PROS AND CONS OF RESTRICTING SNAP PURCHASES

HEARING

BEFORE THE

COMMITTEE ON AGRICULTURE
HOUSE OF REPRESENTATIVES

ONE HUNDRED FIFTEENTH CONGRESS

FIRST SESSION

FEBRUARY 16, 2017

Serial No. 115–2

PROS AND CONS OF RESTRICTING SNAP PURCHASES

PROS AND CONS OF RESTRICTING SNAP PURCHASES

HEARING

BEFORE THE

COMMITTEE ON AGRICULTURE
HOUSE OF REPRESENTATIVES

ONE HUNDRED FIFTEENTH CONGRESS

FIRST SESSION

FEBRUARY 16, 2017

Serial No. 115–2

COMMITTEE ON AGRICULTURE

K. MICHAEL CONAWAY, Texas, *Chairman*

GLENN THOMPSON, Pennsylvania
Vice Chairman
BOB GOODLATTE, Virginia,
FRANK D. LUCAS, Oklahoma
STEVE KING, Iowa
MIKE ROGERS, Alabama
BOB GIBBS, Ohio
AUSTIN SCOTT, Georgia
ERIC A. "RICK" CRAWFORD, Arkansas
SCOTT DesJARLAIS, Tennessee
VICKY HARTZLER, Missouri
JEFF DENHAM, California
DOUG LaMALFA, California
RODNEY DAVIS, Illinois
TED S. YOHO, Florida
RICK W. ALLEN, Georgia
MIKE BOST, Illinois
DAVID ROUZER, North Carolina
RALPH LEE ABRAHAM, Louisiana
TRENT KELLY, Mississippi
JAMES COMER, Kentucky
ROGER W. MARSHALL, Kansas
DON BACON, Nebraska
JOHN J. FASO, New York
NEAL P. DUNN, Florida
JODEY C. ARRINGTON, Texas

COLLIN C. PETERSON, Minnesota, *Ranking Minority Member*
DAVID SCOTT, Georgia
JIM COSTA, California
TIMOTHY J. WALZ, Minnesota
MARCIA L. FUDGE, Ohio
JAMES P. McGOVERN, Massachusetts
FILEMON VELA, Texas, *Vice Ranking Minority Member*
MICHELLE LUJAN GRISHAM, New Mexico
ANN M. KUSTER, New Hampshire
RICHARD M. NOLAN, Minnesota
CHERI BUSTOS, Illinois
SEAN PATRICK MALONEY, New York
STACEY E. PLASKETT, Virgin Islands
ALMA S. ADAMS, North Carolina
DWIGHT EVANS, Pennsylvania
AL LAWSON, JR., Florida
TOM O'HALLERAN, Arizona
JIMMY PANETTA, California
DARREN SOTO, Florida
LISA BLUNT ROCHESTER, Delaware

————

MATTHEW S. SCHERTZ, *Staff Director*
ANNE SIMMONS, *Minority Staff Director*

(II)

CONTENTS

PROS AND CONS OF RESTRICTING SNAP PURCHASES

THURSDAY, FEBRUARY 16, 2017

HOUSE OF REPRESENTATIVES,
COMMITTEE ON AGRICULTURE,
Washington, D.C.

The Committee met, pursuant to other business, at 10:24 a.m., in Room 1300 of the Longworth House Office Building, Hon. K. Michael Conaway [Chairman of the Committee] presiding.

Members present: Representatives Conaway, Thompson, Goodlatte, King, Rogers, Gibbs, Austin Scott of Georgia, Crawford, Hartzler, Denham, LaMalfa, Davis, Yoho, Allen, Bost, Rouzer, Kelly, Comer, Marshall, Bacon, Faso, Dunn, Arrington, Peterson, David Scott of Georgia, Costa, Walz, Fudge, McGovern, Lujan Grisham, Kuster, Nolan, Bustos, Maloney, Plaskett, Adams, Evans, Lawson, O'Halleran, Panetta, Soto, and Blunt Rochester.

Staff present: Bart Fischer, Caleb Crosswhite, Callie McAdams, Haley Graves, Jackie Barber, Jadi Chapman, Jennifer Tiller, Mary Rose Conroy, Stephanie Addison, Keith Jones, Kellie Adesina, Lisa Shelton, Troy Phillips, John Konya, Nicole Scott, and Carly Reedholm.

OPENING STATEMENT OF HON. K. MICHAEL CONAWAY, A REPRESENTATIVE IN CONGRESS FROM TEXAS

The CHAIRMAN. This hearing of the Committee on Agriculture entitled, *Pros and Cons of Restricting SNAP Purchases,* will come to order. Thank you.

I want to welcome our witnesses to today's hearing, and thank them for taking the time to share their views on a very timely and somewhat sensitive topic, the idea of restricting SNAP purchases. This hearing is a continuation of the conversation had at a Member roundtable last October. There are good arguments to be made on both sides of this issue, and this discussion will be yet another addition to the Committee's commitment to strengthening the Supplemental Nutrition Assistance Program.

On November 18 of last year, USDA released a report entitled, *Foods Typically Purchased by Supplemental Nutrition Assistance Program Households.* This study analyzed food purchase data collected at the point of sale to assess differences in the purchasing patterns of SNAP and non-SNAP households. Ultimately, the report found that about 40¢ of every dollar of every purchase dollar was spent on basic items like meat, fruits, vegetables, milk, eggs, and bread. Another 20¢ was spent on sweetened drinks, desserts, salty snacks, candy, and sugar. The remaining 40¢ was spent on a

variety of items such as cereal, prepared foods, other dairy products, rice, beans, and other cooking ingredients. To be clear, when comparing spending on broad food categories, the data show that both SNAP and non-SNAP households make similar food choices. However, the report also confirms that there are differences in spending in individual food categories. One can also reasonably infer from the report that billions in taxpayer dollars are being spent on items like sweetened beverages and prepared desserts.

This report, while not the sole basis of this hearing, begs the question of whether certain food or beverage items should be restricted as eligible food items in SNAP. While it is important to have this discussion, we can all agree that no one in America ought to go hungry, and SNAP is essential to providing nutrition to the most vulnerable citizens during tough times.

Our goal is to provide much-needed nutrition and to encourage Americans to eat healthier. To that end, this Committee has historically advocated for nutrition education and healthy eating incentive programs. Today, we will consider whether additional restrictions should be added to that mix.

Thank you again to the witnesses for being here today. We look forward to your testimony.

[The prepared statement of Mr. Conaway follows:]

PREPARED STATEMENT OF HON. K. MICHAEL CONAWAY, A REPRESENTATIVE IN CONGRESS FROM TEXAS

I want to welcome our witnesses to today's hearing and thank them for taking the time to share their views on a very timely and somewhat sensitive topic—the idea of restricting SNAP purchases. This hearing is a continuation of the conversation had in a Member roundtable last October. There are good arguments to be made on both sides of this issue, and this discussion will be yet another addition to the Committee's commitment to strengthening the Supplemental Nutrition Assistance Program.

On November 18th of last year, USDA released a report entitled, *Foods Typically Purchased by Supplemental Nutrition Assistance Program Households*. This study analyzed food purchase data collected at the point of sale to assess differences in the purchasing patterns of SNAP and non-SNAP **households.**

Ultimately, the report found that about 40¢ of every food purchase dollar was spent on basic items like meat, fruits, vegetables, milk, eggs, and bread.

Another 20¢ was spent on sweetened drinks, desserts, salty snacks, candy, and sugar. The remaining 40¢ was spent on a variety of items such as cereal, prepared foods, other dairy products, rice, beans, and other cooking ingredients.

To be clear, when comparing spending on broad food categories, the data show that both SNAP and non-SNAP households made similar food choices. However, the report also confirms that there are differences in spending on individual food categories. One can also reasonably infer from the report that billions in taxpayer dollars are being spent on items like sweetened beverages and prepared desserts.

The report, while not the sole basis of this hearing, begs the question of whether certain food or beverage items should be restricted as eligible food items in SNAP. While it's important to have this discussion, we can all agree that no one in America ought to go hungry, and SNAP is essential in providing nutrition to the most vulnerable citizens during tough times.

Our goal is to provide much needed nutrition and to encourage Americans to eat healthier. To that end, this Committee has historically advocated for nutrition education and healthy eating incentive programs. Today, we will consider whether additional restrictions should be added to that mix. Thank you again to the witnesses for being here today. We look forward to your testimony.

With that, I now turn to the Ranking Member for any comments he would like to make.

The CHAIRMAN. I now turn to the Ranking Member for any comments that he would like to make.

STATEMENT OF HON. COLLIN C. PETERSON, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF MINNESOTA

Mr. PETERSON. Thank you, Mr. Chairman.

We have had 16 SNAP hearings, we are now taking a look at how SNAP recipients are purchasing food, what kind of food they are purchasing with their SNAP dollars.

Before we get too far, though, I think it is important to again note that the overwhelming theme of the testimony we have heard in the last Congress is that while there are some areas for improvement, SNAP works. We heard testimony opposing efforts to block grant SNAP and on the importance of keeping SNAP within the farm bill.

Those of us who have been around a while know that this is a complicated program, and I would urge Members to keep that in mind as we work on the farm bill this next year. I don't think there is one single issue that is the problem, and I don't think there is one single solution that will magically somehow improve SNAP efficiency.

Looking specifically at SNAP food choice, it would seem pretty straightforward that we not allow SNAP dollars to be spent on junk food. But the problem is, how do you define that? This is something that I took a look at when I was Chairman.

In Minnesota, they tried this. Somehow or another they requested a waiver from FNS to disallow candy, I don't know how they did this, but when they were defining *candy,* if the candy didn't contain wheat it was banned, but if it did contain wheat, it wasn't. So a Kit-Kat bar was okay under what they were doing, and a Hershey bar was not. So I don't know. When you go down this route, you are opening a real can of worms, and from what I can tell talking to my folks back home, that grocery stores have really no interest in being the food police. USDA has been resistant to this effort as well. And from what I know, when you look at how, and the kind of food, SNAP recipients buy, it is really not different from the food of people that are not on SNAP. The underlying issue is all of us in the United States do a bad job of deciding what to eat, and we can all use some guidance probably. But I am not sure the government is the way to provide that.

So I am hopeful that we can be open-minded. The discussion on these issues can continue and our efforts can continue, so that we learn more about how SNAP actually works, and I look forward to hearing today's witnesses and yield back.

The CHAIRMAN. I thank the gentleman. The chair would remind or request that other Members submit their opening statements for the record so witnesses may begin their testimony to ensure that there is ample time for questioning.

I want to thank our panel for being here. It is, by all arguments, some of the best informed folks, and it is a balanced panel. We have folks on both sides of the issue, and we have folks who have to administer the program, whatever it is we come up with. So we have a terrific panel and I am excited to hear from them after reading their testimony last night.

Today, we have with us Dr. Angela Rachidi. She is a Research Fellow, Poverty Studies at American Enterprise Institute here in Washington, D.C. We have Diane Whitmore Schanzenbach, Direc-

tor of The Hamilton Project, Senior Fellow, Economic Studies, the Brookings Institute here in D.C. We have Leslie Sarasin, CEO of the Food Marketing Institute in Arlington, Virginia. We have Mr. John Weidman, who is the Deputy Executive Director, The Food Trust, Philadelphia, Pennsylvania. And we have Brian Wansink, the Director of Cornell University Food and Brand Lab at Ithaca, New York. And given everyone's last names, I came sort of close to getting some of those right. So Dr. Rachidi, if you will, please, 5 minutes.

STATEMENT OF ANGELA K. RACHIDI, PH.D., RESEARCH FELLOW IN POVERTY STUDIES, AMERICAN ENTERPRISE INSTITUTE, WASHINGTON, D.C.

Dr. RACHIDI. Thank you. Chairman Conaway, Ranking Member Peterson, and other Members of the Committee, thank you for the opportunity to testify this morning on restrictions on purchases in the Supplemental Nutrition Assistance Program, or SNAP. My name is Angela Rachidi, and I am a Research Fellow in Poverty Studies at the American Enterprise Institute, or AEI. Prior to joining AEI, I was the Deputy Commissioner for Policy and Evaluation at the New York City Department of Human Resources, or HRA. HRA administers SNAP, and during my time there, we provided benefits to almost two million New Yorkers each month.

Most relevant for my testimony today is my experience drafting a proposal for a demonstration project in New York City to restrict the use of SNAP benefits to purchase sweetened beverages. Regrettably, it was denied by the U.S. Department of Agriculture in 2011.

I will make four main points today. First, obesity and the related health problems remain one of the most challenging public health issues of our time, with sweetened beverages identified as one of the main contributors. Second, the integrity of SNAP as a publicly funded program rests on how well its implementation matches the stated goals of the program. Third, this problem is not unique to low-income households, but SNAP offers one opportunity for government to play a positive role. And fourth, a demonstration project to test a restriction on sweetened beverages in SNAP is consistent with bipartisan efforts to support evidence-based policy making.

For my oral testimony, I won't go through all of the research on obesity, the related health problems, and its connection to sweetened beverages. But I do want to say, however, that obesity is a major public health crisis that affects all Americans, no matter their income status, and for this reason, it requires a multi-faceted public health approach.

High sweetened beverage consumption is not unique to SNAP households, but supporting such purchases, especially at the levels suggested in the data, directly contradicts the stated goals of the program. The Food Stamp Act of 1977 states that the goal is to provide for improved levels of nutrition among low-income households through a cooperative Federal-state program of food assistance. This purpose holds today.

For a program with a stated goal of improving nutrition, accepting such a large percentage of spending on beverages with no nutritional value seems counterintuitive and likely undermines public

support for the program. Estimates suggest SNAP households spend almost ten percent of their food budgets on these products. Allowing the purchase of sweetened beverages also directly competes with nutritional education programming, and it competes against costs associated with obesity, which sweetened beverages are a large contributor to; estimates suggest that obesity costs $147 billion per year.

Placing restrictions on SNAP should be part of a broader approach to address this problem. Some believe that educating SNAP recipients on healthy eating is a better approach. I would argue that it should not be one or the other, and the USDA's own research supports this. The USDA's Healthy Incentives Program, which gave financial incentives to SNAP households to purchase fruits and vegetables had no effect on sweetened beverage consumption, even though these households did eat more fruits and vegetables. The Summer EBT for Children Program found that a WIC-based model which provided restrictions was more effective than a SNAP-based model, which did not allow restrictions. And another study not conducted through the USDA found that restrictions plus incentives was most effective in reducing sweetened beverage intake.

As part of a broader approach toward evidence-based policy making, a demonstration project is needed. I believe that with cooperation from the USDA and funding from Congress, a demonstration project is feasible. A random assignment experiment similar to the Healthy Incentives Pilot could be conducted. With the technology that exists today, this would not be overly burdensome on retailers. In fact, when we developed the proposal in New York City, we spoke to retailers and they told us that it would not be that difficult to implement such a restriction, since they program their EBT systems anyway.

In conclusion, with a new Congress and Administration, I am hopeful that a demonstration project in a few states will be allowed in order to test whether a restriction could be effective. At a time when leaders of both parties are promoting evidence-based policy making, testing such an idea and rigorously evaluating the results should receive broad support.

Thank you, and I can respond to any questions that you may have.

[The prepared statement of Dr. Rachidi follows:]

PREPARED STATEMENT OF ANGELA K. RACHIDI, PH.D., RESEARCH FELLOW IN POVERTY STUDIES, AMERICAN ENTERPRISE INSTITUTE, WASHINGTON, D.C.

The Supplemental Nutrition Assistance Program (SNAP): Time to Test a Sweetened Beverage Restriction

Chairman Conaway, Ranking Member Peterson, and other Members of the Committee, thank you for the opportunity to testify this morning on restrictions on purchases in the Supplemental Nutrition Assistance Program or SNAP.

My name is Angela Rachidi, and I am a Research Fellow in Poverty Studies at the American Enterprise Institute (AEI). Prior to joining AEI, I spent almost a decade at the New York City Human Resources Administration (HRA) as the Deputy Commissioner for Policy and Evaluation. HRA is New York City's main social service agency and administers SNAP. During my time at HRA, the city provided SNAP benefits to almost two million New Yorkers each month.

In my role, I studied all aspects of the program. Most relevant for today is my experience—under the direction of then-Mayor Michael Bloomberg, Commissioners

for Health Thomas Friedan and Thomas Farley, and HRA Commissioner Robert Doar—drafting a proposal for a demonstration project in New York City to restrict the use of SNAP benefits to purchase sweetened beverages. We proposed a restriction as a way to support the overarching goal of the program, which is to improve nutrition. Regrettably, it was denied by the U.S. Department of Agriculture (USDA) in 2011.

In the years since I left HRA, the public health problems caused by sweetened beverages have not solved themselves. I am here today to urge the Committee to support demonstration projects that test whether a sweetened beverage restriction in SNAP can improve the health and well-being of SNAP recipients.

I will make four main points to support this recommendation:

1. Obesity and related health problems remain one of the most challenging public health issues of our time, affecting millions of poor and non-poor Americans, with sweetened beverages identified as one the main contributors.

2. The integrity of SNAP as a publicly-funded program rests on how well its implementation matches the stated goals of the program. Congress has stated that the purpose of SNAP is to support nutrition among low-income households, which is directly contradicted by allowing sweetened beverages to be purchased.

3. This public health problem is complex and requires a comprehensive approach that includes multiple strategies, including changes to SNAP.

4. A demonstration project to test a sweetened beverage restriction in SNAP is consistent with bipartisan efforts to support evidence-based policymaking. Through rigorous evaluation, a demonstration project could assess whether government efforts can achieve potential gains, such as better health, without adversely affecting other measures of well-being.

Before I get to these main points, I want to state clearly that SNAP is one of the more effective Federal safety net programs in the U.S. A large body of research shows that it reduces poverty, improves food security among low-income households, and has positive effects on infant health and long-term benefits for children who receive it.[1] In the average month in 2016, 44.2 million Americans received SNAP for a total cost of $70.9 billion.[2] Among American households, 12.7 percent were food-insecure in 2015 and 5.0 percent had very low food insecurity; percentages which likely would be much higher without SNAP.[3] In 2015, SNAP lifted almost 4.6 million people out of poverty, according to the Supplemental Poverty Measure.[4]

Beyond these national statistics, I saw first-hand the positive impacts that SNAP had on individuals and families in New York City. It serves a wide variety of households, including the elderly, the disabled, and working families. However, as with any government program, it can always be improved. And as a nutrition assistance program, SNAP could do more to support healthy eating among recipient households, especially children.

Obesity, Health Problems, and the Connection to Sweetened Beverages

The National Institutes of Health has termed obesity "a devastating public-health crisis for the United States,"[5] and for good reason. Among all Americans, 37.9 percent of adults (age 20 or older) were obese in 2013–2014 and over 70 percent were overweight or obese.[6] Among children, 20.6 percent of 12–19 year olds and 17.4 per-

[1] See Judith Bartfield, *et al.,* eds, SNAP Matters: How Food Stamps Affect Health and Well-Being (Stanford, CA: Stanford University Press, 2015); Douglas Almond, Hilary W. Hoynes, and Diane Whitmore Schanzenbach, "Inside the War on Poverty: The Impact of Food Stamps on Birth Outcomes," *Review of Economics and Statistics* 93, no. 2 (May 2011): 387–403; and Hilary Hoynes, Diane Whitmore Schanzenbach, and Douglas Almond, "Long-Run Impacts of Childhood Access to the Safety Net," *American Economic Review* 106, no. 4 (April 2016): 903–34.

[2] U.S. Department of Agriculture, Food and Nutrition Service "Supplemental Nutrition Assistance Program Participation and Costs," February 3, 2017, *https://www.fns.usda.gov/sites/default/files/pd/SNAPsummary.pdf*.

[3] Alisha Coleman-Jensen, *et al.,* "Household Food Security in the United States in 2015," U.S. Department of Agriculture, Economic Research Services, September 2016, *https://www.ers.usda.gov/webdocs/publications/err215/err-215.pdf?v=42636*.

[4] Trudi Renwick and Liana Fox, "The Supplemental Poverty Measure: 2015," U.S. Census Bureau, September 2016, *http://www.census.gov/content/dam/Census/library/publications/2016/demo/p60-258.pdf*.

[5] National Institutes of Health, "About We Can! Background," February 13, 2013, *https://www.nhlbi.nih.gov/health/educational/wecan/about-wecan/background.htm*.

[6] Centers for Disease Control and Prevention, National Center for Health Statistics, "Obesity and Overweight," June 13, 2016, *https://www.cdc.gov/nchs/fastats/obesity-overweight.htm*.

cent of 6–11 year olds were obese in those same years.[7] According to the Centers for Disease Control and Prevention (CDC), people who are obese are a greater risk for a variety of health issues, including type 2 diabetes, heart disease, stroke, some cancers, low quality of life, and certain mental illnesses.[8]

Excessive sugar consumption is considered one of the primary causes of obesity, with sugar-sweetened beverages specifically linked to excessive weight gain and obesity, and the related health problems that result.[9] Because of these known associations and because sweetened beverages have no nutritional value, the White House Task Force on Childhood Obesity issued a report in 2010 that included recommendations calling for the nation's food assistance programs to be part of the solution by encouraging access to nutritious foods and offering incentives and eliminating disincentives to healthy eating habits.[10] In addition, according to the *2015–2020 Dietary Guidelines for Americans:*

> The two main sources of added sugars in U.S. diets are sugar-sweetened beverages and snacks and sweets. Many foods high in calories from added sugars provide few or no essential nutrients or dietary fiber and, therefore, may contribute to excess calorie intake without contributing to diet quality; intake of these foods should be limited to help achieve healthy eating patterns within calorie limits. There is room for Americans to include limited amounts of added sugars in their eating patterns, including to improve the palatability of some nutrient-dense foods, such as fruits and vegetables that are naturally tart (*e.g.,* cranberries and rhubarb). Healthy eating patterns can accommodate other nutrient-dense foods with small amounts of added sugars, such as whole-grain breakfast cereals or fat-free yogurt, as long as calories from added sugars do not exceed ten percent per day, total carbohydrate intake remains within the AMDR [Acceptable Macronutrient Distribution Range], and total calorie intake remains within limits.[11]

The USDA's *Dietary Guidelines* go on to note that the "the major source of added sugars in typical U.S. diets is beverages, which include soft drinks, fruit drinks, sweetened coffee and tea, energy drinks, alcoholic beverages, and flavored waters."[12] In fact, almost ½ of added sugars consumed by the U.S. population come from sweetened beverages.[13]

This is why it is so alarming that such a notable percentage of food/beverage purchases in American households are for sweetened beverages, according to a recent USDA study.[14] Among SNAP households, 9.25 percent of food purchases were for sweetened beverages and 7.10 percent of non-SNAP households were for the same. SNAP households spent more on sweetened beverages than fruits and milk combined. According to the National Health and Nutrition Examination Survey (NHANES), low-income children are more likely to consume sweetened beverages and intake more calories from sweetened beverages than higher-income children.[15] Children participating in SNAP in particular were more likely than nonparticipants to consume sweetened beverages,[16] and 63 percent of adults receiving SNAP con-

---

[7] *Ibid.*

[8] Centers for Disease Control and Prevention, "The Health Effects of Overweight and Obesity," June 5, 2015, *https://www.cdc.gov/healthyweight/effects/*.

[9] Brian K. Kit, *et al.,* "Trends in Sugar-Sweetened Beverage Consumption Among Youth and Adults in the United States: 1999–2010," *American Journal of Clinical Nutrition* 98, no. 1 (May 2013): 180–88.

[10] White House Task Force on Childhood Obesity, "Solving the Problem of Childhood Obesity Within a Generation," May 2010, *https://letsmove.obamawhitehouse.archives.gov/sites/letsmove.gov/files/TaskForce_on_Childhood_Obesity_May2010_FullReport.pdf*.

[11] U.S. Department of Agriculture, *Dietary Guidelines for Americans 2015–2010,* December 2015, 31, *https://health.gov/dietaryguidelines/2015/resources/2015-2020_Dietary_Guidelines.pdf*.

[12] *Ibid.*

[13] *Ibid.*

[14] U.S. Department of Agriculture, Food and Nutrition Service, "Foods Typically Purchased by Supplemental Nutrition Assistance Program (SNAP) Households," November 2016, *https://www.fns.usda.gov/sites/default/files/ops/SNAPFoodsTypicallyPurchased.pdf*.

[15] Euna Han and Lisa M. Powell, "Consumption Patterns of Sugar-Sweetened Beverages in the United States," *Journal of the Academy of Nutrition and Dietetics* 113, no. 1 (January 2013): 43–53.

[16] Cindy Leung, *et al.,* "Associations of Food Stamp Participation with Diet Quality and Obesity in Children," *Pediatrics* 131, no. 3 (March 2013): 463–72.

sumed a sweetened beverage on the day of the NHANES.[17] Also according to the NHANES, more than ½ of adult SNAP recipients drank regular soda and 24 percent drank another sweetened beverage on the day of the survey.[18] Sweetened beverage consumption is high among all American households, with low-income households and SNAP recipients no exception.

Program Integrity

High sweetened beverage consumption is not unique to SNAP households. But supporting such purchases, especially at levels suggested in the data, directly contradicts the stated goals of the program. The Food Stamp Act of 1977, which outlines the purpose of the program, states that the goal is "to provide for improved levels of nutrition among low-income households through a cooperative Federal-state program of food assistance." [19]

Public health experts have clearly determined that sweetened beverages have no nutritional value and are a major contributor to obesity and related health problems. Few can argue the reverse. Yet, almost ten percent of food and beverage spending among SNAP households is on these products.

To be fair, it is unclear whether SNAP households would make these purchases with their own money if they were restricted from SNAP or even in the absence of SNAP. However, for a program with a stated goal of improving nutrition, accepting such a large percentage of spending on beverages with no nutritional value seems counterintuitive and likely undermines public support for the program.

Beyond these concerns, allowing the purchase of sweetened beverages directly competes with the USDA's nutrition education programming at the Federal and state level. Approximately $350 million is spent per year on SNAP Nutrition Education activities, with more spent by the states.[20] The Farm Bill of 2008 authorized an additional $20 million to test demonstration projects designed to increase healthy eating. Federal dollars dedicated to improving nutrition are in direct competition with benefit dollars being spent to purchase sweetened beverages.

Separately from SNAP, not confronting the problems created by obesity has substantial impacts on Federal medical expenditures. Medical costs associated with obesity (which largely fall on Medicare and Medicaid) are estimated to be at least $147 billion per year.[21] Not only is SNAP contributing to sweetened beverage consumption, but it may be adding to other Federal expenditures related to medical costs associated with obesity.

Problem Is Complex and Requires a Comprehensive Approach

As I already mentioned, the public health challenges posed by sweetened beverages are not unique to low-income households. But restrictions could be part of a broader approach to address the problem. Already, the USDA pilot tested a Healthy Incentive program, which gave financial incentives to SNAP households to purchase fruits and vegetables. The results of the evaluation found that the financial incentives increased consumption of certain fruits and vegetables by a small, but statistically significant amount.[22] It also found that retailers had little trouble implementing the pilot. But the incentives had no effect on added sugars, which included no change to sweetened beverage consumption.

In another study, researchers randomly assigned low-income households not receiving SNAP into four different groups to test incentives, restrictions, and both. They found that the incentive plus restriction group (the restriction was on sweetened beverages and other sweets) had positive effects on fruit consumption and re-

---

[17] Sara N. Bleich, Seanna Vine, and Julia A. Wolfson, "American Adults Eligible for SNAP Consume More Sugary Beverages Than Ineligible Adults," *Preventative Medicine* 57, no. 6 (December 2013), *https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3842507/*.

[18] U.S. Department of Agriculture, Food and Nutrition Service, "Diet Quality Among SNAP Recipients by SNAP Participation Status: Data from the National Health and Nutrition Examination Survey, 2007–2010," May 2015, *https://www.fns.usda.gov/sites/default/files/ops/NHANES-SNAP07-10.pdf*.

[19] Food Stamp Program Act of 1977, *https://www.fns.usda.gov/sites/default/files/PL_106-580.pdf*.

[20] U.S. Department of Agriculture, Economic Research Service, "Nutrition Education," October 12, 2016, *https://www.ers.usda.gov/topics/food-nutrition-assistance/supplemental-nutrition-assistance-program-snap/nutrition-education/*.

[21] See Eric A. Finkelstein, *et al.,* "Annual Medical Spending Attributable to Obesity: Payer and Service-Specific Estimates," *Health Affairs* 28, no. 5 (2009): w822–31, *http://content.healthaffairs.org/content/28/5/w822.full.pdf*.

[22] See U.S. Department of Agriculture, Food and Nutrition Service, *Healthy Incentives Pilot Final Evaluation Report,* September 2014, *https://www.fns.usda.gov/snap/healthy-incentives-pilot-final-evaluation-report*.

duced sweetened beverage and other sweets intake.[23] The incentive-alone and restriction-alone group showed no difference compared with the control group. Although this was not conducted with SNAP households (given that the USDA has not allowed testing restrictions), it suggests that restrictions could be used to reduce sweetened beverage consumption.

Similarly, although not the main purpose, a study of the Summer Electronic Benefit Transfer for Children Program published in 2016 found that only a Women, Infant, and Children (WIC)-based model, which restricted what could be purchased with benefits, including sweetened beverages, led to a reduction in sweetened beverage consumption among families who participated.[24] The SNAP-based model, which had no restrictions, did not reduce sweetened beverage consumption.

Another recent study surveyed SNAP and non-SNAP participants on their perceptions of the program and areas for improvement around nutrition. Just over ½ of SNAP participants supported removing sweetened beverages from products allowed under SNAP, and almost 80 percent of non-SNAP participants supported the same.[25] In 2011, we surveyed New York City SNAP participants on their consumption patterns and attitudes around restrictions. We found that almost 70 percent of surveyed SNAP participants supported restricting sweetened beverages from SNAP (49 percent) or didn't care one way or the other (16 percent).

This research suggests that a restriction may be beneficial, but likely as part of other efforts to achieve the same. It also suggests that combining a restriction with incentives, broader nutrition education programs, and public messaging may reduce sweetened beverage consumption among those exposed.

SNAP Demonstration Project to Test Restrictions

For these reasons, and as part of a broader approach toward evidence-based policymaking, a demonstration project to test a sweetened beverage restriction in SNAP is needed. It could involve a few states or localities to assess whether the potential gains, such as better health, can be achieved without adverse effects on other measures of well-being. In a bipartisan effort in 2010, under the direction of Governor David Patterson and Mayor Michael Bloomberg, and in partnership with the New York City Department of Health, we submitted a proposal to the USDA to administer a demonstration project in New York City that would restrict sweetened beverages from SNAP.

Our main objective was to test whether a restriction would lead to changes in consumption of sweetened beverages and other food groups among SNAP recipients, as well as whether a restriction could be implemented. We designed a rigorous evaluation to compare like counties within New York City (one would experience the restriction while the other would not), as well as to assess whether retailers could appropriately implement the restriction and whether participants could follow the changes. We proposed using survey data and retailer data to assess changes in consumption patterns over time, as well as qualitative work to assess the retailer and participant experience. Regrettably, our proposal, which was to be funded completely by the city and the state, was denied by the USDA in 2011.

Since our proposal in 2010, we now know more about the Healthy Incentive[s] Pilot and the Summer EBT pilot. Both studies suggest that more can be done to improve nutrition and reduce sweetened beverage consumption among SNAP households. The logical next step is to conduct a study of SNAP restrictions. Given what was learned from those studies, a demonstration project is not only possible, but has been made more feasible. With cooperation from the USDA and funding from Congress, a demonstration project involving a few states could greatly expand our knowledge of what works in combating sweetened beverage consumption and the obesity crisis.

To give you a sense of how this might work, the Healthy Incentive[s] Pilot operated in 2010–2012 reprogrammed EBT data systems at the retailer source to identify and calculate incentives as part of the program. A similar approach could be taken, but with restrictions. Participants assigned to the restriction group would receive special EBT cards and retailer EBT systems would be programmed to not allow sweetened beverage purchases among those SNAP households. With the technology systems in place today, implementing this type of demonstration project

[23] Lisa Harnack, *et al.,* "Effects of Subsidies and Prohibitions on Nutrition in a Food Benefit Program: A Randomized Clinical Trial," *JAMA Internal Medicine* 176, no. 11 (November 2016): 1610–19.

[24] U.S. Department of Agriculture, Food and Nutrition Service, "Summer Electronic Benefit Transfer for Children (SEBTC) Demonstration: Summary Report," May 2016, *https:// www.fns.usda.gov/sites/default/files/ops/sebtcfinalreport.pdf.*

[25] Cindy W. Leung, *et al.,* "Improving the Nutritional Impact of SNAP: Perspectives from the Participants," *American Journal of Preventive Medicine* 52, no. 2 (February 2017): 252.

would not be overly burdensome on retailers. In fact, as part of the Healthy Incentive[s] Pilot, few retailers identified problems, and few said the pilot affected store operations. This type of design is not only possible, but it would provide a strong treatment and control study that would tell us whether any changes in sweetened beverage consumption were due the restrictions or not.

When we developed the New York City proposal, retailers were consulted about the ease or difficulty of implementing such a restriction. Retailers with EBT systems indicated that it could be done fairly easily since restrictions are already in place for other purchases, such as alcohol or nonfood items. One concern was retailers who do not use EBT systems, instead using manual systems. But these retailers make up a small share of overall SNAP sales and, as part of a demonstration project, could be counseled to ensure that they understand who is restricted from purchasing sweetened beverages and who is not. As part of the data collection effort, the evaluators would know whether households assigned to the restriction group were allowed to purchase sweetened beverages or not.

With a new Congress and Administration, I am hopeful that a demonstration project in a few states be allowed in order to test whether a restriction could be effective. Given the problems of obesity and the toll it takes on our poor communities, this is an issue that receives bipartisan support. For example, the bipartisan National Commission on Hunger recommended in its 2015 report that Congress pass legislation to restrict sweetened beverages from SNAP. As a first step, Congress could authorize funding for demonstration projects.

Conclusion

Some may ask why restrict sweetened beverages and no other foods with added sugar. Even though precedent exists in other government programs to determine what is nutritious and what is not, there are two reasons for starting with sweetened beverages. First, the research is clear that sweetened beverages are a much larger contributor to added sugars in the diets of Americans today (almost 50 percent of added sugars comes from these products) than other products. Second, the amount of spending on sweetened beverages far surpasses what is spent on other candies and sweets. And added sugars are often combined with other nutritious foods, such as whole grain cereals, yogurts, or nuts. The case against sweetened beverages in a nutrition assistance program seems clear.

Some also argue that restrictions would be overly burdensome on retailers. While I respect the views of industry professionals, retailers already place restrictions on what can be purchased with SNAP benefits through their EBT systems, and the definition of sweetened beverage could be defined in a way that is very straightforward.

In terms of how a restriction might affect low-income households, I am sympathetic to not wanting the government to stigmatize or unfairly targeted poor households. But SNAP is a government-funded program with a clearly stated goal: to improve the nutrition of low-income households. Not only is allowing sweetened beverages inconsistent with that goal, it actually may work against it by contributing to poor health. I also question how detrimental a restriction could be, given that certain restrictions already apply, other food assistance programs implement restrictions, and the majority of SNAP households either support the restriction or do not care when asked on surveys. It is also possible that SNAP benefits are fungible, and many SNAP households use their own money for food purchases, suggesting that a restriction may not have much effect on consumption. However, it is unclear how SNAP households would respond to a restriction until it is tested and rigorously evaluated.

In conclusion, a restriction on sweetened beverages should be tested as part of a demonstration project for the purpose of improving public health. At a time when leaders of both parties are promoting evidence-based policymaking, testing such an idea and rigorously evaluating the results should receive broad support. I urge Congress to support pilot projects and urge the USDA to approve any requests from states.

Thank you, and I can respond to any questions that you may have.

The CHAIRMAN. Thank you, Dr. Rachidi.
Dr. Schanzenbach?

STATEMENT OF DIANE WHITMORE SCHANZENBACH, PH.D., DIRECTOR AND SENIOR FELLOW, ECONOMIC STUDIES, THE HAMILTON PROJECT, BROOKINGS INSTITUTION; PROFESSOR OF SOCIAL POLICY AND OF ECONOMICS, NORTHWESTERN UNIVERSITY, WASHINGTON, D.C.

Dr. SCHANZENBACH. Thank you. Chairman Conaway, Ranking Member Peterson, and Members of the Committee, thanks for the opportunity to appear before you today. My name is Diane Schanzenbach. I am the Director of The Hamilton Project, which is an economic policy initiative at Brookings Institution. I am also a Professor of Social Policy of Economics at Northwestern University in Illinois.

SNAP is a highly efficient and effective program. It lifted nearly five million children out of poverty in 2014. SNAP is targeted efficiently to families who need benefits the most. It reduces the likelihood that families have trouble affording food, and serves as an automatic fiscal stabilizer in times of economic downturn. It also has extremely low rates of both error and fraud.

A key reason for SNAP's success is that it relies on the private-sector to provide efficient access to food from grocery stores and other retail outlets. The reliance on the program on the free market system has been a feature of SNAP since the beginning. With a few restrictions, recipients have been able to optimize which items to purchase, and from which retail stores, subject to prevailing prices, and also to their own taste preferences and nutritional needs.

SNAP also has long-term benefits to children. My own recent research study, which is the only long-term causal study on SNAP access, found that those who had access to SNAP benefits during childhood were more likely to graduate from high school, they grew up to be healthier, and for women in particular, they grew up to be more economically self sufficient as adults, all due to childhood access to SNAP benefits, because this is an investment in children.

There has been much media discussion of the November 2016 USDA report on the typical food purchase patterns by SNAP participants and non-participants. The top line finding of that report is that SNAP and non-SNAP families have extremely similar spending patterns. The study did not address the more fundamental question, namely, how does SNAP change the types of groceries that participants buy? By increasing a family's resources available to purchase groceries, SNAP is expected to increase not only the quantity, but also the quality of foods purchased. SNAP families are able to buy more nutritious foods that they otherwise could not afford.

Additional restrictions on SNAP purchases will undermine the effectiveness and the efficiency of the program. In particular, SNAP restrictions will be difficult to structure and practice. In the case of a proposed ban on the purchase of soft drinks or sweetened beverages, it will be unlikely to change consumption patterns.

So recall that SNAP benefits are modest. They are approximately $4.50 per person per day, and as a result, almost everyone who participates in the program has to supplement their SNAP purchases with groceries purchased out of their own cash income. So what will happen if a soft drink purchase is banned using SNAP

benefits? Well, we would expect there to be no consumption change. A family could continue to purchase the same basket of goods. They will just have to make certain at the checkout line to pay for the soft drinks out of their cash instead of their SNAP benefits. In other words, a ban will likely increase the administrative cost of the program, both to the USDA and to retailers, and increase the stigma faced by recipients when they use SNAP, but not have the benefit of actually inducing any behavioral changes. It will be all costs and no benefits.

I think there are better policy options that are more likely to improve the diets of SNAP recipients. Market-based policies that reduce the relative price of healthy foods can increase that consumption. For example, as you know, the Healthy Incentives Pilot in Massachusetts increased consumption of targeted healthy foods by 25 percent. Exploring ways to replicate or scale this type of program nationally would provide an effective and a market-based path forward toward achieving the goal of increasing healthy food consumption of SNAP recipients.

Strengthening SNAP is a smart public investment that will improve both public health and economic growth, but banning certain foods will raise the administrative burdens and costs of the program, making it less efficient, but is unlikely to change consumption.

By contrast, policy changes that strengthen the purchasing power of SNAP benefits and allow markets to function without undue interference are more likely to improve dietary choices of recipients and reduce food insecurity.

Thank you, and I am looking forward to questions.

[The prepared statement of Dr. Schanzenbach follows:]

PREPARED STATEMENT OF DIANE WHITMORE SCHANZENBACH, PH.D., DIRECTOR AND SENIOR FELLOW, ECONOMIC STUDIES, THE HAMILTON PROJECT, BROOKINGS INSTITUTION; PROFESSOR OF SOCIAL POLICY AND OF ECONOMICS, NORTHWESTERN UNIVERSITY, WASHINGTON, D.C.

Chairman Conaway, Ranking Member Peterson, and Members of the Committee:
Thank you for the opportunity to appear before you today at this hearing on the Pros and Cons of Restricting Purchases in the Supplemental Nutrition Assistance Program (SNAP).

My name is Diane Schanzenbach, I am Director of the Hamilton Project, an economic policy initiative at the Brookings Institution, where I am also a Senior Fellow in Economic Studies.

I am also a Professor of Social Policy and Economics at Northwestern University. For the past 2 decades, I have conducted and published numerous peer-reviewed research studies and book chapters on the U.S. safety net, including SNAP and the Food Stamp Program. I also study childhood obesity, food consumption, and food insecurity. I recently served as a member of the Institute of Medicine's *Committee on Examination of the Adequacy of Food Resources and SNAP Allotments*.

My testimony today draws primarily from research that I have conducted or reviewed that considers the role of SNAP and other influences on food consumption and food insecurity.

SNAP is a highly efficient and effective program. It lifted nearly five million people out of poverty in 2014 (the most recent data available).[1] SNAP is targeted efficiently to families who need benefits the most, reduces the likelihood that families have trouble affording food, and serves as an automatic fiscal stabilizer in times of

---

[1] Sherman, Arloc. 2015, September 16. "Safety Net Programs Lift Millions From Poverty, New Census Data Show." Center on Budget and Policy Priorities, Washington, D.C. Available at: *http://www.cbpp.org/blog/safety-net-programs-lift-millions-from-poverty-new-census-data-show*.

economic downturns.[2–3] It has extremely low rates of both error and fraud.[4–5] SNAP also has long-term benefits to children. My own recent research study found that those who had access to SNAP benefits during childhood were more likely to graduate from high school, grew up to be healthier, and women in particular were more likely to become economically self-sufficient due to childhood access to SNAP benefits, as shown in *Figure 1*.

Figure 1. Impact of Access to Food Stamps During Early Life on Adult Health and Economic Outcomes

Access to food stamps in early life improves health outcomes in men and women and economic self-sufficiency in women in later life.
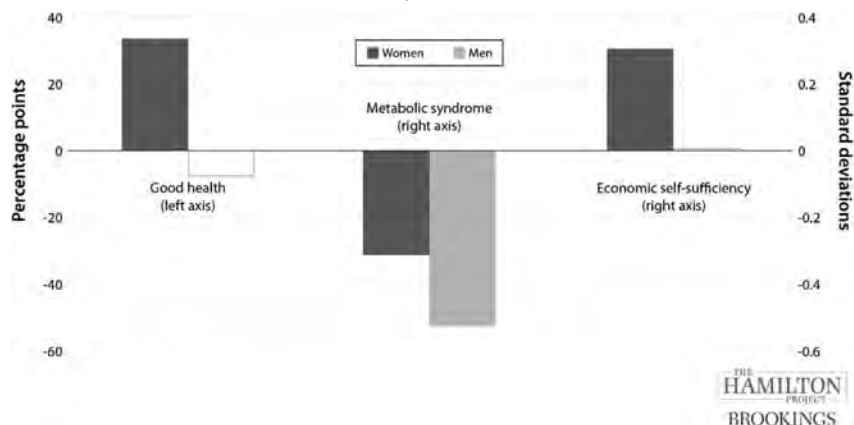
Sources: Hoyes, Schanzenbach, and Almond 2016.
Note: Hollowed bars are not statistically significant.

Generally, economists advise policymakers not to interfere in the private market unless there is a compelling reason to do so—such as a market failure or another inefficiency that would be improved through government intervention. In the case of SNAP, the fundamental problem the program is meant to address is not a market failure, but is instead a lack of resources available to purchase food. Government assistance is needed because some families, generally temporarily, do not have adequate resources to purchase enough food to sustain an active, healthy lifestyle. When they receive SNAP, participating families have more resources they can use to purchase groceries. Once the fundamental problem of resource adequacy is addressed, recipients can interact with the private market to obtain the food they need.

A key reason for SNAP's success is that it relies on the private-sector to provide efficient access to food, through grocery stores and other retail outlets. The reliance of the program on the free market system has been a feature of SNAP since the beginning. With few restrictions, recipients have been able to optimize which items to purchase and from what retail stores, subject to prevailing prices and their own tastes, preferences, and nutritional needs.

In my opinion, additional restrictions on SNAP purchases will undermine the effectiveness and the efficiency of the program. In particular, based on my research on SNAP and food consumption I believe that SNAP restrictions: will be difficult

---

[2] Institute for Research on Poverty. 2015, November. "SNAP, Food Security, and Health." Policy Brief No. 8, Institute for Research on Poverty, University of Wisconsin-Madison, Madison, WI. Available at: *http://www.irp.wisc.edu/publications/policybriefs/pdfs/PB8-SNAPFoodSecurityHealth.pdf*.

[3] Schanzenbach, Diane Whitmore, Lauren Bauer, and Greg Nantz. 2016, April 21. "Twelve Facts about Food Insecurity and SNAP." Economic Facts, The Hamilton Project, Washington, D.C. Available at: *http://www.hamiltonproject.org/papers/twelve_facts_about_food_insecurity_and_snap*.

[4] Rosenbaum, Dottie. 2014, July 2. "SNAP Error Rates at All-Time Lows." Report, Center on Budget and Policy Priorities, Washington, D.C. *http://www.cbpp.org/research/snap-error-rates-at-all-time-lows*.

[5] U.S. Department of Agriculture (USDA). 2013, August 15. "USDA Releases New Report on Trafficking and Announces Additional Measures to Improve Integrity in the Supplemental Nutrition Assistance Program." Food and Nutrition Service, U.S. Department of Agriculture, Washington, D.C. Available at: *https://www.fns.usda.gov/pressrelease/2013/fns-001213*.

to structure in practice, will be inefficiently targeted, and in many cases—such as a proposed ban of the purchase of soft drinks or sweetened beverages—will be unlikely to change consumption patterns. There are better policy options for promoting healthy eating patterns, both for SNAP recipients and for all Americans.

SNAP Restrictions will be Difficult to Structure in Practice

There are a few broad types of restrictions that have gained policy traction. One set involves narrowly targeting the commodities that can be purchased with SNAP, another involves restricting the purchase of unhealthy foods broadly, or sodas or sugar sweetened beverages in particular, and another proposes banning purchases of certain luxury foods. Each of these will be difficult to implement in practice because of the complexities involved in determining which items would fall under the ban. In addition, the restrictions would increase the administrative burden on private businesses, and particularly on small establishments.

The complexities arise in part because of the sheer number of products that would need to be classified. Consumers have vast differences in their tastes and preferences, and the market responds by providing variety. There are more than 650,000 food and beverage products on the market today, and 20,000 more are introduced annually.[6] The complexity is multiplied because there is no clear standard for defining foods as "healthy" or "unhealthy," or as luxury goods. Creating such standards would be difficult at best, and would entail substantial administrative costs to categorize and track the nutritional profile of each good to produce a SNAP-eligible foods list. The list would have to be maintained continuously and communicated to retailers and consumers in real time. My prediction is that the additional bureaucracy needed to support such an undertaking is not likely to save taxpayer money.

Furthermore, items should not be classified in a manner that suggests a particular food is always "good" or "bad." The Academy of Nutrition and Dietetics, the largest organization of food and nutrition professionals, has adopted a position statement that the "total diet" or overall pattern of food eaten should be the most important focus of healthy eating.[7] All foods can fit into a healthy diet if consumed in moderation and with appropriate portion size, and as a result no particular food should be always banned.

SNAP Improves Diets

By focusing on the descriptive question of what SNAP participants buy, the USDA study did not address the more fundamental question—namely how does SNAP change the types of groceries that participants buy? Economists have strong predictions about the impact of SNAP: by increasing a family's resources available to purchase groceries, SNAP is expected to increase both the *quantity* and the *quality* of foods purchased, and it has. When SNAP increases low-income families' grocery purchasing power, they are able to buy more nutritious foods they otherwise could not afford. While this is a surprisingly hard question to study empirically, a recent study found that a $30 increase in monthly SNAP benefits would increase participants' consumption of nutritious foods such as vegetables and healthy proteins, while reducing food insecurity and consumption of fast food, as shown in *Figure 2* below.[8]

---

[6] USDA. 2016, October 12. "New Products." Economic Research Service, U.S. Department of Agriculture, Washington, D.C. Available at: *https://www.ers.usda.gov/topics/food-markets-prices/processing-marketing/new-products/*.

[7] Freeland-Graves, Jeanne H., and Susan Nitzke. 2013. "Position of the Academy of Nutrition and Dietetics: Total Diet Approach to Healthy Eating." *Journal of the Academy of Nutrition and Dietetics* 113 (2): 307–17. Available at: *http://www.andjrnl.org/article/S2212-2672(12)01993-4/abstract*.

[8] Anderson, Patricia M., and Kristin F. Butcher. 2016, June 14. "The Relationships Among SNAP Benefits, Grocery Spending, Diet Quality, and the Adequacy of Low-Income Families' Resources." Report, Policy Futures, Center on Budget and Policy Priorities, Washington, D.C. Available at: *http://www.cbpp.org/research/food-assistance/the-relationships-among-snap-benefits-grocery-spending-diet-quality-and-the*.

Figure 2. Estimated Impact of a $30 Increase in Monthly Per Capita SNAP Benefits
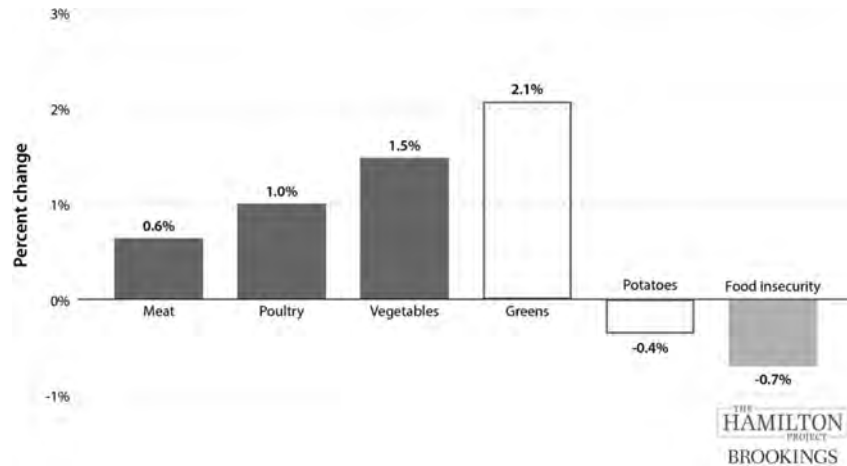
Source: Anderson and Butcher 2016.

Note: Percentages for the dark green bars represent change in consumption. Food insecurity is defined as having difficulty at some time during the year providing enough food for all household members due to lack of resources. The hollowed bars are not statistically significant.

Similar impacts were found in a randomized controlled trial of a Summer EBT program that gave families $60 per month in benefits per eligible child during the summer months, to offset the loss of school meals. The study found that children assigned to receive additional benefits improved their diets, consuming more fruits, vegetables, whole grains, and dairy products, and fewer sugar-sweetened beverages.[9]

SNAP and Non-SNAP Households Have Similar Consumption

There has been much media discussion of the November 2016 USDA report on typical food purchase patterns by SNAP participants and non-participants.[10] The top-line finding of that report is that SNAP and non-SNAP households have extremely similar food spending patterns. Out of every dollar spent by SNAP families:

- Around 40¢ went to what the study classifies as "basic items" such as meat, fruits, vegetables, eggs, bread and milk.
- Around 20¢ went to salty snacks, sugar, candy and sweetened beverages, with 5¢ going to soft drinks.
- The remaining 40¢ spent on other goods, including prepared foods, cereal, rice, beans, and dairy products.

The USDA findings are consistent with my own published research using the Consumer Expenditure Survey that also found similar spending patterns across food categories for SNAP and non-SNAP households.[11]

Public-health advocates rightly point out that sugar-sweetened beverages are the largest source of excess calories in the average American diet, and they provide no

---

[9] Briefel, Ronette, Ann Collins and Anne Wolf. 2013, November 8. "Impact of the Summer Electronic Benefits Transfer for Children (SEBTC) Demonstration on Children's Nutritional Status." Panel Paper, Mathematica Policy Research and Abt Associates, Washington, D.C. Available at: *https://appam.confex.com/appam/2013/webprogram/Paper7254.html*.

[10] USDA. 2016, November 18. "Foods Typically Purchased by Supplemental Nutrition Assistance Program (SNAP) Households." Nutrition Assistance Program Report, Office of Policy Support, Food and Nutrition Service, U.S. Department of Agriculture, Washington, D.C. Available at: *https://www.fns.usda.gov/snap/foods-typically-purchased-supplemental-nutrition-assistance-program-snap-households*.

[11] Hoynes, Hilary W., Leslie McGranahan, and Diane W. Schanzenbach. 2014. "SNAP and Food Consumption." Discussion Paper 2014–03, Center for Poverty Research, University of Kentucky, Lexington, KY. Available at: *http://uknowledge.uky.edu/cgi/viewcontent.cgi?article=1008&context=ukcpr_papers*.

nutritional benefit.[12–13] The obesity epidemic has hit Americans across all income levels, and public-health advocates are right to call attention to our excessive consumption of sugar-sweetened beverages as one probable cause.[14] The USDA study indicates that this is an issue across the income distribution, and there is no need to single out SNAP recipients for their consumption of soft drinks. Among the spending observed in the USDA study, about 5¢ of each dollar went to the purchase of soft drinks. This rate is similar to non-SNAP households, which spend an average of four percent of their grocery dollars on soft drinks.

A Soda Ban Will Not Reduce Soda Consumption

Another option that has been proposed is to disallow only the purchase of soft drinks or sweetened beverages with SNAP benefits. These proposals exaggerate the potential impacts on consumption such bans would have, because the rationale for the bans is based on a false understanding of how SNAP benefits work. SNAP benefits are modest—approximately $4.50 per person per day—and as a result nearly all families supplement their SNAP purchases with groceries purchased from their cash income. This occurs by design, and is why the program is called the *Supplemental* Nutrition Assistance Program; it is intended in most cases to extend a family's food purchasing power, not to cover 100 percent of food purchases. Estimates suggest that 70 to 80 percent of participants, perhaps even higher, supplement their SNAP spending with cash.

What will happen if soft drink purchases are banned using SNAP benefits? Take a typical family that spends the average amount—$12 per month—on soft drinks, and supplements their SNAP spending with spending out of cash resources. Our best prediction is that there will be no consumption change as a result of the SNAP restriction; such a family can continue to purchase the same basket of goods, but they would have to make certain to pay for the soft drinks out of their own cash instead of their SNAP benefits. In other words, a ban will likely increase the administrative costs of the program to both the USDA and retailers, and increase the stigma faced by recipients when they use the benefits, but not have the benefit of inducing any behavioral changes.

Recommendations

There are better policy options that are more likely to improve the diets of SNAP recipients, particularly when you consider that, over the past decade, fresh fruits and vegetables have become relatively more expensive compared to foods that are considered less healthy, as shown in *Figure 3* below. In response, market-based policies can increase the affordability of healthy foods and provide incentives for low-income families to purchase them.

One approach that merits further consideration is the USDA's randomized controlled trial of the Healthy Incentives Pilot in Massachusetts. This pilot program gave SNAP recipients an immediate 30¢ rebate for every dollar they spent on a narrowly defined group of fruits and vegetables.[15] In response to this price rebate, consumption of the targeted healthy foods increased by 25 percent.[16] In recent years, many local areas and even a few states have taken a similar approach by awarding bonus dollars for benefits used at farmers' markets, allowing recipients to stretch their food budget farther when they buy fresh produce. To date, these programs have been successful. Exploring ways to replicate or scale these types of programs nationally would provide a more constructive and effective path forward toward achieving the goal of increasing healthy food consumption by SNAP recipients.

---

[12] Welsh, J.A., A.J. Sharma, L. Grellinger, and M.B. Vos. 2011. "Consumption of Added Sugars is Decreasing in the United States." *American Journal of Clinical Nutrition* 94 (3): 726–34. Available at: *https://www.ncbi.nlm.nih.gov/pubmed/21753067*.

[13] The Nutrition Source. "Public Health Concerns: Sugary Drinks." School of Public Health, Harvard University, Cambridge, MA. Available at: *https://www.hsph.harvard.edu/nutritionsource/healthy-drinks/beverages-public-health-concerns/*.

[14] Center for Disease Control and Prevention. 2016, September 1. "Adult Obesity Facts." Center for Disease Control and Prevention, U.S. Department of Health & Human Services, Atlanta, GA. Available at: *https://www.cdc.gov/obesity/data/adult.html*.

[15] USDA. 2015, September 2. "Healthy Incentives Pilot." Report, Food and Nutrition Service, U.S. Department of Agriculture, Washington, D.C. Available at: *https://www.fns.usda.gov/hip/healthy-incentives-pilot*.

[16] Bartlett, Susan, Jacob Klerman, Parke Wilde, Lauren Olsho, Michelle Blocklin, Christopher Logan, and Ayesha Enver. 2013. "Healthy Incentives Pilot (HIP) Program." Food and Nutrition Services, Office of Policy Support, U.S. Department of Agriculture, Washington, D.C. Available at: *https://www.fns.usda.gov/sites/default/files/HIP_Interim.pdf*.

Figure 3. Price Levels by Food Category, 1980–2016
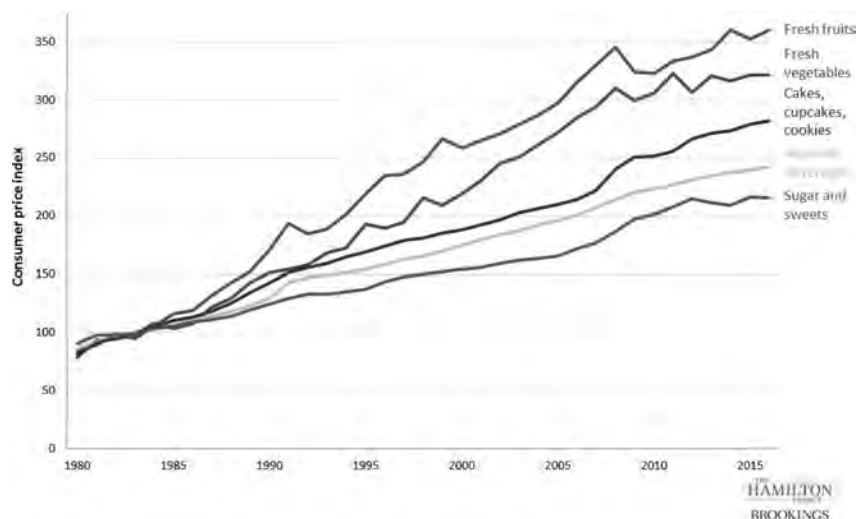
Source: Bureau of Labor Statistics 2016.
Note: Base year of the index (100) is the average for 1982–84.

Strengthening SNAP and reducing food insecurity in the more than 22 million U.S. households that receive nutritional assistance on a monthly basis is a smart public investment that will improve both public health and economic growth. Banning certain foods will raise the administrative burdens and cost of the program, but is unlikely to change consumption. By contrast, policy changes that strengthen the purchasing power of SNAP benefits and allow markets to function without undue interference are more likely to improve dietary choices of recipients and reduce food insecurity.

Thank you, and I look forward to answering any questions you might have.

The CHAIRMAN. Thank you.
Ms. Sarasin, 5 minutes.

STATEMENT OF LESLIE G. SARASIN, PRESIDENT AND CHIEF EXECUTIVE OFFICER, FOOD MARKETING INSTITUTE, ARLINGTON, VA

Ms. SARASIN. Good morning. Thank you very much. I am Leslie Sarasin. I serve as President and CEO of FMI. Our members' grocery stores are located in every Congressional district in the country.

Grocers play an important role in the efficient delivery of safe, affordable food for both the SNAP and the WIC Programs. We appreciate this Committee's work to better understand SNAP this morning.

Becoming an authorized SNAP retailer is a complicated process. Retailers must submit specified paperwork and credentials, and adhere strictly to the SNAP operating rules and ongoing training for their associates. Violation of SNAP operating rules results in revocation of both the SNAP and the WIC licenses.

SNAP authorized stores code all products within the electronic checkout system as either SNAP eligible or ineligible. When an eligible item is scanned, the system deducts the product's price from the customer's SNAP EBT card. When an ineligible item is

scanned, the cashier is prompted to ask the customer for another form of payment. Approximately 50 percent of SNAP transactions are multi-tendered, such that another form of payment is also used to pay for non-food items, ineligible items, or eligible food items that exceed the balance available on the SNAP EBT card. If a customer tries to purchase a tobacco or alcohol product with their SNAP EBT benefits, the electronic system will freeze until the product is actually removed. Within the electronic systems, WIC eligible items are charged against that benefit first, followed by those eligible for SNAP, and finally, the cashier must collect another form of payment: cash, check, debit, or credit for all remaining items.

Grocery transactions for SNAP customers vary significantly throughout the month. Data indicate the first transaction of the month is usually the largest and may contain larger quantities of protein and perishables. By the last week of the month, customers typically purchase maximum calories at minimum cost.

We appreciate the Committee's recognition of the role grocers play in the SNAP program. FMI has announced a new industry SNAP task force to identify areas where the program works well, and also to consider those that may require improvement. Some suggest that limiting what customers can buy with SNAP, making it more like WIC, may help achieve these goals. Doing so would place a tremendous burden, both on USDA and on food retailers, and likely would not achieve policy goals. Please consider two recent examples from the WIC Program.

When USDA began the Fresh Fruits and Vegetables Cash Value Voucher Program, it subjectively decided all fresh fruits and vegetables were eligible, except white potatoes. As many of you will recall, this ban on white potatoes unleashed a great debate throughout Congress and the industry. In the end, after more than a year of debate and consideration of actual science, USDA reversed the ban to allow white potatoes to be purchased through WIC. This was one item out of the tens of thousands found in each of our members' stores that would have to be studied and debated before USDA can make a determination as to whether a product is in or out.

Second, if our goal with SNAP is to provide short-term lifelines to needy Americans so they can get and keep a job to earn enough to support their families without government benefits, such limitations seem unlikely to help accomplish that goal at a reasonable cost. Doing so will require additional USDA staff to make these decisions for all products currently in market, as well as the estimated 20,000 new products introduced every year. USDA would also need to maintain a real time list downloadable to every electronic payment system in the country.

I should note that in 2004, Congress directed USDA to create an electronically downloadable real time UPC database for all WIC eligible foods. Today, retailers are still waiting for this list. The fact that nearly 13 years later we are still waiting for the list shows the complexity of creating and keeping one updated in real time, even for a list of products as small as WIC's. A similar SNAP database would include more than 100 times the number of products, along with more than the 20,000 that are introduced every year. Could

it be done? Probably so, but we expect it would be both challenging and expensive.

Finally, FMI members are incredible contributors to their communities. They are the largest contributors to our nation's food banks, create good paying jobs, and help build our future workforce. We look forward to working with the Committee on SNAP and other related issues, and I am also happy to answer any questions you may have.

[The prepared statement of Ms. Sarasin follows:]

PREPARED STATEMENT OF LESLIE G. SARASIN, PRESIDENT AND CHIEF EXECUTIVE OFFICER, FOOD MARKETING INSTITUTE, ARLINGTON, VA

Chairman Conaway, Ranking Member Peterson, and Members of the Committee,

My name is Leslie Sarasin, and I serve as President and Chief Executive Officer of Food Marketing Institute,[1] a trade association that represents food retailers and wholesalers, as well as their suppliers of products and services. FMI members are located in every Congressional district across the country. FMI's maxim when referring to its member companies is "Feeding Families and Enriching Lives," a responsibility we take very seriously.

Food Retail Role

In the context of "feeding families," our industry is pleased to maintain an important role in facilitating the efficient delivery in our stores of safe, affordable food products for both the Supplemental Nutrition Assistance Program (SNAP) and the Special Supplemental Nutrition Program (WIC). I appreciate the work this Committee is undertaking to better understand the operations of SNAP and the differences between a short-term hunger program as contemplated in SNAP and a longer-term nutrition program as contemplated in WIC.

As you know, the WIC program serves mothers and their children up to age 5. FMI members redeem very specific food prescriptions designed to ensure moms and their babies have access to the early nutrition they need for optimum physical and mental development. This important nutrition program is overseen by the House Education and the Workforce Committee and is currently up for reauthorization.

SNAP, the program under the full purview of this Committee, is one in which FMI members serve as the delivery mechanism for benefits. SNAP, a program created to address hunger among Americans, is designed to supplement the food budgets for seniors and/or families experiencing financial difficulty, or on a longer-term basis, individuals who are disabled.

As designed, SNAP allows customers to purchase approved food products from a SNAP-authorized retailer. Becoming an authorized SNAP/WIC retailer is not a simple process, and that process requires completion of specified paperwork and the providing of many credentials, including a business license, a photo ID for each owner of the business and proof of a social security number. This information may be requested at reauthorization or at any time throughout the process. Once approved, retaining SNAP/WIC authorization is not a foregone conclusion. The food retailer must agree to adhere strictly to the SNAP operating rules, violation of which results in having both the SNAP and WIC licenses revoked. Additionally, authorized retailers must agree to ongoing training programs for their associates to ensure they understand and adhere to all SNAP rules and regulations, as delineated in USDA's 25 page training guide.

SNAP has been enhanced in recent years by moving from a paper-based program that issued "food stamps" to an electronic benefits transfer program known as "EBT," through which benefits are downloaded electronically to a government-issued debit card which then may be utilized at store level by SNAP benefit recipients. This movement to EBT has increased the efficiency of the program and enhanced

---

[1] Food Marketing Institute proudly advocates on behalf of the food retail industry. FMI's U.S. members operate nearly 40,000 retail food stores and 25,000 pharmacies, representing a combined annual sales volume of almost $770 billion. Through programs in public affairs, food safety, research, education and industry relations, FMI offers resources and provides valuable benefits to more than 1,225 food retail and wholesale member companies in the United States and around the world. FMI membership covers the spectrum of diverse venues where food is sold, including single owner grocery stores, large multi-store supermarket chains and mixed retail stores. For more information, visit *www.fmi.org* and for information regarding the FMI foundation, visit *www.fmifoundation.org*.

its accountability by reducing the opportunity for fraud and human error. The program also benefitted from the work of this Committee and then Nutrition Subcommittee Chairman Bob Goodlatte, whose efforts focused on ensuring interoperability and consistency of the program across state lines. The EBT Interoperability and Portability Act (P.L. 106–171), signed into law in 2000, ensures that EBT transactions operate consistently from state to state. This law has significantly reduced the incidence of error and has allowed shoppers living in border state areas to seek the best prices through which to stretch their SNAP benefits. It also has enabled those who must cross state lines for emergency reasons, such as to care for a sick relative or to escape the disastrous results of a natural event like Hurricane Sandy, to continue receiving benefits in a seamless manner.

As the front line purveyors of SNAP, authorized retailers maintain a unique and special vantage point from which to see SNAP transactions. At the time of food purchase, SNAP recipients input their unique, secret PIN after swiping their card. As is the case with commercial debit cards, the PIN is an important added authentication to prevent a stolen card from being used by an unauthorized person.

All products in SNAP-authorized stores are coded within the electronic checkout system as being either eligible or ineligible for purchase with SNAP benefits. This designation often can be seen on a paper receipt with the initials "FS." When a SNAP customer places products on the checkout conveyor belt, the checkout system scans each item as either eligible or ineligible for SNAP. If an item is eligible, the system deducts the product's price from the customer's SNAP EBT card. If ineligible, it prompts the cashier to ask the customer for another form of payment. Examples of ineligible items include laundry detergent and diapers, since they are not food items, and a hot rotisserie chicken, since hot, ready-to-eat food items are not eligible for purchase with SNAP benefits.

Data indicate that approximately 50% of supermarket customers using SNAP benefits when purchasing groceries also use other forms of payment, either to pay for non-food items, ineligible products or for eligible food items that exceed the remaining balance on the SNAP EBT card. It also is my understanding that if a customer attempts to purchase a tobacco product or alcoholic beverage, the electronic system will freeze and will not allow the transaction to continue until the tobacco or alcohol product is removed.

Those not fully involved in the SNAP transactional process can find it baffling and can often be confused about products that are eligible and those that are ineligible and therefore paid for through other means, and even in some cases by products that are eligible but not paid for with SNAP benefits in a particular transaction. Under the electronic systems in place today, the items eligible for WIC are charged against that benefit first, followed by those eligible for SNAP benefits, and finally, the cashier must collect another form of payment—cash, check, debit or credit—for all remaining items not eligible under either of the programs and/or for items that exceed the dollar or prescription value of the benefits. As a result, while the items the electronic system charges to the SNAP benefit are eligible to be purchased with SNAP, they may not necessarily be designated by the customer to be the specific items purchased with SNAP benefits. This occurs, for example, when a SNAP customer places $100 worth of eligible items, such as bananas, eggs and bread, and has only $80 in benefits on the EBT card; the electronic system deducts $80 from the grand total of SNAP-eligible items, but does not necessarily attribute the $80 to a specific array of products on the checkout conveyor belt.

It is worth noting that grocery transactions for SNAP customers vary significantly throughout the month. Data indicate the first transaction of the month is likely the largest and may contain larger quantities of protein, perishables, or even a splurge item. The purchases of second and third weeks of the month are often more balanced, and the purchases made in the last week of the month typically find customers purchasing maximum calories at minimum cost.

This variation among purchases is particularly noteworthy in the seven states that continue to issue benefits to all recipients on only 1 day of the month, rather than spreading issuance dates throughout the month. There are four states that distribute benefits on only 2 or 3 days each month. Expanding the dates for issuing SNAP benefits allows supermarkets to better address supply chain issues on fresh and perishable items and allows labor needs to be spread throughout the month into full-time positions rather than having them concentrated in a segment of the month with multiple part-time positions to accommodate the volume of SNAP shoppers trying to redeem benefits on one day. A chart of state issuance time frames is attached to this testimony.

Need for Sound Public Policy

FMI member companies appreciate the Committee's recognition that food retailers are engaged and informed partners in the SNAP and WIC programs, as evidenced by the invitation for this testimony. As your partners in this endeavor, we hope you will consider several issues of concern to food retailers.

Against the backdrop of food retailers' commitment to enrich the lives of individuals in the communities they serve, we suggest that as the Committee examines SNAP, it keep in mind the larger goals and purpose of this hunger program. A strategic policy-oriented discussion could help make an already good program even better. If, however, the consideration becomes bogged down in energy zapping tactical questions of specific product(s) to be considered for elimination from SNAP, this program enhancement will be made much more difficult, if not impossible. FMI respectfully submits that changes to the program should be part of a broad policy discussion with clearly articulated desired results and delineation of the most effective and efficient means to achieve those results.

We at FMI would be pleased to participate in that "results" discussion. To assist in that process, we have announced the development of an industry SNAP Task Force to identify areas of the program we find to be exceptional, to make sure those are not eliminated, and to consider those we believe may require improvement in order to achieve your policy goals.

As I understand them, among the Committee goals are the following:

- To ensure no unfair penalty on individuals who find themselves on the edge of the benefits cliff and who are trying to move to a higher paying job;
- To ensure SNAP is the most efficient program possible, eliminating fraud and opportunities for fraud on both the delivery and recipient side;
- To make SNAP the least burdensome possible for individuals whose participation in the program may actually reduce government health care, social services, and education costs, such as seniors with a fixed income, disabled individuals and families supporting children under the age of 18; and
- To identify and prepare individuals who receive SNAP benefits for enhanced employment opportunities.

It has been suggested that achievement of these goals might be facilitated by development of a prescription of limitations for SNAP purchases, perhaps similar to those that exist in the WIC program. While this may seem an attractive option, I respectfully suggest that prior to doing so we first identify the result being sought in undertaking such a change in the program.

To demonstrate how a tactical reaction may actually prove to be inconsistent with a policy goal, it is worthwhile to consider an anecdote from the most recent reauthorization of the WIC nutrition program. At that time, similar debates occurred regarding products that should or should not be authorized under the WIC program. There were a number of factions, including farmers touting the unique benefits of the crops they were growing. Ultimately, WIC was updated to allow for the first time a fresh fruits and vegetables benefit and all fruits and vegetables were allowed under this program, with one exception. The exception made was for white potatoes, deemed at the time not to be nutritionally significant. Yet, just 1 year later, the Institute of Medicine issued a report indicating that Americans suffer from relatively high incidences of a deficiency in potassium, for which white potatoes serve as a good source under definitions established by the Food and Drug Administration. Moreover, we are now in the process in this country of redesigning the Nutrition Facts Panel that appears on food products to add potassium as a required element so that consumers can begin to address this deficiency. In the last Congress, in 2015 a change was made to allow white potatoes as a vegetable in the WIC program.

From experience previously in my career while serving as the President and Chief Executive Officer of the American Frozen Food Institute, I can relay anecdotes regarding the treatment of frozen foods, specifically frozen fruits and vegetables, that are nutritionally equivalent and in some cases nutritionally superior, to their unfrozen counterparts in not being declared WIC eligible by some states to the utter detriment of both the programs and the frozen fruit and vegetable industries.

Of course, the discussions today will hardly illuminate specific issues such as these, but it is critical as we consider changes to Federal hunger programs such as SNAP that we identify the policy goals to be achieved, rather than just focus on a potentially desirable sound bite. I would respectfully suggest that if our goal with SNAP is to provide needy Americans a short-term lifeline to allow them to get and keep a job so they earn enough to support their families without government benefits, the unilateral limitation of any specific product is unlikely to help accomplish that goal. It is worth noting that doing so will also increase the need for additional

USDA staff to make and encode these determinations for an estimated 20,000 new products introduced into the marketplace annually and then download these electronically on a real-time basis to every electronic payments system in the country.

SNAP was designed and currently serves as a hunger program. It is a supplementary program for the customers whose circumstances require them to rely upon it for a season of their life, and for these individuals it is a life-saver. Eighty-two percent of all SNAP benefits in FY 2015 went to households that included a child, an elderly person or a person with disabilities.

There have been a number of limitations suggested for this program whether it be no meats, no desserts, no snacks, no soft drinks and even no white bread. Not only do such limitations appear incongruous to the policy positioning of a program designed to provide temporary assistance addressing hunger considerations, but they also would prove an administrative nightmare, increasing the cost of acceptance and slowing down checkout lines in an industry that historically has experienced only just more than a 1% profit margin and in which every second of delay affects profitability and ultimately the number of associates that can be hired and the prices in a store.

Language was included in the WIC reauthorization legislation in 2004 directing the Secretary to develop an electronically downloadable list of WIC-eligible products on a state by state basis. *This has still not been completed because of its complexity.* A similar type of electronic list for SNAP would easily involve 100 times more products making it a 100 times more complex. Could it be done? Probably so. But if it hasn't been done in the WIC program in spite of a 15 year old Congressional directive, it likely would not be easy or inexpensive. And at the end of the day, we must ask ourselves what the policy goal is that this level of expenditure of time and money would achieve.

We are truly blessed in this country with the safest, most abundant and most affordable food supply in the world. We believe that with that blessing comes the responsibility to lift up those individuals in our communities who may need an extra hand, with the goal that they might provide an extra hand for someone else at another time in the future.

FMI member companies are the largest contributors to our nation's food banks. In 2016, food retailers donated more than 1.3 billion of the four billion meals Feeding America provided to families in need.[2] We are also constantly developing new ways to enhance this donation level by decreasing food waste. In fact, we have spent much of the past year working with our supplier partners at the Grocery Manufacturers Association (GMA) on efforts to reduce customer confusion regarding product date labels, frequently misunderstood to be expiration dates. FMI and GMA have just announced an industry-driven voluntary program to reduce dozens of terms currently in use on date labels and move (to the extent possible) to two primary labels: "BEST if used by" to indicate quality and "USE by" for perishable products that may have potential degradation implications.

I am pleased to answer any questions you may have and to serve as a resource to this Committee as you work to make SNAP even more efficient. I also have to call out the exceptional FNS retailer management division at USDA headed by Andrea Gold. Through hurricanes, tornados and floods as well as new store openings or changes in ownership, we could not have had a better resource than Andrea and her team to help our members through their challenges.

State-by-State Monthly SNAP Benefit Issuance Schedule

(Current as of February 13, 2017; Food Marketing Institute Research)

State	Day(s) of SNAP Benefit Distribution
Alabama	In August 2013, the state expanded their distribution dates, moving from the 4th to the 18th of the month to the 4th through the 23rd of the month. To assist in the transition, recipients received ½ of their benefit on their original date and ½ on their new date in the month.
Alaska**	The main SNAP issuance is all on the first day of the month. Smaller supplemental issuances for new applicants and late recertifications occur daily throughout the month.
Arizona	SNAP benefits are distributed over the first 13 days of the month by the first letter of the recipients' last name. For example: last names that begin with A or B are distributed on the first day of the month; 2nd day of the month: C and D; *etc.*
Arkansas	Arkansans receive their benefits on these 8 days: 4th, 5th, 8th, 9th, 10th, 11th, 12th or 13th of each month, based on the last number of their [S]ocial [S]ecurity [N]umber.

[2] Source: *Feeding America, 2016 Annual Report,* Available at *http://www.feedingamerica.org/about-us/about-feeding-america/annual-report/2016-feeding-america-annual-report.pdf*, pp.13.

State-by-State Monthly SNAP Benefit Issuance Schedule—Continued

(Current as of February 13, 2017; Food Marketing Institute Research)

State	Day(s) of SNAP Benefit Distribution
California	California is different in that each county distributes SNAP to those who qualify. The payments go out to all those who qualify between the 1–10 of the month. Others (*i.e.,* new applicants) get paid throughout the month depending on when they were accepted.
Colorado	Food Stamp benefits are distributed on the first 10 days of the month by the recipient's last digit of their [S]ocial [S]ecurity [N]umber.
Connecticut	SNAP benefits and cash are distributed on the first 3 days of the month, by the first letter of the recipient's last name. (A–F are available on the first; G–N on the second and O–Z are distributed on the third day of the month.)
Delaware	Benefits are made available over 23 days, beginning with the 2nd day of every month, based on the first letter of the client's last name.
District of Columbia	Benefits are made available from the 1st to the 10th of every month, based on the first letter of the client's last name.
Florida	All SNAP recipients moved from a 15 day distribution to a 28 day distribution in April 2016. In March 2016, to assist in the new transition, benefits were "split." Recipients received the first half of their benefits on their "old" date and received the second half of their monthly benefits on what was their "new" date going forward. The ACCESS Florida system assigns benefit availability dates based on the case number recipients received when they became eligible for the SNAP program.
Georgia	In September 2012, SNAP benefits in Georgia expanded from the 5th to the 14th, and then finally to the current 5th to 23rd of each month, distributed every other day.
Hawaii	Benefits are made available on the 3rd and the 5th of every month, based on the first letter of the client's last name.
Idaho	Benefits were previously made available on the first day of every month. (Prior to August 2009, benefits were distributed on 5 consecutive days at the beginning of each month, but this was later moved to 1 day.) In 2014, H.B. 565 was enacted. The bill requires the state Department of Health and Welfare to issue SNAP benefits over the course of 10 consecutive days within a month. Bonus money received from USDA paid for the cost of the change. Currently, and since July 1, 2016, benefits are distributed over the first 10 days of each month based on the last number of the birth year of the recipient; for example, a birthday of 8/25/64 would receive benefits on the 4th day of each month.
Illinois	SNAP benefits are made available on these 12 days of the month: 1st, 3rd, 4th, 7th, 8th, 10th, 11th, 14th, 17th, 19th, 21st, and 23rd of every month, based on a combination of the type of case and the case name.
Indiana	On January 1, 2014, the state implemented an expanded schedule for the distribution of benefits during the fifth through the twenty-third day of each month, to be issued every-other-day, based on the first letter of the recipient's last name. For example: A or B = benefits available on the 5th; first Letter of the Last Name is: C or D = benefits available on the 7th. Previously, benefits were made available on the first 10 calendar days each month. (TANF is issued on the first of the month.)
Iowa	Benefits are made available over the first 10 calendar days of every month, based on the first letter of the client's last name.
Kansas	Benefits are made available over the first 10 calendar days of every month, based on the first letter of the client's last name.
Kentucky	Benefits are made available over the first 19 calendar days of every month, based on the last digit of the client's case number. This was recently expanded from the previous 10 day distribution.
Louisiana	Benefits are made available between the 1st and the 14th of every month, based on the last digit of the client's SSN. (Elderly and disabled benefits are made available between the 1st and the 4th of every month.)
Maine	Benefits are available the 10th to the 14th of every month based on the last digit of the recipient's birthday.
Maryland	In January 2016, the distribution schedule was changed. Benefits are now distributed from the 4th to the 23rd of every month, based on the first three letters of the client's last name. Previously, benefits were distributed from the 6th through the 15th of the month. This was accomplished through a 5 month phase-in.
Massachusetts	Distribution is based on the last digit of each recipient's [S]ocial [S]ecurity [N]umber and distributed over the first 14 days of the month.
Michigan	In January 2011, SNAP moved from a 7 day distribution to the current distribution, which is from the 3rd to the 21st, distributed every-other-day, based on the last digit of the head of household's recipient identification number. For example, clients' numbers ending with 0 will receive food benefits on the 3rd of the month; numbers ending with 1, food benefits will be available on the 5th of the month.
Minnesota	Benefits are staggered over 10 calendar days, beginning on the 4th through the 13th of every month, without regard to weekends or holidays, based on the last digit of the client's case number.
Mississippi	Effective February 2017, benefits are made available from the 4th to the 21st of every month, based on the last two digits of the client's case number. Benefits were previously distributed from the 5th to the 19th (15 days) of every month.
Missouri	Benefits are made available over the first 22 days of every month, based on the client's birth month and last name.

State-by-State Monthly SNAP Benefit Issuance Schedule—Continued

(Current as of February 13, 2017; Food Marketing Institute Research)

State	Day(s) of SNAP Benefit Distribution
Montana	Benefits are distributed over 5 days by the last number of the recipient's case number, from the 2nd to the 6th of every month.
Nebraska	Nebraska distributes benefits during the first 5 calendar days of the month. The day of distribution is based on the last digit of the [S]ocial [S]ecurity [N]umber.
Nevada **	In Nevada, food stamp benefits are issued on the first day of each month.
New Hampshire **	New Hampshire benefits are available on the 5th of every month.
New Jersey	The monthly SNAP allotment is available over the first 5 days of the month. The day is based on the number in the 7th position of their case number. Some of the cases still receive their benefits based on the assignment at the time the county was converted to EBT. In Warren County, all benefits are made available on the 1st of the month.
New Mexico	Benefits are made available over 20 days every month, based on the last two digits of the SSN.
New York	The process is twofold as follows: in New York City, recipients receive their SNAP benefits within the first 13 business days of the month, according to the last digit of their case number, not including Sundays or holidays. The actual dates change from 1 month to the next, so NYC publishes a 6 month schedule showing the exact availability dates. For the remainder of New York State, recipients receive their benefits within the first 9 days of the month, also according to the last digit of their case number, including Sundays and holidays.
North Carolina	Effective July 2011, the state expanded its 10 day distribution schedule. Benefits are now distributed from the 3rd to the 21st of every month, based on the last digit of the primary cardholder's Social Security Number.
North Dakota **	Benefits are made available on the first day of every month.
Ohio	In April 2014, Ohio expanded its SNAP distribution from the first 10 days of the month to the first 20 days of the month, staggered every 2 days. This only affected SNAP recipients who moved from one county to another; recipients who experienced a 1 day or more break in eligibility; and, all new recipients. Recipients who were on SNAP before April 2014 did not see a change.
Oklahoma	Benefits are made available from the 1st to the 10th of every month, based on the last digit of the client's SNAP case number.
Oregon	SNAP is distributed on the first 9 days of the month as such: [S]ocial [S]ecurity [N]umbers ending with "0" or "1" distribute on the 1st day of the month, numbers ending with a "2" are distributed on the 2nd day of the month and so on.
Pennsylvania	Benefits are made available over the first 10 business days of every month (excluding weekends and holidays) based on the last digit of the client's case number.
Rhode Island **	Benefits are made available on the first day of every month.
South Carolina	In 2012, South Carolina expanded from a 9 day to a 19 day issuance. Current recipients stayed within the 9 day distribution, but all new recipients were given a date that expanded into the 19 days.
South Dakota **	Benefits are made available on the 10th day of every month.
Tennessee	In October 2012, Tennessee expanded distribution from 10 to 20 days.
Texas	Benefits are made available over the first 15 days of the month, based on the last digit of the client's SNAP case number.
Utah	Benefits are made available on the 5th, 11th, or 15th of every month, based on the first letter of the client's last name: A–G available on the 5th; H–O available on the 11th; P–Z available on the 15th.
Vermont **	Vermont benefits are available on the first of every month.
Virginia	On September 1, 2012, benefit distribution was moved from 1 day a month to 5 days, and then eventually to the current 1st to the 9th day of every month, based on the last digits of the client's case number.
Washington	Benefits are staggered over the first 10 days of the month based on the last digit of the households' assistance unit number. Weekends and holidays do not affect the schedule. **However, beginning February 1, 2017, an expansion of distribution was fully implemented.** Going forward, it will be the first 20 days of the month.
West Virginia	Benefits are made available over the first 9 days of every month, based on the first letter of the client's last name.
Wisconsin	Benefits are made available over the first 15 days of every month, based on the eighth digit of the client's SSN.
Wyoming	SNAP is distributed on the first 4 days of the month.

Notes:

** States with asterisks are those that only distribute benefits on 1 day a month. There are seven that still do so. Warren County, New Jersey distributes only 1 day a month, although the rest of the state distributes over 5 days. Also, there are four states that distribute SNAP just 2 or 3 days a month.

Additional Distribution Information:

There is no limit on the number of days for stagger. The only condition in regulation is that no single household's issuance should exceed 40 days *between* issuances.

Currently, benefit recipients may only be issued their benefits one time a month, or within 40 days.

Supplemental Nutrition Assistance Program: One-Month Change in Total Participation

(Prepared by the Food Research and Action Center (FRAC))
(Data as of January 6, 2017)

State	September 2016	October 2016	Percent Change September 2016 *vs.* October 2016
Kentucky	657,389	671,628	2.2
Arkansas	399,538	403,376	1.0
South Carolina	746,646	752,030	0.7
Texas	3,864,686	3,891,234	0.7
Wyoming	33,806	33,977	0.5
Kansas	246,179	247,281	0.4
Nevada	441,986	443,138	0.3
Montana	119,863	120,065	0.2
Vermont	78,034	78,092	0.1
Massachusetts	771,436	771,512	0.0
Washington	952,711	951,845	−0.1
Colorado	467,426	466,789	−0.1
Idaho	176,217	175,976	−0.1
Pennsylvania	1,858,232	1,855,129	−0.2
Arizona	964,979	963,303	−0.2
Mississippi	555,278	554,225	−0.2
Hawaii	173,669	173,289	−0.2
Florida	3,287,446	3,279,009	−0.3
West Virginia	351,391	350,474	−0.3
Georgia	1,688,832	1,683,945	−0.3
Indiana	710,738	708,476	−0.3
Oregon	712,084	709,684	−0.3
Iowa	378,478	377,126	−0.4
Minnesota	465,211	463,461	−0.4
New York	2,950,208	2,938,258	−0.4
New Jersey	857,779	854,146	−0.4
Missouri	770,944	767,403	−0.5
Alabama	830,742	826,790	−0.5
Wisconsin	712,582	709,134	−0.5
Oklahoma	621,462	618,434	−0.5
California	4,252,654	4,230,399	−0.5
South Dakota	95,655	95,153	−0.5
Connecticut	424,431	422,181	−0.5
Maryland	720,566	716,620	−0.5
Delaware	149,158	148,340	−0.5
New Hampshire	95,393	94,823	−0.6
Maine	183,299	182,095	−0.7
Ohio	1,564,498	1,553,901	−0.7
Virginia	811,949	806,332	−0.7
Utah	214,505	212,903	−0.7
Michigan	1,434,550	1,423,008	−0.8
North Dakota	54,622	54,124	−0.9
Tennessee	1,083,880	1,071,344	−1.2
Illinois	1,931,575	1,907,969	−1.2
North Carolina	1,470,079	1,450,485	−1.3
New Mexico	480,493	473,398	−1.5
Rhode Island	168,973	166,365	−1.5
District of Columbia	132,308	126,322	−4.5
Louisiana	1,042,876	943,685	−9.5
Nebraska	177,912	153,419	−13.8
Alaska	84,825	71,768	−15.4
Total	**43,493,149**	**43,215,557**	**−0.6**

The following areas receive Nutrition Assistance Grants which provide benefits analogous to the Supplemental Nutrition Assistance Program: Puerto Rico, American Samoa, and the Northern Mariana[Islands]. In addition, 2015 and 2016 data are preliminary and are subject to significant revision.

*State where October 2016 SNAP data include disaster assistance (D–SNAP).

Supplemental Nutrition Assistance Program: One-Year Change in Total Participation

(Prepared by the Food Research and Action Center (FRAC))
(Data as of January 6, 2017)

State	October 2015	October 2016	Percent Change October 2015 *vs.* October 2016
Louisiana	879,541	943,685	7.3
Montana	113,462	120,065	5.8
Wyoming	32,729	33,977	3.8
Texas	3,777,317	3,891,234	3.0
New Mexico	460,048	473,398	2.9
Alaska	69,996	71,768	2.5
North Dakota	53,271	54,124	1.6
Nevada	439,498	443,138	0.8
Delaware	147,127	148,340	0.8
Oklahoma	613,397	618,434	0.8
Pennsylvania	1,873,447	1,855,129	−1.0
South Dakota	96,692	95,153	−1.6
Massachusetts	786,492	771,512	−1.9
New York	2,996,649	2,938,258	−1.9
Iowa	384,685	377,126	−2.0
West Virginia	359,001	350,474	−2.4
Arizona	991,567	963,303	−2.9
Colorado	481,892	466,789	−3.1
Connecticut	439,210	422,181	−3.9
Rhode Island	173,148	166,365	−3.9
Virginia	844,204	806,332	−4.5
Minnesota	485,317	463,461	−4.5
Utah	222,981	212,903	−4.5
Ohio	1,629,349	1,553,901	−4.6
California	4,436,189	4,230,399	−4.6
Hawaii	182,226	173,289	−4.9
Illinois	2,007,492	1,907,969	−5.0
New Jersey	899,481	854,146	−5.0
Georgia	1,774,540	1,683,945	−5.1
Vermont	82,364	78,092	−5.2
South Carolina	793,218	752,030	−5.2
Maine	192,404	182,095	−5.4
Kentucky	713,911	671,628	−5.9
Michigan	1,513,129	1,423,008	−6.0
Alabama	881,402	826,790	−6.2
Wisconsin	756,434	709,134	−6.3
Oregon	759,386	709,684	−6.5
Kansas	265,478	247,281	−6.9
New Hampshire	101,894	94,823	−6.9
Idaho	189,385	175,976	−7.1
Maryland	779,303	716,620	−8.0
Tennessee	1,168,238	1,071,344	−8.3
Washington	1,043,008	951,845	−8.7
Missouri	843,876	767,403	−9.1
District of Columbia	140,654	126,322	−10.2
Indiana	799,663	708,476	−11.4
Florida	3,708,499	3,279,009	−11.6
Mississippi	628,354	554,225	−11.8
Arkansas	457,380	403,376	−11.8
North Carolina	1,647,808	1,450,485	−12.0
Nebraska	176,363	153,419	−13.0
Total	**45,368,265**	**43,215,557**	**−4.7**

The following areas receive Nutrition Assistance Grants which provide benefits analogous to the Supplemental Nutrition Assistance Program: Puerto Rico, American Samoa, and the Northern Mariana[Islands]. In addition, 2015 and 2016 data are preliminary and are subject to significant revision.

*State where October 2016 SNAP data include disaster assistance (D–SNAP).

Supplemental Nutrition Assistance Program: Five-Year Change in Participation

(Prepared by the Food Research and Action Center (FRAC))
(Data as of January 6, 2017)

State	October 2011	October 2016	Percent Change October 2011 *vs.* October 2016
Nevada	351,686	443,138	26.0
New Mexico	432,289	473,398	9.5
California	3,867,094	4,230,399	9.4
Connecticut	396,517	422,181	6.5
Illinois	1,831,037	1,907,969	4.2
Pennsylvania	1,785,240	1,855,129	3.9
Louisiana	916,060	943,685	3.0
Delaware	144,612	148,340	2.6
Hawaii	169,405	173,289	2.3
Wyoming	33,252	33,977	2.2
Florida	3,225,957	3,279,009	1.6
West Virginia	347,064	350,474	1.0
Maryland	709,681	716,620	1.0
Oklahoma	624,112	618,434	− 0.9
Rhode Island	168,694	166,365	− 1.4
Montana	121,992	120,065	− 1.6
Colorado	480,566	466,789	− 2.9
New York	3,060,107	2,938,258	− 4.0
Alaska	74,792	71,768	− 4.0
New Jersey	890,859	854,146	− 4.1
Iowa	398,574	377,126	− 5.4
Texas	4,174,348	3,891,234	− 6.8
South Dakota	103,282	95,153	− 7.9
Massachusetts	838,603	771,512	− 8.0
North Dakota	59,383	54,124	− 8.9
Alabama	910,034	826,790	− 9.1
District of Columbia	140,003	126,322	− 9.8
Georgia	1,870,781	1,683,945	− 10.0
Virginia	896,420	806,332	− 10.0
Oregon	798,772	709,684	− 11.2
Ohio	1,766,584	1,553,901	− 12.0
Nebraska	174,941	153,419	− 12.3
North Carolina	1,655,694	1,450,485	− 12.4
Minnesota	531,728	463,461	− 12.8
Washington	1,095,139	951,845	− 13.1
South Carolina	867,258	752,030	− 13.3
Mississippi	645,220	554,225	− 14.1
Wisconsin	828,362	709,134	− 14.4
Arizona	1,138,220	963,303	− 15.4
Tennessee	1,280,908	1,071,344	− 16.4
New Hampshire	114,744	94,823	− 17.4
Vermont	94,604	78,092	− 17.5
Arkansas	490,487	403,376	− 17.8
Kansas	302,633	247,281	− 18.3
Missouri	950,725	767,403	− 19.3
Kentucky	842,885	671,628	− 20.3
Indiana	901,967	708,476	− 21.5
Michigan	1,884,542	1,423,008	− 24.5
Idaho	233,194	175,976	− 24.5
Utah	285,695	212,903	− 25.5
Maine	251,189	182,095	− 27.5
Total	**46,224,722**	**43,215,557**	**− 6.5**

The following areas receive Nutrition Assistance Grants which provide benefits analogous to the Supplemental Nutrition Assistance Program: Puerto Rico, American Samoa, and the Northern Mariana[Islands]. In addition, 2015 and 2016 data are preliminary and are subject to significant revision.
  * State where October 2016 SNAP data include disaster assistance (D–SNAP).

Share of Population Participating in SNAP

(Prepared by the Food Research and Action Center (FRAC))
(Data as of January 6, 2017)

State	Population Estimate (2015)	SNAP Participants, October 2016	Share of Population
New Mexico	2,085,109	473,398	22.7
Louisiana	4,670,724	943,685	20.2
West Virginia	1,844,128	350,474	19.0
District of Columbia	672,228	126,322	18.8
Mississippi	2,992,333	554,225	18.5
Oregon	4,028,977	709,684	17.6
Alabama	4,858,979	826,790	17.0
Georgia	10,214,860	1,683,945	16.5
Tennessee	6,600,299	1,071,344	16.2
Florida	20,271,272	3,279,009	16.2
Oklahoma	3,911,338	618,434	15.8
Rhode Island	1,056,298	166,365	15.7
Delaware	945,934	148,340	15.7
South Carolina	4,896,146	752,030	15.4
Nevada	2,890,845	443,138	15.3
Kentucky	4,425,092	671,628	15.2
New York	19,795,791	2,938,258	14.8
Illinois	12,859,995	1,907,969	14.8
Pennsylvania	12,802,503	1,855,129	14.5
North Carolina	10,042,802	1,450,485	14.4
Michigan	9,922,576	1,423,008	14.3
Texas	27,469,114	3,891,234	14.2
Arizona	6,828,065	963,303	14.1
Maine	1,329,328	182,095	13.7
Arkansas	2,978,204	403,376	13.5
Ohio	11,613,423	1,553,901	13.4
Washington	7,170,351	951,845	13.3
Missouri	6,083,672	767,403	12.6
Vermont	626,042	78,092	12.5
Wisconsin	5,771,337	709,134	12.3
Hawaii	1,431,603	173,289	12.1
Iowa	3,123,899	377,126	12.1
Maryland	6,006,401	716,620	11.9
Connecticut	3,590,886	422,181	11.8
Montana	1,032,949	120,065	11.6
Massachusetts	6,794,422	771,512	11.4
South Dakota	858,469	95,153	11.1
California	39,144,818	4,230,399	10.8
Indiana	6,619,680	708,476	10.7
Idaho	1,654,930	175,976	10.6
Alaska	738,432	71,768	9.7
Virginia	8,382,993	806,332	9.6
New Jersey	8,958,013	854,146	9.5
Colorado	5,456,574	466,789	8.6
Kansas	2,911,641	247,281	8.5
Minnesota	5,489,594	463,461	8.4
Nebraska	1,896,190	153,419	8.1
North Dakota	756,927	54,124	7.2
New Hampshire	1,330,608	94,823	7.1
Utah	2,995,919	212,903	7.1
Wyoming	586,107	33,977	5.8
Total	**321,418,820**	**43,215,557**	**13.4**

The following areas receive Nutrition Assistance Grants which provide benefits analogous to the Supplemental Nutrition Assistance Program: Puerto Rico, American Samoa, and the Northern Mariana[Islands]. In addition, 2015 and 2016 data are preliminary and are subject to significant revision.

＊State where October 2016 SNAP data include disaster assistance (D–SNAP).

The CHAIRMAN. Thank you.

Mr. Weidman, 5 minutes.

STATEMENT OF JOHN WEIDMAN, DEPUTY EXECUTIVE DIRECTOR, THE FOOD TRUST, PHILADELPHIA, PA

Mr. WEIDMAN. Thank you, Chairman Conaway and Ranking Member Peterson, for inviting me to testify. My name is John Weidman. I am Deputy Executive Director for The Food Trust, a Pennsylvania-based nonprofit working nationally to improve access to healthy food.

This year through a grant from the Robert Wood Johnson Foundation, we have launched the Center for Healthy Food Access, a national collaborative effort aimed at improving the health of children. I am here today to talk about strategies The Food Trust has been employing to improve health and encourage healthy eating among SNAP participants.

We believe that to have the greatest impact, it takes a comprehensive approach that includes access, education, and incentives. In Pennsylvania, we have been improving access by opening farmers' markets, working with corner stores to stock healthier products, and incentivizing new supermarket development. Our team of nutrition educators is providing innovative and engaging programing through SNAP-Ed to teach children and adults how to eat healthy, cook, and shop on a budget. And we run a successful Food Bucks Program that provides $2 worth of free produce for every $5 spent with SNAP at farmers' markets and a local supermarket.

Based on research, this comprehensive approach is working. A peer-reviewed study published in the journal *Pediatrics* found that our SNAP-Ed program reduced childhood overweight by 50 percent. More recently, data collected on the BMI of Philadelphia children is showing that after decades of rising childhood obesity rates, we are finally seeing them drop. The strategies that are being implemented, access to healthy food, nutrition education, SNAP incentives, are happening all around the country and they are not only changing eating habits and preventing diet-related disease, but they are also creating jobs and spurring economic development.

I want to share a brief story about Nicole Speller, a participant in one of our free 6 week SNAP-Ed cooking workshops that take place in over 500 community sites across southeastern Pennsylvania. Nicole had decided to make a change and improve her health. She also happened to be a fantastic cook, and each week she would share the recipe she was learning with her neighbors and her church. Upon completing the workshop series, Nicole started her own healthy cooking class at her church. This is just one example of how SNAP-Ed is helping to create a culture of health, and it is happening in innovative ways in every state in the nation.

Of course, understanding how to eat healthy is only part of the problem. Accessing healthy food continues to be a challenge for millions of Americans. Over the last decade, we have seen incredible success through public-private partnerships to incentivize grocery stores to meet the need for better access. In Pennsylvania, through the leadership of now-Congressman Dwight Evans, we have the Pennsylvania Fresh Financing Initiative, which funded 88 grocery store projects in urban and rural areas, and created 5,000 jobs.

Based on this successful model, there is now the Federal HFFI and programs in many other states.

Most recently through Governor Kasich's Ohio Fresh Food Program, Vinton County, a rural county in southeast Ohio, is now slated for a new grocery store to open after the only store in the entire county had previously closed. This store will now serve seniors and working families who have been unable to satisfy the very basic human need of going to the store to buy food.

The same grocers who we work with on HFFI programs also stress the need of the importance of nutrition education. It makes sense if grocers open a store and stock it with fresh produce, they need nutrition education to drive demand for healthy food. This is why both access and education go hand-in-hand, not only to drive better health outcomes, but also to ensure that stores are profitable and serve as economic anchors.

Last, I want to discuss incentives that help make healthy choices more affordable. In Philadelphia, 73 percent of Philly Food Bucks users report eating more fruits and vegetables, and SNAP sales at our farmers' markets have increased 300 percent since we launched the program. In Michigan, the Double Up Food Bucks Program is available throughout the state at farmers' markets and supermarkets, and around the country, hospitals are now participating in Veggie ℞ programs, allowing physicians to prescribe fruits and vegetables to low-income patients. The USDA FINI Program has supported the expansion of these SNAP incentive programs. Making healthier food more affordable makes it easier for low-income families to make healthier choices. Many parents might try putting a plate of fresh carrots in front of a toddler. If he doesn't like it, they can just fix him something else to eat. But imagine if you only have enough money to afford one plate of food. The decision to try new things becomes much more difficult.

In closing, there is no silver bullet to prevent diet-related disease like obesity and diabetes, but the costs are real. A recent study calculated the cost of diet-related disease at $427 billion. A comprehensive approach that combines access, nutrition education, incentives, and includes public-private partnerships holds the most promise for stemming these rising healthcare costs. Congress has moved forward to address obesity and diabetes through innovative programs like SNAP-Ed, FINI, and HFFI. SNAP is the foundation of this comprehensive approach and keeps millions of families from going hungry, and it is a critical economic pillar in low-income urban and rural communities. Without SNAP, stores would close, jobs would be lost, families would go hungry, and it would increase the need for food stamps. Quite a vicious cycle, if there ever was one, but by expanding access to healthy food, nutrition education, and SNAP incentives in the next farm bill, we can improve health, increase revenues for American farmers, create jobs in urban and rural areas, and control rising healthcare costs.

Thank you for asking me to testify.

[The prepared statement of Mr. Weidman follows:]

PREPARED STATEMENT OF JOHN WEIDMAN, DEPUTY EXECUTIVE DIRECTOR, THE FOOD TRUST, PHILADELPHIA, PA

Thank you, Chairman Conaway and Ranking Member Peterson, for inviting me to testify. My name is John Weidman, and I am the Deputy Executive Director of The Food Trust, a Pennsylvania based nonprofit that works nationally to improve access to affordable nutritious food. We were founded in 1992, and 2017 marks our 25th Anniversary. This year, through a grant from the Robert Wood Johnson Foundation we have launched the Center for Healthy Food Access: a national collaborative effort aimed at improving the health of children in America. I am here today to talk about the strategies that The Food Trust has been employing to improve health and encourage healthy eating among SNAP participants. We believe that to have the greatest impact it takes a comprehensive approach that includes improving access, providing nutrition education, and utilizing SNAP incentives. In Pennsylvania, we have been improving access by opening and maintaining farmers['] markets in low-income neighborhoods, working with small food stores to stock healthier products, and incentivizing new supermarket development through the Pennsylvania Fresh Food Financing Initiative, the national model for Healthy Food Financing programs. Our team of dieticians and nutrition educators is providing innovative and engaging programming through the SNAP-Ed program to teach children and adults how to eat healthy, how to cook, and how to shop on a budget. And we run a successful Food Bucks program that provides $2 worth of free fruits and vegetables for every $5 spent with SNAP at Philadelphia farmers['] markets and a local supermarket chain.

Based on research that has been conducted in Philadelphia, this comprehensive approach is working. A peer-reviewed study published in the journal *Pediatrics* found that our SNAP-Ed funded school nutrition education program reduced childhood overweight by 50%.[1] More recently, data collected on the Body Mass Index (BMI) of Philadelphia children is showing that after decades of rising childhood obesity rates, we are finally seeing them drop.[2] The strategies that are being implemented in Pennsylvania—access to healthy food, nutrition education, and SNAP Incentives—are happening all around the country, and they are not only changing eating habits and preventing diet-related diseases like heart disease and diabetes, but they are also creating jobs and spurring economic development in struggling urban and rural communities.

I want to share a brief story about Nicole Speller, a participant in one of our free 6 week SNAP-Ed cooking workshops that take place in over 500 community sites: libraries, community centers, and churches across southeastern Pennsylvania. Nicole had decided to make a change and improve her health. She also happened to be a fantastic cook, and each week she would share the recipes and nutrition tips she was learning with her neighbors and her church group. Upon completing the workshop series, Nicole started her own healthy cooking class at her church. This is just one example of how SNAP-Ed is helping to create a culture of health, and it is happening in innovative ways in every state in the nation. In addition to our cooking workshops, we also use Share Our Strength's excellent Cooking Matters program to teach how to shop healthy in the supermarket and make healthy choices on a budget. We also work directly with thousands of school children each year to teach them about food, farming, and eating healthy.

Of course, understanding how to eat healthier is only part of the problem for many SNAP participants. Accessing healthy food continues to be a challenge for millions of Americans. Over the last decade, we have seen incredible success through public-private partnerships to incentivize grocery stores, farmers['] markets, and other healthy food retail solutions to meet the need for better access. In Pennsylvania, thanks in large part to now-Congressman Dwight Evans, our Fresh Food Financing Initiative funded 88 grocery store projects in urban and rural areas and created 5,000 jobs. Based on this successful model, we now have the Federal Healthy Food Financing Initiative (HFFI) and programs in New York, Illinois, Mississippi, Colorado, and other states. Most recently, through Governor Kasich's Ohio Fresh Food Program, Vinton County—a rural county in southeast Ohio—is now slated for a new grocery store to open after the only store in the county had previously closed.

---

[1] Foster, G.D., Sherman, S., Borradaile, K.E., Grundy, K.M., Veur, S.S., Nachmani, J., Karpyn, A., Kumanyika, S., Shults, J. (2008). *A Policy-Based School Intervention to Prevent Overweight and Obesity.* PEDIATRICS, 121(4). doi:10.1542/peds.2007-1365.

[2] Robbins, J.M., Mallya G., Wagner A., Buehler J.W. *Prevalence, Disparities, and Trends in Obesity and Severe Obesity Among Students in the School District of Philadelphia, Pennsylvania, 2006–2013.* PREV. CHRONIC. DIS. 2015; 12; 150185. DOI; *http://dx.doi.org/10.5888/pcd12.150185*.

This store will now serve seniors and working families who have been unable to satisfy the very basic human need of going to the store to buy food.

While the HFFI model was developed working directly with grocers who want to improve access in under-served areas, they also stress the importance of nutrition education. It makes sense: if grocers open a store and stock it with fresh produce, they need nutrition education programs to drive demand for purchasing healthy food. For this reason, some grocers are now hiring registered dieticians to guide consumers in the store. Grocers understand the need to improve eating habits, but at the end of the day they cannot stock food that does not sell. This is why both access and education go hand-in-hand, not only to drive better health outcomes, but also to ensure that stores are profitable and serve as economic anchors for small towns and urban neighborhoods.

In addition to the vital role the Federal Government plays, partnerships with the private sector are a critical component of the solution. Consumer demand for healthy products is growing, and many operators and manufacturers are shifting their product portfolios in a healthier direction. At the same time, retailers are developing innovative ways to sell these products. Grocers, bodega owners, and farmers have been indispensable partners in all of the efforts I have been discussing. We are partnering with food manufacturers such as Campbell Soup Company, which is spearheading a 10 year initiative in Camden, New Jersey, to improve health and reduce food insecurity. GSK (GlaxoSmithKline), another corporate partner, is funding a city-wide initiative called Get HYPE Philly! that is focused on youth leadership development, healthy eating and exercise, and education and job skills. We need more of these innovative partnerships in the years ahead.

Last, I want to discuss incentives that encourage SNAP participants to try healthier foods and that make healthier choices more affordable. As I mentioned, The Food Trust launched our Philly Food Bucks program in 2011, and it has been a huge success. Seventy-three percent of Philly Food Bucks users report eating more fruits and vegetables, and SNAP sales at farmers['] markets have increased 300% since the start of the program. Based in Michigan, the Fair Food Network has greatly expanded their Double Up Food Bucks program in farmers' markets and grocery stores across the country. Wholesome Wave, based in Connecticut, is bringing SNAP incentives to health care, allowing physicians to "prescribe" fruits and vegetables to low-income patients for redemption at local farmers['] markets. In 2014, USDA launched FINI, the Food Insecurity Nutrition Incentive program, which has supported research, piloting, and expansion of SNAP incentive programs. Making healthier food more affordable makes it easier for low-income families to take risks when trying new foods. Many parents might try putting a plate of fresh carrots and peas in front of a toddler. If he sticks out his tongue and says yuck, they can just fix him something else to eat. (This is based on personal experience. I have a 3 year old). But imagine if you only have enough money to afford one plate of food—the decision to try new things becomes much more difficult.

In closing, there is no silver bullet to prevent diet-related diseases like obesity and diabetes, but the costs are real. A recent study by the Milken Institute calculated the direct medical costs for diet-related disease in 2014 at $427.8 billion.[3] Soda and sugary drinks are a big driver of the problem and Congress has moved forward to address obesity and diabetes through innovative programs like SNAP-Ed, FINI and HFFI. A comprehensive approach that combines access, nutrition education, and SNAP incentives holds the most promise for stemming these rising healthcare costs and building new, healthier habits. SNAP is the foundation of this comprehensive approach. It keeps millions of families from going hungry and is a critical economic pillar for lower income urban and rural communities. Without SNAP, stores would close, jobs would be lost, more families would drop into poverty, and more people would need food stamps. A vicious cycle, if there ever was one. By expanding access to healthy food, nutrition education, and incentives in the next farm bill we can improve health, increase revenues for American farmers, create jobs in urban and rural areas, and control rising healthcare costs.

Thank you for the opportunity to testify, I look forward to your questions.

The CHAIRMAN. Thank you very much.
Dr. Wansink?

---

[3] Waters, H., & DeVol, R. (2016). *Weighing Down America: The Health and Economic Impact of Obesity*. Retrieved from Milken Institute: *http://assets1c.milkeninstitute.org/assets/Publication/ResearchReport/PDF/Weighing-Down-America-WEB.pdf*.

STATEMENT OF BRIAN WANSINK, Ph.D., JOHN S. DYSON PROFESSOR OF MARKETING AND DIRECTOR, CORNELL UNIVERSITY FOOD AND BRAND LAB, ITHACA, NY

Dr. WANSINK. Thank you for giving me the opportunity to present my perspective on the pros and cons of restricting SNAP purchases. I will be addressing three questions today: first, what happens when food purchases are restricted; second, who has the most potential to shop healthier; and third, how can this be best encouraged? Thank you.

First, as a behavioral scientist and Director of the Cornell Food and Brand Lab, I focus on changing behaviors in a practical way. But as former USDA Executive Director from the Center for Nutrition Policy and Promotion, the *Dietary Guidelines,* I focused on changing eating behaviors in a scalable way. What I want to emphasize is our best and worst eating habits start in the grocery store. If we can change what people bring home, we change what they eat.

Now how do food restrictions influence people? Well, I have two exhibits. First, how does shopping behavior change after *versus* before people receive SNAP benefits? Well, there is a new 6 year study of SNAP recipients in Rhode Island that shows that spending on SNAP eligible products went up once they received the benefits, but the general purchase of SNAP ineligible benefits, the soft drinks and things like this, did not go down. What they do is they trace some of this to people buying more convenient products when they get SNAP benefits.

Exhibit 2 looks at incentives. When we specifically financially incentivize shoppers to buy more fruits and vegetables, what happens? In one 6 month study of 208 families in Utica, New York, we gave shoppers ten percent more money back in a debit card when they bought healthy foods like fruits and vegetables. When low-income shoppers were given this, they spent $33 more per week with $12 of that being on healthier foods, but $21 being on less healthy foods such as snack foods. The money they saved on healthy foods, they also spent on less healthy foods.

Now these are both preliminary reports. They do show that when people are incentivized to buy healthy foods, they do, but they also buy less healthy foods.

What I want to look at is who has the biggest potential to eat better? Now we make a mistake when we only look at all SNAP recipients as a homogenous group of shoppers. Instead, people are in a pyramid like this. It goes in a hierarchy of healthy disposition. If you see something like this, there are people at the top who are very vigilant shoppers. These are people who know the number of calories in a Coke, the number of calories in Fritos. They care about what they eat. No change is going to influence what they buy. At the very bottom, you have health disinterested shoppers. Again, these are people who are either resigned or they are disinterested in shopping healthier, and again, no change is going to have much impact on what they buy. Who we can influence is this middle group, the health predisposed shoppers, because these are the people who want to eat better, but they just need the help and the nudge to do so.

Now if we look at what is going to work best for these health predisposed shoppers, the question is how do we do this? Will the restriction work? And second, will something else work better?

Now I said earlier it is not clear whether the hassles of related retailing shopper dignity would merit a change, but there might be a solution to this. So for instance, one option would be to give a SNAP recipient an option. They can use 100 percent of their SNAP benefits to purchase whatever they wanted, or if they agreed themselves to restricting—let's just say to produce. Maybe they get a bonus. They get 125 percent more. Now we are not sure how this would work, and it does merit testing as mentioned earlier, but a second option is far easier to implement and can be scaled very quickly. It involves providing simple guidelines to retailers, maybe even a certification on how to make it easier for SNAP shoppers, all shoppers, to buy healthier foods by making it more convenient, attractive, and normal to do so.

There is a precedent for this healthier by design shopping program that is beginning to work in food deserts. Last year, the National Association of Convenience Stores developed and launched a new tool kit of evidence-based tactics that could be used to increase the sales of healthier foods. It is one reason why when you buy gas, you often find a basket of bananas next to the cash register. That is because of this program. These are small, easy changes to make, and they are win-win benefits for both retailers, SNAP recipients, and us. But systematically giving other retailers the guidance on how to make these healthy nudges and credit them for doing so would benefit SNAP shoppers just as well as it is benefitting us.

Another way this retail program is underway is the Nordic solution to sustainability and obesity, it is related to the EAT Foundation and GreeNudge. And over there, supermarkets are being guided to make small changes in signage, service, and structure, and it has increased fruits and vegetables consumption for that.

Now in summary, and this is a third alternative, but I will give three things. SNAP recipients get benefits and restricted benefits, but they do not necessarily buy only healthier foods. They buy everything else. Second, there are three segments of shoppers; and third, there are different ways to best encourage this health predisposed segment.

Thanks for this opportunity to talk with you.

[The prepared statement of Dr. Wansink follows:]

PREPARED STATEMENT OF BRIAN WANSINK, PH.D., JOHN S. DYSON PROFESSOR OF MARKETING AND DIRECTOR, CORNELL UNIVERSITY FOOD AND BRAND LAB, ITHACA, NY

Good morning, Chairman Conway, Ranking Member Peterson, Members of the Committee: Thank you for giving me the opportunity to present my perspective on the pros and cons of restricting SNAP purchases. I will be addressing three questions today: (1) What happens when food purchases are restricted? (2) Who has the most potential to shop healthier, and (3) How can this be best encouraged?

When Happens When Food Purchases are Restricted?

As a behavioral scientist and Director of the Cornell Food and Brand Lab, I focus on changing eating behaviors in a *practical* way. As the former USDA Executive Director for the Center for Nutrition Policy and Promotion—the *Dietary Guidelines*— I focused on changing eating behaviors in a *scalable* way.

When Food Stamps were first introduced, their purpose was to fill bellies with calories. Seventy years later we have another important opportunity. Fill bellies with

the *right* calories. With increasing health care costs threatening the future of the American economy, one place we can begin turning this around—starting tonight—is with what we eat in our homes. Of all the health concerns that face Americans, diet-related disease and obesity are the ones that we can tackle most immediately.

What is critical to remember, however, is this: Our best and worse eating habits start in the grocery store. If we can change what people bring home from the grocery store or market, we can change how they eat.

Do people shop differently when they're given extra money—such as a rebate or SNAP benefits? Two preliminary studies give us some insight here.

Exhibit No. 1. How does shopping behavior change *after **versus** before* people receive SNAP benefits? A new 6 year study of SNAP recipients in Rhode Island showed that the spending on SNAP eligible products went up once they received benefits, but the general purchase of SNAP ineligible benefits did not go down (Hastings and Shaprio 2017). Further unpublished analyses (learned through conversation) also suggest that purchase of convenient-to-eat foods goes up once a person receives SNAP benefits. They trade their SNAP benefits for convenience.

Exhibit No. 2 looks at incentives. What if we specifically financially incentivize shoppers to buy more fruits and vegetables? In one 6 month study of 208 families in Utica, NY, we gave shoppers a 10% bonus—10% more money back on their debit card—when they bought healthy foods such as fruits and vegetables. When low-income shoppers (poverty ratio less than 1.3) were given this extra money as a subsidy, they spent $33 more per week on healthier foods—including fruits and vegetables, but they also spent $21 more per week on less healthy foods, such as snack foods (Cawley, *et al.,* 2016). Some of the money they saved on the healthy foods, they appeared to spend on less healthy foods.

Although both of these are single, preliminary white papers in the National Bureau of Economic Research, they point at the idea that extra money—in the form of SNAP benefits or subsidies—changes the way people shop. They *do* buy more of the healthy, incentivized foods, but they also buy more of the less healthy foods. They just use their own money instead.

A key question, however, is "Who has the most potential to eat better?"

The Hierarchy of Health Predisposition

When I was the Executive Director of the USDA's Center for Nutrition Policy and Promotion, I saw people off-handedly dismiss potentially useful ideas for new initiatives if they would not benefit 100% of the population under discussion.

In trying to solve difficult problems, it is very useful to not view 100% of all people—such as all SNAP benefit recipients—as the same. Some people already eat very healthy, some people do not want to eat healthy, and some people want to, but they need help. When trying to predict how a SNAP shopper would respond to a restriction, it is useful to understand that there is a Hierarchy of Health Predisposition.

Not all SNAP shoppers shop alike and we can view them—like all shoppers—on how predisposed they are to wanting to make a healthier shopping decision. We can view them as belonging to one of three fluid groups within a Hierarchy of Health Predisposition. The top segment of this hierarchy are Health Vigilant shoppers. They are highly informed, conscious of calories, and they are influenced by nutrition information. At the bottom extreme, Health Disinterested shoppers have little interest in changing their eating choices because of either the effort, sacrifice, or perceived futility of doing so. The segment in the middle are the Health Predisposed shoppers. They would prefer to make healthier food choices, but they have difficulty consistently doing so unless it involves very little sacrifice on their part. This Predisposed segment is the one that buys the 100 calorie packages of snacks and the sugar-free yogurt. For all people, this segment is larger on New Years Day than it was in December; it was larger this past Monday morning than it was during the prior Friday night's shopping trip.

The Hierarchy of Health Predisposition

Health
Vigilant
Shoppers

Health
Predisposed
Shoppers

Health
Disinterested
Shoppers

One reason nutrition guidance systems (such traffic lights or Guiding Stars) have had only modest influences on the sales of healthy food may be because they mainly resonate with only the top of the Hierarchy. Health Disinterested shoppers ignore these programs, and Heath Predisposed shoppers inconsistently follow them. If the only segment they reach are the Vigilant shoppers, interventions like this will have hardly any impact on sales since this segment is already shopping in a healthy way.

This is important because SNAP restrictions may not have the same impact on healthy shopping behavior that we desire. The Health Vigilant shoppers will already be shopping healthy, and they do not need them. At the other extreme, Healthy Disintereseted shoppers might simply rechannel their own money toward what they would have bought anyway. What this importantly raises is the question as to whether there other ways to guide SNAP shoppers to eat healthier—particularly those in this middle section.

Non-Restrictive Options to Encourage Healthier SNAP Shopping Patterns

One extreme way to try and encourage SNAP shoppers to eat better is to restrict what they can purchase. Some people might say this is not practical for retailers. Other people might say this is not respectful of the dignity or free choice of SNAP shoppers.

What is not asked when it comes to restricting SNAP purchases is, "Will it even work?" As just noted, for the Health Vigilant, it wouldn't have any impact because they already eat healthy. At the other end, for the Health Disinterested, it may not work because they will simply spend their cash on what they would have otherwise bought anyway. There are two open questions: (1) Will a restriction work with the Health Predisposed—this middle segment, and (2) Would something else work better?

First, as said earlier, it is not clear if the retail hassles and the shopper dignity and free choice issues related to a restriction would merit a change. There may be a solution to this, however. Suppose a nutritionally predisposed shopper had one of two options. One option would be to have 100% of their SNAP benefits to purchase whatever they wanted (foods that are currently eligible). A second option would be that they could agree to self-restrict themselves from buying certain foods in exchange for, say, 125% of their SNAP benefits. In effect, if they agreed to restrict their SNAP benefits to buy only predetermined healthy foods—say fruits, vegetables, whole grains, lean meat and dairy—they would get more 25% (or however much) more buying power. Such a system would still give people an option—they could either choose the 100% unrestricted plan or they could choose the 125% restricted plan—and it would help those who wanted to eat better to more easily do so. Of course, we have no evidence of how effective this would be in practice, but it is an idea that merits pilot testing. It lets people be free to choose while also providing them an incentive to eat better. The SNAP recipient chooses what they want.

A second option is far easier to implement and can be scaled quickly. It involves providing simple guidelines to retailers—perhaps even a certification—on how to make it easier for SNAP shoppers (and all shoppers) to buy healthier foods by mak-

ing it more convenient, attractive, and normal (the CAN framework) to do so. This notion of "Healthy Shopping by Design" is fashioned off of the Smarter Lunchroom Movement which is a USDA-sponsored initiative that trains food service directors on the dozens of ways they can guide students toward making healthier selections in the school lunchroom (Hanks, *et al.,* 2013). The 66-point scorecard shows whether the way they set up, serve, and promote foods make kids fit or fat. For instance, a score of 25 out of 66 indicates there is easy room for improvement, but also points at the 41 other changes they could make (*Appendix*).

There is precedent for a Healthy Shopping by Design program that is beginning to work in food deserts. In 2016, the National Association of Convenience Stores, working with the Cornell Food and Brand Lab developed and launched a new toolkit titled, "Ideas That Work to Grow Better-for-You Sales," and they include evidence-based tactics to increase the sales of healthier foods. It is one reason you can often buy a banana when you buy gas—they are sitting right next to the cash register (Lenard and Schare 2016). These are small easy changes to make, but they are win-win and benefit both retailers and (food desert) shoppers.

Systematically giving other retailers the guidance of how to make healthy nudges, and the credit for doing so could change healthy shopping for SNAP shoppers just as the Smarter Lunchroom Movement is changing lunchtime for school children (Wansink 2017; 2014). In Norway, this is currently underway as a Nordic Solution to sustainability and obesity (which is related to the EAT Foundation and GreeNudge). Over there, supermarkets are being guided how to make small changes to the signage, structure, and service, and the results have been increased fruit and vegetable sales for all (Wansink, Karvold, and Tran 2017).

Summary

1. Giving SNAP recipients more benefits or restricted benefits may not lead them to only buy healthier food (they will also buy more convenient foods and less healthier foods).

2. There are three segments of shoppers: the Health Vigilant, the Health Pre-disposed, and the Health Disinterested. The easiest win will be to focus efforts programming on the Health Predisposed segment.

3. There are at least two ways to try and influence the Health Predisposed segment. One might be giving them 100% of their unrestricted benefits, or 130% of restricted benefits. A second would be to work with retailers to show them how they can be even more profitable by making it convenient, attractive, and normal for SNAP shoppers—indeed all shoppers—to shop healthier. Just as this program is responsible for putting bananas by the convenience store checkouts, and more vegetables in Norwegian shopping carts, it could be successful on a larger scale with supermarkets and other stores accepting SNAP benefits.

Thank you for this opportunity to share my perspective with you.

References

Cawley, John, Andrew S. Hanks, David R. Just, and Brian Wansink (2016), "Incentivizing Nutrition Diets: A Field Experiment of Relative Price Changes and How They Are Framed," National Bureau of Economics Research, Working paper 21929.

Hanks, Andrew S., David R. Just, and Brian Wansink (2013), "Smarter Lunchrooms Can Address New School Lunchroom Guidelines and Childhood Obesity," *Journal of Pediatrics,* 162: 4 (April), 867–869.

Hastings, Justine and Jesse M. Shapiro (2017), "How are SNAP Benefits Spent? Evidence from a Retail Panel," National Bureau of Economic Research, Working paper.

Lenard, Jeff and Carolyn Schnare (2016), "Eight Low-Cost—and Proven—Tactics for How C-Store Operators and Grow Their Healthy Offer," *NACS Magazine,* August, 30–36.

NACS (2016), "NACS Toolkit Helps C-Stores Grown Better-for-You Sales," May 26 *http://www.nacsonline.com/Media/Daily/Pages/ND0526161.aspx#.WKPMM neZNPs.*

Wansink, Brian (2014), *Slim by Design—Mindless Eating Solutions for Everyday Life,* New York, NY: William Morrow.

Wansink, Brian, Knut Karevold, and Huy Tran (2017), "Supermarket Interventions to Sell Sustainable Fruits and Vegetables: The Nordic Solution to Healthier Shopping," Cornell Food and Brand Lab, working paper.

Wansink, Brian (2017), "Healthy Profits: An Interdisciplinary Retail Framework that Increases the Sales of Healthy Foods, *Journal of Retailing,* in press.

APPENDIX. EXAMPLE OF SCORECARDS THAT ENCOURAGE HEALTHIER CHOICES

SMARTER LUNCHROOMS SCORECARD

Date _____ School Name _____ Completed by _____

The Smarter Lunchrooms Scorecard is a list of simple, no-cost or low-cost strategies based on research from Cornell University, that can increase participation, reduce food waste, and increase selection and consumption of healthy school food.

INSTRUCTIONS

1. Review the scorecard before beginning.
2. Observe a lunch period. Check off statements that reflect the lunchroom.
3. Ask other school nutrition staff, teachers, or administration about items that have an asterisk.*

4. Tally the score.
5. Discuss the results with stakeholders. Choose unchecked strategies to implement in the lunchroom.

SmarterLunchrooms.org

FOCUS ON FRUIT

- At least two kinds of fruit are offered.
- Sliced or cut fruit is offered.
- A variety of mixed whole fruits are displayed in attractive bowls or baskets (instead of stainless steel pans).
- Fruit is offered in at least two locations on all service lines, one of which is right before each point of sale.
- At least one fruit is identified as the featured fruit-of-the-day and is labeled with a creative, descriptive name at the point of selection.
- A fruit taste test is offered at least once a year.*

Focus on Fruit Subtotal _____ of 6

VARY THE VEGETABLES

- At least two kinds of vegetables are offered.
- Vegetables are offered on all service lines.
- Both hot and cold vegetables are offered.
- When cut, raw vegetables are offered, they are paired with a low-fat dip such as ranch, hummus, or salsa.*
- A serving of vegetables is incorporated into an entree item at least once a month (e.g., beef and broccoli bowl, spaghetti, black bean burrito).*
- Self-serve spices and seasonings are available for students to add flavor to vegetables.
- At least one vegetable is identified as the featured vegetable-of-the-day and is labeled with a creative, descriptive name at the point of selection.
- A vegetable taste test is offered at least once a year.*

Vary the Vegetables Subtotal _____ of 8

HIGHLIGHT THE SALAD

- Pre-packaged salads or a salad bar is available to all students.
- Pre-packaged salads or a salad bar is in a high traffic area.
- Self-serve salad bar tongs, scoops, and containers are larger for vegetables and smaller for croutons, dressing, and other non-produce items.
- Pre-packaged salads or salad bar choices are labeled with creative descriptive names and displayed next to each choice.

Highlight the Salad Subtotal _____ of 4

MOVE MORE WHITE MILK

- Milk cases/coolers are kept full throughout meal service.
- White milk is offered in all beverage coolers.
- White milk is organized and represents at least 1/3 of all milk in each designated milk cooler.
- White milk is displayed in front of other beverages in all coolers.
- 1% or non-fat white milk is identified as the featured milk and is labeled with a creative, descriptive name.

Move More White Milk Subtotal _____ of 5

BOOST REIMBURSABLE MEALS

- Cafeteria staff politely prompt students who do not have a full reimbursable meal to select a fruit or vegetable.
- One entrée is identified as the featured entrée-of-the-day, is labeled with a creative name next to the point of selection, and is the first entrée offered.
- Creative, descriptive names are used for featured items on the monthly menu.
- One reimbursable meal is identified as the featured combo meal and is labeled with a creative name.
- The combo meal of the day or featured entrée-of-the-day is displayed on a sample tray or photograph.
- A (reimbursable) combo meal is offered as a grab-and-go meal.
- Signs show students how to make a reimbursable meal on any service line (e.g., a sign that says "Add a milk, fruit and carrots to your pizza for the Power Pizza Meal Deal!")
- Students can pre-order lunch in the morning or day before.*
- Students must use cash to purchase à la carte snack items if available.
- Students have to ask a food service worker to select à la carte snack items if available.*
- Students are offered a taste test of a new entrée at least once a year.*

Reimbursable Meals Subtotal _____ of 11

LUNCHROOM ATMOSPHERE

- Cafeteria staff smile and greet students upon entering the service line and throughout meal service.
- Attractive, healthful food posters are displayed in dining and service areas.
- A menu board with today's featured meal options with creative names is readable from 5 feet away when approaching the service area.
- The lunchroom is branded and decorated in a way that reflects the student body.
- Cleaning supplies or broken/unused equipment are not visible during meal service.
- All lights in the dining and meal service areas work and are turned on.
- Compost/recycling and trash cans are at least 5 feet away from dining students.
- There is a clear traffic pattern. Signs, floor decals, or rope lines are used when appropriate.
- Trash cans are emptied when full.
- A menu board with tomorrow's featured meal with creative names is readable from 5 feet away in the service or dining area.

Lunchroom Atmosphere Subtotal _____ of 10

STUDENT INVOLVEMENT

- Student artwork is displayed in the service area or dining space.
- Students, teachers, or administrators announce today's menu in daily announcements.*
- Students are involved in the development of creative and descriptive names for menu items.*
- Students have the opportunity to volunteer in the lunchroom.
- Students are involved in the creation of artwork or marketing materials to promote menu items.*
- Students provide feedback (informal - "raise your hand if you like..." or formal - focus groups, surveys) to inform menu development.*

Student Involvement Subtotal _____ of 6

SCHOOL COMMUNITY INVOLVEMENT

- A monthly menu is posted in the main office.
- A menu board with creative, descriptive names for today's featured meal options is located in the main office.
- A monthly menu is provided to students, families, teachers, and administrators.*
- Information about the benefits of school meals is provided to teachers and administration at least annually.*
- Nutrition education is incorporated into the school day.*
- Students are engaged in growing food (for example, gardening, seed planting, farm tours, etc.).*
- Elementary schools provide recess before lunch.*
- The school participates in other food promotion programs such as: Farm to School, Chefs Move to Schools, Fuel Up to Play 60, Share our Strength, etc.*
- The school has applied for the HealthierUS School Challenge.*
- Smarter Lunchrooms strategies are included in the Local School Wellness Policy.*

School Involvement Subtotal _____ of 10

SMARTER LUNCHROOMS SCORECARD TOTAL

Focus on Fruit	_____	of 6
Vary the Vegetables	_____	of 8
Highlight the Salad	_____	of 4
Move More White Milk	_____	of 5
Reimbursable Meals	_____	of 11
Lunchroom Atmosphere	_____	of 10
Student Involvement	_____	of 6
School Involvement	_____	of 10
Scorecard Total	_____	of 60

AWARD LEVEL

Bronze 15 - 25
Great job! This lunchroom is off to a strong start.

Silver 26 - 45
Excellent. Think of all the kids that are inspired to eat healthier!

Gold 46 - 60
This lunchroom is making the most of the Smarter Lunchroom Movement. Keep reaching for the top!

For Scorecard FAQs visit: SmarterLunchrooms.org

The **asterisk** * indicates items that may need input from other school nutrition staff, teachers, or administration.

Smarter Lunchrooms Scorecard 2.0

© Smarter Lunchrooms Movement, Cornell University 2017
Funded in part by USDA FNS/ERS

DEFINITIONS

Point of Sale (POS): Anywhere students leave the line with food and are charged or counted, such as at a register, check-out, or PIN pad.
Point of Selection: Anywhere students select food or drink.
Service Line: A designated line for meal selection—deli bar, salad bar, hot lunch line, snack window, etc.

Grab-and-Go: A pre-packaged reimbursable meal.
Reimbursable Meal/Combo Meal: Any meal that meets all the USDA meal requirements and is priced as a unit.
Featured Items: A fruit, vegetable, milk, or entrée that has been identified for promotion.

EXHIBIT 1

How Are SNAP Benefits Spent? Evidence from a Retail Panel

chusetts Institute of Technology, and the Quantitative Marketing and Economics Conference, and from comments by discussant J.P. Dubé. We thank our dedicated research assistants for their contributions. The views expressed herein are those of the authors and do not necessarily reflect the views of the National Bureau of Economic Research.

Abstract

We use a novel retail panel with more than 6 years of detailed transaction records to study the effect of participation in the Supplemental Nutrition Assistance Program (SNAP) on household spending. We frame our approach using novel administrative data from the state of Rhode Island. The marginal propensity to consume SNAP-eligible food (MPCF) out of SNAP benefits is 0.5 to 0.6. The MPCF out of cash is much smaller. These patterns obtain even for households for whom SNAP benefits are economically equivalent to cash in the sense that benefits do not cover all food spending. We reject the hypothesis that households respect the fungibility of money in a semiparametric setup. A *post-hoc* model of mental accounting rationalizes these facts and others.

Justine S. Hastings,
Brown University,
Department of Economics,
64 Waterman Street,
Providence, RI 02912,
and NBER,
justine_hastings@brown.edu;

Jesse M. Shapiro,
Economics Department,
Box B,
Brown University,
Providence, RI 02912,
and NBER,
jesse_shapiro_1@brown.edu.

A online appendix is available at *http://www.nber.org/data-appendix/w23112*.

1 Introduction

This paper studies how receipt of benefits from the Supplemental Nutrition Assistance Program (SNAP) affects household spending. SNAP is of special interest to economists for at least two reasons. First, the program is economically important: it is the second-largest means-tested program in the United States after Medicaid (Congressional Budget Office 2013), enrolling 19.6 percent of households in fiscal 2014.[1]

Second, the program's stated objectives sit awkwardly with economic theory. On signing the bill to implement the predecessor Food Stamp Program, President Lyndon Johnson declared that the program would "enable low-income families to increase their food expenditures" (Johnson 1964). The Food and Nutrition Service of the USDA says that SNAP is important for "helping low-income families put food on the table" (FNS 2012). Yet although SNAP benefits can only be spent on food, textbook demand theory (Mankiw 2000; Browning and Zupan 2004) predicts that, for the large majority of SNAP recipients who spend more on food than they receive in benefits,[2] SNAP benefits are economically equivalent to cash.[3] As typical estimates of the marginal propensity to consume food (MPCF) out of cash income are

---

[1] There were 22,743,911 participating households in fiscal 2014 (FNS 2016a) and 116,211,092 households in the U.S. on average from 2010–2014 (U.S. Census Bureau 2016).

[2] Hoynes, *et al.,* (2015) find that spending on food at home is at or above the SNAP benefit level for 84 percent of SNAP recipient households. Trippe and Ewell (2007) report that 73 to 78 percent of SNAP recipients spend at least ten percent more on food than they receive in SNAP benefits.

[3] Consider a household with monthly income y and SNAP benefits b. If the household spends f on SNAP-eligible food then she has $y - \max(0, f - b)$ available to buy other goods. Let $U(f,n)$ denote the household's strictly monotone, differentiable, and strictly quasiconcave utility function defined over the dollar amount of SNAP-eligible food consumption f and other consumption n. Suppose that there is a solution $f^* = \arg\max_f U(f, y - \max(0, f - b))$ such that $f^* > b$. The first-order necessary condition for this program is a necessary and sufficient condition for a solution to the program $\max_f U(f; y+b-f)$ in which the benefits are given in cash. Therefore $f^* = \arg\max_f U(f, y+b-f)$.

close to 0.1,[4] the textbook treatment says that SNAP benefits should mostly subsidize non-food spending.

Estimating the effect of SNAP benefits on spending is challenging because it requires good measurement of household spending and suitably exogenous variation in program participation or benefits. Survey-based measures of household spending are error-prone and sensitive to the mode of elicitation (Ahmed, *et al.,* 2006; Browning, *et al.,* 2014; Battistin and Padula 2016). Important components of SNAP eligibility and benefit rules are set nationally, and major program changes have often coincided with other policy changes or economic shocks (Congressional Budget Office 2012), making it difficult to separate the effect of SNAP from the effect of these contextual factors.

In this paper we analyze a novel panel consisting of detailed transaction records from February 2006 to December 2012 for nearly ½ million regular customers of a large U.S. grocery retailer. The data contain information on method of payment, including whether payment was made using a government benefit card. We use the panel to study the effect of transitions on and off of SNAP, and of legislated changes in SNAP benefits, on household spending.

We adopt three approaches to isolating the causal effect of SNAP on spending: a panel event-study design using trends prior to SNAP adoption to diagnose confounds, an instrumental variables design exploiting plausibly exogenous variation in the timing of program exit, and a differences-in-differences design exploiting legislated changes to benefit schedules.

We motivate each of these approaches with findings from novel Rhode Island administrative data. The data show that household income and size change in the months preceding a household's transition on to SNAP, motivating our panel event-study design. The data also show that SNAP spell lengths are typically divisible by 6 months because of the recertification process, motivating our instrumental-variables design. National administrative records show discrete jumps in SNAP benefits associated with legislated program changes in 2008 and 2009, motivating our differences-in-differences design.

By construction our retail panel includes purchases at a single grocery chain. Rhode Island administrative data show that it is possible to reliably infer transitions on to SNAP using data from a single grocery chain, by focusing on consecutive periods of non-SNAP use followed by consecutive periods of SNAP use. Additional data, including a survey conducted by the retailer, show that SNAP participation is only weakly related to a household's choice of retailer.

Graphical analysis of our panel event-study design shows that after adoption of SNAP, households in the retailer panel increase SNAP-eligible spending by about $110 a month, equivalent to a bit more than ½ of their monthly SNAP benefit. There is no economically meaningful trend in SNAP-eligible spending prior to adoption of SNAP. Graphical analysis of our instrumental-variables and differences-in-differences designs also implies an MPCF out of SNAP in the range of 0.5 to 0.6.

We exploit large swings in gasoline prices during our sample period to estimate the MPCF out of cash for the retail panelists. We observe gasoline spending at the retailer and confirm that increases in gasoline prices lead to significant additional out-of-pocket expenses for panelist households. We estimate that every $100 per month of additional gasoline spending reduces food spending by less than $10, in line with past estimates of the MPCF out of cash for the SNAP-recipient population (*e.g.,* Castner and Mabli 2010) but far below the estimated MPCF out of SNAP.

Turning to SNAP-ineligible spending at the retailer, we estimate an MPC of 0.02 out of SNAP benefits, and a (statistically indistinguishable) MPC of 0.04 out of cash.

We develop an economic model of food spending by households for whom SNAP benefits do not cover all food spending and are therefore fungible with cash. We show how to test the hypothesis of fungibility, allowing for the endogeneity of cash income and SNAP benefits, and for the possibility that different households' consumption functions do not share a common parameterization or parametric structure. Our tests consistently reject the null hypothesis that households treat SNAP benefits as fungible with other income.

We extend our economic model to include mental accounting following the approach in Farhi and Gabaix (2015). The extension is *post-hoc.* By design, it rationalizes the finding that the MPCF is greater out of SNAP benefits than out of cash. It also predicts that, following SNAP receipt, households will allocate relatively less effort to bargain-hunting in the food domain than in the non-food do-

---

[4] Castner and Mabli (2010) estimate an MPCF out of cash income of 0.07 for SNAP participants. Hoynes and Schanzenbach (2009) estimate an MPCF out of cash income of 0.09–0.10 for populations with a high likelihood of participating in the Food Stamp Program.

main. We find that SNAP receipt reduces the store-brand share of expenditures and the share of items on which coupons are redeemed, but only for SNAP-eligible foods.

We also discuss the responses from qualitative interviews conducted at a food pantry as part of a Rhode Island pilot proposal to modify SNAP benefit timing. Respondents were not scientifically sampled, and it is not appropriate to derive general conclusions from these interviews. Nevertheless, we find that they provide useful context for our analysis.

This paper contributes to a large literature on the effects of SNAP and the predecessor Food Stamp Program on food spending, recently reviewed by Bitler (2015) and Hoynes and Schanzenbach (2016). There are four strands to this literature. The first strand studies the effect of converting food stamp benefits to cash. Moffitt (1989) finds that a cashout in Puerto Rico did not affect food spending. Wilde and Ranney (1996) find that behavior in two randomized cashout interventions is not consistent with fungibility; Schanzenbach (2002) finds that behavior in these same interventions is consistent with fungibility.[5] The second strand, reviewed in Fox, *et al.* (2004), either compares participants to nonparticipants or relates food spending to the size of a household's benefit, either across households or over time. Wilde (2001) and Hoynes and Schanzenbach (2009), among others, criticize this strand of the literature for using a source of variation in program benefits that is likely related to non-program determinants of spending.[6] The third strand studies randomized evaluations of program extensions or additions. Collins, *et al.* (2016) study a randomized evaluation of the Summer Electronic Benefit Transfer for Children program and use survey data to estimate an MPCF out of program benefits of 0.58.

The fourth strand exploits policy variation in program availability and generosity. Studying the initial rollout of the Food Stamp Program using survey data, Hoynes and Schanzenbach (2009) estimate an MPCF out of food stamps of 0.16 to 0.32, with confidence interval radius ranging from 0.17 to 0.27. Hoynes and Schanzenbach (2009) estimate an MPCF out of cash income of 0.09 to 0.10 and cannot reject the hypothesis that the MPCF out of food stamps is equal to the MPCF out of cash income. Studying the effect of a 2009 SNAP benefit expansion using survey data, Beatty and Tuttle (2015) estimate an MPCF out of SNAP benefits of 0.53 to 0.64 (they do not report a confidence interval on these values) and an MPCF out of cash income of 0.15.[7] Closest to our study, Bruich (2014) uses retail scanner data with method-of-payment information to study the effect of a 2013 SNAP benefit reduction, estimating an MPCF out of SNAP benefits of 0.3 with confidence interval radius of 0.15.[8] Bruich (2014) does not report an MPCF out of cash income. We estimate an MPCF out of SNAP benefits of 0.5 to 0.6 with confidence interval radius as low as 0.015, and an MPCF out of cash income of no more than 0.1.

This paper contributes new evidence of violations of fungibility in a large-stakes real-world decision with significant policy relevance. That households mentally or even physically separate different income sources according to spending intentions is well-documented in hypothetical-choice scenarios (*e.g.,* Heath and Soll 1996; Thaler 1999) and ethnographic studies (*e.g.,* Rainwater, *et al.,* 1959). Much of the recent literature documenting this behavior in real-world markets focuses on consumer choice settings with little direct policy relevance (*e.g.,* Milkman and Bashears 2009; Hastings and Shapiro 2013; Abeler and Marklein forthcoming). Important exceptions include Kooreman's (2000) study of a child tax credit in the Netherlands, Feldman's (2010) study of a change in U.S. Federal income tax withholding, and Benhassine, *et al.*'s (2015) study of a labeled cash transfer in Morocco.

Methodologically, this paper shows how to test for the fungibility of money without assuming that the consumption function takes a particular parametric form or that the consumption function is identical for all households.[9] Our approach nests

---

[5] Fox, *et al.* (2004) question the validity of the findings from Puerto Rico and one of the randomized interventions, arguing that the best evidence indicates that cashout reduces food spending.

[6] Wilde, *et al.* (2009) address the endogeneity of program benefits by exploiting variation in whether household food spending is constrained by program rules. Li, *et al.* (2014) use panel data to study the evolution of child food insecurity in the months before and after family entry into the food stamp program.

[7] Nord and Prell (2011) estimate the effect of the 2009 benefit expansion on food security and food expenditures. Ratcliffe, *et al.* (2011) and Yen, *et al.* (2008) estimate the effect of SNAP and food stamps, respectively, on food insecurity, using state-level policy variables as excluded instruments.

[8] Andreyeva, *et al.* (2012) and Garasky, *et al.* (2016) use retail scanner data to describe the food purchases of SNAP recipients, but not to estimate the causal effect of SNAP on spending.

[9] Whereas classical tests of consumer rationality (Varian 1983; Blundell, *et al.,* 2003) require observing price changes, we provide a set of intuitive sufficient conditions on the model and the measurement process that permit testing based on income variation alone.

Kooreman's (2000), but avoids the concern that a rejection of fungibility is due to misspecification of functional forms (Ketcham, *et al.,* 2016).

Finally, the paper presents new evidence from novel administrative data on SNAP recipients in Rhode Island, including the first evidence we are aware of from state administrative data on how household wage income evolves before and after entry into SNAP.[10] Although we present these findings primarily as background, they are of interest in their own right as evidence on the contextual factors associated with SNAP adoption.

2   Background and Evidence from Administrative and Survey Data

2.1   Rhode Island Administrative Data

We use Rhode Island state administrative records housed in a secure facility at the Rhode Island Innovative Policy Laboratory at Brown University. Personally identifiable information has been removed from the data and replaced with secure identifiers that make it possible to link different records associated with the same individual or household. These records are not linked to our retail panel.

We obtain the state's SNAP records from October 2004 through June 2016. These data define the months of benefit receipt and the collection of individuals associated with every household on SNAP in every month. We assume that a household's composition is unchanged prior to its first benefit receipt and that it does not change from its most recent composition between the end of any given period of benefit receipt and the start of the next period. We exclude from our analysis any household whose membership we cannot uniquely identify in every month,[11] or whose adult composition changes during the sample period. The final sample consists of 185,534 unique households.

From SNAP records we compute, for each household and month, the total number of children in the household under 5 years old. From the records of the state unemployment insurance system we compute, for each household and quarter,[12] the sum of total unemployment insurance benefits received from and total earnings reported to the state unemployment insurance system by all individuals who are in the household as of the quarter's end.[13] We refer to this total as household income, but we note that it excludes income not reported to the Rhode Island unemployment insurance system, such as social security benefits and out-of-state earnings.

We also obtain records of all debits and credits to SNAP Electronic Benefit Transfer (EBT) cards for the period September 2012 through October 2015. From these we identify all household-months in which the household received a SNAP benefit and all household-months in which the household spent SNAP benefits at a large, anonymous retailer in Rhode Island ("Rhode Island Retailer") chosen to be similar to the retailer that provided our retail panel. Although these data can be linked to the SNAP records using a household identifier, we do not exploit that link in the analysis that follows.

2.2   Changes in Household Circumstances Around SNAP Adoption

Household income and household size are major determinants of SNAP eligibility (FNS 2016b). We therefore hypothesize that entry into SNAP is associated with a decline in household income and a rise in household size. *Figure 1* shows that this hypothesis is confirmed in our administrative data. The figure shows panel event-study plots of household income and number of children as a function of time relative to SNAP adoption, which we define to occur on the first quarter or month, respectively, of a household's first SNAP spell. In the period of SNAP adoption, household income declines and the number of children rises, on average.

Past research shows that greater household size and lower household income are associated, respectively, with greater and lower at-home food expenditures among the SNAP-recipient population (Castner and Mabli 2010).[14] It is therefore unclear

---

[10] Other recent studies analyzing linked unemployment insurance and SNAP data include Anderson, *et al.,* (2012) and Leung and O'Leary (2015).

[11] This can occur either because we lack a unique identifier for a member individual or because a given individual is associated with multiple households in the same month.

[12] Data on earnings are missing from our database for the fourth quarter of 2004 and the second quarter of 2011.

[13] We exclude from our analysis any household-quarter in which the household's total quarterly earnings exceed the 99.9999th percentile or in which unemployment insurance benefits in any month of the quarter exceed three times the 4 week equivalent of the 2016 maximum weekly benefit of $707 (Rhode Island Department of Labor and Training 2016).

[14] Past research also finds that unemployment—a likely cause of the decline in income associated with SNAP adoption—is associated with a small decline in spending on food for home consumption. Using cross-sectional variation in the Continuing Survey of Food Intake by Individ-

whether these contextual factors should contribute a net rise or fall in food expenditures in the period of SNAP adoption. Because *Figure 1* shows that these factors trend substantially in the periods preceding SNAP adoption, we can assess their net effect by studying trends in spending prior to adoption.

Figure 1 therefore motivates our panel event-study research design, in which we use trends in spending prior to SNAP adoption to diagnose the direction and plausible magnitude of confounds.

2.3 Length of SNAP Spells and the Certification Process

When a state agency determines that a household is eligible for SNAP, the agency sets a certification period at the end of which benefits will terminate if the household has not documented continued eligibility.[15] The certification period may not exceed 24 months for households whose adult members are elderly or disabled, and may not exceed 12 months otherwise (FNS 2014). In practice, households are frequently certified for exactly these lengths of time, or for other lengths divisible by 6 months (Mills, *et al.,* 2014).

Figure 2 shows the distribution of SNAP spell lengths in Rhode Island administrative data. The figure shows clear spikes in the density at spell lengths divisible by 6 months.

Figure 2 motivates our instrumental variables research design, which exploits the 6 month divisibility of certification periods as a source of plausibly exogenous timing of program exit.

2.4 Legislated Changes in SNAP Benefit Schedules

Appendix Figure 1 shows the average monthly SNAP benefit per U.S. household from February 2006 to December 2012, which coincides with the time frame of our retail panel. The series exhibits two discrete jumps, which correspond to two legislated changes in the benefit schedule: an increase in October 2008 due to the 2008 Farm Bill and an increase in April 2009 due to the American Recovery and Reinvestment Act.

Appendix Figure 1 motivates our differences-in-differences research design, which exploits these legislated benefit increases.

2.5 Inferring SNAP Adoption from Single-Retailer Data

Households can spend SNAP at any authorized retailer. We will conduct our analysis of food spending using data from a single retail chain. Changes in a household's choice of retailer could be mistaken for program entry and exit in single-retailer data. We use our EBT panel to evaluate the importance of these mistakes and to determine how best to infer program transitions in single-retailer data.

For each $K \in \{1,-,12\}$ and for each household in our EBT panel, we identify all cases of K consecutive months without SNAP spending at the Rhode Island Retailer followed by K consecutive months with SNAP spending at the Rhode Island Retailer. We then compute the share of these transition periods in which the household newly enrolled in SNAP within 2 months of the start of SNAP spending at the retailer, where we define new enrollment as receipt of at least \$10 in SNAP benefits following a period of at least 3 consecutive months with no benefit.

Figure 3 plots the share of households newly enrolling in SNAP as a function of the radius K of the transition period. For low values of K, many transitions reflect retailer-switching rather than new enrollments in SNAP. The fraction of transitions that represent new enrollments increases with K. For $K = 6$ and above, the fraction constituting new enrollments is over 86 percent. When we focus on households who do the majority of their SNAP spending at the retailer in question—arguably a sample more comparable to the households in our retail panel—this fraction rises to 96 percent.

Figure 3 motivates our definition of SNAP adoption in the retailer data.

---

uals, Aguiar and Hurst (2005) estimate that unemployment is associated with nine percent lower at-home food expenditure. Using pseudo-panel variation in the Family Expenditure Survey, Banks, *et al.* (1998) estimate that unemployment is associated with a 7.6 percent decline in the sum of food consumed in the home and domestic energy. Using panel variation in the Panel Study of Income Dynamics, Gough (2013) estimates that unemployment is associated with a statistically insignificant one to four percent decline in at-home food expenditure. Using panel variation in checking account records, Ganong and Noel (2016) estimate that the onset of unemployment is associated with a 3.1 percent decline in at-home food expenditure. Aggregate data seem to confirm these findings: real average annual at-home food expenditure fell by 1.6 percent from 2006 to 2009, during which time the unemployment rate more than doubled (Kumcu and Kaufman 2011).

[15] Federal rules state that "the household's certification period must not exceed the period of time during which the household's circumstances (*e.g.,* income, household composition, and residency) are expected to remain stable" (FNS 2014).

2.6 SNAP Participation and Choice of Retailer

Even if we isolate suitably exogenous changes in SNAP participation and benefits, our analysis of single-retailer data could be misleading if SNAP participation directly affects retail choice.

Ver Ploeg, *et al.* (2015) study the types of stores at which SNAP recipients shop using nationally representative survey data collected from April 2012 through January 2013. For 46 percent of SNAP recipients, the primary grocery retailer is a supercenter, for 43 percent it is a supermarket, for three percent it is another kind of store, and for eight percent it is unknown. The corresponding values for all U.S. households are 45 percent, 44 percent, four percent, and seven percent. As with primary stores, the distribution of alternate store types is nearly identical between SNAP recipients and the population as a whole. SNAP recipients' choice of store type is also nearly identical to that of low-income non-recipients. While this evidence does not speak directly to the causal effect of SNAP on choice of store type, it seems to cast doubt on the hypothesis that SNAP receipt *per se* is a major factor determining where households shop.

As further evidence, a companion note to this paper analyzes Nielsen Homescan data and finds little relationship at the state-year level between changes in the market shares of major retailers and changes in the number of SNAP recipients in the state.

In the next section we present further evidence on retailer substitution using survey data collected by the retailer that supplied our panel.

3 Retailer Data and Definitions

3.1 Purchases and Demographics

We obtained anonymized transaction-level data from a large U.S. grocery retailer with gasoline stations on site. The data comprise all purchases in five states made using loyalty cards by households who shop at one of the retailer's stores at least every other month. We observe 6.02 billion purchases made on 608 million purchase occasions by 486,570 households from February 2006 through December 2012. We exclude from our analysis the 1,214 households who spend more than $5,000 in a single month.

For each household, we observe demographic characteristics including age, household composition, and ZIP [C]ode. We use these data in robustness checks and to study heterogeneity in our estimates.

For each item purchased, we observe the quantity, the pre-tax amount paid, a flag for the use of WIC, and the dollar amount of coupons or other discounts applied to the purchase. For each purchase occasion, we observe the date, a store identifier, and a classification of the store into a retailer division, a grouping based on the store's brand and distribution geography. We also observe the main payment method used for the purchase, defined as the payment method (*e.g.,* cash, check, government benefit) accounting for the greatest share of expenditure. For purchase occasions in March 2009 and later, we additionally observe the exact breakdown of spending by payment method.

We classify a purchase occasion as a *SNAP purchase occasion* if the main payment method is a government benefit and WIC is not used. Using the detailed payment data for purchase occasions in March 2009 and later, we calculate that SNAP is used in only 0.23 percent of the purchase occasions that we do not classify as SNAP purchase occasions. The appendix table shows that our key results are not sensitive to excluding WIC users from the sample.

We define a *SNAP month* as any household-month with positive total spending across SNAP purchase occasions.[16] Of the household-months in our panel, 7.8 percent are SNAP months. Of the households in our panel, 43 percent experience at least 1 SNAP month.

3.2 Product Characteristics

The retailer provided us with data on the characteristics of each product purchased, including an indicator for whether the product is store-brand, a text description of the product, and the product's location within a taxonomy.

---

[16] Using our detailed payment data for March 2009 and later, we can alternatively define a SNAP month as any month in which a household uses SNAP. This definition agrees with our principal definition in all but 0.27 percent of household-months.

We classify products as SNAP-eligible or SNAP-ineligible based on the retailer's taxonomy and the guidelines for eligibility published on the USDA website.[17] Among all non-fuel purchases in our data, 71 percent of spending goes to SNAP-eligible products, 25 percent goes to SNAP-ineligible products, and the remainder goes to products that we cannot classify.

We use our detailed payment data for purchases made in SNAP months in March 2009 or later to validate our product eligibility classification. Among all purchases made at least partly with SNAP in which we classify all products as eligible or ineligible, in 98.6 percent of cases the expenditure share of SNAP-eligible products is at least as large as the expenditure share paid with SNAP. Among purchases made entirely with SNAP, in 98.7 percent of cases we classify no items as SNAP-ineligible. Among purchases in which all items are classified as SNAP-ineligible, in more than 99.9 percent of cases SNAP is not used as a payment method.

3.3 Shopping Effort

For each household and month we compute the store-brand share of expenditures and the share of items for which coupons are redeemed for both SNAP-eligible and SNAP-ineligible purchases. Prior evidence suggests that both of these can serve as a proxy for households' efforts to save money.[18] We adjust these measures for the composition of purchases as follows. For each item purchased, we compute the store-brand share of expenditure among other households buying an item in the same product category in the same retailer division and the same calendar month and week. The expenditure-weighted average of this measure across purchases by a given household in a given month is the predicted store-brand share, *i.e.,* the share of expenditures that would be store-brand if the household acted like others in the panel who buy the same types of goods. Likewise, we compute the share of other households buying the same item in the same retailer division, month, and week who redeem coupons, and compute the average of this measure across purchases by a given household in a given month to form a predicted coupon use. We subtract the predicted from the actual value of each shopping effort measure to form measures of *adjusted store-brand share* and *adjusted coupon redemption share.*

3.4 Monthly Spending and Benefits

For each household in our panel we calculate total monthly spending on SNAP-eligible items, fuel, and SNAP-ineligible items excluding fuel. We calculate each household's total monthly SNAP benefits as the household's total spending across all SNAP purchase occasions within the month.[19]

Our data corroborate prior evidence (*e.g.,* Hoynes, *et al.,* 2015) that, for most households, SNAP benefits do not cover all SNAP-eligible spending. For 93 percent of households who ever use SNAP, average SNAP-eligible spending in non-SNAP months exceeds average SNAP benefits in SNAP months. SNAP-eligible spending exceeds SNAP benefits by at least $10 in 93 percent of SNAP months and by at least five percent in 92 percent of SNAP months. The appendix table reports estimates of key parameters for the subset of households for whom, according to various definitions, SNAP benefits are inframarginal to total food spending.

3.5 SNAP Adoption

Motivated by the analysis in section 2.5, we define a *SNAP adoption* as a period of 6 or more consecutive non-SNAP months followed by a period of 6 or more consecutive SNAP months. We refer to the first SNAP month in an adoption as an *adoption month.* We define a *SNAP adopter* as a household with at least one SNAP adoption. Our panel contains a total of 24,456 SNAP adopters.

Panel A of *Figure 4* shows the share of SNAP adopters with positive SNAP spending in each of the 12 months before and after a household's first SNAP adoption. Panel B of *Figure 4* shows average SNAP benefits before and after adoption. Following adoption, the average household receives about $200 in monthly SNAP benefits. For comparison, the average U.S. SNAP benefit per household in fiscal 2009, roughly at the midpoint of our sample period, was $276 (FNS 2016a).

---

[17] Grocery and prepared food items intended for home consumption are generally SNAP-eligible (FNS 2017). Alcohol, tobacco, pet food, and prepared food intended for on-premise consumption are SNAP-ineligible (FNS 2017).

[18] Store-brand items tend to be less expensive than national-brand alternatives, and correspondingly are more popular among lower-income households (Bronnenberg, *et al.,* 2015). Coupon use rose during the Great Recession, reflecting households' greater willingness to trade time for money (Nevo and Wong 2015).

[19] Our concept of total SNAP benefits has a correlation of 0.98 with the exact amount of SNAP spending calculated using detailed payment information in SNAP months March 2009 and later.

We conduct the bulk of our analysis using the sample of SNAP adopters. The appendix tablepresents our key results for alternative samples.

3.6 Retailer Share of Wallet

Spending patterns suggest that panelists buy a large fraction of their groceries at the retailer. Mabli and Malsberger (2013) estimate average 2010 spending on food at home by SNAP recipients of $380 per month using data from the Consumer Expenditure Survey. Hoynes *et al.* (2015) find that average per-household food expenditures are 20 to 25 percent lower in the Consumer Expenditure Survey than in the corresponding aggregates from the National Income and Product Accounts. In the 6 months following a SNAP adoption, average monthly SNAP-eligible spending in our data is $469.

Panelists also seem to buy a large fraction of their gasoline at the retailer: average monthly fuel spending at the retailer is $97 in the 6 months following SNAP adoption, as compared to Mabli and Malsberger's (2013) estimate of $115.

Survey data from the retailer suggest that SNAP use is associated with a reduction in the retailer's share of overall category spending. During the period June 2009 to December 2011, the retailer conducted an online survey on a convenience sample of customers. The survey asked:

> About what percentage of your total overall expenses for groceries, household supplies, or personal care items do you, yourself, spend in the following stores?

Respondents were presented with a list of retail chains including the one from which we obtained our data. Excluding responses in which the reported percentages do not sum to 100, we observe at least one response from 961 of the households in our panel. Among survey respondents that ever use SNAP, the average reported share of wallet for the retailer is 0.61 for those surveyed during non-SNAP months (N = 311 survey responses) and 0.53 for those surveyed during SNAP months (N = 80 survey responses).[20] The same qualitative pattern obtains among SNAP adopters, and in responses to a retrospective question about shopping frequency.[21]

Taken at face value, these findings suggest that retailer substitution will tend, if anything, to bias downward the estimated effect of SNAP participation on food spending. In the appendix table we verify that our results are robust to restricting attention to households with relatively few supermarkets in their county, for whom opportunities to substitute across retailers are presumably more limited.

4 Descriptive Evidence

4.1 Marginal Propensity To Consume Out of SNAP Benefits

Figure 5 shows the evolution of monthly spending before and after SNAP adoption for our sample of SNAP adopters. Each plot shows coefficients from a regression of spending on a vector of indicators for months relative to the household's first SNAP adoption. Panel A shows that SNAP-eligible spending increases by approximately $110 in the first few months following SNAP adoption. Recall from *Figure 4* that the average household receives monthly SNAP benefits of approximately $200 following SNAP adoption. Taking the ratio of the increase in spending to the benefit amount, we estimate an MPCF out of SNAP benefits between 0.5 and 0.6.

Panel B shows that SNAP-ineligible spending increases by approximately $5 following SNAP adoption, implying an MPC of a few percentage points. The increase in SNAP-ineligible spending is smaller in both absolute and proportional terms than the increase in SNAP-eligible spending. The online appendix shows directly that the share of spending devoted to SNAP-eligible items increases significantly following SNAP adoption. This finding is not consistent with the hypothesis that SNAP leads to a proportional increase in spending across all categories due to substitution away from competing retailers.

Following the analysis in section 2.2, trends in spending prior to adoption should provide a sense of the influence of changes in contextual factors on spending. Panel A shows very little trend in SNAP-eligible spending prior to SNAP adoption. Panel B shows, if anything, a slight decline in SNAP-ineligible spending prior to adoption, perhaps due to economic hardship. Neither of these patterns seems consistent with the hypothesis that the large increase in SNAP-eligible spending that occurs at SNAP adoption is driven by changes in contextual factors.

---

[20] The difference in means is statistically significant (t = 2.15, p = 0.032).

[21] The question asks, "In your opinion, do you think you, yourself have been shopping more, less, or about the same amount at the retailer over the past 3 months?" Among households surveyed in a SNAP month, 60 percent report that their frequency of shopping at the retailer has stayed "about the same." Among those saying that it has not stayed the same, a majority (59 percent) say that it has decreased.

Figure 6 shows the evolution of monthly spending during a monthly clock that begins at SNAP adoption and resets every 6 months. Panels A and B show that SNAP participation and benefits fall especially quickly in the first month of the clock, consistent with the finding in section 2.3 that SNAP spell lengths tend to be divisible by 6 months. Participation and benefits also fall more quickly in the sixth month, perhaps reflecting error in our classification of adoption dates.

Panel C of *Figure 6* shows that the pattern of SNAP-eligible spending closely follows that of SNAP benefits. Benefits decline by about $12 more in the first month of the cycle than in the second. Correspondingly, SNAP-eligible spending declines by $6 to $7 more in the first month than in the second. Taking the ratio of these two values implies an MPCF out of SNAP benefits between 0.5 and 0.6, consistent with the evidence in *Figure 5*.

Appendix Figure 2 plots the evolution of SNAP-eligible spending around the legislated benefit changes described in section 2.4. The plot shows that likely SNAP recipients' SNAP-eligible spending increases relative to that of likely non-recipients around the periods of benefit increases. The online appendix reports the results of a differences-in-differences analysis of these changes in the spirit of Bruich (2014) and Beatty and Tuttle (2015). We estimate an MPCF out of SNAP benefits of 0.53, and if anything a negative effect of benefit expansions on SNAP-ineligible spending.

4.2 Marginal Propensity To Consume Out of Cash

Two pieces of indirect evidence suggest that an MPCF out of SNAP of 0.5 to 0.6 is too large to be consistent with households treating SNAP benefits as fungible with other income.

The first is that, for the average SNAP recipient, food at home represents only 22 percent of total expenditure (Castner and Mabli 2010). Engel's Law (Engel 1857; Houthakker 1957) holds that the budget share of food declines with total resources, and hence that the budget share exceeds the MPCF. Engel's Law is not consistent with a budget share of 0.22 and an MPCF of 0.5 to 0.6.

The second is that prior estimates of the MPCF out of cash for low-income populations are far below 0.5. Castner and Mabli (2010) estimate an MPCF of 0.07 for SNAP recipients. Hoynes and Schanzenbach (2009) estimate an MPCF of 0.09–0.10 for populations with a high likelihood of entering the Food Stamp Program. Assessing the literature, Hoynes and Schanzenbach (2009) note that across "a wide range of data (cross sectional, time series) and econometric methods" past estimates of the MPCF out of cash income are in a "quite tight" range from 0.03 to 0.17 for low-income populations.

For more direct evidence, we study the effect on spending of the large changes in gasoline prices during our sample period. These changes affect the disposable income available to households and therefore give us a window into the MPCF out of cash income.

Panel A of *Figure 7* shows the time-series relationship between gasoline prices and fuel expenditure for SNAP adopters at different quartiles of the distribution of average fuel expenditure. Those households in the upper quartiles exhibit substantial changes in fuel expenditure when the price of gasoline changes. For example, during the run-up in fuel prices in 2007, part of an upward trend often attributed to increasing demand for oil from Asian countries (*e.g.,* Kilian 2010), households in the top quartile of fuel spending increased their spending on fuel by almost $100 per month. Households in lower quartiles increased their fuel spending by much less.

Panel B of *Figure 7* shows the time-series relationship between gasoline prices and SNAP-eligible expenditure for the same groups of households. The relationship between the two series does not appear consistent with an MPCF out of cash income of 0.5 to 0.6. For example, if the MPCF out of cash income were 0.5 we would expect households in the top quartile of fuel spending to decrease SNAP-eligible spending significantly during the run-up in fuel prices in 2007. In fact, we see no evidence of such a pattern, either looking at the top quartile in isolation, or comparing it to the lower quartiles.

The absence of a strong response of SNAP-eligible spending to fuel prices is consistent with prior evidence of a low MPCF out of cash. It is not consistent with the hypothesis that changes in income drive large changes in the retailer's share of wallet, as such income effects would lead to a relationship between gasoline prices and measured SNAP-eligible spending.

4.3 Quantitative Summary

Table 1 presents two-stage least squares (2SLS) estimates of a series of linear regression models. In each model the dependent variable is the change in spending from the preceding month to the current month. The endogenous regressors are the

change in the SNAP benefit and the change in the additive inverse of fuel spending. The coefficients on these endogenous regressors can be interpreted as MPCs. Each model includes calendar month fixed effects. (Household fixed effects are implicit in the first-differencing of the variables in the model.)

All models use the interaction of the change in the price of regular gasoline and the household's average monthly number of gallons of gasoline purchased as an excluded instrument. This instrument permits estimating the MPC out of cash following the logic of *Figure 7*.

Models (1), (2), and (3) of *Table 1* all use the change in SNAP-eligible spending as the dependent variable. The models differ in the choice of excluded instruments for SNAP benefits. In model (1), the instrument is an indicator for whether the month is an adoption month. In model (2), it is an indicator for whether the month is the first month of the 6 month SNAP clock. These instruments permit estimating the MPCF out of SNAP following the logic of *Figures 5* and *6,* respectively. In model (3), both of these instruments are used.

Estimates of models (1), (2), and (3) indicate an MPCF out of SNAP between 0.55 and 0.59 and an MPCF out of cash close to 0. In model (3), confidence intervals exclude an MPCF out of SNAP below 0.57 and an MPCF out of cash above 0.1. In all cases, we reject the null hypothesis that the MPCF out of SNAP is equal to the MPCF out of cash.

Model (4) parallels model (3) but uses SNAP-ineligible spending as the dependent variable. We estimate an MPC out of SNAP of 0.02 and an MPC out of cash of 0.04. We cannot reject the hypothesis that these two MPCs are equal.

The appendix table shows that the conclusion that the MPCF out of SNAP exceeds the MPCF out of cash holds when we exclude households for whom SNAP benefits may not be economically equivalent to cash, and restrict to single-adult households to limit the role of intra-household bargaining.

The online appendix reports that the implied MPCF out of SNAP is slightly higher in the household's first SNAP adoption than in subsequent SNAP adoptions. We cannot reject the hypothesis that the MPCF is equal between first and subsequent adoptions. The online appendix also reports estimates of the MPCF out of SNAP and cash for various demographic groups.

5 Model and Tests for Fungibility

5.1 Model

In each month $t \in \{1,-,T\}$, household i receives SNAP benefits $b_{it} \geq 0$ and disposable cash income $y_{it} > 0$. The household chooses food expenditure fit and nonfood expenditure nit to solve

(1)

$$\max_{f,n} U_i\left(f,n;\xi_{it}\right)$$

$$s.t. \quad n \leq y_{it} - \max\left(0,f - b_{it}\right)$$

where ξ_{it} is a preference shock and $U_i\,()$ is a utility function strictly increasing in f and n. The variables (b_{it},y_{it}, x_{it}) are random with support Ω_i.

Assumption 1. *For each household i, optimal food spending can be written as*

(2)

$$f_{it} = f_i\left(y_{it} + b_{it},\xi_{it}\right)$$

where $f_i\,()$ is a function with range $[0,y_{it} + b_{it}]$.

A sufficient condition for assumption 1 is that, for each household i, at any point $(b,y,\xi) \in \Omega_i$ the function $U_i\,(f\,,y+b-f;\xi)$ is smooth and strictly concave in f and has a stationary point $f^* > b$. Then optimal food spending exceeds the level of SNAP benefits even if benefits are disbursed as cash, so the "kinked" budget constraint in (1) does not affect the choice of f_{it}.

For each household and month, an econometrician observes data $(f_{it},b_{it},y_{it},z_{it})$ where z_{it} is a vector of instruments. A concern is that x_{it} is determined partly by contextual factors such as job loss that directly affect y_{it} and b_{it}.

Assumption 2. Let $n_{it} = (y_{it}+b_{it}) - \mathrm{E}(y_{it}+b_{it}\,|z_{it})$. *For each household i, the instruments z_{it} satisfy*

(3)

$$\left(\xi_{it},v_{it}\right) \perp z_{it}.$$

Proposition 1. *Under assumptions 1 and 2, for each household i*

(4)

$$E(f_{it}|z_{it}) = \varphi_i\left(E(y_{it}+b_{it}|z_{it})\right)$$

for some function φ_i *().*

Proof. Let P_i denote the CDF of (ξ_{it}, v_{it}). Then

$$
\begin{aligned}
E(f_{it}|z_{it}) &= \int f_i\left(E(y_{it}+b_{it}|z_{it})+v_{it}, \xi_{it}\right) dP_i(\xi_{it}, v_{it}|z_{it}) \\
&= \int f_i\left(E(y_{it}+b_{it}|z_{it})+v_{it}, \xi_{it}\right) dP_i(\xi_{it}, v_{it}) \\
&= \varphi_i\left(E(y_{it}+b_{it}|z_{it})\right)
\end{aligned}
$$

where the first equality follows from assumption 1 and the second from assumption 2. See Blundell and Powell (2003, p. 330).

Example. (Cobb-Douglas) Suppose that for each household i there is $\beta_i \in (0,1)$ such that:

(5)

$$
U_i(f, n, \xi) =
\begin{cases}
(f - \xi)^{\beta_i}(n+\xi)^{1-\beta_i}, & \text{if } f \geq \xi \geq -n \\
-\infty, & \text{otherwise}
\end{cases}
$$

with $\beta_i(y+b)+\xi > b$ and $(1-\beta_i)(y+b) > \xi$ at all points in Ω_i. Then assumption 1 holds with

(6)

$$f_i(y_{it}+b_{it}, \xi_{it}) = \beta_i(y_{it}+b_{it}) + \xi_{it}.$$

and, under assumption 2, proposition 1 applies with

(7)

$$\varphi_i\left(E(y_{it}+b_{it}|z_{it})\right) = \alpha_i + \beta_i E(y_{it}+b_{it}|z_{it})$$

for $\alpha_i \equiv E(\xi_{it})$.

Remark 1. In his study of a child tax credit in the Netherlands, Kooreman (2000) assumes a version of (6), which he estimates via ordinary least squares using cross-sectional data under various restrictions on α_i, β_i, and ξ_{it}.

5.2 Testing for Fungibility

Index a family of perturbations to the model by γ. Let f^{γ}_{it} be food spending under perturbation γ, with

(8)

$$f^{\gamma}_{it} = f_i(y_{it}+b_{it}, \xi_{it}) + \gamma b_{it}$$

for f_i () the function defined in assumption 1. We may think of γ as the excess sensitivity of food spending to SNAP benefits. The null hypothesis that the model holds is equivalent under (8) to $\gamma = 0$.

Let $Y_{it} = E(y_{it} + b_{it}|z_{it})$ and $B_{it} = E(b_{it}|z_{it})$ and observe that

(9)

$$f^{\gamma}_{it} - E\left(f^{\gamma}_{it}|Y_{it}\right) = \gamma(B_{it} - E(B_{it}|Y_{it})) + e_{it}$$

where $E(e_{it}|Y_{it}, B_{it}) = 0$. The nuisance terms φ_i *() have been "partialled out" of (9) as in Robinson (1988). The target* γ can be estimated via OLS regression of $(f^{\gamma}_{it} - E(f^{\gamma}_{it}|Y_{it}))$ on $(B_{it} - E(B_{it}|Y_{it}))$.

Remark 2. It is possible to allow for measurement error in f_{it} that depends on $(y_{it}+b_{it})$. Say that for known function $m()$, unobserved measurement error η_{it} inde-

pendent of z_{it}, and unknown function λ_{it} () we have that measured food spending $\hat{f}_{it}$ follows

(10)

$$m\left(\hat{f}_{it}\right) = m\left(f_{it}\right) + \lambda_{it}\left(y_{it} + b_{it}, \eta_{it}\right).$$

Then under perturbations $m((f^{\gamma}_{it}) = m(f_{it}) + \gamma b_{it}$ an analogue of (9) holds, replacing f^{γ}_{it} with $m(\hat{f}_{it})$. Examples include additive measurement error, where $m()$ is the identity function, and multiplicative measurement error, where m() is the natural logarithm. The latter case has a simple interpretation as one in which the econometrician observes spending at a single retailer whose share of total household food spending is given by $\exp\left(\lambda_{it}\left(y_{it} + b_{it}, \eta_{it}\right)\right)$.

Remark 3. The reasoning above is unchanged if b_{it} and y_{it} are each subject to an additive measurement error that is mean-independent of z_{it}. In this case, we can simply let Y_{it} and B_{it} represent the conditional expectations of the corresponding mismeasured variables.

5.3 *Implementation and Results*

With (9) in mind, estimation proceeds in three steps:

Step 1. Estimate (Y_{it}, B_{it}) from (y_{it}, b_{it}, z_{it}), yielding estimates $(\hat{Y}_{it}, \hat{B}_{it})$.

Step 2. Estimate $\left(\mathrm{E}\left(f^{\gamma}_{it}|Y_{it}\right), \mathrm{E}\left(B_{it}|Y_{it}\right)\right)$ from $(f^{\gamma}_{it}, \hat{Y}_{it}, \hat{B}_{it})$, yielding estimates $\left(\mathrm{E}\widehat{\left(f^{\gamma}_{it}|Y_{it}\right)}, \mathrm{E}\widehat{\left(B_{it}|Y_{it}\right)}\right)$.

Step 3. Estimate γ from $\left(f^{\gamma}_{it} - \mathrm{E}\widehat{\left(f^{\gamma}_{it}|Y_{it}\right)}, \hat{B}_{it} - \mathrm{E}\widehat{\left(B_{it}|Y_{it}\right)}\right)$, yielding estimate $\hat{\gamma}$.

We let f^{γ}_{it} be SNAP-eligible spending, b_{it} be SNAP benefits, and y_{it} be the additive inverse of fuel spending. We let the instruments z_{it} be given by the number of SNAP adoptions experienced by household i as of calendar month t, and the product of the average price of regular gasoline with the household's average monthly number of gallons of gasoline purchased.

In step 1, we estimate (Y_{it}, B_{it}) via first-differenced regression of $(y_{it} + b_{it})$ and b_{it} on z_{it}.

In step 2, we consider four specifications for estimating $(\mathrm{E}(f^{\gamma}_{it}|Y_{it}), \mathrm{E}(B_{it}|Y_{it}))$. In the first, we estimate these via first-differenced regression of f^{γ}_{it} and $\hat{B}_{it}$ on $\hat{Y}_{it}$, pooling across households. In the second, we estimate these via first-differenced regression of f^{γ}_{it} and $\hat{B}_{it}$ on $\hat{Y}_{it}$, separately by household. In the third, we estimate these via first-differenced regression of f^{γ}_{it} and $\hat{B}_{it}$ on indicators for the quintiles of $\hat{Y}_{it}$, separately by household. In the fourth, we estimate these via locally weighted polynomial regression of f^{γ}_{it} and $\hat{B}_{it}$ on $\hat{Y}_{it}$, separately by household. Thus, the first specification implicitly treats φ_i as linear and homogeneous across households, the second treats φ_i as linear and heterogeneous across households, and the third and fourth allow φ_i to be nonlinear and heterogeneous across households.

In step 3, we estimate γ via first-differenced regression of $\left(f^{\gamma}_{it} - \mathrm{E}\widehat{\left(f^{\gamma}_{it}|Y_{it}\right)}\right)$ on $\left(\hat{B}_{it} - \mathrm{E}\widehat{\left(B_{it}|Y_{it}\right)}\right)$.

Table 2 presents the results. Across all three specifications, our estimates of γ are 0.5 or greater, and in all cases we can reject the null hypothesis that $\gamma = 0$ with a high level of confidence.

6 Interpretation

We speculate that households treat SNAP benefits as part of a separate mental account, psychologically earmarked for spending on food. In this section we discuss results of qualitative interviews conducted at a food pantry in Rhode Island. We then present quantitative evidence that we think suggests a mental accounting explanation, and present a *post-hoc* model of mental accounting that rationalizes this evidence.

6.1 *Qualitative Interviews with SNAP-Recipient Households*

As part of preparation related to a state proposal to pilot a change to SNAP benefit distribution, Rhode Island Innovative Policy Laboratory staff conducted a series of qualitative interviews at a large food pantry in Rhode Island in May, July, and August 2016. Interviewees were approached in the waiting room of the pantry and were offered a $5 gift card to a grocery retailer in exchange for participating. Interviews were conducted in English and Spanish.

Interviewees were selected from those waiting to be served at the food pantry and were not sampled scientifically. Interviews were conducted primarily to inform the implementation of the pilot program and the responses should not be taken to imply

any generalizable conclusions. We report them here as context for our quantitative evidence.

Of the 25 interviews conducted, 19 were with current SNAP recipients. Of these, all but three reported spending non-SNAP funds on groceries each month, with an average out-of-pocket spending of $100 for those reporting positive out-of-pocket spending.

Each interviewee was asked the following two questions, which we refer to as SNAP and CASH:

> (SNAP) Imagine that **in addition your current benefit, you received an extra $100 in SNAP benefits** at the beginning of the month. How would this change the way that you spend your money during the month? [emphasis added]
>
> (CASH) Imagine that **you received an additional $100 in cash** at the beginning of the month. How would this change the way that you spend your money during the month? [emphasis added]

Of the 16 SNAP-recipient interviewees who report nonzero out-of-pocket spending on groceries, 14 chose to answer questions SNAP and CASH.

Interviewers recorded verbal responses to each question as faithfully as possible. The most frequently occurring word in response to the SNAP question is "food," which occurs in eight of the 14 responses. Incorporating mentions of specific foods or food-related terms like "groceries," the fraction mentioning food rises to ten out of 14 responses. The word "food" occurs in three of the 14 responses to CASH; more general food related terms occur in five of the 14 responses to CASH.

Several responses seem to suggest a difference in how the household would spend $100 depending on the form in which it arrives. For example, in response to question SNAP one interviewee said "[I would] buy more food." In response to CASH the same interviewee said "[I would buy] more household necessities." Another interviewee said in response to SNAP that "[I would buy] more food, but the same type of expenses. If I bought $10 of sugar, now [I would buy] $20." In response to CASH, the same interviewee said that "[I would spend it on] toilet paper, soap, and other necessary home stuff, or medicine." A third interviewee said in response to SNAP that "I would buy more food and other types of food . . ." and in response to CASH that "I could buy basic things that I can't buy with [SNAP]."[22]

Some responses suggest behavior consistent with inframarginality. For example one interviewee's answer to SNAP included the observation that "I would probably spend $100 less out of pocket," although this interviewee also mentions increasing household expenditures on seafood and produce. Another interviewee answered SNAP with "[I] would spend all in food, and also buy soap [and] things for [my] two kids."

6.2 Quantitative Evidence on Shopping Effort

If SNAP recipients consider SNAP benefits to be earmarked for food, they may view a dollar saved on food as less valuable than a dollar saved on non-food purchases. To test this hypothesis, we study the effect of SNAP on bargain-seeking behavior.

Figure 8 shows the evolution of the adjusted store-brand share before and after SNAP receipt for our sample of SNAP adopters. Each plot shows coefficients from a regression of the adjusted store-brand share on a vector of indicators for months relative to SNAP adoption. Among SNAP-eligible items, panel A shows a trend towards a greater store-brand share prior to SNAP adoption, perhaps reflecting the deterioration in households' economic well-being that normally triggers entry into a means-tested program. Once households adopt SNAP, there is a marked and highly statistically significant drop in the store-brand share. Because we have adjusted store-brand share for the composition of purchases, this decline is driven not by changes in the categories of goods purchased, but by a change in households' choice of brand within a category.

Panel B of *Figure 8* shows an analogous plot for SNAP-ineligible items. The adjusted storebrand share of SNAP-ineligible expenditure rises before SNAP adoption and does not decline significantly following adoption. Regression analysis presented in the online appendix shows that we can confidently reject the hypothesis that the change in adjusted store-brand share at SNAP adoption is equal between SNAP-eligible and SNAP-ineligible products.

---

[22] The bracketed term is a translation for the Spanish word *cupones*. This word is literally translated as "coupons" but is often used to refer to SNAP. (See, for example, Project Bread 2016.)

Figure 9 shows analogous evidence for coupon use. Following SNAP adoption, the average adjusted coupon redemption share declines for both SNAP-eligible and SNAP-ineligible products, but the decline is more economically and statistically significant for SNAP-eligible products than for SNAP-ineligible products. Because we have adjusted the coupon redemption share for the basket of goods purchased, these patterns are not driven by changes in the goods purchased, but rather by households' propensity to redeem coupons for a given basket of goods. Regression analysis presented in the online appendix shows that we can reject the hypothesis that the change in the adjusted coupon redemption share at SNAP adoption is equal between SNAP-eligible and SNAP-ineligible products.

6.3 *Post-Hoc* Model of Mental Accounting

To fix ideas and rationalize the preceding evidence, we specify a model of mental accounting based on Farhi and Gabaix (2015). Return to the setup of section 5, considering for ease of notation a single household and time period, and ignoring the preference shock ξ. Let preferences over food consumption f and non-food consumption n be Cobb-Douglas, and suppose that the household can exert effort $s_f \geq 0$ and $s_n \geq 0$, respectively, to reduce the cost of a given unit of consumption in the food and non-food domains, respectively. Finally, suppose that the household exhibits a distaste for deviating from a psychological default level of food spending, determined in part by the earmarking of SNAP benefits. Formally, write the household's problem as

(11)

$$\max_{f,n,s_f,s_n} f^\beta n^{1-\beta} - c\left(s_f + s_n\right) - \kappa \left| (\beta y + b) - d\left(\frac{s_f}{f}\right)f \right|$$

$$s.t. \quad d\left(\frac{s_n}{n}\right)n \leq y - \max\left(0, d\left(\frac{s_f}{f}\right)f - b\right).$$

Here, the function $c\,()$, which is smooth and strictly increasing in its argument, describes the cost of shopping effort. The function $d\,()$, which is smooth, strictly decreasing and strictly convex, describes the return to shopping effort in terms of prices paid. The parameter $\kappa > 0$ indexes the importance of sticking to the household's default plan to spend amount b of SNAP benefits and amount βy of cash income on food.

If $b = 0$, then in any interior optimum the ratio of food spending to non-food spending is $\beta/(1 - \beta)$, the standard result for Cobb-Douglas utility. Necessary conditions also imply that $d\left(\frac{s_f}{f}\right) = d\left(\frac{s_n}{n}\right)$, because the value of a dollar saved is the same regardless of whether it is saved on food or other goods. By contrast, if $b > 0$, then in any interior optimum with food spending strictly between b and $\beta y + b$, the ratio of food to non-food spending must exceed $\beta/(1 - \beta)$. Necessary conditions also imply that $d\left(\frac{s_f}{f}\right) > d\left(\frac{s_n}{n}\right)$, because the household assigns a psychological shadow value of $\kappa > 0$ to greater food spending.

In this sense, the model in (11) can rationalize both the tendency to consume food out of SNAP in greater proportion than out of cash income, and the tendency to reduce bargain-hunting in the food domain (relative to the non-food domain) after receipt of SNAP. The model is *post-hoc* in that the specification of the target spending $(\beta y + b)$ is arbitrary and does not derive from portable psychological primitives.

7 Conclusions

We use data from a novel retail panel to study the effect of the receipt of SNAP benefits on household spending behavior. Novel administrative data motivates three approaches to causal inference. We find that the MPCF out of SNAP benefits is 0.5 to 0.6 larger than the MPCF out of cash. We argue that these findings are not consistent with households treating SNAP funds as fungible with non-SNAP funds, and we support this claim with formal tests of fungibility that allow different households to have different consumption functions.

We speculate that households treat SNAP benefits as part of a separate mental account. Responses to hypothetical choice scenarios in qualitative interviews suggest that some households plan to spend SNAP benefits differently from cash. Quantitative evidence shows that, after SNAP receipt, households reduce shopping effort

for SNAP-eligible products more so than for SNAP-ineligible products. A *post-hoc* model of mental accounting based on Farhi and Gabaix (2015) rationalizes these facts.

References

Abeler, Johannes and Felix Marklein. Forthcoming. *Fungibility, labels, and consumption.* JOURNAL OF THE EUROPEAN ECONOMIC ASSOCIATION.

Aguiar, Mark and Erik Hurst. 2005. *Consumption **versus** expenditure.* JOURNAL OF POLITICAL ECONOMY 113(5): 919–948.

Ahmed, Naeem, Matthew Brzozowski, and Thomas F. Crossley. 2006. *Measurement errors in recall food consumption data.* Institute for Fiscal Studies Working Paper 06/21.

Anderson, Theresa, John A. Kirlin, and Michael Wiseman. 2012. *Pulling together: Linking unemployment insurance and Supplemental Nutrition Assistance Program administrative data to study effects of the Great Recession.* U.S. Department of Agriculture, Agricultural Research Service.

Andreyeva, Tatiana, Joerg Luedicke, Kathryn E. Henderson, and Amanda S. Tripp. 2012. *Grocery store beverage choices by participants in Federal food assistance and nutrition programs.* AMERICAN JOURNAL OF PREVENTIVE MEDICINE 43 (4): 411–418.

Banks, James, Richard Blundell, and Sarah Tanner. 1998. *Is there a retirement-savings puzzle?* AMERICAN ECONOMIC REVIEW 88(4): 769–788.

Battistin, Erich and Mario Padula. 2016. *Survey instruments and the reports of consumption expenditures: Evidence from the Consumer Expenditure Surveys.* JOURNAL OF THE ROYAL STATISTICAL SOCIETY: SERIES A (STATISTICS IN SOCIETY) 179(2): 559–581.

Beatty, Timothy K.M. and Charlotte J. Tuttle. 2015. *Expenditure response to increases in in-kind transfers: Evidence from the Supplemental Nutrition Assistance Program.* AMERICAN JOURNAL OF AGRICULTURAL ECONOMICS 97(2): 390–404.

Benhassine, Najy, Florencia Devoto, Esther Duflo, Pascaline Dupas, and Victor Pouliquen. 2015. *Turning a shove into a nudge? A "labeled cash transfer" for education.* AMERICAN ECONOMIC JOURNAL: ECONOMIC POLICY 7(3): 86–125.

Bitler, Marianne P. 2015. *The health and nutrition effects of SNAP: Selection into the program and a review of the literature on its effects.* In J. Bartfeld, C. Gundersen, T. Smeeding, and J.P. Ziliak (eds.), SNAP MATTERS: HOW FOOD STAMPS AFFECT HEALTH AND WELL BEING: 134–160. Stanford: Stanford University Press.

Blundell, Richard W., Martin Browning, and Ian A. Crawford. 2003. *Nonparametric Engel curves and revealed preference.* ECONOMETRICA 71(1): 205–240.

Blundell, Richard and James L. Powell. 2003. *Endogeneity in nonparametric and semiparametric regression models.* In M. Dewatripont, L.P. Hansen, and S.J. Turnovsky (eds.), ADVANCES IN ECONOMICS AND ECONOMETRICS: THEORY AND APPLICATIONS, EIGHTH WORLD CONGRESS 2: 312–357. Cambridge: Cambridge University Press.

Bronnenberg, Bart J., Jean-Pierre Dube, Matthew Gentzkow, and Jesse M. Shapiro. 2015. *Do pharmacists buy Bayer? Informed shoppers and the brand premium.* QUARTERLY JOURNAL OF ECONOMICS 130(4): 1669–1726.

Browning, Edgar K. and Mark A. Zupan. 2004. *Microeconomics: Theory and Applications.* 8th ed. Hoboken: Wiley.

Browning, Martin, Thomas F. Crossley, and Joachim Winter. 2014. *The measurement of household consumption expenditures.* ANNUAL REVIEW OF ECONOMICS 6(1): 475–501.

Bruich, Gregory A. 2014. *The effect of SNAP benefits on expenditures: New evidence from scanner data and the November 2013 benefit cuts.* Harvard University. Mimeo. Accessed at *http://scholar.harvard.edu/files/bruich/files/bruich_2014b.pdf* on May 5, 2016.

Castner, Laura and James Mabli. 2010. *Low-income household spending patterns and measures of poverty.* Washington, D.C.: Mathematica Policy Research.

Collins, Ann M., Ronette Briefel, Jacob Alex Klerman, Anne Wolf, Gretchen Rowe, Chris Logan, Ayesha Enver, Syeda Fatima, Anne Gordon, and Julia Lyskawa. 2016. *Summer Electronic Benefit Transfer for Children (SEBTC) Demonstration: Summary Report.* Accessed at *http://www.fns.usda.gov/sites/default/files/ops/sebtcfinalreport.pdf* on January 5, 2016.

Congressional Budget Office. 2012. *The Supplemental Nutrition Assistance Program.* Accessed at *https://www.cbo.gov/sites/default/files/112th-congress-2011-2012/reports/04-19-SNAP.pdf* on May 5, 2016.

____. 2013. Accessed at *https://www.cbo.gov/sites/default/files/113th-congress-2013-2014/graphic/43935-means-tested-infographic0.pdf* on May 5, 2016.

Engel, Ernst. 1857. *Die Productions- und Consumtionsverhältnisse des Königreichs Sachsen.* ZEITSCHRIFT DES STATISTISCHEN BUREAUS DES KÖNIGLICH SÄCHSISCHEN MINISTERIUM DES INNEREN 8–9: 1–54.

Fan, Jianqing and Irene Gijbels. 1996. *Local Polynomial Modelling and Its Applications.* London, UK: Chapman and Hall.

Farhi, Emmanuel and Xavier Gabaix. 2015. *Optimal taxation with behavioral agents.* NBER Working Paper No. 21524.

Feldman, Naomi E. 2010. *Mental accounting effects of income tax shifting.* THE REVIEW OF ECONOMICS AND STATISTICS 92(1): 70–86.

FNS. 2012. *Building a healthy America: A profile of the Supplemental Nutrition Assistance Program.* Accessed at *http://www.fns.usda.gov/sites/default/files/BuildingHealthyAmerica.pdf* on May 5, 2016.

____. 2014. *FNS Handbook 501, Chapter 5.* Accessed at *http://www.fns.usda.gov/sites/default/files/FNSHANDBOOK_501_Chap5_4_2014_new.pdf* on January 5, 2016.

____. 2016a. *Supplemental Nutrition Assistance Program.* Accessed at *http://www.fns.usda.gov/pd/supplemental-nutrition-assistance-program-snap* on May 25, 2016.

____. 2016b. *Supplemental Nutrition Assistance Program (SNAP): Eligibility.* Accessed at *http://www.fns.usda.gov/snap/eligibility* on January 5, 2016.

____. 2017. *Supplemental Nutrition Assistance Program (SNAP): Eligible Food Items.* Accessed at *http://www.fns.usda.gov/snap/eligible-food-items* on January 14, 2017.

Fox, Mary Kay, William Hamilton, and Biing-Hwan Lin. 2004. *Effects of food assistance and nutrition programs on nutrition and health: Volume 3, literature review.* U.S. Department of Agriculture, Economic Research Service.

Ganong, Peter and Pascal Noel. 2016. *How does unemployment affect consumer spending?* Harvard University Working Paper, January 2016.

Garasky, Steven, Kassim Mbwana, Andres Romualdo, Alex Tenaglio, and Manan Roy. 2016. *Foods typically purchased by Supplemental Nutrition Assistance Program (SNAP) households.* U.S. Department of Agriculture, Food and Nutrition Service.

Gough, Margaret. 2013. *How do unemployment and recessions affect time in food preparation and food expenditures within the family?* POPULATION ASSOCIATION OF AMERICA ANNUAL MEETING CONFERENCE PAPER.

Hastings, Justine S. and Jesse M. Shapiro. 2013. *Fungibility and consumer choice: Evidence from commodity price shocks.* QUARTERLY JOURNAL OF ECONOMICS 128(4): 1449–1498.

Heath, Chip and Jack B. Soll. 1996. *Mental budgeting and consumer decisions.* JOURNAL OF CONSUMER RESEARCH 23(1): 40–52.

Houthakker, Hendrik S. 1957. *An international comparison of household expenditure patterns, commemorating the centenary of Engel's law.* ECONOMETRICA 25(4): 532–551.

Hoynes, Hilary W., Leslie McGranahan, and Diane Whitmore Schanzenbach. 2015. *SNAP and food consumption.* In J. Bartfeld, C. Gundersen, T. Smeeding, and J. P. Ziliak (eds.), SNAP MATTERS: HOW FOOD STAMPS AFFECT HEALTH AND WELL BEING: 107–133. Stanford: Stanford University Press.

Hoynes, Hilary W. and Diane Whitmore Schanzenbach. 2009. *Consumption responses to in-kind transfers: Evidence from the introduction of the Food Stamp Program.* AMERICAN ECONOMIC JOURNAL: APPLIED ECONOMICS 1(4): 109–139.

Hoynes, Hilary W. and Diane Whitmore Schanzenbach. 2016. *U.S. food and nutrition programs.* In R. Moffit (ed.), ECONOMICS OF MEANS-TESTED TRANSFER PROGRAMS IN THE UNITED STATES, VOLUME I: 219–302. Chicago; London: The University of Chicago Press.

Johnson, Lyndon B. 1964. *Remarks upon signing the Food Stamp Act.* Accessed at *http://www.presidency.ucsb.edu/ws/?pid=26472* on May 5, 2016.

Ketcham, Jonathan D., Nicolai V. Kuminoff, and Christopher A. Powers. 2016. *Choice inconsistencies among the elderly: Evidence from plan choice in the Medicare Part D program: Comment.* AMERICAN ECONOMIC REVIEW 106(12): 3932–3961.

References—Continued

Kilian, Lutz. 2010. *Explaining fluctuations in gasoline prices: A joint model of the global crude oil market and the U.S. retailer gasoline market.* THE ENERGY JOURNAL 31(2): 87–112.

Kooreman, Peter. 2000. *The labeling effect of a child benefit system.* AMERICAN ECONOMIC REVIEW 90(3): 571–583.

Kumcu, Aylin and Phillip Kaufman. 2011. *Food spending adjustments during recessionary times.* AMBER WAVES September 1, 2011. Accessed at *http://www.ers.usda.gov/amber-waves/2011-september/food-spending.aspx#.V2gqeXoqsYS* on June 20, 2016.

Leung, Pauline and Christopher J. O'Leary. 2015. *Should UI eligibility be expanded to low-earning workers? Evidence on employment, transfer receipt and income from administrative data.* Upjohn Institute Working Paper 15–236.

Li, Yiran, Bradford Mills, George C. Davis, and Elton Mykerezi. 2014. *Child food insecurity and the food stamp program: What a difference monthly data make.* SOCIAL SERVICE REVIEW 88(2): 332–348.

Mabli, James and Rosalie Malsberger. 2013. *Recent trends in spending patterns of Supplemental Nutrition Assistance Program participants and other low-income Americans.* MONTHLY LABOR REVIEW, September 2013.

Mankiw, Gregory N. 2000. *Principles of Microeconomics.* Boston: Cengage Learning.

Milkman, Katherine L. and John Bashears. 2009. *Mental accounting and small windfalls: Evidence from an online grocer.* JOURNAL OF ECONOMIC BEHAVIOR AND ORGANIZATION 71(2): 384–394.

Mills, Gregory, Tracy Vericker, Heather Koball, Kye Lippold, Laura Wheaton, and Sam Elkin. 2014. *Understanding the rates, causes, and costs of churning in the Supplemental Nutrition Assistance Program (SNAP)—Final report.* U.S. Department of Agriculture, Food and Nutrition Service.

Moffitt, Robert. 1989. *Estimating the value of an in-kind transfer: The case of food stamps.* ECONOMETRICA 57(2): 385–409.

Nevo, Aviv and Arlene Wong. 2015. *The elasticity of substitution between time and market goods: Evidence from the Great Recession.* NBER Working Paper No. 21318.

Nord, Mark and Mark Prell. 2011. *Food security improved following the 2009 ARRA increase in SNAP benefits.* U.S. Department of Agriculture, Economic Research Service.

Project Bread. 2016. *Can I Get SNAP?* Accessed at *http://www.gettingfoodstamps.org/espanol/canigetsnap.html* on January 7, 2016.

Rainwater, Lee, Richard P. Coleman, and Gerald Handel. 1959. *Workingman's Wife: Her Personality, World and Life Style.* New York: Oceana Publications.

Ratcliffe, Caroline, Signe-Mary McKernan, and Sisi Zhang. 2011. *How much does the Supplemental Nutrition Assistance Program reduce food insecurity?* AMERICAN JOURNAL OF AGRICULTURAL ECONOMICS 93(4): 1082–1098.

Rhode Island Department of Labor and Training. 2016. *2016 UI and TDI Quick Reference.* Accessed at *https://web.archive.org/web/20160104022814/http://www.dlt.ri.gov/lmi/news/quickref.htm* on December 22, 2016.

Robinson, Peter M. 1988. *Root-N-consistent semiparametric regression.* ECONOMETRICA 56(4): 931–954.

Schanzenbach, Diane Whitmore. 2002. *What are food stamps worth?* Princeton University Industrial Relations Section Working Paper No. 468.

Thaler, Richard H. 1999. *Mental accounting matters.* JOURNAL OF BEHAVIORAL DECISION MAKING 12(3): 183–206.

Thompson, Samuel B. 2011. *Simple formulas for standard errors that cluster by both firm and time.* JOURNAL OF FINANCIAL ECONOMICS 99(1): 1–10.

Trippe, Carole and Daisy Ewell. 2007. *An analysis of cash food expenditures of food stamp households.* Washington, D.C.: Mathematica Policy Research.

U.S. Census Bureau. 2010. *County Business Patterns.* Accessed at *http://www.census.gov/data/datasets/2010/econ/cbp/2010-cbp.html* on June 15, 2016.

_____. 2016. Accessed at *http://www.census.gov/quickfacts/table/PST045215/00* on May 5, 2016.

Varian, Hal R. 1983. *Non-parametric tests of consumer behaviour.* REVIEW OF ECONOMIC STUDIES 50(1): 99–110.

Ver Ploeg, Michele, Lisa Mancino, Jessica E. Todd, Dawn Marie Clay, and Benjamin Scharadin. 2015. *Where do Americans usually shop for food and how do they travel to get there? Initial findings from the National Household Food Acquisition and Purchase Survey.* U.S. Department of Agriculture, Economic Research Service.

Wilde, Parke E. 2001. *The food stamp benefit formula: Implications for empirical research on food demand.* JOURNAL OF AGRICULTURAL AND RESOURCE ECONOMICS 26(1): 75–90.

Wilde, Parke E. and Christine Ranney. 1996. *The distinct impact of food stamps on food spending.* JOURNAL OF AGRICULTURAL AND RESOURCE ECONOMICS 21(1): 174–185.

Wilde, Parke E., Lisa M. Troy, and Beatrice L. Rogers. 2009. *Food stamps and food spending: An Engel function approach.* AMERICAN JOURNAL OF AGRICULTURAL ECONOMICS 91(2): 416–430.

Yen, Steven T., Margaret Andrews, Zhuo Chen, and David B. Eastwood. 2008. *Food Stamp Program participation and food insecurity: An instrumental variables approach.* AMERICAN JOURNAL OF AGRICULTURAL ECONOMICS 90(1): 117–132.

Table 1: Estimated Marginal Propensities To Consume

	(1) SNAP-eligible spending	(2) SNAP-eligible spending	(3) SNAP-eligible spending	(4) SNAP-ineligible spending
MPC out of				
SNAP benefits	0.5891	0.5495	0.5884	0.0230
	(0.0074)	(0.0360)	(0.0073)	(0.0043)
cash	-0.0019	-0.0013	-0.0020	0.0421
	(0.0494)	(0.0494)	(0.0494)	(0.0688)
p-value for equality of MPCs	0.0000	0.0000	0.0000	0.7764
Instruments:				
Change in price of regular gasoline ×(Household average gallons per month)	Yes	Yes	Yes	Yes
SNAP adoption	Yes	No	Yes	Yes
First month of SNAP clock	No	Yes	Yes	Yes
Number of household-months	2005392	2005392	2005392	2005392
Number of households	24456	24456	24456	24456

Notes: The sample is the set of SNAP adopters. The unit of observation is the household-month. Each column reports coefficient estimates from a 2SLS regression, with standard errors in parentheses clustered by household and calendar month using the method in Thompson (2011). All models are estimated in first differences and include calendar month fixed effects. Endogenous regressors are SNAP benefits and the additive inverse of fuel spending; coefficients on these regressors are reported as marginal propensities to consume. The "price of regular gasoline" is the quantity-weighted average spending per gallon on regular grade gasoline among all households before any discounts or coupons. "Household average gallons per month" is the average monthly number of gallons of gasoline purchased by a given household during the panel. "SNAP adoption" is an indicator for whether the month is an adoption month as defined in section 3.5. "First month of SNAP clock" is an indicator equal to one in the first month of a six-month clock that begins in the most recent adoption month. The indicator is set to zero in the first six months (inclusive of the adoption month) following the most recent adoption, in any month after the first 24 months (inclusive of the adoption month) following the most recent adoption, and in any month for which there is no preceding adoption.

Table 2: Tests of Fungibility

	Consumption function:			
	Linear, homogeneous	Linear, heterogeneous	Nonlinear, heterogeneous (Quintile means)	Nonlinear, heterogeneous (Local regression)
Excess sensitivity to SNAP benefits ($\hat{\gamma}$)	0.6919	0.6966	0.6315	0.8091
	(0.0914)	(0.1160)	(0.0184)	(0.0361)
p-value for γ=0	0.0000	0.0000	0.0000	0.0000
[bootstrap p-value]	[0.0000]	[0.0000]	[0.0000]	[0.0000]
Number of household-months	1944056	1944056	1944056	1941678
Number of households	23708	23708	23708	23679

Notes: The sample is the set of SNAP adopters that purchase fuel at least once. The unit of observation is the household-month. The table presents estimates of the excess sensitivity γ to SNAP benefits using the three-step estimator described in section 5.3. Let f_{it}^{γ} be SNAP-eligible spending, b_{it} be SNAP benefits, and y_{it} be the additive inverse of fuel spending. Let z_{it} be a vector consisting of the number of SNAP adoptions experienced by household i as of calendar month t, and the product of the average price of regular gasoline with the household's average monthly number of gallons of gasoline purchased. First, we estimate $Y_{it} = E(y_{it} + b_{it}|z_{it})$ and $B_{it} = E(b_{it}|z_{it})$ via first-differenced regression of $(y_{it} + b_{it})$ and b_{it} on z_{it}, respectively, producing estimates $(\hat{Y}_{it}, \hat{B}_{it})$. Next, we estimate $(E(f_{it}^{\gamma}|Y_{it}), E(B_{it}|Y_{it}))$ via four different methods, producing estimates $\left(E\widehat{(f_{it}^{\gamma}|Y_{it})}, E\widehat{(B_{it}|Y_{it})}\right)$. In the first column, we estimate these via first-differenced regression of f_{it}^{γ} and $\hat{B}_{it}$ on $\hat{Y}_{it}$, pooling across households. In the second column, we estimate these via first-differenced regression of f_{it}^{γ} and $\hat{B}_{it}$ on $\hat{Y}_{it}$, separately by household. In the third column, we estimate these via first-differenced regression of f_{it}^{γ} and $\hat{B}_{it}$ on indicators for the quintiles of $\hat{Y}_{it}$, separately by household. In the fourth column, we estimate these via locally weighted linear regression of f_{it}^{γ} and $\hat{B}_{it}$ on $\hat{Y}_{it}$, separately by household, with Gaussian kernel and the rule-of-thumb bandwidth proposed by Fan and Gijbels (1996). Finally, we estimate γ via first-differenced regression of $\left(f_{it}^{\gamma} - E\widehat{(f_{it}^{\gamma}|Y_{it})}\right)$ on $\left(\hat{B}_{it} - E\widehat{(B_{it}|Y_{it})}\right)$, reporting in parentheses the asymptotic standard errors clustered by household and calendar month using the method in Thompson (2011). We report two p-values for the hypothesis that γ = 0. The first p-value is based on the asymptotic standard errors; the second p-value (in brackets) is based on a nonparametric bootstrap over households with 30 replicates. Missing values in the fourth column are due to a small number of cases in which the rule-of-thumb bandwidth is ill-defined.

Figure 1: Household income and size before and after SNAP adoption

Panel A: Household Income
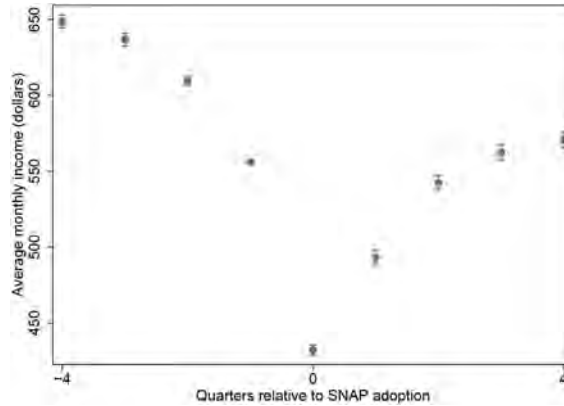
Panel B: Number of Children Under Five Years of Age
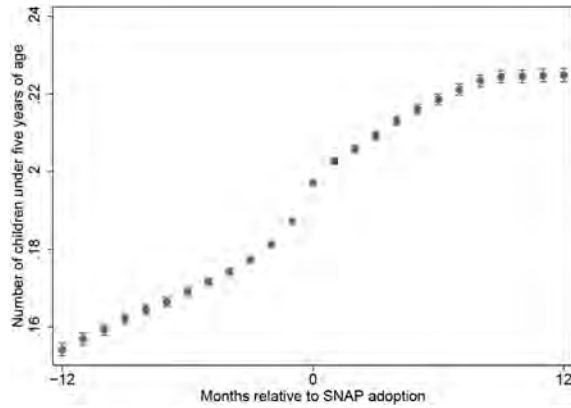
Notes: Data are from Rhode Island administrative records from October 2004 through June 2016. See section 2.1 for details on sample definition and variable construction. Each panel plots coefficients from a regression of the dependent variable on a vector of lead and lagged indicators for periods relative to SNAP adoption, defined as the first period in which the household receives SNAP. The period immediately prior to adoption ("−1") is the omitted category. Each regression includes time period fixed effects, household fixed effects, and indicators for observations more than 1 year before or after adoption. In panel A, a time period is a calendar quarter and the unit of analysis is a household-quarter. In panel B, a time period is a month and the unit of analysis is the household-month. In both panels, the error bars are ± 2 coefficient standard errors and standard errors are clustered by household. Dotted lines show the sample mean of the dependent variable across observations within 1 year (4 quarters or 12 months) of SNAP adoption. Each coefficient series is shifted by a constant so that the observation-count-weighted mean of the regression coefficients is equal to the sample mean of the corresponding dependent variable.

Figure 2: Distribution of Lengths of SNAP Spells
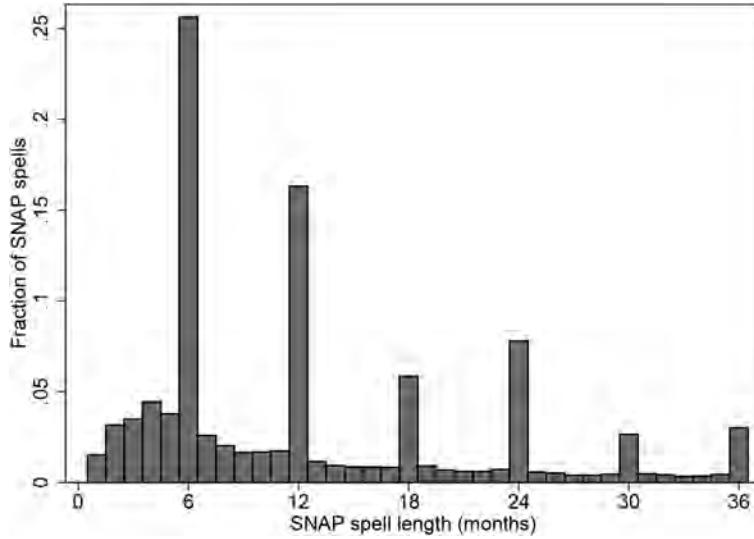
Notes: Data are from Rhode Island administrative records from October 2004 through June 2016. See section 2.1 for details on sample definition and variable construction. The plot shows a histogram of the distribution of SNAP spell lengths, where a spell is defined as a set of consecutive months in which the household is entitled to a SNAP benefit in each month according to state program records. Spells longer than 36 months are excluded from the sample.

Figure 3: Inferring SNAP Adoption from Single-Retailer Data
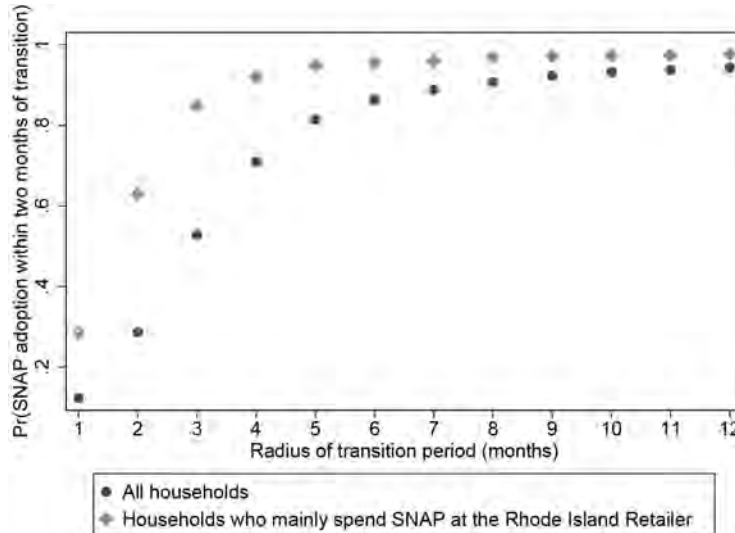
Notes: Data are from Rhode Island EBT transaction records from September 2012 through October 2015. See section 2.1 for details on sample definition and variable construction. The figure plots the fraction of transition periods of a given radius in which the household newly enrolled in SNAP within 2 months of the start of SNAP spending at the Rhode Island

Retailer. We define new enrollment as the receipt of at least $10 in SNAP benefits following a period of at least 3 consecutive months with no benefit. A transition period of radius K is a period in which a household exhibits K consecutive months without SNAP spending at the Rhode Island Retailer followed by K consecutive months with SNAP spending at the Rhode Island Retailer. Households who mainly spend SNAP at the Rhode Island Retailer are those who spend at least ½ of their total EBT expenditures between September 2012 and October 2015 at the Rhode Island Retailer.

Figure 4: SNAP Use and Benefits Before and After SNAP Adoption

Panel A: SNAP Use
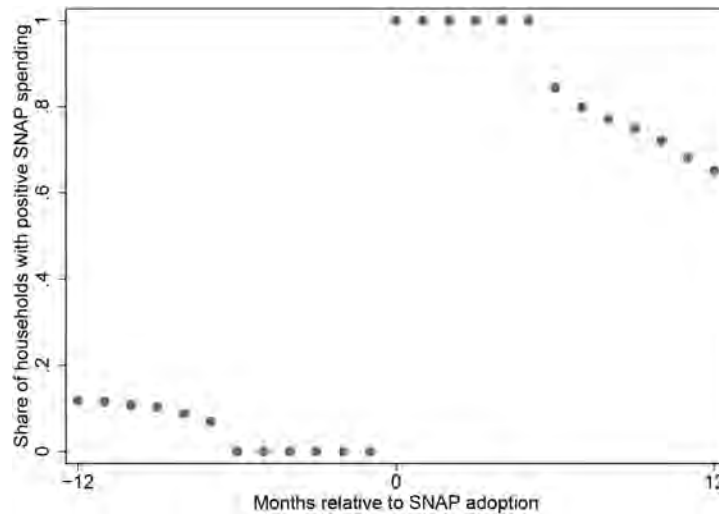
Panel B: SNAP Benefits
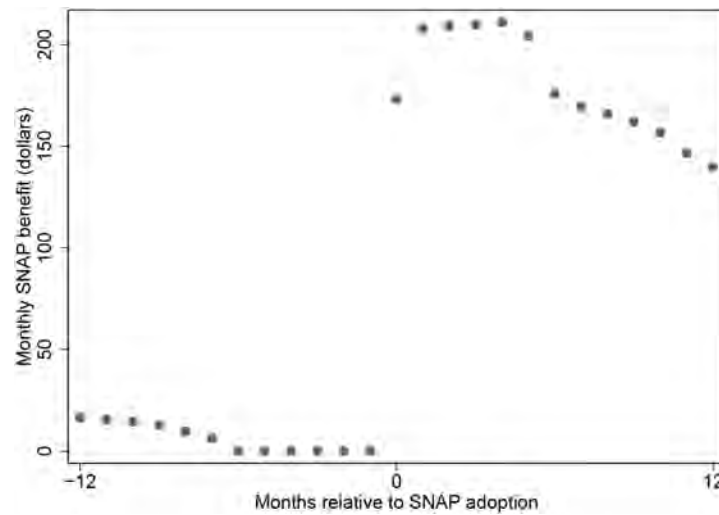
Notes: The sample is the set of SNAP adopters. Panel A plots the share of households with positive SNAP spending in each of the 12 months before and after the household's first SNAP adoption. Panel B plots the average SNAP benefit in each of the 12 months before and after the first SNAP adoption.

Figure 5: Monthly Expenditure Before and After SNAP Adoption, By SNAP Eligibility of Product

Panel A: SNAP-Eligible Spending
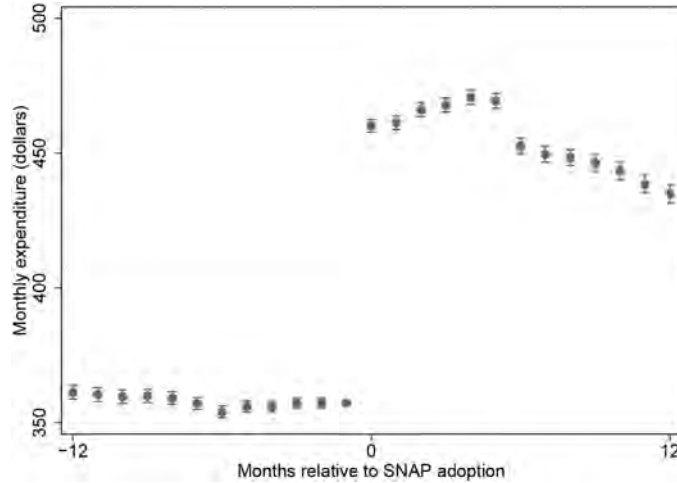
Panel B: SNAP-Ineligible Spending
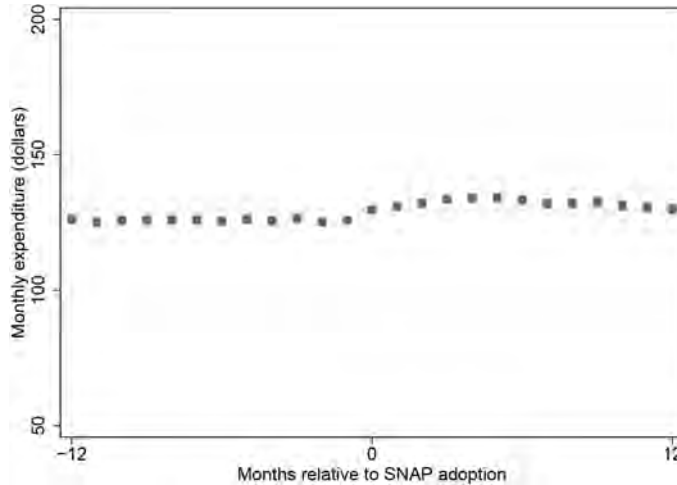
Notes: Each figure plots coefficients from a regression of SNAP-eligible or SNAP-ineligible spending on a vector of lead and lagged indicators for month relative to the household's first SNAP adoption, with the month prior to SNAP adoption ("-1") as the omitted category. The unit of observation for each regression is the household-month. Error bars are ± 2 coefficient standard errors. Standard errors are clustered by household. Each regression includes calendar month fixed effects, household fixed effects, and two indicators for observations before and after 12 months of SNAP adoption. The dotted lines show the sample mean of household monthly expenditure across observations within 12 months of SNAP adoption. Each coefficient series is shifted by a constant so that the observation-count-weighted mean of the regression coefficients is equal to the sample mean of the corresponding dependent variable.

Figure 6: Participation, Benefits, and Spending Over the 6 Month SNAP Clock

Panel A: SNAP Use
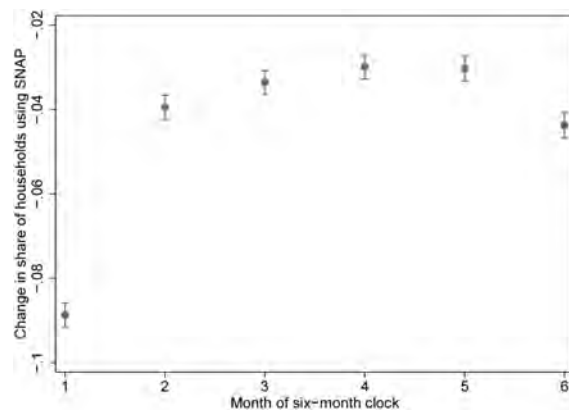
Panel B: SNAP Benefits
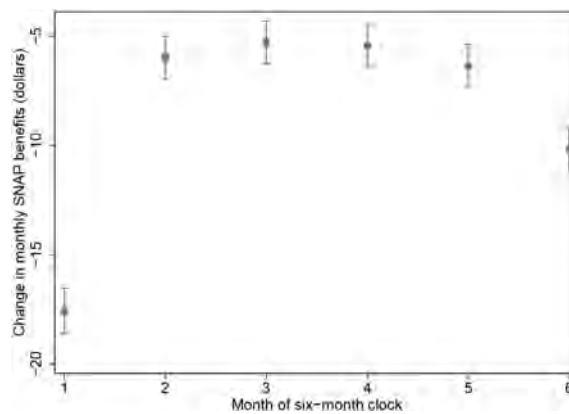
Panel C: SNAP-Eligible Spending
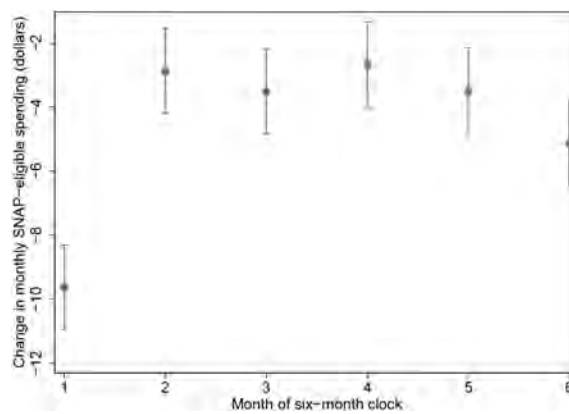
Notes: Each figure plots coefficients from a regression of the dependent variable on a vector of indicators for the position of the current month in a monthly clock that begins in the most recent adoption month and resets every 6 months or at the next SNAP adoption, whichever comes first. The unit of observation for each regression is the household-month. The sample is the set of SNAP adopters. Error bars are ±2 coefficient standard errors. Standard errors are clustered by household. Each regression includes calendar month fixed effects. The omitted category consists of the first 6 months (inclusive of the adoption month) after the household's most recent SNAP adoption, all months after the first 24 months (inclusive of the adoption month) following the household's most recent adoption, and all months for which there is no preceding adoption. In Panel A, the dependent variable is the change in an indicator for whether the household-month is a SNAP month. In Panel B, the dependent variable is the change in monthly SNAP benefits. In Panel C, the dependent variable is the change in monthly SNAP-eligible spending.

Figure 7: Monthly Expenditure and the Price of Gasoline

Panel A: Fuel Spending
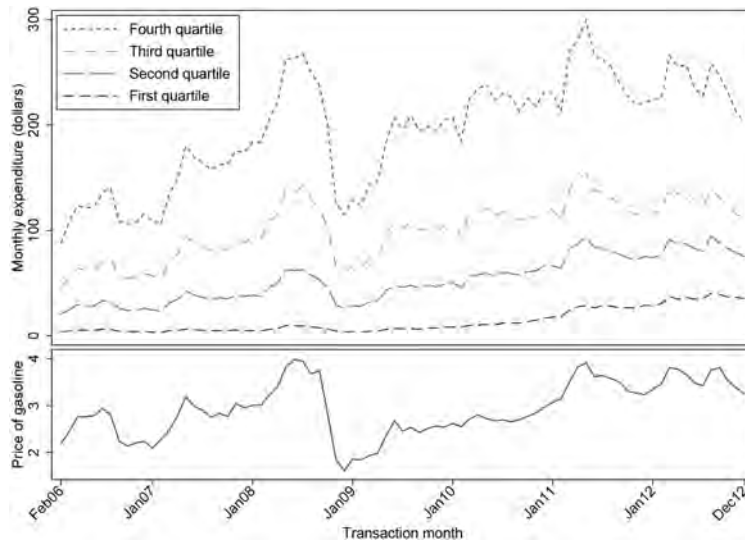
Panel B: SNAP-Eligible Spending
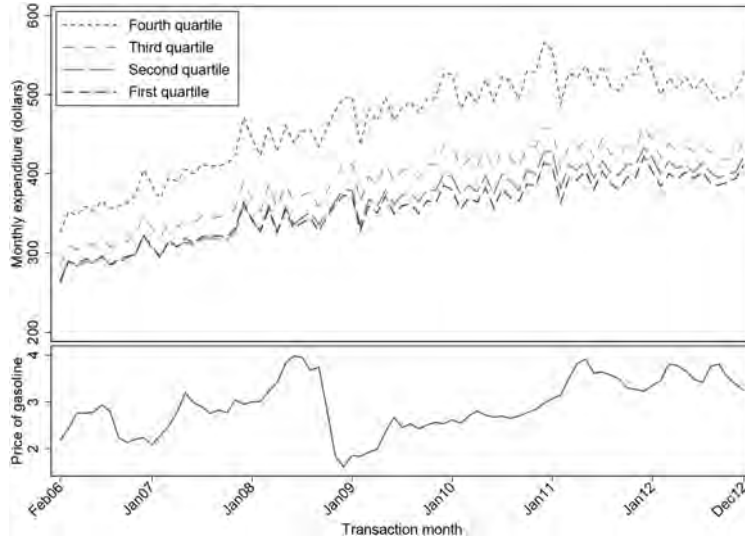
Notes: Panel A plots average monthly fuel spending by quartile of average monthly fuel spending. Panel B plots average monthly SNAP-eligible spending by quartile of average monthly fuel spending. The unit of observation is the household-month and the sample is the set of SNAP adopters who ever purchase fuel. The lower portion of both plots shows the price of gasoline, computed as the quantity-weighted average spending per gallon on regular grade gasoline among all households before any discounts or coupons.

Figure 8: Store-Brand Share Before and After SNAP Adoption, By SNAP Eligibility of product

Panel A: SNAP-Eligible Products
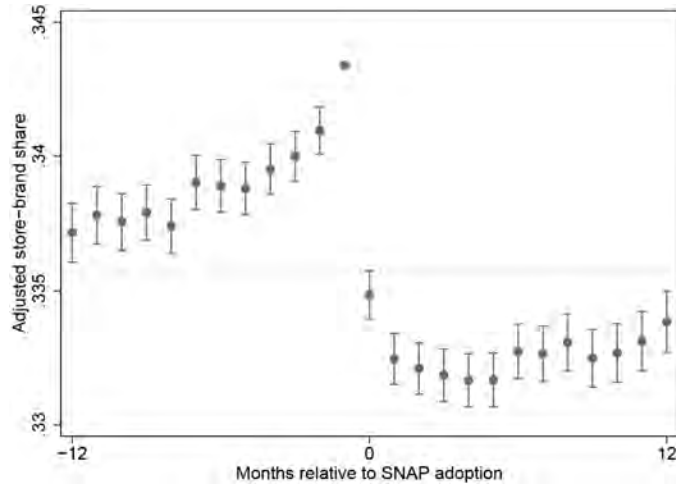
Panel B: SNAP-Ineligible Products
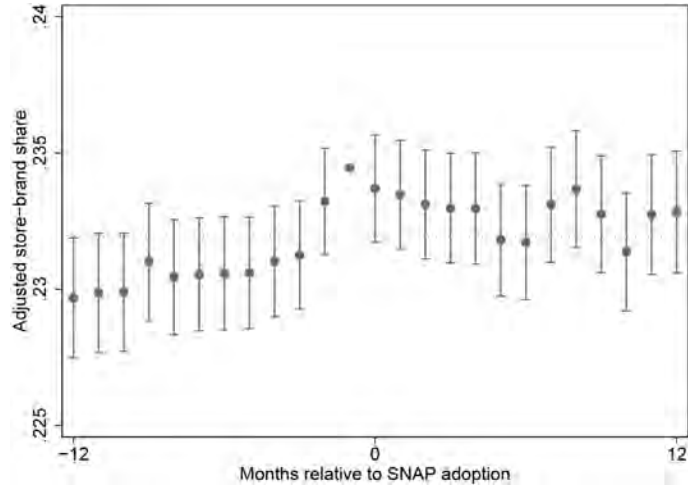
Notes: Each figure plots coefficients from a regression of adjusted store-brand share of expenditures on a vector of lead and lagged indicators for month relative to the household's first SNAP adoption, with the month prior to SNAP adoption ("−1") as the omitted category. The unit of observation for each regression is the household-month. Error bars are ±2 coefficient standard errors. Standard errors are clustered by household. Each regression includes calendar month fixed effects, household fixed effects, and two indicators for observations before and after 12 months of SNAP adoption. The dotted line shows the sample mean of the store-brand share of expenditure across observations within 12 months of SNAP adoption. Each coefficient series is shifted by a constant so that the observation-count-weighted mean of the regression coefficients is equal to the sample mean of the store-brand share of expenditure in the given SNAP eligibility group.

Figure 9: Coupon Use Before and After SNAP Adoption, By SNAP Eligibility of Product

Panel A: SNAP-Eligible Products
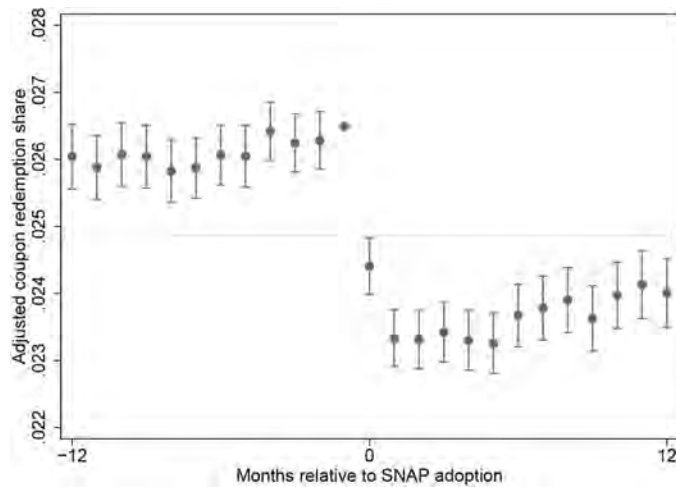
Panel B: SNAP-ineligible products
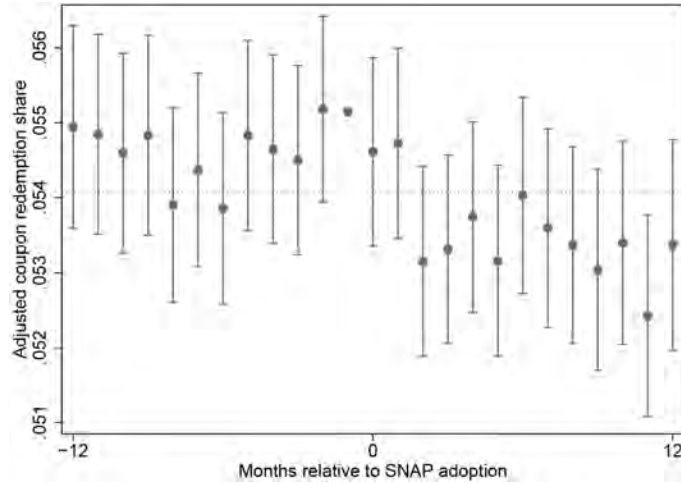
Notes: Each figure plots coefficients from a regression of the adjusted cou-pon redemption share on a vector of lead and lagged indicators for month relative to the household's first SNAP adoption, with the month prior to SNAP adoption ("−1") as the omitted category. The unit of observation for each regression is the household-month. Error bars are ±2 coefficient standard errors. Standard errors are clustered by household. Each regres-sion includes calendar month fixed effects, household fixed effects, and two indicators for observations before and after 12 months of SNAP adoption. The dotted line shows the sample mean of the share of purchases using a coupon across observations within 12 months of SNAP adoption. Each coef-ficient series is shifted by a constant so that the observation-count-weighted mean of the regression coefficients is equal to the sample mean of the share of purchases using a coupon in the given SNAP eligibility group.

Appendix Table: Results for Alternative Samples and Specifications

		MPCF out of SNAP benefits	cash	p-values for tests of fungibility	Number of household-months (households)
(1)	Baseline	0.588 (0.007)	-0.002 (0.049)	0.0000 0.0000	2005392 (24456)
(2)	All households with at least 2 consecutive SNAP months	0.589 (0.007)	0.018 (0.049)	0.0000 0.0000	8586958 (104719)
(3)	Below-median number of supermarkets in county	0.602 (0.009)	0.011 (0.052)	0.0000 0.0000	1002450 (12225)
(4)	Average SNAP-eligible spending exceeds average SNAP benefit	0.575 (0.007)	-0.000 (0.048)	0.0000 0.0000	1664272 (20296)
(5)	Average SNAP-eligible spending exceeds average SNAP benefit by at least $100	0.584 (0.009)	-0.001 (0.046)	0.0000 0.0000	1162842 (14181)
(6)	Households with only one adult	0.579 (0.016)	0.010 (0.064)	0.0000 0.0000	350058 (4269)
(7)	Households never on WIC	0.545 (0.008)	0.008 (0.043)	0.0000 0.0000	1174732 (14326)
(8)	Exclude recession adopters	0.579 (0.006)	-0.000 (0.052)	0.0000 0.0000	1425160 (17380)

Notes: Specification (1) corresponds to baseline results presented in the body of the paper. The first and second columns of numbers report coefficients and standard errors from the third column of table 1. The third column of numbers reports two p-values. The upper p-value is for the test of hypothesis that the MPCFs in the first two columns are equal. The lower p-value is for the test of the hypothesis that $\gamma = 0$ from the specification in the fourth column of table 2. The final column of numbers reports the sample size corresponding to the specifications in the first two columns. Specification (2) repeats specification (1) using the sample of all households with at least 2 consecutive SNAP months. Specification (3) repeats specification (1) using the sample of SNAP adopters for whom the number of supermarkets in the county of residence is below the median for SNAP adopters. Data on the number of supermarkets come from US Census Bureau (2010). A supermarket is defined as a supermarket or other grocery store; the category excludes convenience stores. Specification (4) repeats specification (1) using the sample of SNAP adopters for whom average SNAP-eligible spending in non-SNAP months exceeds the average SNAP benefit in SNAP months. Specification (5) repeats specification (1) using the sample of SNAP adopters for whom average SNAP-eligible spending in non-SNAP months exceeds the average SNAP benefit in SNAP months by at least $100. Specification (6) repeats specification (1) using the sample of SNAP adopters for which there is only one adult in the household. Specification (7) repeats specification (1) using the sample of SNAP adopters who never use WIC as the major payment method in any transaction. Specification (8) repeats specification (1) using the sample of SNAP adopters who did not adopt SNAP during the Great Recession (December 2007 - June 2009).

Appendix Figure 1: Legislated Changes in SNAP Benefits
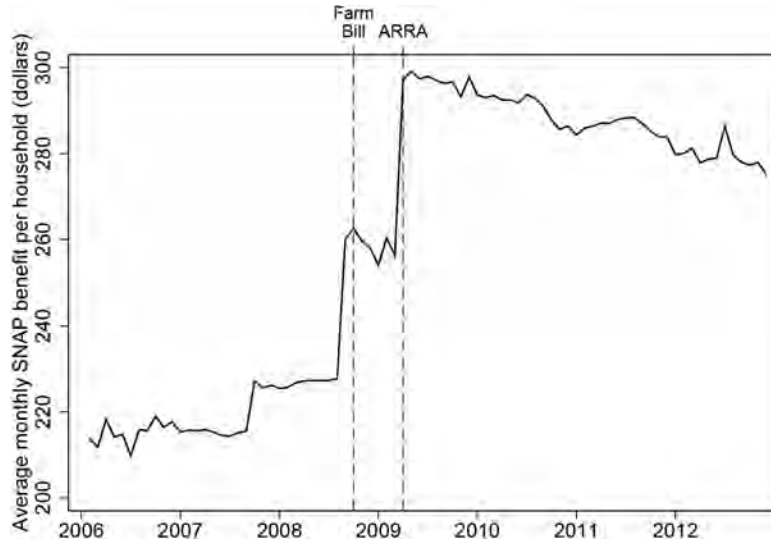
Notes: This figure plots the average monthly SNAP benefit per U.S. household between February 2006 and December 2012. The series was obtained directly from the United States Department of Agriculture Food and Nutrition Service via *http://www.fns.usda.gov/sites/default/files/pd/SNAPZip69throughCurrent.zip*. The vertical lines at October 2008 and April 2009 denote the implementation dates of changes in SNAP benefits due to the farm bill and American Recovery and Reinvestment Act (ARRA), respectively.

Appendix Figure 2: Monthly SNAP Benefits and SNAP-Eligible Spending Around Benefit Changes

68
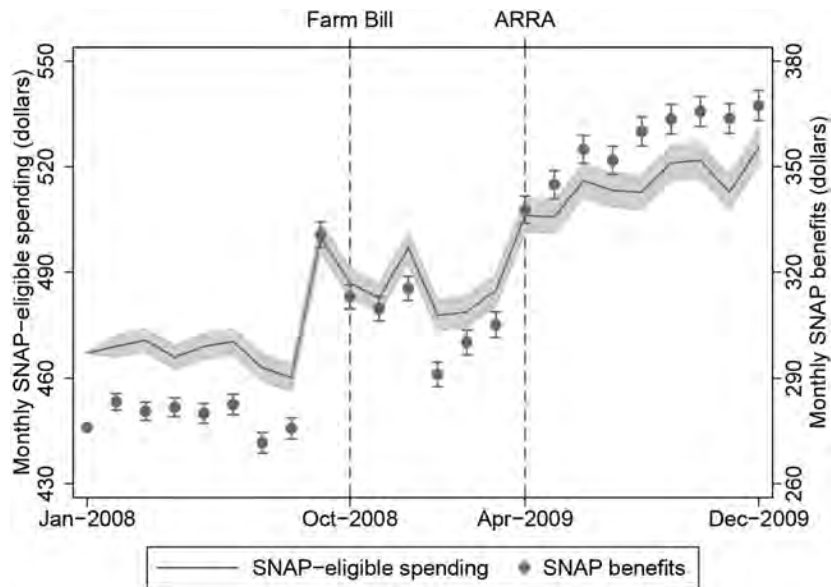
Notes: The sample includes all households in the retailer panel that have at least 2 consecutive SNAP months during the panel. The figure plots coefficients from a regression of SNAP benefits and SNAP-eligible spending on interactions between the share of calendar months between February 2006 and December 2007 during which each household used SNAP and calendar month indicators, with the January 2008 interaction normalized to zero. The unit of observation is the household-month and only months from January 2008 to December 2009 are included in the regression. Error bars and shaded region represent ±2 coefficient standard errors. Standard errors are clustered by household. Each regression includes household and calendar month fixed effects. Each coefficient series is seasonally adjusted by subtracting from each coefficient the corresponding coefficient from an auxiliary regression of the dependent variable on interactions between the share of months between February 2006 and December 2007 during which each household used SNAP and year and seasonal month indicators. The auxiliary regressions include household, year, and seasonal month fixed effects and are estimated using only data from January 2010 to December 2012. Each coefficient series is shifted by a constant so that the observation-count-weighted mean of the regression coefficients is equal to the sample mean of the corresponding dependent variable among households who used SNAP in every month between February 2006 and December 2007. Vertical lines at October 2008 and April 2009 denote the implementation dates of changes in SNAP benefits due to the farm bill and American Recovery and Reinvestment Act (ARRA), respectively.

Exhibit 2

Incentivizing Nutritious Diets: A Field Experiment of Relative Price Changes and How They Are Framed

John Cawley, Andrew S. Hanks, David R. Just, Brian Wansink
Working Paper 21929
http://www.nber.org/papers/w21929

Abstract

This paper examines how consumers respond to price incentives for nutritious relative to less-nutritious foods, and whether the framing of the price incentive as a subsidy for nutritious food or a tax on non-nutritious food influences consumers' responses. Analyzing transaction data from an 8 month randomized controlled field experiment involving 208 households, we find that a 10% relative price difference between nutritious and less nutritious food does not significantly affect overall purchases, although low-income households respond to the subsidy frame by buying more of both nutritious and less-nutritious food.

John Cawley,
2312 MVR Hall,

David R. Just,
Cornell University,

Department of Policy Analysis and Management and Department of Economics,
Cornell University,
Ithaca, NY 14853,
and NBER,
JHC38@cornell.edu;

210C Warren Hall,
Ithaca, NY 14850,
drj3@cornell.edu;

Andrew S. Hanks
Ohio State University
130A Campbell Hall
1787 Neil Ave.
Columbus, OH 43210
hanks.46@osu.edu;

Brian Wansink,
Cornell University,
475H Warren Hall,
Ithaca, NY 14850,
wansink@cornell.edu.

Introduction

Diet-related chronic disease is a global problem. Worldwide, the annual deaths due to high blood pressure total 7.5 million, high blood glucose (diabetes) 3.4 million, overweight and obesity 2.8 million, and high cholesterol 2.6 million (WHO, 2009). In the U.S., 37% of the adult population has cardiovascular disease, 16% has high total blood cholesterol, 34% has hypertension, 11% has diabetes, and it is estimated that 41% will be diagnosed with some form of cancer during their lifetime (USDA, 2010). Moreover, 35.1% of adults and 16.9% of youths in the U.S. are obese (Ogden, *et al.,* 2014). Even in low-income countries, the top ten risk factors for preventable death include high blood pressure, high blood glucose, and high cholesterol (WHO, 2009). The problems with many modern diets, which contribute to these high rates of chronic disease (McCullough, *et al.,* 2002), are that they contain too much saturated fats, cholesterol, added sugars, added sodium, and refined grains, and too little whole grains and fresh fruits and vegetables (USDA, 2010).

As a result of the high rates of chronic disease, there have been calls for taxes on energy-dense less-nutritious foods from many medical and public health organizations, such as the World Health Organization (2015), U.S. Dietary Guidelines Advisory Committee (2015), British Medical Association (2015), Institute of Medicine (2009), and the International Obesity Task Force (2005), which urged all European Union member countries to enact taxes on energy-dense foods. There have also been numerous calls in medical journals for taxes to incentivize a healthy diet (*e.g.,* Brownell and Frieden, 2009, and Jacobson and Brownell, 2000). Taxes on energy-dense foods are arguably the most commonly-advocated anti-obesity policy.

Policymakers worldwide have responded to this call for action. Numerous countries, such as Australia, Canada, Denmark, Fiji, Finland, France, Hungary, Norway, and Mexico, have recently implemented taxes on energy-dense, less-nutritious foods (see *e.g.,* World Health Organization, 2015, Sassi, *et al.,* 2013, and Thow, *et al.,* 2011). In the U.S., 34 states tax soft drinks sold in grocery stores, at an average rate of 4.02%, and 15 states tax snacks sold in grocery stores at an average rate of 1.2% (Chriqui, *et al.,* 2008). In early 2015, Berkeley, California became the first U.S. city to impose an excise tax on sugar-sweetened beverages (Cawley and Frisvold, 2015).

To some extent, an individual's diet and any resulting chronic disease or premature mortality can be seen as a private, individual decision. However, there are two economic rationales for government intervention to incentivize healthier diets. First, there are external costs of a poor diet that operate through private and public health insurance (Cawley, 2015). Premiums that fund private health insurance, and the taxes that fund public health insurance, are not a function of diet, and as a result, the costs of treating diet-related chronic disease are borne not only by those with the disease but also by others in the same insurance pools and by taxpayers. The exact magnitude of these external costs is not known, but they are undoubtedly large given the enormous medical care costs. Indeed, it is estimated that the annual direct medical care costs total $273 billion for cardiovascular disease (CDC, 2015a), $315.8 billion for obesity (Cawley, Meyerhoefer, *et al.,* 2015), $116 billion for diabetes (CDC, 2015b), and $263.8 billion for cancer (this includes both direct and indirect costs; CDC 2015c). To pool these separate estimates would result in some degree of double-counting, but the overall cost of these diseases is clearly very high.

Behavioral economics offers a second rationale for government intervention to incentivize healthier diets. Individuals may have time-inconsistent preferences; they may want to eat a nutritious diet so as to be healthy in the future, but in the short run may be tempted by immediate gratification (Laibson, 2014). Some have argued that optimal taxes should reflect not only externalities but also internalities associated with time-inconsistent preferences, and that in such cases sin taxes can make those who engage in such activities happier because it helps them help themselves (Gruber and Mullainathan, 2005).

Whether or not food taxes and subsidies are effective is an empirical question. However, it is challenging to estimate the effect of existing food taxes on purchases

and consumption. In the U.S., state-level taxes are so small that it is very difficult to measure their effects (Fletcher, Frisvold, and Tefft, 2010; Chaloupka, *et al.,* 2011; Fletcher, *et al.,* 2011). For national taxes, it is difficult to disentangle the effect of the tax from time effects; *i.e.,* it is hard to identify a geographic control group. For both, policy endogeneity is a problem.

As an alternative approach, researchers have used field experiments to measure consumer responsiveness to price changes. For example, the USDA's Healthy Incentives Pilot for recipients of the Supplemental Nutrition Assistance Program (SNAP) offered a 30¢ rebate to the Electronic Benefit Transfer card for each dollar spent on fruits and vegetables. The program resulted in 0.22 cups/day more fruits and vegetable consumed by participating adults (USDA, 2013). Other field experiments paired their price changes with related interventions such as signs or marketing, the effect of which is confounded with the price change. For example, a set of experiments conducted by researchers at the University of Minnesota manipulated prices in cafeterias and vending machines (but also increased signage) and found that a 50% subsidy for fruits and salads tripled sales, but sales fell to baseline after the subsidy was removed (French, *et al.,* 1997; Jeffrey, *et al.,* 1994). Elbel, *et al.* (2013) opened their own store in a hospital, and imposed a 30% tax on unhealthy foods, which they juxtaposed next to healthier alternatives. They estimate that the tax increased the probability of consumers choosing healthier alternatives by 11 percentage points. The generalizability is unclear given that the store was a researcher-created environment that involved deliberate juxtapositioning of healthier and less healthy options.

This paper contributes to the literature that uses field experiments to measure consumer responsiveness to changes in food prices. A review of the literature by Epstein, *et al.* (2012) finds only four studies that manipulated prices of foods in supermarkets; all provided discounts for healthy foods, and three of the four examined only purchases of a subset of available foods. Other experiments manipulating food prices took place in laboratories, cafeterias and restaurants, farmer[s'] markets, and vending machines (Epstein, *et al.,* 2012). In a recent study, nutritious foods were subsidized 12.5% or 25% and less-nutritious items were taxed 12.5% or 25%, depending on the treatment, in a simulated online market place with 6000 food items. Calories purchased of taxed foods decreased and calories purchased of subsidized foods increased, but overall calories did not change between baseline and price change interventions, suggesting substitution of calories towards foods neither taxed nor subsidized. Yet, there is evidence of improved nutrient quality of foods purchased in the subsidy condition (Epstein, *et al.,* 2015).

Another relevant recent study is that of List, Samek, and Zhu (2015). They conducted a field experiment at a grocery store in a high-poverty area of Chicago. They enlisted 222 participants for a 6.5 month study and examined the effect of two treatments: $1 incentive to purchase at least 5 cups of fresh fruits and vegetables on their shopping trip, and information on preparing fruits and vegetables. They find little effect from the information, but find large effects of the incentives (it doubles purchases of fresh fruits and vegetables) that persist after the incentives end.

The contribution of this research is to estimate the responsiveness of consumers to a price change—with no other interventions such as additional signage or juxtapositioning of alternatives—in the consumer's usual retail environment. In other words, we observe consumers buying their usual items in the supermarket in which they typically shop. We observe all food purchases made at the supermarket (and provide incentives for subjects to do all of their food shopping at the supermarket), and we rely on an objective system that classifies food as nutritious and less-nutritious and which is already in place in the supermarket.

We conduct a randomized controlled field experiment in order to measure the impact of a 10% relative price difference between nutritious and less-nutritious food in order to answer three research questions: (1) Are consumers' food purchases responsive to less-nutritious food being made 10% more expensive than nutritious food? (2) Does that responsiveness depend on whether the price change is framed as a tax on less-nutritious food, a subsidy for nutritious food, or both? (3) Do the answers differ by the education or income of the consumer?

We hypothesize that the relative price change will decrease purchases of less-nutritious foods and increase purchases of nutritious foods. We also hypothesize that those told that the 10% price difference is a tax will respond more, relative to those who are told that the 10% price difference is a subsidy; this is motivated by prospect theory, which posits that people interpret gains and losses relative to a reference point (Kahneman and Tversky, 1979). In particular, people may respond more when the tradeoff is framed as a loss rather than a foregone reward (Gachter, *et al.,* 2009; Homonoff, 2015), which suggests that people may be more responsive to the frame of a tax on less-nutritious food than that of a subsidy for nutritious food.

Additionally, we hypothesize that responses to the relative price change may differ by socioeconomic status, measured by income and education, though the direction of the response is unclear. Consumer response may differ by income for several reasons. Mullainathan and Shafir (2013) argue that poverty consumes mental bandwidth, which implies that lower-income individuals may pay less attention to the price change. On the other hand, other evidence suggests that lower-income individuals may be more responsive to the relative price change. Low-income individuals who receive public assistance (such as food stamps or social security) exhibit "first of the month effects"—their spending on food decreases as the month progresses (Hastings and Washington, 2010; Shapiro, 2005). This suggests that they may be credit constrained and perhaps price reductions could have substantial income effects. Furthermore, other research suggests that the income elasticity of body weight is greater for low-income individuals (Akee, *et al.,* 2013; Schmeiser, 2009).

Second, consumer response may also differ by education. The better educated tend to demand more health and be more efficient producers of their own health (Grossman, 1972) and thus may have a more elastic demand for nutritious food. In addition, the better educated may simply better understand the treatment or respond to changing prices in general.

Data and Methods

The Field Experiment

Controlled field studies with random assignment have the potential to clearly identify causal effects (List, 2009, 2011) and can have high levels of both internal and external validity (Roe and Just 2009). Thus, these types of studies can be uniquely effective for measuring the impact of potential policy instruments.

Identifying Nutritious and Less-Nutritious Foods

Any experiment designed to manipulate the prices of nutritious and less-nutritious foods faces the challenge of defining those two categories. We relied upon a supermarket shelf-label nutrition guidance system that had already been in place in the supermarket for several years prior to this experiment.[*][2] This proprietary system, called Guiding Stars, scores foods based on their nutritional value. More specifically, it takes into account vitamins, minerals, fiber and whole grains (which raise the score) and saturated fat, trans fat, cholesterol and added sugar and sodium (which lower the score). Ultimately, foods are rated on a scale from zero stars (poor nutritional value) to three stars (best nutritional value), and this score is displayed on the supermarket shelf label below each food item (retail price and unit price). Over 60,000 food items are rated. The few foods that are not rated are new (and thus not yet rated), seasonal (not consistently available), or have no calorie or nutrient content (such as dried spices or dried coffee or tea). For more information on Guiding Stars, see Fischer, *et al.* (2011).

For our experiment, we defined less-nutritious food as that which receives zero stars, and defined nutritious food as that which receives any stars (one, two, or three). An incentive scheme could offer more finely-tuned subsidies based on whether the item received one, two, or three stars, but that would also involve the tradeoff of increased complexity that could cause confusion for study participants. We chose to make the intervention simple to understand, and divided foods into those with zero stars (which were made relatively more expensive) and those with one or more stars (which were made relatively cheaper).[3] Of the rated food items observed in our data, 29% have at least one star and are thus classified as nutritious.

Participation and Incentives

Between May 1 and June 30, 2010, we recruited 239 loyalty card shoppers to participate in the study. Individuals were recruited via face-to-face contact at the entrances to two grocery stores in upstate New York. These stores are part of a regional supermarket chain that is located in the Northeast U.S. In order to ensure a diverse set of participants, subjects were recruited at various days and times, as well as at two different stores of the same chain in neighborhoods of differing socioeconomic status. In addition, to be eligible for inclusion in the study, participants had to have children under the age of 18 years living at home, do at least 75% of their shopping at the supermarket chain, and do a majority of the household's shopping.

---

[*]**Editor's note:** There is no footnote no. 1 in this working paper, as submitted.

[2] Sales data suggest that consumers use and respond to the Guiding Stars information; see Cawley, Sweeney, Just, *et al.* (2015). However, this information was in place well before and throughout the experiment and is thus not confounded with the treatment effects we estimate.

[3] The prices of unrated items were not altered.

After enrollment, subjects were sent an e-mail with a link to complete a survey on their household characteristics and shopping patterns. After repeated requests, fourteen subjects did not complete the survey and were dropped. One household later attrited from the study and so we drop data for that household. In 16 households, two individuals claimed to each do ½ of the household's shopping. Both were enrolled but purchases were aggregated to the household level. As a result, we have complete information, survey responses and expenditure data, for 208 households.

Soon after enrollment, participating households received two cards.[4] A scanner card (with the subject's name and photograph) was used to track purchases at the supermarket checkout lane. A debit card was used to deliver incentives and subsidies, which were electronically credited on a weekly basis. We observed households' food purchases (through their use of the scanner card) for a total of 33 weeks, including an 8 week baseline period before the relative prices of nutritious and less-nutritious foods were altered.[5] To encourage households to conduct all of their food shopping at the participating supermarket, during this baseline period, they received a 10% discount on purchases of all rated food items, defined as any foods rated with 0, 1, 2, or 3 stars.

Treatment Conditions

At the conclusion of the baseline period, subjects were randomized into one of four groups. The control group (N=52 households) continued to receive a 10% discount on all rated food items. For the treatment group (N=156), nutritious food was made 10% cheaper than less-nutritious food. How this price wedge was framed differed based on the treatment group into which the subject was randomized. The tax group (N=51) was told that they received a 15% discount on all rated food items, but were taxed 10% (and thus received only a 5% discount) on less-nutritious food. The subsidy group (N=55) was told it received a 5% discount on all rated food items, plus an additional 10% subsidy on nutritious food, for a total of 15% off nutritious food. The tax/subsidy group (N=50) was told that it received a 10% discount on all rated food items, plus an additional 5% subsidy on nutritious food (for a total subsidy of 15%) but was taxed 5% on less-nutritious food (for a net subsidy of 5%). In all three treatment conditions, nutritious food was subsidized 15% and less-nutritious food was subsidized 5%; thus each group faced a 10% price wedge between nutritious and less-nutritious food. The only way the treatments differed was in how that relative price difference was framed.

Households were notified of their respective treatment via e-mail and phone calls. Out of concern that subjects may not check their e-mail or voice messages, the enrolled representative from each household was also individually contacted by phone and notified directly; this process took 12 days. We removed these 2 weeks from analysis because some subjects during that time may not have yet been aware of their treatment condition.

In a voluntary field experiment, it is not possible to impose taxes on less-nutritious foods greater than the participation incentive, or subjects would likely buy these foods elsewhere and such expenditures would not be recorded as part of the study. To address this, the participation incentive was always greater than the tax imposed, ensuring that shoppers could not be worse off by shopping at the study stores. Because the participation incentive was also offered during the baseline period, we are able to identify the effect of price changes using the relative price changes between nutritious and less-nutritious foods that were imposed between the baseline and treatment periods. See *Table 1* for the relative price changes at baseline and during the treatment period, and details of the framing of the treatment.

To clarify, prices on the supermarket shelves were not altered. The participating supermarket was understandably unwilling to allow the researchers to manipulate shelf prices for all of their customers. Instead, subjects' purchases were tracked using the scanner cards, and the discounts, net of taxes, were uploaded weekly to the debit card. To ensure the salience of the price changes, each subject received a weekly e-mail notifying them of the amount of incentive or subsidy they had received, and reminding them which foods were taxed and which were subsidized. We acknowledge that this may affect the generalizability of these results, an issue we return to in the Discussion. The treatment period lasted for 25 weeks and ended without prior notice. See *Figure 1* for a detailed timeline of the study.

---

[4] In the 16 households in which two members enrolled in the study, each enrollee received his/her own set of cards.

[5] Households signed up 5–8 weeks before the treatment period; thus, we have baseline data for every household for at least 4 weeks and up to 8 weeks for some households.

Data

Itemized grocery purchases of each subject were tracked by the supermarket for the entire 33 weeks of the study using the scanner cards. The item-level transaction data include: date, quantity of item, expenditures on item, Guiding Stars score of each item (0, 1, 2, or 3 stars), and the description of the item. These transactions were aggregated by household and week, with weeks defined as Monday through Sunday. We merge the information from the baseline survey with the transaction data.

We focus on two main outcomes: the household's expenditures (defined before any subsidies or taxes applied by the experiment) and quantity purchased. Quantity purchased is measured in units, which is a limited measure because it does not account for size differences. For example, a ½ gallon and a gallon of milk each count as one unit, as do two different-sized boxes of the same cereal. Thus, this measure of quantity is a noisy measure of the quantity of food purchased. We examine these two outcomes for all food purchases, as well as separately for nutritious food and less-nutritious food.

If a household did not buy any food in that category in that week, the values of expenditures and quantity purchased are set to zero. The exception to this occurred during the first 3 weeks of the baseline period when households were still being enrolled in the study. During these 3 weeks, weeks with no expenditures were treated as missing until the household recorded their first shopping trip.

Hypotheses and Empirical Methods

We test the following hypotheses:

> H1: Increasing the price of less-nutritious food relative to the price of nutritious food will decrease purchases of less-nutritious food and increase purchases of nutritious food;
>
> H2: Framing the relative price change as a subsidy for nutritious food will increase the extent to which the price change increases purchases of nutritious food;
>
> H3: Framing the relative price change as a tax on less-nutritious food will increase the extent to which the relative price change decreases purchases of less-nutritious food;
>
> H4: These effects will vary by income and education.

In order to test these hypotheses, we estimate difference-in-differences models of expenditures and quantities. Randomization into the treatment and control groups allows for interpretation of the difference-in-differences estimator as a causal effect of the treatment. We first estimate these models assuming no framing effects and thus pool all three treatment conditions—tax, subsidy, and tax/subsidy—into a single treatment condition. We then subsequently estimate the models testing for framing effects, with each of the three frames as a separate treatment.

To estimate the average effect of the price change, ignoring the possibility of framing effects, we estimate the following two-way fixed effects model:

(1)

$$y_{hw} = \alpha_0 + \beta_0 Treatment_h * Post_w + \sum_{w=1}^{W-1} \chi_0 \mathrm{I}_w + \sum_{h=1}^{H-1} \delta_0 \mathrm{I}_h + \varepsilon_{hw}$$

The data are aggregated by household (h) and week (w). The difference-in-differences estimator is β_0. This coefficient measures the change between the baseline and treatment period for the treatment group relative to the control group. In order to control for time-invariant unobserved heterogeneity among households, the model controls for household fixed effects I_h. In order to control for time effects, such as the seasonal availability of fresh fruits and vegetables and changes in demand due to holidays, the model controls for week fixed effects I_w. The OLS regression model is estimated for all food purchases, as well as separately for purchases of nutritious food and less-nutritious food. The null hypothesis is that the 10% price wedge has no impact on purchases: $\beta_0 = 0$. To account for possible correlation in errors for the same household over time, standard errors are clustered by household.

In order to test whether the framing of the price change affects consumers' response to the price change, we estimate the following model, which estimates a separate difference-in-differences effect for each of the three treatment groups (tax, subsidy, tax and subsidy):

(2)

$$y_{hw} = \alpha_1 + \beta_1 Tax_h * Post_w + \beta_2 Subsidy_h * Post_w$$
$$+ \beta_3 Tax \& Subsidy_h * Post_w + \sum_{w=1}^{W-1} \chi_1 I_w + \sum_{h=1}^{H-1} \delta_1 I_h + \varepsilon_{hw}$$

The null hypothesis is that the framing of the treatment as either a tax on less-nutritious food, a subsidy of nutritious food, or both, does not alter the treatment effect; *i.e.,* that $\beta_1 = \beta_2 = \beta_3$.

To test whether the treatment effect varies by income, we estimate models (1) and (2) separately for those whose household income is (a) below or (b) above 130% of the Federal Poverty Line (FPL), which is the eligibility threshold for the Supplemental Nutrition Assistance Program (SNAP) and is close to the eligibility threshold for Medicaid (133% of FPL).

To test whether the treatment effect varies by education, we estimate the model separately for those whose educational attainment is (a) a high school degree or less or (b) some college or more.

We emphasize that, given our overall sample size, we have limited statistical power for subgroups. When we divide the sample by income, we have 36 households below and 155 households above 130% of the FPL. When we divide the sample by education, we have 18 participants with a high school education or less, and 182 participants with some college or more education (see *Table 2*). These subtotals do not sum to our total of 208 households because of non-response to the questions about income and education.

Empirical Results

Summary Statistics

Tables 2 and *3* list summary statistics for the study participants, with columns for the whole sample, control group, all treatment groups pooled, and each treatment group separately. *Table 2* reports sample sizes for the socioeconomic subgroups. *Tables 3a* and *3b* report summary statistics for additional household characteristics, such as income, number of children at home, household size, marital status, and race/ethnicity, which are all controlled for in our model through the inclusion of household fixed effects.

The summary statistics indicate that our sample is relatively well educated (91% have more than a high school education) and white (93.7%). This is a reflection of the fact that our sample consists of individuals in upstate New York and the participating supermarket chain is relatively high-end. By construction, all families have at least one child under the age of 18 years in the household.

Table 4 lists unconditional weekly expenditures on foods (overall, all rated, less nutritious, nutritious) for the entire sample and by group (control, all treatment, each treatment group). Household weekly food expenditures at this supermarket averaged $89.83 during the baseline period, and $100.88 during the treatment period. In comparison, data from the Consumer Expenditure Survey indicate that on average U.S. households spent $76 per week on food purchased for at-home consumption in 2013 (BLS, 2015). Notably the BLS estimate is unconditional, whereas our sample consists of households with at least one child under the age of 18 years, and are thus likely to be above-average in terms of food expenditures.

The increase in average weekly food expenditures for all treatment groups ($10.95) is roughly equal to that for the control group ($11.32); this unconditional difference-in-differences suggests that the treatment did not significantly affect overall expenditures on food. The increase in expenditures on nutritious food was also similar for all treatment groups pooled ($4.69) and the control group ($3.30).

Overall Effect of Relative Price Change

Table 5 lists results of the difference-in-differences models for expenditures and quantities. Our hypothesis is that the 10% relative price change increased the quantity demanded of nutritious food, and decreased the quantity demanded of less-nutritious food. *Table 5* shows that the point estimates of the coefficients are consistent with these hypotheses, but the coefficients are not statistically significant. For example, we find that creating a 10% price difference between nutritious and less-nutritious foods raised spending on nutritious food by $1.11 per week and lowered spending on less nutritious food by $1.55 per week, neither of which is statistically significant. On net, spending on all food rated by Guiding Stars (whether nutritious or less nutritious) fell by $0.44 per week, which was not statistically significant. In terms of quantities, the 10% relative price difference increased weekly pur-

chases of nutritious food by 0.95 units and lowered weekly purchases of less nutritious food by 0.87 units; overall purchases of foods rated by Guiding Stars rose by .08 units. None of those changes are statistically significant.

In summary, we are unable to reject the null hypothesis of no effect of the relative price change on purchases of nutritious and less-nutritious foods.

Effect of Framing of Relative Price Change

Next we test whether the effect of the relative price change differed by the way in which it was framed: as a tax on less-nutritious food, a subsidy for nutritious food, or both. It is possible that, because of loss aversion, the tax frame may exhibit a greater treatment effect than the subsidy frame. Moreover, given the difference in salience, we may see a greater increase in purchases of nutritious food for the subsidy frame, but a greater decrease in purchases of less-nutritious food for the tax frame.

Table 6 presents the results of the difference-in-difference models that estimate separate effects by frame. In no case are the treatment effects significantly different across frames (whether tax *versus* subsidy, tax *versus* tax/subsidy, or subsidy *versus* tax/subsidy). In addition, no estimated treatment effect for nutritious or less-nutritious food is significantly different from zero. However, some point estimates are substantial; *e.g.,* the effect of the relative price change for those in the tax frame to increase their weekly purchases of nutritious food by $4.52 (relative to a mean of $36.55) and for those in the tax/subsidy frame to decrease their weekly purchases of less nutritious food by $4.40 (relative to a mean of $49.59).

In summary, we are unable to reject the null hypothesis of no framing effect for the relative price change.

Differences by Income and Education

In our next analyses, we test whether the overall price treatment effects differed by income or education. For the sake of simplicity, we report results for expenditures (but not those for quantities). *Table 7* presents results of the overall price treatment effects separately for households with incomes below and above 130% of the Federal Poverty Line.

Although the difference in results across income was not statistically significant, the point estimates suggest that the treatment was associated with lower-income households spending $7.03 more per week on nutritious food and $7.11 more per week on less-nutritious food. In contrast, higher-income households spent $1.27 less on nutritious food per week and $4.02 less on less-nutritious food per week. None of these point estimates are statistically significant.

Table 8 presents the results of models estimated separately by education. Again, we find no statistically significant difference between the effect of the relative price change for the two socioeconomic groups. Moreover, the difference in point estimates is considerably smaller across education groups than across income groups.

We next test whether framing effects differed by income or education. *Table 9* reports results for the model that estimates treatment effects by frame, with the model estimated separately by income category. There are large and statistically significant differences in the effects of the frame by income. Specifically, low-income households that were given the subsidy frame (*i.e.,* told that the 10% relative price change represented a subsidy for nutritious food) significantly increased their purchases of less-nutritious food (by $21.23 per week). The increase in purchases of nutritious foods was $11.58, but not statistically significant. Overall, purchases of foods rated by Guiding Stars rose $32.81 per week on average for this group.

In contrast, higher-income households that were given the subsidy frame decreased their weekly purchases of both nutritious food ($4.55) and less-nutritious food ($7.55), although these are not significantly different from zero. The effects of the price change on less nutritious foods and all rated foods are, however, significantly different for the low-income and high-income groups given the subsidy frame.

In addition, *within* each income group, there is a significant difference in framing effects. As stated above, the low-income individuals given the subsidy frame significantly increased their purchases of less-nutritious food (by $21.23 per week); in contrast, the low-income individuals given the tax frame decreased their purchases of less-nutritious food (by $9.04, which is not statistically significant). That difference across frames is statistically significant. The responses of the tax and subsidy frame among the low-income participants also significantly differed for expenditures on all rated items, unrated items, and all items. They did not significantly differ in their treatment effect on expenditures on nutritious foods.

Table 10 presents results for models that estimate treatment effects by frame, with the models estimated separately by education category. There are no statistically significant differences in framing effects by education. Moreover, within edu-

cational group there are no statistically significant differences in framing effects; *i.e.,* we cannot reject the null hypothesis that the effect was the same for each treatment group or frame.

In summary, we find significant differences in framing effects by income. Specifically, the treatment effect is much greater for the low-income households given the subsidy frame than those given the tax frame; they buy more of even what the relative price change was seeking to discourage: less-nutritious food.

Extension: Permutation Tests

Given our sample size (208 households' weekly purchases over 8 months) we seek additional confirmation of both the result of significant treatment effects among low-income households given the subsidy frame, and the inability to reject the null of no effect for the overall sample. To that end, we conducted permutation tests (Kaiser, 2007) in which households were randomly re-labeled as being in one of the three treatment groups or the control group, after which the expenditure models were re-estimated. This was repeated 1,000 times and we compare the statistical significance of the treatment effect in our primary models to the distribution of treatment effects estimated in the 1,000 permutations. A p value of (*e.g.*) 0.05 indicates that only 5% of the permutations yielded more statistically significant results than our primary models, which would suggest that the original result was not due to chance.

The results of the permutation tests are provided in *Appendix Tables 1–3*. In general, these results confirm both of our major findings. First, for the overall sample we cannot reject the null hypothesis of no effect of the price change treatment. Appendix *Table 1* shows that, for both nutritious and less-nutritious foods, 70% or more of the permutations yielded more statistically significant treatment effects than the ones estimated in our primary model. *Table 2* shows that the permutation tests are also consistent with our inability to reject the null hypothesis of no effect of framing for the overall sample. *Appendix Table 3* shows that the permutation test confirms our finding of a significant positive effect of the treatment for low-income households given the subsidy frame; specifically, the permutation test p value is 0.056, indicating that the finding in our primary model is more significant than 94.4% of the permutations based on random re-labeling of groups. The result for the purchase of nutritious foods by the low-income households given the subsidy frame falls just short of statistical significance (p=.102).

Overall, the results of the permutation test confirm the earlier results—we cannot reject the null of a zero treatment effect for the overall sample, and we find evidence that low-income households given the subsidy frame buy significantly more less-nutritious foods.

Extension: Share of Purchases that was Nutritious

As another extension, we examine the proportion of expenditures on nutritious foods (the denominator includes expenditures on all rated foods). *Table 11* presents results for the difference-in-differences model in which the dependent variable is the percent of expenditures that was on nutritious foods. The effect of the relative price change was to increase the share of expenditures devoted to nutritious food by 1.08 percentage points, relative to a mean of 42.5%. However, this increase was not statistically significant. Subsequent columns in the table list the effects for high and low-income, and the high and low education groups. In each case the change in the percent of nutritious purchases resulting from the tax is small and not statistically significant.

Extension: Purchases of Unrated Foods

As described in the Data section, the Guiding Stars system rates virtually all foods in the supermarket. Those that are not rated include items that are new and have simply not yet been rated, or seasonal and therefore not consistently available. However, foods that have no calorie content are also not rated. This includes some items that are relatively uninteresting from a health perspective (*e.g.,* dried spices) but it also includes bottled water, alcoholic beverages, and dried tea and coffee. These are of interest because after the relative price change consumers may shift away from sugar-sweetened beverages to these other drink options. In order to test for any such effects, we estimate difference-in-differences models of expenditures and quantities purchased in that category. The results appear as additional columns in each of the earlier tables. We also include a column for All Items, which includes not just rated foods but also unrated foods.

Table 5 shows that the main effect of the treatment is a very small change in weekly expenditures on unrated items ($0.81), which is not statistically significant. However, the treatment results in an increase in the quantity of unrated foods purchased per week of 0.66 units, which is statistically significant. *Table 6* provides in-

formation on the effect of the framing of the relative price change. In five out of six cases, the effect of the treatment on purchases of unrated food items is not statistically significant; the exception is that those given the subsidy frame purchased 0.92 more units of unrated food per week. The results in *Table 9* indicate that this effect is concentrated among the lower-income households in the subsidy frame, who increased their purchases of unrated food items by $5.78 per week.

Extension: Change in Treatment Effects over Time

The dynamics of treatment effects can be interesting; a large initial effect that falls over time could be due to novelty or salience, while a small initial effect that increases over time is consistent with habit formation. To investigate this, we estimated our model of the overall treatment effect (*i.e.,* ignoring framing effects) for each week, and plot the results in *Figure 1*. Although our sample size precludes us from drawing strong conclusions, the negligible effect in the first 7 weeks of the treatment, combined with the larger treatment effects later in the treatment period, are consistent with gradual habit formation.

Robustness Checks

To verify our initial results, we conduct a variety of additional robustness checks. First, we re-estimate our models excluding the baseline data and find very similar results. Second, we estimate our original difference-in-differences models dropping the weeks with holidays (Thanksgiving, Christmas, and New Year's); the main difference is that the treatment effect is significant for low-income households' spending on nutritious foods (it rises by $9.43 per week). This is concentrated among the low-income households given the subsidy frame, who increase their spending on nutritious food by $16.80 per week. Third, most of the subjects are women, so we drop the men and re-estimate the models using only the female subjects. The main difference is that the results for higher-income households become more significant; *e.g.,* the high-income households in the subsidy frame decrease their spending on nutritious food ($8.87 less per week), less nutritious foods ($10.93 less per week), all rated foods ($19.80 less per week) and all items ($20.45 less per week). Fourth, we sought to investigate the large treatment effects exhibited by the low-income households given the subsidy frame. In particular, we investigated whether these households were buying non-perishables (stocking up for future consumption) or were buying perishables (for immediate consumption). Estimating our models separately for expenditures on perishables and non-perishables, we find that the low-income households given the subsidy frame generally bought more of everything, but the increases were statistically significant for perishables that were nutritious and less-nutritious, and for non-perishables that were less-nutritious. In other words, the low-income households given the subsidy frame were not just using the treatment as an opportunity to "stock up"; they were also buying more perishables for immediate consumption.

Extension: Subjects' Interpretations of the Relative Price Change

In order to better understand why there might be framing effects, we examine the results of a survey we administered to study participants after the treatment period ended. Participants were asked how they interpreted the treatment. Specifically, they were presented with seven statements describing the treatment, and were asked to rate their agreement with each of them on a Likert scale that ranged from 1 (strongly disagree) to 9 (strongly agree). *Table 12* presents the unconditional mean responses for the entire sample as well as the control group, the entire treatment group, and each treatment group separately.

One important result that stands out is that participants, *no matter what their frame,* tended to interpret the relative price change as a subsidy for nutritious food rather than a tax on less-nutritious food. For example, for the sample as a whole, the mean agreement that the debit card payments were a "reward for eating healthy food" averaged 6.2 on the nine-point scale, whereas "penalty for eating unhealthy food" averaged 2.9. In addition, for the sample as a whole, the mean agreement that it represented a "discount for eating healthy foods" was 6.4 out of 9, whereas the agreement that it was a "tax on unhealthy foods" was 3.4 out of 9.

This is not to say that the framing had no effect on subjects' perceptions. There was a statistically significant difference in the mean agreement that the treatment was a "penalty for eating unhealthy food" (3.4 in the tax frame *versus* 2.4 in the subsidy frame) as well as in the mean agreement that the treatment was a "tax on unhealthy foods" (3.7 in the tax frame *versus* 2.8 in the subsidy frame). Thus, the frame did have a detectable effect on perceptions of the treatment, but participants in all groups tended to interpret the treatment as more of a subsidy of nutritious food than a tax on less-nutritious food.

Extension: Subjects' Interpretations of their Change in Shopping During Treatment

In the survey conducted after the treatment concluded, subjects were also asked whether or not participating in the study influenced their shopping. The unconditional means by group are reported in *Table 12*. Those in the treatment groups (all pooled) expressed greater agreement with the statements that they were buying more starred (nutritious) foods, more healthier foods, and a higher percentage of healthier foods, but the difference between the treatment and control groups is not statistically significant in any of those cases.

There are significant differences in the mean response to these questions by frame. Specifically, those in the tax/subsidy frame tend to express greater agreement that the study led them to buy more nutritious foods, buy healthier foods, and buy a higher percentage of healthier foods, relative to those in the subsidy frame. Notably, we did not see such a difference in our data in the actual expenditures and quantities purchased.

Discussion

This paper contributes to the literature on the effects of food taxes and subsidies through an 8 month field experiment that created a 10% price wedge between nutritious and less-nutritious foods. We find that, on the whole, expenditures and quantities purchased did not change significantly in response to the price change. The point estimates suggest that the treatment group spent slightly less on less-nutritious food and slightly more on nutritious food, but these changes were not statistically significant. Some of the point estimates are substantial in magnitude, and their lack of statistical significance is due in part to imprecision of the estimates and to limited statistical power from 208 households.

Although we hypothesized that the framing of the relative price change as either a subsidy for nutritious food or a tax on less-nutritious food could alter the treatment effect, we find no significant differences in effects by frame. We do, however, find effects of framing by income. Specifically, lower income households to whom the relative price change was framed as a subsidy bought significantly more less-nutritious food (and more of all food) than low-income households to whom it was framed as a tax. Permutation tests are consistent with these results, suggesting that they are not due to chance.

One possible explanation for lower-income households buying more of all food, including the relatively more expensive less-nutritious food, is that lower-income households may experience a large income effect of a price decrease. In a related finding, List, *et al.* (2015) estimate that a \$1 reward for buying any fresh fruits and vegetables caused the patrons of a grocery store in a low-income neighborhood of Chicago to double their purchases of produce. Previous research has also documented that food purchases drop significantly in the course of the benefit month for low-income households (*e.g.,* Hastings and Washington, 2010, Shaprio, 2005) and that income increases obesity for low-income, but not other, households (see the review in Cawley, 2015). Another possibility is that poverty consumes mental bandwidth for low-income individuals (Mullainathan and Shafir, 2013) or causes distractions sufficient to result in cognitive deficits (Mani, *et al.,* 2013), such that households may have misunderstood the subsidy for nutritious food as a general "food subsidy."

Although we hypothesized that better educated individuals might respond differently to the treatment, we find no evidence of differences in the treatment effect or in the framing effects by education.

Taxes on energy-dense foods are arguably the most commonly-advocated anti-obesity policy. The results of this paper have several implications for such policies to promote more nutritious diets. First, taxes may need to be large to change behavior. In the U.S., taxes on soda pop and snacks average one to four percent (Chriqui, *et al.,* 2014), but we find no significant impact on expenditures or purchases from a ten percent relative price change. Second, price changes may have different impacts by income; we find that subsidies for nutritious food may lead low-income households to buy more of all food, including more of the less-nutritious food that the policy is attempting to discourage.

It should be noted that even if taxes do not change behavior, these policy instruments can still internalize external costs, thereby addressing a market failure. Moreover, if consumers do not significantly alter their purchases, it implies that the tax results in relatively little deadweight loss and thus is a relatively efficient way for the government to collect revenue.

Strengths of this study include a randomized controlled field experiment, with actual consumers making real purchases of actual products in their usual retail environment. Such controlled field experiments represent a strong design for estimating

casual effects (List, 2009). The present study is a relatively long experiment of this type, with an 8 week baseline and 25 week treatment period.

The greatest limitation of the study is the limited statistical power associated with observing 208 households for 33 weeks; this is particularly acute when studying subsamples and testing for differences between income or education groups. In some cases, we estimate substantial point estimates but because of their imprecision they are not statistically significant. Given our limits with statistical power, we cannot rule out price elasticities common in the literature.[6] However, the permutation tests are consistent with our main results of a null effect for the overall sample but that low-income households given the subsidy frame spend more on less-nutritious food. Another limitation is a lack of data from after the intervention ended; however, we find no significant main effects of the treatment, so there is little reason to look for habit persistence after the treatment ended.

Readers should exercise caution when generalizing from the results associated with this relatively white, well-educated and high-income sample from upstate New York. In addition, although we observe detailed information on food purchases, we do not observe food consumption, which would be informative about the health consequences of taxes on energy-dense foods.

Furthermore, the effects estimated in this paper may be influenced by the design of the experiment. Consumer responsiveness may have been attenuated by the fact that the price changes were less salient than usual. Our relative price changes were not reflected on supermarket shelves; consumers had to note the number of Guiding Stars for the item and take into account the subsidy or tax they received. This may have led to less responsiveness because of the mental cost of calculating the relative price change, or consumers may have overlooked the price change at times because it was less salient (Finkelstein, 2009).

In addition, participation and subsidies, minus taxes, were paid weekly, and this departure from immediacy may have also muted consumer responsiveness. Given that participants knew they were participating in a study, they may have perceived the price changes as temporary and not bothered changing their usual food habits.

In this study consumers were directed to the Guiding Stars nutrition guidance system to determine the amount of the tax or subsidy (if any). Thus, there was not only a price effect but also potentially an effect from nutrition information. This would also be true of any salient tax placed on energy-dense foods, such as a "fat tax" or tax on sugar-sweetened beverages. It also implies that the consumer responses we estimate may be greater than those that would be observed from a tax on certain foods that was implemented simply for revenue reasons and was not directly linked to the nutrition of the items.

Important directions for future research include estimating the impacts of greater price changes, testing for changes in treatment effects over time (they may increase due to habit formation or decrease due to diminishing salience or novelty), and continuing to refine how to frame price changes to maximize their intended impact.

Works Cited

Akee, Randall, Emilia Simeonova, William Copeland, Adrian Angold, and E. Jane Costello. 2013. "Young Adult Obesity and Household Income: Effects of Unconditional Cash Transfers." *American Economic Journal: Applied Economics,* 5(2): 1–28.

Andreyeva, Tatiana, Michael W. Long, and Kelly D. Brownell. 2010. "The impact of food prices on consumption: a systematic review of research on the price elasticity of demand for food." *American Journal of Public Health,* 100(2): 216.

Brownell, K.D., Frieden, T.R., 2009. *Ounces of prevention—the public policy case for taxes on sugared beverages.* New England Journal of Medicine 360, 18.

British Medical Association. 2015. Food for Thought: Promoting Healthy Diets among Children and Young People.

Bureau of Labor Statistics. 2015. "Consumer Expenditures in 2013." Accessed June 17, 2015. *http://www.bls.gov/cex/csxann13.pdf.*

Cawley, John. 2015. "An Economy of Scales: A Selective Review of Obesity's Economic Causes, Consequences, and Solutions." *Journal of Health Economics,* 43: 244–268.

Cawley, John and David Frisvold. 2015. "The Incidence of Taxes on Sugar-Sweetened Beverages: The Case of Berkeley, California." NBER Working Paper #21465.

Cawley, John, Chad Meyerhoefer, Adam Biener, Mette Hammer and Neil Wintfeld. 2015. "Savings in Medical Expenditures Associated with Reductions in Body Mass Index Among Adults With Obesity, by Diabetes Status." *PharmacoEconomics,* 33: 707–722.

Cawley, John, Matthew J. Sweeney, David R. Just, Harry M. Kaiser, William D. Schultze, Jeffrey Sobal, Elaine Wethington, and Brian C. Wansink. 2015. "The Impact of a Supermarket Nutrition Rating System on Purchases of Nutritious and Less Nutritious Foods." *Public Health Nutrition,* 18(1): 8–14.

Centers for Disease Control and Prevention. 2015a. "Heart Disease." *http://www.cdc.gov/heartdisease/faqs.htm.*

Centers for Disease Control and Prevention. 2015b. "Preventing Chronic Diseases: Investing Wisely in Health Preventing Diabetes and Its Complications." *http://www.cdc.gov/nccdphp/publications/factsheets/Prevention/pdf/diabetes.pdf.*

Centers for Disease Control and Prevention. 2015c. "Addressing The Cancer Burden: At A Glance." *http://www.cdc.gov/chronicdisease/resources/publications/aag/dcpc.htm.*

Chaloupka, Frank J., Lisa M. Powell, and Jamie F. Chriqui. 2011. "Sugar-Sweetened Beverages and Obesity: The Potential Impact of Public Policies." *Journal of Policy Analysis and Management,* 30(3): 645–655.

Chouinard, Hayley H., David E. Davis, Jeffrey T. LaFrance, and Jeffrey M. Perloff. "Fat taxes: big money for small change." In *Forum for Health Economics & Policy,* vol. 10, no. 2. 2007.

---

[6] The 95% confidence intervals for the implied price elasticities of demand are quite large: $-3.5, -10.3$) for nutritious food and (2.5, 6.2) for less-nutritious foods.

Works Cited—Continued

Chriqui J.F., Eidson S.S., Chaloupka F.J. 2014. *State Sales Taxes on Regular Soda (as of January 1, 2014)—BTG Fact Sheet.* Chicago, IL: BRIDGING THE GAP PROGRAM, Health Policy Center, Institute for Health Research and Policy, University of Illinois at Chicago.

Elbel, Brian, Glen B. Taksler, Tod Mijanovich, Courtney B. Abrams, and L.B. Dixon. 2013. "Promotion of Healthy Eating Through Public Policy: A Controlled Experiment." *Am. J. Prev. Med.* 2013; 45(1): 49–55.

Epstein, Leonard H., Eric Finkelstein, Hollie Raynor, Chantal Nederkoorn, Kelly D. Fletcher, Noelle Jankowiak, and Rocco A. Paluch. "Experimental analysis of the effect of taxes and subsides on calories purchased in an on-line supermarket." *Appetite* 95 (2015): 245–251.

Epstein, Leonard H., Noelle Jankowiak, Chantal Nederkoorn, Hollie A. Raynor, Simone A. French, and Eric Finkelstein. 2012. "Experimental research on the relation between food price changes and food-purchasing patterns: a targeted review." *American Journal of Clinical Nutrition,* 95: 789–809.

Fischer L.M., Sutherland L.A., Kaley L.A., *et al.,* 2011. "Development and implementation of the guiding stars nutrition guidance program." *American Journal of Health Promotion* 26: e55–e63.

Fletcher, Jason M., David Frisvold, and Nathan Tefft. "Can soft drink taxes reduce population weight?." *Contemporary Economic Policy* 28, no. 1 (2010): 23–35.

Fletcher, Jason M., David E. Frisvold, and Nathan Tefft. 2011. "Are Soft Drink Taxes an Effective Mechanism for Reducing Obesity?" *Journal of Policy Analysis and Management,* 30(3): 655–662.

French S.A., Story M., Jeffery R.W., Snyder P., Eisenberg M., Sidebottom A., Murray D. 1997. "Pricing strategy to promote fruit and vegetable purchase in high school cafeterias." *J. Am. Diet. Assoc.,* 97:1008–10.

Gächter, Simon & Orzen, Henrik & Renner, Elke & Starmer, Chris, 2009. "Are experimental economists prone to framing effects? A natural field experiment," *Journal of Economic Behavior & Organization,* 70(3): 443–446.

Grossman, Michael. 1972. "On the Concept of Health Capital and the Demand for Health." *Journal of Political Economy,* 80(2): 223–249.

Gruber, Jonathan H. and Sendhil Mullainathan. 2005. "Do Cigarette Taxes Make Smokers Happier," *Advances in Economic Analysis and Policy,* 2005, v5(1), Article 4.

Harrison, Glenn W., and John A. List. (2004). *Field Experiments.* JOURNAL OF ECONOMICS LITERATURE, 42(4): 1009–1055.

Hastings, J. and Washington, E. 2010. "The first of the month effect: Consumer behavior and store responses." *American Economic Journal: Economic Policy,* 2(2): 142–162.

Homonoff, Tatiana A. 2015. "Can Small Incentives Have Large Effects? The Impact of Taxes *versus* Bonuses on Disposable Bag Use." Working paper, Cornell University.

Institute of Medicine. 2009. "Local Government Actions to Prevent Childhood Obesity." *Institute of Medicine Report Brief.* September 1 2009. url: *http://www.iom.edu/Reports/2009/Local-Government-Actions-to-Prevent-Childhood-Obesity.aspx.* Accessed Jan. 24, 2012.

Jacobson M.F., Brownell K.D. 2000. *Small taxes on soft drinks and snack foods to promote health.* AMERICAN JOURNAL OF PUBLIC HEALTH, 90(6): 854–7.

Jeffery R.W., French S.A., Raether C., Baxter J.E. 1994. "An environmental intervention to increase fruit and salad purchases in a cafeteria." *Prev. Med.,* 23: 788–92.

Kahneman, Daniel, and Amos Tversky. "Prospect theory: An analysis of decision under risk." *Econometrica: Journal of the Econometric Society* (1979): 263–291.

Kaiser, J. 2007. "An exact and a Monte Carlo proposal to the Fisher-Pitman permutation tests for paired replicates and for independent samples." *Stata Journal* 7: 402–412.

Laibson, D. 1997. "Golden eggs and hyperbolic discounting." *Quarterly Journal of Economics,* 112(5), 443–477.

List, John A. 2009. *An Introduction to Field Experiments in Economics.* JOURNAL OF ECONOMICS BEHAVIOR AND ORGANIZATION, 70: 439–442.

List, John A. 2011. "Why Economists Should Conduct Field Experiments and 14 Tips for Pulling One Off." *Journal of Economic Perspectives* 25(3): 3–16.

List, John A., Anya Samek, and Terri Zhu. 2015. "Incentives to Eat Healthy: Evidence from a Grocery Store Field Experiment." CESR—Schaeffer Working Paper No. 2015–025.

Mani, Anandi, Sendhil Mullainathan, Eldar Shafir, and Jiaying Zhao. 2013. "Poverty impedes cognitive function." *Science* 341(6149): 976–980.

McCullough, Marjorie L., Diane Feskanich, Meir J. Stampfer, Edward L. Giovannucci, Eric B. Rimm, Frank B. Hu, Donna Spiegelman, David J. Hunter, Graham A. Colditz, and Walter C. Willett. 2002. "Diet quality and major chronic disease risk in men and women: moving toward improved dietary guidance." *The American Journal of Clinical Nutrition* 76(6): 1261–1271.

Mullainathan, Sendhil, and Eldar Shafir. *Scarcity: Why having too little means so much.* Macmillan, 2013.

Ogden C.L., Carroll M.D., Kit B.K., Flegal K.M. 2014. "Prevalence of Childhood and Adult Obesity in the United States, 2011–2012." *JAMA,* 311(8): 806–814.

Roe, Brian E., and David R. Just. 2009. "Internal and external validity in economics research: Tradeoffs between experiments, field experiments, natural experiments, and field data." *American Journal of Agricultural Economics* 91(5): 1266–1271.

Sassi, F., A. Belloni and C. Capobianco. 2013. "The Role of Fiscal Policies in Health Promotion", *OECD Health Working Papers,* No. 66, OECD Publishing.

Schmeiser, M.D. 2009. "Expanding wallets and waistlines: The impact of family income on the BMI of women and men eligible for the earned income tax credit." *Health Economics,* 18: 1277–1294.

Shapiro, J.M. 2005. "Is there a daily discount rate? Evidence from the food stamp nutrition cycle." *Journal of Public Economics,* 89(2): 303–325.

Thow, A.M., Quested, C., Juventin, L., Kun, R., Khan, a. N., & Swinburn, B. 2011. "Taxing soft drinks in the Pacific: Implementation lessons for improving health." *Health Promotion International,* 26(1): 55–64.

U.S. Department of Agriculture and U.S. Department of Health and Human Services. *Dietary Guidelines for Americans, 2010.* 7th Edition, Washington, D.C.: U.S. Government Printing Office, December 2010.

U.S. Department of Agriculture. 2013. *Healthy Incentives Pilot (HIP) Interim Report,* by Susan Bartlett, *et al.,* Project Officer: Danielle Berman, Alexandria, VA: July 2013.

World Health Organization. 2009. *Global health risks: mortality and burden of disease attributable to selected major risks.* (Geneva, Switzerland: WHO).

World Health Organization. 2015. *Using Price Policies to Promote Healthier Diets.* (Geneva, Switzerland: WHO).

Figure 1: Study Timeline
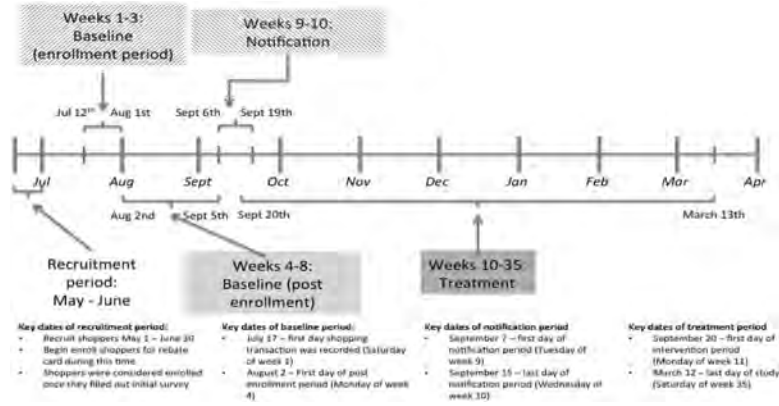
Note: Weeks are defined as Monday through Sunday.

Figure 2: Estimated Coefficients for Overall Price Treatment by Week
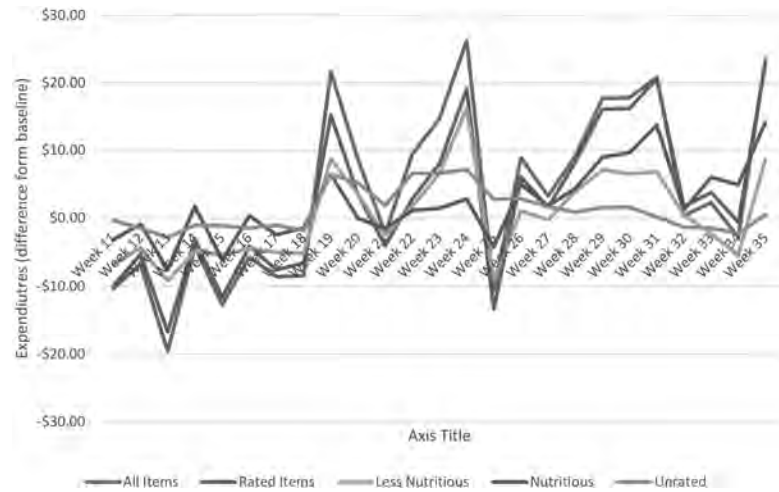
Notes: Week 11 is the first week of the intervention period and begins on Mon, Sep. 20, 2010. Thanksgiving occurred during week 20 and Christmas occurred during week 24.

Table 1: Comparison of Treatment and Control Groups

	Control Group	Treatment Group 1: Subsidy	Treatment Group 2: Tax	Treatment Group 3: Subsidy and Tax
Discount on all Food Items as a Reward for Participation	10%	5%	15%	10%
Subsidy on Nutritious Foods	—	10%	—	5%
Tax on Less-Nutritious Foods	—	—	10%	5%
Reduction in the Relative Price of Nutritious vs Less-Nutritious Foods	None	10%	10%	10%

Table 2: Descriptive Measures of Household Demographic Variables Used in Regression
(standard deviations in parentheses)

	Whole Sample	Control	All Treatment Groups	Subsidy	Tax	Tax/ Subsidy
More than high school education	91.00%	92.00%	90.70%	90.60%	91.80%	89.60%
St. dev.	(0.287)	(0.274)	(0.292)	(0.295)	(0.277)	(0.309)
N (> HS ed.)	182	46	136	48	45	43
N (≤ HS ed.)	18	4	14	5	4	5
Above 130% of FPL	81.20%	75.00%	83.20%	82.40%	82.60%	84.80%
St. dev.	(0.392)	(0.438)	(0.375)	(0.385)	(0.383)	(0.363)
N (Above 130% of FPL)	155	36	119	42	48	39
N (At or below 130% of FPL)	36	12	24	9	8	7
Income > $80,000	31.41%	27.08%	32.87%	25.49%	34.78%	39.13%
St. dev.	(0.465)	(0.449)	(0.471)	(0.440)	(0.482)	(0.493)
N (Inc. > $80K)	60	13	47	13	16	18
N (Inc. <= $80K)	131	35	96	38	30	28
More than one child under 18	58.70%	59.60%	58.40%	54.70%	56.90%	64.00%
St. dev.	(0.494)	(0.495)	(0.494)	(0.503)	(0.500)	(0.485)
N (> 1 child)	121	31	90	29	29	32
N (= 1 child)	85	21	64	24	22	18

* p<.1. ** p<0.05. *** p<0.01. Note that the asterisks represent differences of the annotated value from the corresponding value of the control group at the respective level of significance. FPL stands for Federal Poverty Line.

Table 3: Additional Household Demographic Measures
a. Food Assistance, Household Size, and Income
(standard deviations in parentheses)

	Whole Sample	Control Group	All Treatment Groups	Subsidy	Tax	Tax/ Subsidy
% Households Enrolled in WIC	4.8%	5.8%	4.5%	1.8%	2.0%	10.2%
	(0.215)	(0.235)	(0.208)	(0.135)	(0.140)	(0.306)
% Households Enrolled in SNAP	4.3%	5.8%	3.9%	3.6%	3.9%	4.1%
	(0.204)	(0.235)	(0.194)	(0.189)	(0.196)	(0.200)
% Households Not Receiving Food Assistance	89.9%	87.7%	90.7%	94.4%	87.3%	89.8%
	(0.282)	(0.318)	(0.270)	(0.205)	(0.297)	(0.306)
Average Household Size	3.93	3.92	3.93	3.76	4.04	4.02
	(1.076)	(1.064)	(1.084)	(1.027)	(1.190)	(1.031)
Average Number of Children Under 18	2.2	1.8	2.3	3.0	1.9	1.8
	(3.852)	(0.936)	(4.412)	(7.295)	(1.051)	(0.889)
% Household Shopping at Hannaford	83.58	82.09	84.07	83.15	82.24	87.02
	(13.894)	(15.754)	(13.230)	(13.687)	(14.960)	(10.211)
$10K–$20K	9.4%	10.4%	9.0%	11.8%	4.1%	10.9%
	(0.291)	(0.309)	(0.286)	(0.325)	(0.196)	(0.315)
$20K–$30K	19.0%	19.5%	18.9%	19.6%	15.2%	21.7%
	(0.392)	(0.393)	(0.393)	(0.401)	(0.363)	(0.417)
$30K–$40K	9.7%	10.4%	9.4%	7.8%	13.0%	7.6%
	(0.294)	(0.309)	(0.290)	(0.272)	(0.341)	(0.257)
$40K–$50K	9.5%	12.5%	8.4%	3.9%	14.3%	7.6%
	(0.288)	(0.334)	(0.271)	(0.196)	(0.341)	(0.257)
$50K–$60K	12.2%	11.5%	12.4%	10.9%	13.5%	13.0%
	(0.322)	(0.314)	(0.325)	(0.303)	(0.340)	(0.341)
$60K–$70K	10.2%	8.3%	10.8%	12.7%	8.7%	10.9%
	(0.301)	(0.279)	(0.309)	(0.329)	(0.285)	(0.315)
$70K–$80K	4.9%	8.3%	3.7%	3.9%	2.8%	4.3%
	(0.213)	(0.279)	(0.186)	(0.196)	(0.153)	(0.206)
$80K–$90K	11.5%	10.2%	11.9%	21.6%	6.5%	6.5%
	(0.315)	(0.288)	(0.325)	(0.415)	(0.250)	(0.250)
$90K–$100K	4.7%	2.1%	5.5%	0.0%	8.5%	8.7%
	(0.204)	(0.144)	(0.220)	(0.000)	(0.257)	(0.285)
>$100K	6.4%	2.6%	7.7%	5.9%	8.7%	8.7%
	(0.244)	(0.148)	(0.267)	(0.238)	(0.285)	(0.285)

* p<0.1. ** p<0.05. *** p<0.01. Note that the asterisks represent differences of the annotated value from the corresponding value of the control group at the respective level of significance.

Table 3: Additional Household Demographic Measures
b. Marital Status and Race
(standard deviations in parentheses)

	Whole Sample	Control Group	All Treatment Groups	Subsidy	Tax	Tax/ Subsidy
Divorced	5.1%	8.0%	4.1%	5.7%	2.1%	4.3%
	(0.220)	(0.274)	(0.198)	(0.233)	(0.144)	(0.204)
Married	80.2%	74.0%	82.3%	77.2%	* 87.3%	83.0%
	(0.381)	(0.419)	(0.366)	(0.409)	(0.297)	(0.380)
Separated	1.5%	2.0%	1.4%	1.9%	2.1%	0.0%

Table 3: Additional Household Demographic Measures—Continued
b. Marital Status and Race
(standard deviations in parentheses)

	Whole Sample	Control Group	All Treatment Groups	Subsidy	Tax	Tax/ Subsidy
	(0.122)	(0.141)	(0.116)	(0.137)	(0.144)	(0.000)
Widowed	9.6%	12.0%	8.8%	9.4%	4.2%	12.8%
	(0.295)	(0.328)	(0.284)	(0.295)	(0.202)	(0.337)
Single	1.0%	0.0%	1.4%	3.8%	0.0%	0.0%
	(0.100)	(0.000)	(0.116)	(0.192)	(0.000)	(0.000)
African American	1.7%	2.0%	1.6%	1.9%	0.7%	2.1%
	(0.125)	(0.143)	(0.119)	(0.137)	(0.047)	(0.146)
American Indian or Alaska Native	0.5%	0.0%	0.7%	1.9%	0.0%	0.0%
	(0.071)	(0.000)	(0.082)	(0.137)	(0.000)	(0.000)
Asian	1.5%	2.0%	1.4%	0.0%	0.0%	4.3%
	(0.123)	(0.143)	(0.116)	(0.000)	(0.000)	(0.204)
White	93.7%	91.8%	94.3%	94.2%	94.9%	93.6%
	(0.214)	(0.236)	(0.207)	(0.208)	(0.162)	(0.247)
Hispanic or Latino	0.5%	2.0%	* 0.0%	0.0%	0.0%	0.0%
	(0.071)	(0.141)	(0.000)	(0.000)	(0.000)	(0.000)
Not Hispanic or Latino	96.9%	94.0%	* 97.9%	98.0%	95.6%	** 100.0%
	(0.127)	(0.193)	(0.094)	(0.089)	(0.134)	(0.000)

* p<0.1. ** p<0.05. *** p<0.01. Note that the asterisks represent differences of the annotated value from the corresponding value of the control group at the respective level of significance.

Table 4: Weekly Expenditures: Unconditional Means by Treatment Group
(standard deviations in parentheses)

	Whole Sample	Control Group	All Treatment Groups	Subsidy	Tax	Tax/ Subsidy
Baseline Period						
All Foods	$89.83	$89.90	$89.81	$99.99	$81.82	$86.76
	(116.035)	(95.315)	(122.488)	(119.643)	(81.283)	(157.529)
All Rated Foods	$78.80	$78.25	$79.00	$88.59	$70.25	$77.43
	(105.460)	(83.229)	(112.223)	(113.315)	(69.960)	(143.396)
Foods Rated Less Nutritious	$45.65	$44.72	$45.98	$50.73	$41.51	$45.35
	(62.311)	(48.867)	(66.384)	(65.884)	(43.122)	(85.031)
Foods Rated Nutritious	$33.15	$33.52	$33.02	$37.86	* $28.74	$32.08
	(47.030)	(40.335)	(49.170)	(51.713)	(31.500)	(60.313)
Treatment Period						
All Foods	$100.88	$101.22	$100.76	** $10956	$98.97	** $92.91
	(102.566)	(108.558)	(100.503)	(102.659)	(97.627)	(100.332)
All Rated Foods	$88.13	$88.31	$88.08	** $95.53	$86.33	* $81.66
	(89.686)	(94.830)	(87.917)	(89.599)	(85.050)	(88.394)
Foods Rated Less Nutritious	$50.65	$51.49	$50.37	$54.65	$49.37	** $46.68
	(54.582)	(57.214)	(53.681)	(53.898)	(53.374)	(53.471)
Foods Rated Nutritious	$37.48	$36.82	$37.71	** $40.88	$36.95	$34.98
	(40.427)	(42.804)	(39.606)	(41.832)	(37.198)	(39.259)

Because weeks were classified as Monday through Sunday, the baseline period ended with week 8, which is the full week prior to households receiving notice of their treatment group. In the baseline period, values are set to missing prior to the first shopping trip in the first 3 weeks. Once all households were enrolled in the study (by week 4), any missing value was set to zero. Since households received their notices between September 7–15, weeks including these dates were omitted from the analysis. As a result, the treatment period begins with week 11, which is after all households received notice of their treatment.

* p<0.1. ** p<0.05. *** p<0.01. Note that the asterisks represent differences of the annotated value from the corresponding value of the control group at the respective level of significance.

Table 5: Overall Price Effect on Weekly Household Expenditures and Quantities Purchased

(standard errors in parentheses)

	Expenditures					Quantities				
	Nutritious	Less Nutritious	All Rated Items	Unrated	All Items	Nutritious	Less Nutritious	All Rated Items	Unrated	All Items
All Treatment Groups	$1.11	−$1.55	−$0.44	$0.81	$0.37	0.951	−0.873	0.078	*0.661	0.739
	(3.010)	(4.042)	(6.780)	(1.138)	(7.606)	(1.347)	(1.607)	(2.822)	(0.387)	(3.091)
Weekly Dummy Variables	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
N	6,572	6,572	6,572	6,572	6,572	6,572	6,572	6,572	6,572	6,572
Unconditional mean of dependent variable	$36.55	$49.59	$86.14	$11.86	$98.50	16.132	18.853	34.985	3.609	38.744

Participants in the intervention conditions were all combined. Regression coefficients were estimated using a fixed effects regression with weekly dummy variables. For the sake of space, coefficients from the weekly dummy variables were not included in the table. Because weeks were classified as Monday through Sunday, the baseline period ended with week 8, which is the full week prior to households receiving notice of their treatment group. In the baseline period, values are set to missing prior to the first shopping trip in the first 3 weeks. Once all households were enrolled in the study (by week 4), any missing value was set to zero. Since households received their notices between September 7–15, weeks including these dates were omitted from the analysis. As a result, the treatment period begins with week 11, which is after all households received notice of their treatment.
 * p<0.1. ** p<0.05. *** p<0.01.

Table 6: Impact of Price Frame on Expenditures and Quantities Purchased

(standard errors in parentheses)

	Expenditures					Quantities				
	Nutritious	Less Nutritious	All Rated Items	Unrated	All Items	Nutritious	Less Nutritious	All Rated Items	Unrated	All Items
Subsidy	−$0.78	−$2.29	−$3.07	$1.60	−$1.47	0.523	−1.220	−0.698	**0.917	0.220
	(3.655)	(4.914)	(8.225)	(1.376)	(9.041)	(1.600)	(1.884)	(3.327)	(0.450)	(3.627)
Tax	$4.52	$1.89	$6.41	−$0.07	$6.34	2.287	0.896	3.182	0.306	3.489
	(3.489)	(4.784)	(7.908)	(1.460)	(9.015)	(1.564)	(1.925)	(3.325)	(0.461)	(3.654)
Tax/Subsidy	−$0.42	−$4.40	−$4.82	$0.84	−$3.98	−0.002	−2.384	−2.386	0.752	−1.634
	(4.371)	(5.831)	(9.942)	(1.466)	(11.010)	(1.876)	(2.293)	(4.044)	(0.527)	(4.399)
Weekly Dummy Variables	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
N	6,572	6,572	6,572	6,572	6,572	6,572	6,572	6,572	6,572	6,572
Unconditional mean of dependent variable	$36.55	$49.59	$86.14	$11.86	$98.50	16.132	18.853	34.985	3.609	38.744

Participants in the intervention conditions were all combined. Regression coefficients were estimated using a fixed effects regression with weekly dummy variables. For the sake of space, coefficients from the weekly dummy variables were not included in the table. Because weeks were classified as Monday through Sunday, the baseline period ended with week 8, which is the full week prior to households receiving notice of their treatment group. In the baseline period, values are set to missing prior to the first shopping trip in the first 3 weeks. Once all households were enrolled in the study (by week 4), any missing value was set to zero. Since households received their notices between September 7–15, weeks including these dates were omitted from the analysis. As a result, the treatment period begins with week 11, which is after all households received notice of their treatment.
 * p<0.1. ** p<0.05. *** p<0.01.
 ᵃ p<0.05 for difference between Subsidy and Tax.

b p<0.05 for difference between Subsidy and Tax/Subsidy.
c p<0.05 for difference between Tax and Tax/Subsidy.

Table 7: Overall Price Effect on Weekly Household Expenditures, by Income

(standard errors in parentheses)

	Households at or Below 130% of the Federal Poverty Line					Households Above 130% of the Federal Poverty Line				
	Nutritious	Less Nutritious	All Rated Items	Unrated	All Items	Nutritious	Less Nutritious	All Rated Items	Unrated	All Items
All Treatment Groups	$7.03 (6.010)	$7.11 (9.793)	$14.14 (15.460)	$2.47 (2.597)	$16.61 (17.420)	–$1.27 (3.707)	–$4.02 (4.543)	–$5.29 (7.898)	$0.24 (1.313)	–$5.05 (8.893)
Weekly Dummy Variables	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
N	1,141	1,141	1,141	1,141	1,141	4,904	4,904	4,904	4,904	4,904
Unconditional mean of dependent variable	$28.28	$41.04	$69.32	$9.17	$78.85	$38.36	$50.70	$89.06	$12.25	$101.81

Participants in the intervention conditions were all combined. Regression coefficients were estimated using a fixed effects regression with weekly dummy variables. For the sake of space, coefficients from the weekly dummy variables were not included in the table. Because weeks were classified as Monday through Sunday, the baseline period ended with week 8, which is the full week prior to households receiving notice of their treatment group. In the baseline period, values are set to missing prior to the first shopping trip in the first 3 weeks. Once all households were enrolled in the study (by week 4), any missing value was set to zero. Since households received their notices between September 7–15, weeks including these dates were omitted from the analysis. As a result, the treatment period begins with week 11, which is after all households received notice of their treatment.
* p<0.1. ** p<0.05. *** p<0.01.
d p<0.05 difference of estimates for the same type of food (all items, all rated items, *etc.*) but across demographic comparisons.

Table 8: Overall Price Effect on Weekly Household Expenditures, by Education

(standard errors in parentheses)

	High School Education or Less					More than High School Education				
	Nutritious	Less Nutritious	All Rated Items	Unrated	All Items	Nutritious	Less Nutritious	All Rated Items	Unrated	All Items
All Treatment Groups	$2.36 (11.190)	–$4.02 (20.950)	–$1.65 (31.600)	$6.18 (4.130)	$4.52 (34.200)	$0.52 (3.091)	–$2.17 (3.925)	–$1.65 (6.714)	$0.46 (1.139)	–$1.19 (7.528)
Weekly Dummy Variables	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
N	567	567	567	567	567	5,759	5,759	5,759	5,759	5,759
Unconditional mean of dependent variable	$25.16	$39.92	$65.08	$8.76	$74.23	$37.73	$50.41	$88.14	$12.05	$100.67

Participants in the intervention conditions were all combined. Regression coefficients were estimated using a fixed effects regression with weekly dummy variables. For the sake of space, coefficients from the weekly dummy variables were not included in the table. Because weeks were classified as Monday through Sunday, the baseline period ended with week 8, which is the full week prior to households receiving notice of their treatment group. In the baseline period, values are set to missing prior to the first shopping trip in the first 3 weeks. Once all households were enrolled in the study (by week 4), any missing value was set to zero. Since households received their notices between September 7–15, weeks including these dates were omitted from the analysis. As a result, the treatment period begins with week 11, which is after all households received notice of their treatment.
* p<0.1. ** p<0.05. *** p<0.01.
d p<0.05 difference of estimates for the same type of food (all items, all rated items, *etc.*) but across demographic comparisons.

Table 9: Impact of Price Frames on Weekly Expenditures, by Income

(standard errors in parentheses)

	Poverty Income Ratio <= 1.3					Poverty Income Ratio >1.3				
	Nutritious	Less Nutritious	All Rated Items	Unrated	All Items	Nutritious	Less Nutritious	All Rated Items	Unrated	All Items
Subsidy	11.58	* a $21.23	* a, d $32.81	** a $5.78	** a, d $38.59	a −$4.548	* a d −$7.546	a, d −$12.09	$0.414	d −$11.68
	(6.914)	(10.780)	(16.990)	(2.802)	(18.990)	(4.434)	(5.521)	(9.534)	(1.608)	(10.490)
Tax	$0.30	a −$9.037	a −$8.735	a −$3.38	a −$12.11	a $3.832	$3.62	a $7.451	$0.588	$8.039
	(8.190)	(12.470)	(20.380)	(4.138)	(23.370)	(4.180)	(5.334)	(9.015)	(1.540)	(10.230)
Tax/Subsidy	$9.14	$8.14	$17.28	** $5.13	$22.40	−$2.831	−$7.931	−$10.76	−$0.327	−$11.09
	(6.874)	(9.965)	(16.310)	(2.039)	(17.710)	(5.338)	(6.790)	(11.800)	(1.750)	(13.080)
Weekly Dummy Variables	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
N	1,141	1,141	1,141	1,141	1,141	4,904	4,904	4,904	4,904	4,904
Unconditional mean of dependent variable	$28.28	$41.04	$69.32	$9.17	$78.85	$38.36	$50.70	$89.06	$12.25	$101.81

Participants in the intervention conditions were all combined. Regression coefficients were estimated using a fixed effects regression with weekly dummy variables. For the sake of space, coefficients from the weekly dummy variables were not included in the table. Because weeks were classified as Monday through Sunday, the baseline period ended with week 8, which is the full week prior to households receiving notice of their treatment group. In the baseline period, values are set to missing prior to the first shopping trip in the first 3 weeks. Once all households were enrolled in the study (by week 4), any missing value was set to zero. Since households received their notices between September 7–15, weeks including these dates were omitted from the analysis. As a result, the treatment period begins with week 11, which is after all households received notice of their treatment.

* p<0.1. ** p<0.05. *** p<0.01.
a p<0.05 for difference between Subsidy and Tax.
b p<0.05 for difference between Subsidy and Tax/Subsidy.
c p<0.05 for difference between Tax and Tax/Subsidy.
d p<0.05 difference of estimates for the same type of food (all items, all rated items, *etc.*) but across demographic comparisons.

Table 10: Impact of Price Frame on Weekly Expenditures, by Education

(standard errors in parentheses)

	High School Education or Less					More than High School Education				
	Nutritious	Less Nutritious	All Rated Items	Unrated	All Items	Nutritious	Less Nutritious	All Rated Items	Unrated	All Items
Subsidy	−$0.65	−$3.86	−$4.51	$7.38	$2.87	−$0.97	−$2.71	−$3.68	$1.37	−$2.31
	(11.440)	(21.320)	(32.150)	(6.381)	(34.410)	(3.824)	(4.986)	(8.414)	(1.343)	(9.226)
Tax	$2.26	−$5.53	−$3.26	*$6.79	$3.53	$4.19	$2.34	$6.53	−$0.44	$6.09
	(12.020)	(23.800)	(34.630)	(3.621)	(36.810)	(3.536)	(4.636)	(7.781)	(1.523)	(8.963)
Tax/Subsidy	$5.64	−$2.81	$2.83	$4.35	$7.17	−$1.81	−$6.52	−$8.33	$0.39	−$7.94
	(13.210)	(24.060)	(36.560)	(4.385)	(39.780)	(4.705)	(5.961)	(10.400)	(1.533)	(11.470)
Weekly Dummy Variables	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
N	567	567	567	567	567	5,759	5,759	5,759	5,759	5,759

Unconditional mean of dependent variable	$25.16	$39.92	$65.08	$8.76	$74.23	$37.73	$50.41	$88.14	$12.05	$100.67

Participants in the intervention conditions were all combined. Regression coefficients were estimated using a fixed effects regression with weekly dummy variables. For the sake of space, coefficients from the weekly dummy variables were not included in the table. Because weeks were classified as Monday through Sunday, the baseline period ended with week 8, which is the full week prior to households receiving notice of their treatment group. In the baseline period, values are set to missing prior to the first shopping trip in the first 3 weeks. Once all households were enrolled in the study (by week 4), any missing value was set to zero. Since households received their notices between September 7–15, weeks including these dates were omitted from the analysis. As a result, the treatment period begins with week 11, which is after all households received notice of their treatment.

* $p<0.1$. ** $p<0.05$. *** $p<0.01$.

[a] $p<0.05$ for difference between Subsidy and Tax.

[b] $p<0.05$ for difference between Subsidy and Tax/Subsidy.

[c] $p<0.05$ for difference between Tax and Tax/Subsidy.

[d] $p<0.05$ difference of estimates for the same type of food (all items, all rated items, *etc.*) but across demographic comparisons.

Table 11: Overall Price Effect on Shares of Expenditures on Nutritious Foods, by Income and Education

(standard errors in parentheses)

	All	At or Below 130% FPL	Above 130% FPL	HS Educ. or Less	More than HS Educ.
All Treatments	0.0108	0.00359	0.00834	−0.0057	0.00928
	(0.01)	(0.03)	(0.01)	(0.03)	(0.01)
Weekly Dummy Variables	✔	✔	✔	✔	✔
N	4,816	769	3,637	342	4,266
Unconditional Mean Shares	0.425	0.406	0.433	0.369	0.431

Shares of less nutritious and nutritious foods were calculated using only rated food purchases, thus the sign of the share is opposite when comparing nutritious and less nutritious foods. Participants in the intervention conditions were all combined. Regression coefficients were estimated using a fixed effects regression with weekly dummy variables. For the sake of space, coefficients for the constants and the weekly dummy variables were not included in the table. Because weeks were classified as Monday through Sunday, the baseline period ended with week 8, which is the full week prior to households receiving notice of their treatment group. In the baseline period, values are set to missing prior to the first shopping trip in the first 3 weeks. Once all households were enrolled in the study (by week 4), any missing value was set to zero. Since households received their notices between September 7–15, weeks including these dates were omitted from the analysis. As a result, the treatment period begins with week 11, which is after all households received notice of their treatment.

* $p<0.1$. ** $p<0.05$. *** $p<0.01$.

[d] $p<0.05$ difference of estimates for the same type of food (all items, all rated items, *etc.*) but across demographic comparisons.

Table 12: Results of Post-Experiment Survey

(on 9-point Likert Scale)

	Whole Sample	Control Group	All Treatment Groups	Subsidy	Tax	Tax/ Subsidy
Interpretation of Treatment						
Penalty for eating unhealthy food	2.9	2.6	3.0	[a] 2.4	[a] 3.4	3.2
	(1.937)	(1.739)	(2.003)	(1.662)	(2.100)	(2.161)
Reward for eating healthy food	6.2	6.1	6.3	6.0	6.0	6.9
	(2.286)	(2.515)	(2.211)	(2.362)	(2.394)	(1.641)
Tax on unhealthy foods	3.4	2.8	* 3.6	[b] 2.8	* 3.7	**[b] 4.4
	(2.076)	(1.796)	(2.141)	(1.696)	(2.237)	(2.218)
Discount for eating healthy foods	6.4	5.8	* 6.6	6.7	6.2	* 6.9
	(2.225)	(2.543)	(2.077)	(2.157)	(2.313)	(1.595)
Effective in changing what I usually buy	4.5	4.2	4.6	4.8	4.2	5.0
	(2.419)	(2.444)	(2.413)	(2.250)	(2.452)	(2.568)
How much did being a part of the study influence your shopping?						
Buy more starred foods	5.0	4.5	5.1	[b] 4.8	[c] 4.8	[b, c] 5.9
	(2.084)	(2.152)	(2.048)	(2.009)	(2.060)	(1.950)
Buy more non-starred foods	3.1	3.2	3.1	3.0	3.2	3.0
	(1.421)	(1.567)	(1.373)	(1.650)	(1.050)	(1.401)
Buy healthier food	5.3	4.7	5.5	[b] 5.0	5.3	[b] 6.2
	(2.146)	(2.271)	(2.078)	(2.048)	(2.357)	(1.541)
Buy a higher percentage of healthy food	5.3	4.8	5.5	[b] 4.9	5.5	[b] 6.2
	(2.200)	(2.360)	(2.124)	(2.043)	(2.407)	(1.595)
In general, over the entire program						
Shopped healthier at the beginning than at the end	3.3	3.1	3.4	3.4	3.1	3.6
	(1.725)	(1.555)	(1.784)	(1.845)	(1.465)	(2.077)

Note that the asterisks represent differences of the annotated value from the corresponding value of the control group at the respective level of significance. All responses were based on a 9 point Likert scale from Strongly Disagree (1) to Strongly Agree (9).* $p<0.1$. ** $p<0.05$. *** $p<0.01$.

[a] $p<0.05$ for comparison between Subsidy and Tax groups.
[b] $p<0.05$ for comparison between Subsidy and Tax/Subsidy groups.
[c] $p<0.05$ for comparison between Tax and Tax/Subsidy groups.

Appendix Table 1: Permutation Tests for Combined Interventions

Combined Interventions	P-value	95% Lower Confidence Level	95% Upper Confidence Level
All Households:			
Less-Nutritious	0.700	0.671	0.728
Nutritious	0.724	0.695	0.752
At or below 130% FPL:			
Less-Nutritious	0.481	0.450	0.512
Nutritious	0.253	0.226	0.281
Above 130% FPL:			
Less-Nutritious	0.401	0.370	0.432
Nutritious	0.714	0.685	0.742

Appendix Table 2: Permutation Tests for Individual Treatments

Combined Interventions	P-value	95% Lower Confidence Level	95% Upper Confidence Level
Less-Nutritious:			
Subsidy	0.645	0.614	0.675
Tax	0.709	0.680	0.737
Tax/Subsidy	0.455	0.424	0.486
Nutritious:			
Subsidy	0.825	0.800	0.848
Tax	0.193	0.169	0.219
Tax/Subsidy	0.928	0.910	0.943

Appendix Table 3: Permutation Tests for Separate Interventions When Data Are Separated Into Income Groups

Combined Interventions	P-value	95% Lower Confidence Level	95% Upper Confidence Level
At or Below 130% FPL			
Less-Nutritious:			
Subsidy	0.056	0.043	0.072
Tax	0.480	0.449	0.511
Tax/Subsidy	0.448	0.417	0.479
Nutritious:			
Subsidy	0.102	0.084	0.122
Tax	0.969	0.956	0.979
Tax/Subsidy	0.204	0.179	0.230
Above 130% FPL			
Less-Nutritious:			
Subsidy	0.179	0.156	0.204
Tax	0.511	0.480	0.542
Tax/Subsidy	0.242	0.216	0.270
Nutritious:			
Subsidy	0.298	0.270	0.327
Tax	0.360	0.330	0.391
Tax/Subsidy	0.611	0.580	0.641

ATTACHMENT 1

Excerpt from *Slim by Design—Mindless Eating Solutions for Everyday Life* *

Contents

---

* **Editor's note:** The original format of the book, *Slim by Design—Mindless Eating Solutions for Everyday Life,* has an entire section devoted to endnotes for all of the chapters. In this reproduction the endnotes are set as footnotes.

*   *   *   *   *

Chapter Four

Supermarket Makeovers

YOU'VE NEVER SEEN A KLEENEX CAM. **That's why it works so well—it sees you, but you don't see it. It's helped us learn why the crazy things grocery shoppers do aren't as crazy as they seem.**

Back in 2001, I asked some clever engineering students at the University of Illinois at Urbana-Champaign to rig up a small, remotely controlled movie camera into what looked like an ordinary box of Kleenex.[1] Using this invisible camera we could follow shoppers to learn exactly how they shop. We took our Kleenex Cams and stacked them on top of "deserted" shopping carts, hid them on shelves next to Fruity Pebbles cereal, and positioned them in our carts so we could follow shoppers as they moved through the aisles. The Kleenex Cams showed us what catches a person's eye, what they pick up and put back, why they buy things they'll never use,[2] when shopping lists don't matter, and how they shop differently in the "smelly" parts of a grocery store. Again, these studies were all university approved.[3]

But let's back up and set the stage. Our best and worst eating habits start in a grocery store. Food that's bought here gets moved into our homes. Food in our homes gets eaten.[4] If we bought more bags of fruit and fewer boxes of Froot Loops, we would eventually eat more of the first and less of the second. Although bad for the Froot Loops Corporation, it's great for us—and great for grocery stores. The typical grocery store makes more profit by selling you $10 more fruit than $10 more Froot Loops. There's a higher markup on fruit, and—unlike the everlasting box of Froot Loops—fruit spoils, and spoiled fruit spoils profits. You have to sell it while you can.

So if a grocery store makes more by selling healthy foods like fruit, why don't they do a better job of it? They try—but what they really need is a healthy dose of redesign.

> *Our best and worst eating habits start in a grocery store.*

We've been following grocery shoppers since 1995, and some things have changed since then. For one, we no longer have to wrestle with Kleenex Cams. Our newer cameras are so small they're embedded into Aquafina water bottles with false bottoms.[5] The technology is sexier, but the results are *e-x-a-c-t-l-y* the same.[6] Wherever

---

[1] The only remaining photo of the original Kleenex Cam is in this newspaper article below. By today's tech standards, it's pretty boring, but back then it was really souped up. Read about it at *SlimByDesign.org/GroceryStores/*.

[2] One interesting category of items that are most likely to become cabinet castaways are unusual foods that people are buying for a specific occasion. When that occasion never happens, the food just sits and sits. This is a neat article on that: Brian Wansink, S. Adam Brasel, and Stephen Amjad, "The Mystery of the Cabinet Castaway: Why We Buy Products We Never Use," *Journal of Family and Consumer Science* 92, no. 1 (2000): 104–8.

[3] All of these studies are preapproved. Today—compared to twenty or even 10 years ago—studies to be approved by a university's Institutional Review Board to make sure that they are safe and make sure all of the data is collected anonymously and that no one will ever know about that day you bought that EPT kit and the two pints of Chocolate Fudge Swirl. Some studies—like many shopping studies—are observational, but others might ask a person to complete a questionnaire at the end of a trip in exchange for a small amount of money, free food, movie tickets, and so on.

[4] That is, about 88 percent of this food will be eaten. The 12 percent that's wasted, however, isn't the candy, chips, and ice cream; it's typically the spoiled fruit and vegetables, leftovers, and cabinet castaways. Brian Wansink, "Abandoned Products and Consumer Waste: How Did That Get into the Pantry?," *Choices* (October 2001): 46.

[5] A cool example of all of these hidden cameras in use can be found at *http://www.youtube.com/watch?v=2B0Ncy3Gz24*. It's not at a grocery store but in a lunchroom. Same approach.

[6] Lots of people visit our Lab (even from way overseas) like it's some weird trip to Consumer Mecca. Something I've heard a number of times is "Wow . . . this isn't really very high-tech!" No, it isn't. What we'd like to think, however, is that insights trump glitzy technology every

we've done these studies—corner markets in Philadelphia or warehouse stores in France, Brazilian superstores or Taiwanese night markets—people pretty much shop in the same time-stressed, sensory-overwhelmed way. But knowing what can be done to get them to buy a healthier cartful of food is good for shoppers, for grocers, and even for governments.

Wait. Governments?

What jump-started a lot of our recent thinking was a request we received from the Danish Government. In April 2011, they sent a six-person delegation out to my Lab. Their mission: to help Danish grocery stores make it easier for shoppers to shop healthier. Our mission, if we chose to accept it: develop a healthy supermarket makeover plan that would be cheap, easy, and profitable for Danish grocery stores to implement. Our makeover plan had to be profitable for stores because that's the only way it would work. But here's the cool clincher: They'd give us an entire island on which to test our plan.

The Desserted Island of Denmark

BORNHOLM IS A DANISH ISLAND **with forty-two thousand inhabitants that sits in the Baltic Sea, one hundred miles east of Copenhagen.[7] The Government of Denmark wanted us to help change the grocery stores on the entire island so they could profitably help these islanders shop healthier. They wanted to turn it from a Dessert Isle into a Salad Aisle.**

Anyone who's read or seen H.G. Wells's *The Island of Dr. Moreau* knows that islands are a researcher's dream. You can do all sorts of crazy, mad scientist things on them and not worry about the rest of the world bothering you. You can change the shopping carts or layout of all the stores on the island, and if the sales of Crisco and Pixy Stix drop by 20 percent, you know it's not because people are swimming over to buy them in Lapland.

Until they came to talk with us, the Danish Government was considering three types of changes: tax it, take it, or teach it.[8] But taxing food or taking it away creates pushback. Shoppers don't like it, grocers don't like it, and so it can often backfire. For instance, when we did a 6 month study on taxing soft drinks in grocery stores in Utica, New York, a medium-size city in the United States, we found that the only people who bought fewer soft drinks were beer-buying households—and they just bought a lot more beer.[9] People had to drink something with their pizza and burgers, and it wasn't going to be tap water or soy milk. They changed from Coke to Coors.

And teaching doesn't work much better.[10] As shoppers, we don't behave the way we're supposed to because (1) we love tasty food, and (2) we don't like to think very hard. Because of our love for both tasty food and for mindless shopping, we don't approach grocery shopping like a nutrition assignment. We just do it and move on to the next fifty-seven items on our to-do list. With this mindless mindset, when we're shopping at 5:45 on a Friday evening, we're not about to be fazed by there being a few more calories in pizza crust than in pita bread.

---

day of the week. We've got low-definition hidden cameras, hidden scales, counters, and timers, because we don't need holograms or brain-scan machines to nail down the reality—not the theory—of why people do what they do. You don't need infrared sensors to see someone eating twice as many Cheetos when you change what they're watching on TV.

[7] Denmark Islands. Denmark actually has a number of little islands, but none like poor Bornholm. It never gets any peace. Strategically located in the Baltic Sea, it was occupied by the Germans during almost all of World War II and the Russians right after that. And probably by the Vikings way before that.

[8] People—whether public health professionals or politicians—can often get very dramatic in what they tell grocery stores they should do. Dramatic, but not always realistic or right.

[9] This is an interesting paper of unintended consequences: Brian Wansink *et al.,* "From Coke to Coors: A Field Study of a Sugar-Sweetened Beverage Tax and Its Unintended Consequences," May 26, 2012, available at *http://ssrn.com/abstract=2079840* or *http://dx.doi.org/10.2139/ssrn.2079840.*

[10] This is controversial for me to admit since I'm the immediate past president of the Society for Nutrition Education and Behavior and because I was the White House-appointed person (2007–2009) in charge of promoting the [D]ietary [G]uidelines for the USDA.

Welcome to BORNHOLM DENMARK

OUR TESTING ISLAND FOR SUPERMARKET SOLUTIONS

Maybe the best way we can change grocery shopping habits is to make them more mindlessly healthy—make it more convenient, attractive, and normal to pick up and buy a healthier food.[11] So here's what we did in Bornholm. Based on our "Kleenex Cam" recordings,[12] notes, stopwatch times, and data from thousands of similar shoppers, we focused on design changes in five areas of the store: carts, layouts, aisles, signs, and checkout lines. We had two criteria: (1) all the changes had to make the store more money in a month than they cost to implement, and (2) they all had to help make people slim by design. Let's start with a shopping cart.

Half-Cart Solutions

HERE'S A TEN-WORD DESCRIPTION **of how most people shop for groceries: *They throw things in their cart and they check out.* What's the right amount of fruits and vegetables to put in a cart? We don't really know because we don't really care. Yet imagine what would happen if every time we put something in our cart we had to ask ourselves whether it was healthy or not. It would be irritating—for sure—but after a while we'd think twice about what we casually threw in. Just stopping and thinking for a split second would be enough to snap us out of our mindlessly habitual zombie shopping trance.**[13–14]

Back to the cart. When most of us shop, fruits and vegetables take up only 24 percent of our cart.[15] But suppose your grocery store sectioned a cart in ½ by taping a piece of yellow duct tape across the middle interior. And suppose they put a sign in the front of the cart that recommended that you put all the fruits and vegetables in the front and all the other foods in the back. This dividing line in the cart doesn't

---

[11] This was one focus of my book *Mindless Eating*. The basic idea is that making small changes around you that you don't even really notice has a tremendous long-term impact on changing behavior and weight.

[12] We no longer use the Kleenex Cam but we still call it that. We now use our bottles, hats, and iPhones.

[13] A number of years ago we gave secretaries dishes of chocolate Kisses that we either placed on their desk or 6′ from their desk. We found that those who had to walk only 6′ ate ½ as much candy (100 calories less; four each day instead of nine). Yet when we asked them if it was because the 6′ walk was too far or too much of a hassle, their answer surprised us. They said instead that the 6′ distance gave them a chance to pause and ask themselves if they were really that hungry. Half the time they'd answer "no." The key was that something—that distance—caused them to pause and interrupt their mindlessness: Brian Wansink, James E. Painter, and Yeon-Kyung Lee, "The Office Candy Dish: Proximity's Influence on Estimated and Actual Candy Consumption," *International Journal of Obesity* 30, no. 5 (May 2006): 871–75.

[14] Anything that stops and makes a person pause—even for a split second—might be enough to knock them out of their mindless trance and rethink.

[15] The average grocery shopper buys only 24 percent of fruits and vegetables. Simone French, Melanie Wall, Nathan R. Mitchell, Scott T. Shimotsu, and Ericka Welsh, "Annotated Receipts Capture Household Food Purchases from a Broad Range of Sources," *International Journal of Behavioral Nutrition and Physical Activity* 6, no. 37 (2009).

moralize or lecture. It just encourages shoppers to ask themselves whether the food in their hand goes in the front or back of the cart. There's nothing to resist or rage against—they're simply sorting their food . . . if they want to.

When you use duct tape at home, you become MacGyver. When it's used to divide your grocery cart, you become healthier.[16]

We made a few dozen of these divided carts to test at supermarkets in Williamsburg, Virginia, and Toronto, Canada.[17] When people finished shopping and returned their souped-up, tricked-out carts, we gave them a gift card to a local coffee shop if they would answer some questions and give us their shopping receipt.

Shoppers with these divided carts spent twice as much on fruits and vegetables. They also spent more at the store—about 25 percent more. Not only did this fruit and vegetable divider make them think twice about what they bought; it also made them believe that buying more fruits and vegetables was normal. Who knows how much healthy stuff your neighbor buys? *It must be about ¹⁄₂,* people think as they throw in some pears and three more red peppers.

How Your Grocer Can Help You . . .

TEST THE HALF-CART WATERS

Will a divided, half-cart approach be profitable? It can if it can sell more perishable produce—like fruits and vegetables. All that's needed is a visual divider in a few of your carts and a sign in the front that says, "Put your fruits and vegetables in the front of your cart."

If your grocery store doesn't want to bust out the duct tape, they can use printable mats for the bottom of the cart that make the same suggestion—fruits and vegetables in the front ½ and everything else in back (download at *SlimByDesign.org*).

THE MIRACLE OF DUCT TAPE

A Half-Cart Solution

Do it yourself. Divide your cart with your coat, your purse, or your briefcase. Or bring your own duct tape.

---

[16] Brian Wansink, C.R. Payne, K.C. Herbst, and D. Soman, "Part Carts: Assortment Allocation Cues That Increase Fruit and Vegetable Purchases," *Journal of Nutrition Education and Behavior* 45 (2013): 4S, 42.
[17] Brian Wansink, Dilip Soman, Kenneth C. Herbst, and Collin R. Payne, "Partitioned Shopping Carts: Assortment Allocation Cues that Increase Fruit and Vegetable Purchases," under review.

What You Can Do . . .

HINTS FOR HALF-CART SHOPPING

Your local supermarket might not have divided carts yet, and you probably don't travel with your own. Here's what you can do . . .

- **Decide what you want to buy more of.** For instance, a shopper with children might want to be nudged to buy more fruits and vegetables, and a shopper with high blood pressure might want to buy more low-sodium foods. A dieter might want to be nudged to buy more low-carb foods, and a diabetic might want to buy more foods with a low glycemic index.
- **Physically divide your cart by putting something across the middle.** This could be a purse, backpack, scarf, briefcase, coat, or a sleeping child you want to keep an eye on. You can then claim the front half of . . . our cart for whatever you want to purchase more of. If that target space isn't full, you'll naturally tend to buy more to balance things out.

You're 11 percent more likely to take the first vegetable you see than the third.
When opening your cupboard, you're three times as likely to take the first cereal you see as you are the fifth.

Healthy First and Green Line Guides

WHEN YOU WALK UP TO A BUFFET, **you're 11 percent more likely to take the first vegetable you see than the third.[18] When opening your cupboard, you're three times as likely to take the first cereal you see as you are the fifth.[19] The same is true in grocery stores. When you start shopping, you can't wait to start piling things in your cart. But after it starts filling up, you become more selective. If stores could get you to walk by more of the healthy—and profitable—foods first, they might be able to get you to fill up the cart on the good stuff, and squeeze out any room for the Ben & Jerry's variety pack.**

We spend less than 6 minutes in the fruit and vegetable section.

Most grocery stores in the United States place the fruit and vegetable section on the far right of the store. It's the first thing we see and wander over to. The bad news is that many of us spend less than 6 minutes there.[20] We pick up some apples and lettuce and then wander over to the next aisle. But if stores could get us to linger there a little longer, we'd buy a little bit more.

The secret might lie in the fact that we're wanderers—we're not always very deliberate. What if they put a dashed green line that zigzagged through the produce section, and what if they put floor decals in front of food shelves that offer healthy meal ideas? Just like that dashed yellow line on the highway that keeps you mindlessly on the road and the billboards that keep you mindlessly amused, maybe putting a dashed green line and floor decals would also have us wandering the produce section a bit longer.

To test this, we proposed Operation: Green Highway on our mad scientist island in Denmark. Supermarkets could put a 2″ wide dashed green line through the produce section—around the apples and oranges, over to the lettuce, past the onions and herbs, and back around to the berries and kumquats. They could even include some kid-friendly visuals or floor graphics. If a shopper followed this green highway, he or she might be tempted to buy more fruits and vegetables.

To test this, we had people initially trace their way through grocery stores that either did or did not have Health Highway lines. Did people stay on the line? Of

---

[18] A really robust finding. A great reason why you should also pass around the salad and green beans to your kids at dinnertime before you bring out the lasagna. Brian Wansink and David Just, "Healthy Foods First: Students Take the First Lunchroom Food 11% More Often than the Third," *Journal of Nutrition Education and Behavior* 43 (2011): 4S1, S9.

[19] You can just believe me, or you can read ponderous evidence of why this happens: Pierre Chandon and Brian Wansink, "When Are Stockpiled Products Consumed Faster? A Convenience-Salience Framework of Postpurchase Consumption Incidence and Quantity," *Journal of Marketing Research* 39, no. 3 (2002): 321–35.

[20] This is a really neat finding, but it seems like it will take a miracle to get it published. In the meantime, you can find it on SSRN: Brian Wansink and Kate Stein, "Eyes in the Aisle: Eye Scanning and Choice in Grocery Stores," 2013.

course not, but they would have spent an average equivalent of 3 more minutes in the produce section. At about $1/minute, this would mean they could spend as much as $3 more on fruits and vegetables than they otherwise would have.[21–22]

But what about the other store aisles? Let's say that you have two favorite grocery stores: Tops and Hannaford. At Tops, the aisle after the produce section—let's call it Aisle 2—is the potato chips, cookies, and soft drinks aisle. At Hannaford, the potato chips, cookies, and soft drinks are in Aisle 15—the second-to-last aisle in the store. If you're on a diet, which store should you choose?

We followed 259 shoppers in Washington, D.C., grocery stores to see if a person shops differently depending on which aisle they're in.[23] We discovered that most people with shopping carts behave the same way: They walk through the produce section, then turn and go down Aisle 2 (which leads back toward the front of the store). It almost doesn't matter what's in the aisle—health food, dog food, or mops. At this point, shopping's still a fun adventure. But after Aisle 2, shoppers get mission-oriented and start skipping aisles as they look for only what they think they need. So, Aisle 2 gets the most love and attention from the most shoppers.

So, what's in Aisle 2 at your favorite grocery store? It's often soft drinks, chips, or cookies as in the Tops store. To make a grocery store more slim by design, managers could easily load up this aisle with whatever healthier food is most profitable for them. This might be store-brand canned vegetables, whole-grain foods, or high-margin lower-calorie foods. First in sight is first in cart.

How Your Grocer Can Help You . . .

GUIDING ANGLES, AISLES, AND LINES

One way to help shoppers fill up their carts with healthy foods is to make sure those are the aisles they visit first and stay in longest. People cherry-pick their favorite fruits and vegetables and quickly move to the center of the store, but you can keep them in the produce area longer by angling displays so they guide shoppers through the store—think of the 30° and 45° angles you used to see in those old-school pinball games. Also, green lines—Green Highways—seem to nudge most of us, at least occasionally, to turn in a direction we otherwise wouldn't have turned in.

Since shoppers are more likely to buy healthy foods when their carts are empty, stores should load up Aisles 1, 2, and 3 with whatever's healthiest and most profitable.

What You Can Do . . .

WANDER THE HEALTHY AISLES FIRST

Following the green line works well if there *is* a green line. But if there isn't one, you can always make your own.

- **Make a point of wheeling through as many of the produce aisles as possible.** Even if it's fast and furious, simply seeing more fruits and vegetables while your cart is empty makes them more tempting.

- **Hit the other healthier aisles—like those with canned and frozen fruits and vegetables—before you head for the Crunch & Munch section.**

---

[21] Would this dashed green line work through the rest of the store? It could go down some of the healthier aisles—say canned fruits and vegetables or foods with whole grains—and around much of the perimeter of the store. Yet to use the quotation from *Spinal Tap* again, "It's a fine line between clever and stupid." This line might work well in the produce section, but don't take it overboard. It might be irritating or too strange in the rest of the store—particularly because these long aisles might make it look like a highway divider.

[22] My good colleagues Collin Payne and David Just have early evidence that this works well when it's first laid out. See Collin R. Payne and David R. Just, "Using Floor Decals and Way Finding to Increase the Sales of Fruits and Vegetables," under review.

[23] Wansink and Stein, "Eyes in the Aisle."

Wide Aisles and High Products[24]

THE MORE TIME YOU SPEND **in a store, the more you buy. Similarly, the more time you spend in an aisle, the more you buy.**[25] **In order for us to buy a healthy food, we need to (1) see it and (2) have the time to pick it off the shelf.**

But not all shelves are the same. Food placed at eye level is easier to spot and buy. For instance, kids' foods are placed at their eye level, so that they can irritate us into buying them ("I want it! I want it! I want it!").

This works for Count Chocula and our kids, but would it for kale chips and us? We returned to our "I-Spy" habits and observed 422 people purchasing thousands of products in the Washington, D.C., area. First we estimated the height of each shopper using a series of pre-marked shelves they walked by (picture those height-marker decals on the doors of convenience stores).[26] We then measured the height of each product they looked at. Based on where they looked, we could figure out what percent of the foods they bought were at eye level.[27]

If you're shopping in a narrow aisle, 61 percent of everything you'll buy is within 1′ of your eye level—either 1′ above or 1′ below.[28] This is useful to know if you're a grocery-store owner who wants to sell us healthier foods. Smart store managers can put these profitable healthy foods at eyeball level. If the product is one that's typically bought by males, it can be placed even 5″ higher, since the average male is that much taller than the average female.

One well-known finding among people watchers is that nothing causes a person to scoot out of an aisle faster than when someone accidentally brushes against their behind. In his book *Why We Buy,* Paco Underhill refers to this as the "butt brush."[29] Think of the last time this happened to you—five seconds later you had pretty much teleported yourself to another spot in the store. Since brushing against people probably happens much more in narrow grocery store aisles than wide ones, people might spend less time and buy fewer items there. Many grocery store aisles range from 6′ to 8′ wide. In the Washington, D.C., grocery stores mentioned earlier, we measured the width of all the aisles and timed how long the average shopper spent in them. Indeed, the wider the aisle, the more they bought. It didn't matter what was there—canned Brussels sprouts, twenty-pound bags of cat food, dishwashing liquid—the more time they spent in the aisles, the more items they bought.[30]

Your grocer could put more healthy, high-margin food in wider aisles and less healthy food in narrower ones. Identifying or creating healthy food aisles that are wider would be one solution. Another solution—make sure the healthier foods are at eye level.[31]

---

[24] If you want a beleaguered researcher's view of how this works, here's an op-ed: Kate Stein, "Shop Faster," *New York Times,* April 15, 2009, p. A29.

[25] One source for this is Brian Wansink and Aner Tal, "Correlates of Purchase Quantities in Grocery Stores," under review.

[26] Of course this is less accurate than measuring people barefoot with a German-made stadeometer, but knowing someone's relative height is probably sufficient. Being able to document that a 6′ male is taller than a 5′ 5″ female is close enough for this calibration. This issue of precision does raise to mind the comedian Ron White's quote "I'm a pretty big guy—between 6′ and 6′ 6″—depending on what convenience store I'm coming out of."

[27] In this study with Kate Stein, we tracked what people put in their carts but we didn't track them to the cash register. Still, unless someone changes their mind when in the *National Enquirer* checkout line, we assume that what they took, they probably bought.

[28] And 12″ is even a stretch. Most purchased products were within a 6″ range—higher or lower—of eye level for a particular shopper. This includes 37 percent of what women put in their cart and 44 percent for men. To stretch the range of products purchased even further, widen the shopping aisles. If an aisle is narrow—6′ or less—61 percent of the products you buy will be within 12″ of eye level. But if you're in a wider aisle, you look higher and lower. If it's only 2′ wider, ½ of what you buy will be outside this eye zone. But wide aisles also have something else going for them.

[29] Paco Underhill, *Why We Buy: The Science of Shopping* (New York: Simon & Shuster, 2000).

[30] There's also an irritation factor with narrow aisles. If a person can't see a clear way through an aisle, they might be less likely to go down it. And if you keep getting interrupted by people as you're trying to shop because they're scooting by you, you're less likely to linger.

[31] Kate Stein and Brian Wansink, "Eye Height and Purchase Probability," under review.

Eye-Level Shopping Bull's-Eye

*60 percent of what shoppers buy is within 12″ of their eye height.

Slim-By-Design Grocery Shopping
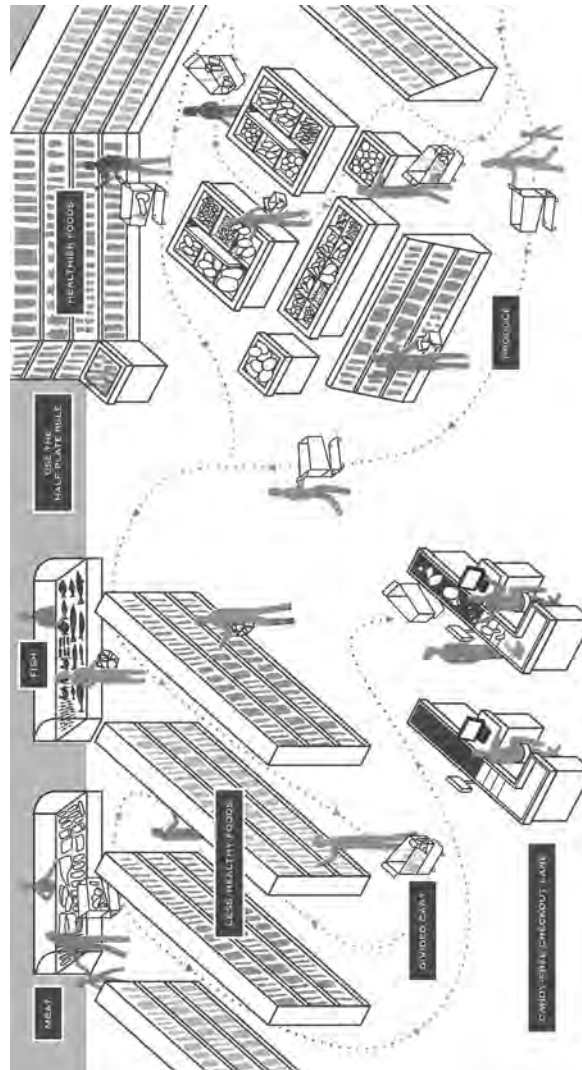
Groceries and Gum

MOST OF US KNOW **that it's a bad personal policy to go shopping on an empty stomach. We think it's because we buy more food when we're hungry—but we don't. In our studies of starving shoppers, they buy the exact same amount of food as stuffed shoppers. They don't buy more, but they buy worse.[32] When we're hungry, we buy foods that are convenient enough to eat right away and will stop our cravings.[33] We don't go for broccoli and tilapia; we go for carbs in a box or bag. We go for one of the "Four C's":**

---

[32] Here's the best proof of why you shouldn't shop when you're hungry: Brian Wansink, Aner Tal, and Mitsuru Shimizu, "First Foods Most: After 18-Hour Fast, People Drawn to Starches First and Vegetables Last," *Archives of Internal Medicine* 172, no. 12 (June 2012): 961–63.

[33] This is a current working paper by Brian Wansink and Drew Hanks, "Timing, Hunger, and Increased Sales of Convenience Foods." Hopefully it will be published in time for our retirement.

crackers, chips, cereal, or candy. We want packages we can open and eat with our right hand while we drive home with our left.

When it comes to cravings, our imagination is the problem. The cravings hit us super-hard when we're hungry because our hunger leads us to imagine what a food would feel like in our mouth if we were eating it. If your Girl Scout neighbor asked you to buy Girl Scout cookies, you'd buy one or two boxes. But if she were to instead ask you to describe what it's like to eat your favorite Girl Scout cookie, you would start imagining the texture, taste, and chewing sensation, and wind up ordering every life-giving box of Samoas she could carry. (Keep this in mind the next time your daughter wants to win the gold medal in cookie sales.)

> *Starving shoppers don't buy more, but they buy worse.*

Most food cravings—including those that occur when we shop—are largely mental. As with the Girl Scout cookies, they seem to be caused when we imagine the sensory details of eating a food we love—we start imagining the texture, taste, and chewing sensation. But if we could interrupt our imagination, it might be easier to walk on by.

One way we can interrupt these cravings is by simply chewing gum. Chewing gum short-circuits our cravings. It makes it too hard to imagine the sensory details of crunchy chips or creamy ice cream. My colleague Aner Tal and I discovered this when we gave gum to shoppers at the start of their shopping trip. When we reconnected with them at the end of their trip, they rated themselves as less hungry and less tempted by food—and in another study we found they also bought seven percent less junk food than those who weren't chewing gum.[34] If you shop for groceries just before dinner, make sure the first thing you buy is gum—and our early findings show that sugarless bubble gum or mint-flavor might work best.

> *Most food cravings—including those that occur when we shop—are largely mental.*
> *Chewing gum short-circuits our cravings. It makes it too hard to imagine the sensory details of crunchy chips or creamy ice cream.*

Lights, Stars, Numerology!

SUPERMARKETS COULD MAKE US **slim by design if they only told us what foods were the healthiest, right? Not really. Supermarkets and food companies have endlessly experimented with little stickers and icons that they hoped would help us to eat better. They'd say things like "Good for You," "Better for You," "Don't Have a Stroke," and so on. The United Kingdom even uses a traffic light—each food has a green (go), yellow (slow), or red (no) icon on it.**

Do you remember these icons? Of course you don't. Most of us ignored them because they were too confusing, self-serving, or unconvincing. Oh, and even when people *did* pay attention to them, they often backfired. Some people believed the green and yellow foods were a lot healthier than they actually were and gorged out on them. Then food companies got tricky and took advantage of this by producing foods that barely met the minimum requirements for a green or yellow icon. Getting the healthy icon then became more important than actually coming up with a healthier product.

> *Most labeling systems seem to backfire because we ignore them or we game them.*

One exception seems to be the Guiding Stars program. Back in 2005, an innovative, brilliant, high-end grocery store in New England—Hannaford Brothers—boldly stuck its neck out by putting bright yellow stars next to the healthiest foods on their shelves—super-healthy foods even got three stars. So, did people buy better food? Well, according to one study, they didn't initially seem to buy any more of the starred food. But they initially did buy less of the unstarred foods. They didn't buy more tofu, though this led them to think twice about the Doritos.[35]

---

[34] One of the ways we've tested this is by intercepting grocery shoppers in the parking lot on their way into a store. We ask them to answer a couple of questions about the store and if we can talk to them after they shop. If they say yes, we tag their cart so we can catch them as they check out. At that time, we ask them a few questions about their experience and if we can have a copy of their shopping receipt. A second group of people get the exact same treatment, except that they're also given a piece of sugarless gum as a thank-you. We tag their cart with a different color tag, and again catch them as they check out.

[35] This is a great study that shows surprisingly that either taxing bad foods or subsidizing good foods seems to backfire. When you subsidize healthy foods, people buy more of both healthy and unhealthy foods. When you tax unhealthy foods, shoppers by less of both unhealthy *and*

But here's why most of these labeling systems seem to backfire: (1) We don't believe them, or (2) we game them. We know an apple gets a green light, an A+, or a 100 percent rating. And we know a Twinkie gets a red light, a D−, and a two percent rating. It's the stuff in the middle that turns us into nonbelievers. If a food gets a rating that doesn't line up with our intuition, it totally loses credibility. When the magic formula is too complicated or too secret, we dismiss these ratings as ridiculous and ignore them.

But worse than our ignoring them is when we game the system. We're experts at getting around something we don't want to do or believe. If one type of cracker is rated five points higher than another type of cracker, we choose it instead of an orange.[36] Then we end up rewarding ourselves by eating more of them.[37]

What You Can Do . . .
USE YOUR INTUITION FIRST AND THEIR LABELS SECOND
Relying too much on ratings is confusing and can backfire. Even if your grocery store is using them, rely first on your common sense and only use the ratings to break ties between brands—Count Chocula beats Cap'n Crunch. But don't celebrate your slightly smarter choice with a double-wide candy bar. That's the compensation danger in a health halo world.

Using the Half-Plate Rule

EACH SPRING, WEGMANS, **a popular grocery chain in the Northeast, does a big health promotion push called "Eat well. Live well." From time to time, we've helped develop new ideas for their stores. In 2009, they visited our Lab to see if we could help develop a program that would encourage their own employees to eat more fruit and vegetables. They were thinking of providing some sort of education or promotion program. Instead, we were thinking of giving them a simple, visual rule of thumb. What we told Wegmans worked great for them, and it can work great for you in the store and even when you get home.**

In the good old days when we were kids, eating was easy. Your grandmother piled dishes of food on the table, you'd take a little of each, and—ta-da—that was nutrition! Today, the 273-page *United States Dietary Guidelines* tips the scale at almost 3 pounds. But there's an easier way for most people. When I was the executive director in charge of the *Dietary Guidelines* and people asked me how they should eat, although not the official USDA-sanctioned answer, my shortcut answer was to simply encourage them to use my Lab's Half-Plate Rule.[38] Half of their plate had to be filled with fruit, vegetables, or salad, and the other ½ could be anything they wanted. It could be lamb, a blueberry muffin, a handful of cheese . . . anything. They could also take as many plates of food as they wanted. It's just that every time they went back for seconds or thirds, ½ their plate still had to be filled with fruit, vegetables, or salad.

---

healthy foods. John Cawley *et al.,* "How Nutrition Rating Systems in Supermarkets Impact the Purchases of Healthy and Less Healthy Foods," under review.

[36] This is an award-winning article that opened a lot of eyes with the health halo concept: Pierre Chandon and Brian Wansink, "The Biasing Health Halos of Fast Food Restaurant Health Claims: Lower Calorie Estimates and Higher Side-Dish Consumption Intentions," *Journal of Consumer Research* 34, no. 3 (October 2007): 301–14.

[37] There's a ton of evidence here that's compelling, but way too detailed to talk about in the text. It happens with both low-fat foods and with foods with healthy names. Knock yourself out reading these two detailed (but award-winning papers): One's mentioned in the prior note and the other one is Brian Wansink and Pierre Chandon, "Can Low-Fat Nutrition Labels Lead to Obesity?," *Obesity* 14 (September 2006): A49–50.

[38] Wansink, *Mindless Eating,* pp. 178–9+.

Half-Plate Healthy

* Follow the Half-Plate Rule.

Could a person load up ½ of their plate with Slim Jims and pork bellies? Sure, but they don't. Giving people freedom—a license to eat with only one simple guideline—seems to keep them in check. There's nothing to rebel against, resist, or work around. As a result, they don't even try. They also don't seem to overeat.[39] They may want more pasta and meatballs or another piece of pizza, but if they also have to balance this with a ½ plate of fruit, vegetables, or salad, many people decide they don't want it bad enough.[40]

> *Using our Half-Plate Rule works amazingly well at home, but only if you also use it when you shop.*

Using our Half-Plate Rule works amazingly well at home, but only if you also use it when you shop.[41] To use it, you need to have enough fruits, vegetables, and salad around in the first place. If as you shop you think about you and your family being half-plate healthy, you'll buy healthier and you'll also spend more. The first is good for you; the second is good for the store.[42]

Wegmans jumped on our idea. Within 2 years, it was rolled out to all their stores, and you can now get Half-Plate place mats, magnets, posters. (They renamed it the trademarkable Half-Plate Healthy.) You can see it in action in any of their stores, and the only place it works better than in a grocery store is in your home.

Supermarkets don't have to talk about servings of fruits and vegetables to get the point across. All they need to do is to reinforce the idea that ½ a plate could hold whatever fruit, vegetables, or salad a person wanted. They can do this on signs, specials, recipes, or in-store promotions—and subtly encourage people to fill their cart with slightly more fruits and vegetables than they typically do.[43]

What You Can Do . . .
THE HALF-PLATE RULE AT HOME
"Fill ½ your plate with fruit, vegetables, or salad, and fill the other ½ with whatever you want." We've given this simple rule to tens of thousands of people because it works. People often report back to us that they eat fewer calories and they eat a lot more "balanced" diet than they did before. They also say they eat until they're full but not stuffed.[44]

---

[39] Check out the article Brian Wansink and Kathryn Hoy,"Half-plate *Versus* MyPlate: The Simpler the System, the Better the Nutrition," forthcoming, and Brian Wansink and Alyssa Niman, "The Half-Plate Rule *vs.* MyPlate *vs.* Their Plate: The Effect on the Caloric Intake and Enjoyment of Dinner," *Journal of Nutrition Education and Behavior* 44, no. 4 (July–August 2012): S33.

[40] The more latitude we give, the more likely they'll follow our advice. When rules become just a little too complicated or vague, we find reasons to stop following them. This was an early problem with MyPlate. When somebody starts questioning "Where does my dessert go?" or "How am I supposed to eat fruit with dinner," the more likely they are to simply say "Whatever" and ignore it.

[41] A recap of this done by Jane Andrews, Wegmans dietitian, can be found at *http://rochester.kidsoutandabout.com/node/1901*.

[42] See more at Wansink and Niman, "The Half-Plate Rule *vs.* MyPlate *vs.* Their Plate."

[43] Learn more about how Wegmans implemented our idea at *http://www.wegmans.com/webapp/wcs/stores/servlet/ProductDisplay?storeId=10052&partNumber=UNIVERSAL_20235*.

[44] Wansink and Hoy, "Half-plate *Versus* MyPlate."

What You Can Do . . .

Nobody likes to be told they can't do something. With the Half-Plate Rule there's nothing you can't eat. You just have to eat an equal amount of fruit, vegetables, or salad. At some point, getting that fourth piece of pizza just isn't worth having to eat another ½ plate of salad. But, most important, you're the one who made that decision.

After forty-five minutes of seeing food, guess what we want?
It's not a snack-size can of lima beans.

The Three Checkouts

GROCERY SHOPPING ISN'T EXACTLY **a trip to Fantasy Island, but the checkout line can be an exception. It's filled with guilty-pleasure rewards at the end of the ho-hum errand of shopping. There are bizarre new gum flavors like mango chutney mint, meal-size candy bars, and irresistibly tacky tabloids with headlines like "Cellulite of the Stars." These aisles are entertaining, but if you're with kids, you're doomed. Kids in grocery checkout lines are like kids in toy stores. They grab, bug, beg, pout, and scream. And if we cave in to buying pink marshmallow puff candy shaped like Hello Kitty, we also cave in to buying something—with lots of chocolate—for us. There's usually nothing in the aisle that we actually need, but after forty-five minutes of seeing food, guess what we want? It's not a snack-size can of lima beans. So we buy the Heath bar we swore we'd never buy again, finish it by the time we leave the parking lot, and shake our head on the way home . . . just as we did last week.**

Mothers shopping with children wanted more foodfree cashier lines. Fathers shopping with children didn't exist.

One supermarket solution is to set up at least one checkout line so it's totally candy-free.[45] Just as large supermarkets have different lines for "10 items or less" or "cash only," some lines could have candy, others could have healthy snacks, and some could totally be free of food. The stores could still sell magazines and other crazy things—like eyeglass repair kits and superglue—but one or two aisles wouldn't have any food at all.

To see what tired shoppers in grocery store parking lots thought of this idea, we asked, "If your favorite supermarket had ten checkout lines, how many should be candy lines, healthy lines, or food-free lines?" Here's what we found:

- **Men shopping alone wanted all candy lines.**
- **Women shopping alone wanted more of the healthy food lines.**
- **Mothers shopping with children wanted more food-free lines.**
- **Fathers shopping with children didn't exist.**

An easier first step would be to help convince your local supermarket manager to start by simply adding a healthy line—perhaps selling fresh fruit, granola bars, and so on. It might be the one longer line shoppers wouldn't mind waiting in. When the manager sees those lines getting longer, he'll quickly make the bigger steps. If he doesn't, there are other places you can shop.

How Your Grocer Can Help You . . .

WHAT IF ALL THE AISLES WERE CANDY AISLES?

If you want that food-free checkout experience but all the aisles are loaded up with Skittles and SweeTarts, here's what you do:

1. **Tell the manager that you want to avoid impulse-buying candy while you're in the checkout line.** Ask him or her which of the open checkouts would be least tempting for a dieter or a shopper with children.

---

[45] See Ulla M. Toft, Lise L. Winkler, Charlotte Glumer, and Brian Wansink (2014), "Candy Free Checkout Aisles: Decreasing Candy Sales in Bornholm Island Supermarkets," under review.

How Your Grocer Can Help You . . .

---

2. **While the manager is thinking, ask if they would consider putting in a candy-free aisle.** You can mention that other stores (such as Hy-Vee, Wegmans, and HEB) have at least one candy-free checkout aisle, and you've heard they're popular with both dieters and parents shopping with kids. If one of those stores you mention happens to be a nearby competitor, it might not be too many more trips before you have your candy-free aisle. That will be a good time to say "thank you."[46]

Which of These Would You Like To See at Your Grocery Store?

AISLE 3
Candy

AISLE 2
Healthy food
(such as raisins, apples,
granola bars, water)

AISLE 1
Candy-free
(non-candy impulse
items, such as batteries,
books, office supplies)
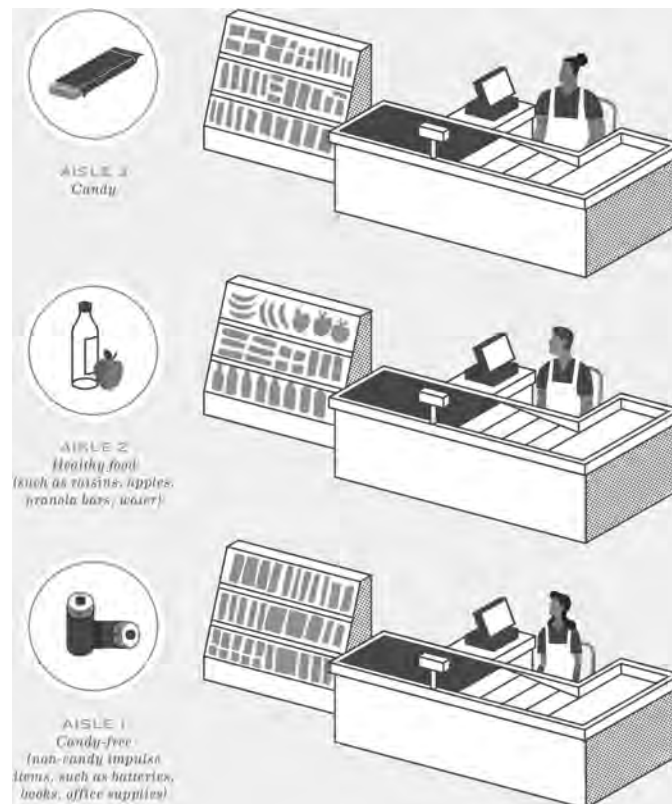
Back to Bornholm

AFTER WATCHING, CODING, AND ANALYZING SHOPPERS **on the Danish island of Bornholm, we generated a small list of changes—baby steps—these grocers could make to profitably help shoppers become slim by design. We were scheduled to present these ideas to all nine grocery store managers at the Bornholm Island Hall after they got off work a couple of days later at seven thirty.**

---

[46] More at Ulla M. Toft, Charlotte Glumer, Lise L. Winkler, and Brian Wansink (2015), "Food Free Checkout Aisles: A Danish Field Study of Becoming Slim by Design," under review.

How Your Grocer Can Help You . . .

THE ORIGINAL SLIM-BY-DESIGN SUPERMARKET PLEDGE

When the Danish Government said they'd be willing to try almost anything we recommended, here's what we first suggested, and here's what paved the way for the full 100-point Supermarket Scorecard at the end of this chapter. We asked them to try the three changes that would be easiest and most profitable for them.

1. **Provide divided ½ carts that encourage people to put their fruits and vegetables in front.** The dividers can be made from paint, duct tape, mats, *etc.*
2. **Angle produce displays and use floor decals (such as green lines) to guide and keep people shopping longer in the produce section.**
3. **Place the healthiest foods in Aisles 1 through 3.**
4. **Make the healthiest aisles the widest and put healthy products at eye level or on end-of-aisle displays (endcaps).**
5. **Use the "Half-Plate Rule" promotion.**
6. **On end-of-aisle displays, combine the regular promotion with a healthy food complement.**
7. **Have two or three types of checkout lines: standard, food-free, and healthy foods only.**

Unfortunately, 2 days later at seven thirty my five-person delegation of researchers almost equaled the six grocery managers who actually showed up. Strike one. After starting the presentation with the only Danish word I knew—"*Velkommen*" (welcome)—I told them the night was all about "new ways you can sell more of your healthier foods and make more money." We then went on to give a punchy presentation on seven easy changes that we knew would work well. We had photos, video clips of shoppers, cool study results, numbers, and funny stories. It was great . . . except that nobody laughed, asked a question, moved, or even seemed to blink. It was like Q&A hour in a wax museum. Strike two.

We generated a small list of changes these grocers could make to profitably help shoppers become slim by design.

Because there were no signs of life, I idled down my enthusiasm and wrapped up our presentation a half hour early so my Danish colleagues could try to salvage the evening. Once they started talking in Danish, some sort of switch flipped in the managers. They started talking louder, started to un-Danishly interrupt each other, and then started arguing. Thinking things were getting out of control, I suggested we call it a night before they started to break furniture. My Danish colleagues waved me off and the melee continued. An hour later, things had slowed down, and the managers thanked us and cleared out. Before we started cleaning up, I asked my Danish colleagues why they were so irate. They said, "Oh, no. They like the changes and they'll make most of them. The rest of the time they were talking about the *other* changes they wanted to make, like having more produce tastings, more pre-prepared salads, and bundling meat and vegetable specials together."

After all our supermarket makeovers, does every Bornholmian look like a sleek, slim, Danish version of *Mad Men?* As I mentioned earlier, it's still too soon to say (we're posting updates at *www.SlimByDesign.org/Bornholm*), but with every trip I make, all signs point in the right direction.

One way to tell how well a new idea is working is by how many people want to jump in and be a part of it. The more changes we made to the grocery stores in Bornholm, the more other groups got involved. Before long, a public health advertising campaign was being rolled out, petitions were launched, and local ordinances were proposed. After the kitchen smoke clears, it will be difficult to see which of these moved the dial the most—but the people on the island are buying in to becoming slim by design.

There's a humbling expression: "Success has a thousand fathers, but failure has only one." If there are dramatic changes in the foods these Danes buy, the public health people will say it was because of their ads, the activists will say it was because of their tireless petition drives, and charismatic politicians will say it was because of their bold regulations. But if nothing happens and the whole plan ends up

being a failure, which father will take the blame? It won't be the public health adviser or the politician. They'll abandon the program in a heartbeat. Unsuccessful public health campaigns cost lots of money. Unsuccessful ordinances can cost political careers.

> *We projected each change would turn a profit within a month if not immediately.*

Yet these supermarket makeovers were cheap and easy to make. Many were done over a weekend, and we projected each of them would turn a profit within a month if not immediately. Still, if even one works, stores will be further ahead than before. On my most recent trip, they asked me to help expand it to the mainland, so some hidden sales numbers must be looking pretty good. It's the beauty of being slim by design.

How Your Grocery Store Can Make You Slim

THERE ARE DOZENS OF WAYS **your favorite grocery store could profitably help you shop a little healthier. In April 2014, I shared the Bornholm story with some of the innovative American grocery stores that sponsored some of the studies you've read about throughout this chapter. They all had clever ideas they were trying out in their stores to help their customers shop a little healthier, but they were all doing something different—and often repeating each other's mistakes. If we could pool together all of my Lab's slim-by-design research findings with some of the ideas they were successfully experimenting with, we could make a supermarket scorecard that could help guide all of them to make profitable healthy changes.**

> *This supermarket scorecard tells shoppers what they should look for or ask their local grocery manager to do.*

Grocery chains are competitive—and not just for shoppers. Even though a grocery chain in Texas doesn't compete for the same shoppers as a grocery chain in Chicago, they all want to win awards for Most Popular, Prettiest, Smartest, or Most Likely to Succeed at their annual Grocery Store-a-Palooza Award Conference. Because having a scorecard means there might be yet another new award they could compete on, most were eager to help develop one. But more important than enabling grocery chains to compete with each other, this supermarket scorecard will transparently show them exactly how to compete. Also, it will tell shoppers what they should look for or ask their local grocery store manager to do. If all these changes help grocery stores make a little more money, grocers will want to make the changes. If all these changes help shoppers shop a little healthier, shoppers will want to hassle their favorite grocer until he or she makes changes.

Slim-by-Design Grocery Store Self-Assessment Scorecard

Okay, so your favorite grocery store has great prices, selection, and convenience, but it might still be making you fat and happy instead of happy and slim. This scorecard tells you what your store is doing to help you eat better. Our Lab has been working with top grocery chains around the nation to help them make you slim by design. You can use a scorecard like this to compare your favorite grocery stores, but it will also tell you what you can ask them to do to make you and your family more slim—and more loyal to their store. Some items on this scorecard might initially seem to have nothing to do with food—like having restrooms and a drinking fountain in the front of the store—but together they will make you less anxious or more comfortable, and others will slow you down and relax you. In the end, even some of these nonfood changes can lead you away from impulsively buying Chunky Monkey ice cream and more toward intelligently buying bananas. This is a start—every year this scorecard is updated with the best practices and the best research that helps us shop better (and helps stores make money). The newest can be found at *SlimByDesign.org*.

Slim-by-Design Grocery Store Self-Assessment Scorecard—Continued

Entrance	
☐ Assign designated parking spots (similar to handicapped spots) for pregnant women and mothers with infants. ☐ Offer preprinted shopping lists of basic staples near the entrance. ☐ Provide information sheets near the entrance on healthy ways to shop. ☐ Offer healthier foods near the entrance to prime healthy shopping. ☐ Two sizes of shopping carts are available. ☐ Handbaskets are available. ☐ Divided shopping carts with a "place fruits and vegetables here" section are provided.	☐ The first area entered by most shoppers is the produce section. ☐ Free healthy samples are near the entrance. ☐ There's a small "grab and go" area in the front of the store with a small selection of milk and bread for the in- and-out, or "fill-in" shopper. ☐ There's a small "grab and go" area in the front of the store with a small selection of milk and bread for the in- and-out, or "fill-in" shopper.
Services and Signage	
☐ Signs promote seasonal combinations of fruits and vegetables. ☐ Educational posters are located around the stores to educate people about healthy eating (for example, the Half-Plate Rule). ☐ Local and seasonal foods are clearly promoted. ☐ There is a special section for organic fruits and/or vegetables. ☐ The organic section is boldly and clearly labeled. ☐ At least one produce-tasting station is near the entrance. ☐ A wide range of precut fruits and vegetables are available. ☐ There are separate in-aisle promotions for canned fruits. ☐ There are separate in-aisle promotions for canned vegetables. ☐ There are separate in-aisle promotions for frozen vegetables. ☐ There are specific perimeter promotions for lean meat.	☐ Signs provide "Did you know?" facts about the health benefits of specific foods. ☐ There are specific perimeter promotions for lean dairy. ☐ There are specific promotions for whole-grain products, such as bread and pasta. ☐ Calorie information is available in the meat section. ☐ Healthy food apps such as Fooducate and QR codes are promoted. ☐ A kiosk with tear-off recipes is available in the produce section. ☐ Combo packs are available that co-promote healthy foods (such as tomatoes and mozzarella). ☐ A guidance system such as Guiding Stars or a stoplight approach is used. ☐ A dietitian is available and visible in the store a couple of days each week. ☐ Unit pricing ($/oz) is available where relevant.
Layout and Atmosphere	
☐ Relaxing music is played in the produce section. ☐ Show price per unit along with price per weight for healthy food, for ease of calculation. ☐ Floor decals are used for way-finding to healthy sections.	☐ Lighting varies throughout the store, but is always brightest on the healthier foods. ☐ Healthy tear-off recipe cards are provided near the fruits and vegetables. ☐ Recipe ingredients for the recipe cards are located next to the cards.
Aisles and Shelves	
☐ Some fruits are bundled into family-size packs. ☐ Some vegetables are bundled into family-size packs.	☐ Ingredients are organized by preparation type (stir-fry *versus* salad)—for example, put mushrooms, eggplants, and peppers in a "stir-fry" section.

Slim-by-Design Grocery Store Self-Assessment Scorecard—Continued

☐ A complementary fresh produce display is available in the meat section (such as one containing broccoli, peas, cauliflower, and peppers). ☐ A complementary fresh produce display is available in the seafood section (such as lemons, tomatoes, beans, and asparagus). ☐ A complementary fresh produce display is available in the frozen food section. ☐ Displays of single fruits (such as oranges, apples, pears, nectarines, and apricots) are next to desserts. ☐ Ready-to-eat fruits and vegetables are available in variety packs.	☐ Expiration dates are visible (at front of package or on signs). ☐ Aisles with healthy foods are the widest. ☐ Less healthy foods are inconveniently placed very low or very high on the shelves. ☐ Healthier foods are conveniently placed at eye level. ☐ Aisles with healthy food are brighter than aisles with unhealthy food. ☐ Hard-to-decide-upon foods ("long-buy" items), such as soups, dressings, and baby foods are located in less busy aisles so people are relaxed enough to comparison shop.

Prepared Food Area

☐ Fruit is available in all foodservice areas. ☐ Vegetables are available in all food-service areas. ☐ A mix of whole fruit options is displayed in an attractive bowl or basket. ☐ The "pick me up" or prepared food section has healthy default foods. ☐ A daily fruit or vegetable option is bundled into all grab-and-go meals. ☐ A salad bar is available. ☐ All beverage coolers have both water and white milk available. ☐ Alternative healthy entrée options (salad bar, yogurt parfaits, and the like) are highlighted on posters or signs within all dining areas. ☐ The healthy daily targeted entrée is placed as the first one seen in all dining areas.	☐ The healthy daily targeted entrées have creative or descriptive names. ☐ Posters displaying healthy foods or a guidance system (such as the Half-Plate Rule) are visible in the dining area. ☐ The cafeteria tracks the popularity and frequency of healthy-option orders to see what promotions work most effectively. ☐ All promotional signs and posters are rotated, updated, or changed at least monthly. ☐ Half portions are available for all entrées. ☐ Half portions are available for all desserts. ☐ Takeout boxes are available for leftovers not eaten in the cafeteria.

Shopper Comfort and Service

☐ Restrooms are easily accessible in the front of the store. ☐ A drinking fountain is located in the front of the store. ☐ There is an area for shoppers to sit and relax. ☐ There is an area for shoppers to eat. ☐ There is a supervised playroom for children.	☐ Health and nutrition games dominate the playroom. ☐ A local fitness club is co-promoted. ☐ A small discount to a local fitness club is given to loyalty club shoppers. ☐ There is a drive-through where you can pick up your groceries, if you call ahead. ☐ Home delivery is available (for an extra charge).

Engagement: Employees and Social Media

☐ The produce-department manager and staff are specifically trained to suggest healthy answers to shopper questions. ☐ The meat-department manager and staff are trained to suggest healthy answers to shopper questions. ☐ The dairy-department manager and staff are trained to suggest healthy answers to shopper questions. ☐ The bakery-department manager and staff are trained to suggest healthy answers to shopper questions.	☐ All employees are trained to suggest healthy complementary products when asked about a particular item. ☐ There are plentiful staff in the meat and produce sections who are trained to suggest healthy upsells or substitutes. ☐ Store or chain has an eng aging website that has a health-related blog featuring local or seasonal products. ☐ The website has shopper loyalty specials. ☐ Tips, features, or videos involving better shopping and better living (such as "Shopping with Kids") are available.

Slim-by-Design Grocery Store Self-Assessment Scorecard—Continued

Checkout

☐ Loyalty programs specifically reward fruit and vegetable consumption.	☐ Receipt provides an indication of what percentage of purchases were fruits and vegetables, low-fat meat, and low-fat dairy.
☐ Receipts are itemized in categories or otherwise coded to indicate how healthy you're shopping.	☐ A default shopping "starter" list is made available to each shopper at the front of the store with a number of the major staples preprinted on it.
☐ The back of receipts feature coupons for healthy foods.	
☐ There is at least one food-free checkout aisle.	☐ The same healthy shopping-tips brochure available at the beginning of the shopping trip is also available at the checkout register.
☐ A discount is offered if a certain percentage of purchases are fruits and vegetables.	
☐ Individual containers of precut fresh fruit are available next to at least one cashier.	☐ "Don't Forget" signs are placed at the register to remind customers about certain healthy foods.
☐ Healthy snack options are offered next to the cashiers.	☐ A "fruits and vegetables only" self-checkout station is provided for quick purchases of produce.
☐ Receipt uses loyalty card information to show how much was spent on fruits and vegetables compared to past trips.	

Scoring Brackets

☐ 70–100—Slim-by-Design Grocery Store—*Gold*

☐ 50–69—Slim-by-Design Grocery Store—*Silver*

☐ 30–49—Slim-by-Design Grocery Store—*Bronze*

ATTACHMENT 2

Healthy Profits: An Interdisciplinary Retail Framework that Increases the Sales of Healthy Foods

Brian Wansink [a–b], *

Abstract

Disruptive layouts, smart carts, suggestive signage, GPS alerts, and touch-screen preordering all foreshadow an evolution in how healthy foods will be sold in grocery stores. Although seemingly unrelated, they will all influence sales by altering either how convenient, attractive, or normal (CAN) it is to purchase a healthy target food. A Retail Intervention Matrix shows how a retailer's actions in these three areas can be redirected to target shoppers based on whether the shoppers are Health Vigilant, Health Predisposed, or Health Disinterested. For researchers, this review offers an organizing framework that integrates marketing, nutrition, psychology, public health, and behavioral economics to identify next generation research. For managers, this framework underscores how dozens of small, low cost, in-store changes are available to each that can surprisingly increase sales of entire categories of healthy food.

[a] Dyson School of Applied Economics and Management, Cornell University, United States.
[b] Cornell Food and Brand Lab, Cornell University, United States.
* Correspondence to: 475 H Warren Hall, Cornell University, Ithaca, NY 14853, United States. Fax: +1 607 255 9984.
E-mail addresses: bcw28@cornell.edu, foodandbrandlab@cornell.edu.

Introduction†

Our best and worst eating habits start in the grocery store. Although critics claim that retailers are primarily motivated to sell unhealthy processed food—Froot Loops instead of fruit or fish sticks instead of fish—the opposite is true for the savvy ones. If the fruit turns mushy and the fish begins to smell, retailers may lose more money in sunk inventory costs then they would otherwise gain by selling the processed versions. Grocers are motivated to sell healthy, profitable foods. Unfortunately, they do not know how to effectively do so (*Chandon and Wansink 2012; Guthrie 2017*; *Inman and Nikolova 2016*), so retail fruit and vegetable sales continue to drop (*Haywood 2016*; *Produce for Better Health 2015*).

Each issue of *Supermarket News* and *Progressive Grocer* highlights clever twists on how retailers can increase sales: novel POP displays, creative cross-promotions, compelling incentive programs, colorful floor decals, and trendy planogram arrangements. Most of these tactics are driven by manufacturers of branded, less-than-healthy packaged goods. In contrast, most of the newest and most creative solutions for selling unbranded healthy products—such as fish, poultry, fruits, and vegetables—have been discovered in academia (*Johnson, et al.,* 2012).

Regretfully, however, many of these discoveries are not widely adopted or used beyond one or two field test stores (*Inman 2012*). First, these discoveries appear disorganized or disjoint because together they use a wide range of interventions to investigate a wide range of outcomes (such as sales, satisfaction, loyalty, repatronage, eye-tracking, and so on). This combination is overwhelming to a manager who is looking for a single solution, such as how to simply sell more fish. Instead of giving managers a useful toolbox of organized solutions, what we give them is more like a shoebox full of tax-time receipts.

The second reason our work is infrequently translated into practice is because its conclusions are either uncompelling or inconsistent (*Vermeir and Van Kenhove 2005*).We tend to focus on interactions or boundary conditions where an intervention might work with some customers and with some food categories, but not with others (*List, Samek, and Zhu 2015*). For instance, a Traffic Light rating system may be useful to some shoppers (*Dzhogleva, Inman, and Maurer 2013; Grunert, Bolton, and Raats 2011; Trudel, et al., 2015*), but to others it might be a glaring warning sign that the food will taste bad (*Werle, et al., 2011*). Academia thrives on interactions and exceptions, but the rest of the world runs on main effects.

The future of healthy retailing will be guided by the future of new research. All of the research in this review has been published or conducted after 2011 and ½ are still working papers.

They comprise a framework that integrates the newest discoveries in marketing, health psychology, public health, consumer research, nutrition, and behavioral economics to identify what might be the most actionable and compelling new research to influence practice and theory. First, the framework collapses the myriad of individual differences among shoppers into a three-segment hierarchy which summarizes their healthy shopping disposition. Second, it offers a useful way to organize the receipt box full of findings in a way that shows *how* various interventions work (improving convenience, attractiveness, and norms) and where they can work within grocery stores (by altering the signage, structure, service mix). *Fig. 1* foreshadows how these pieces will combine to eventually create a Retail Intervention Matrix framework that can organize existing findings and stimulate useful new insights.

---

† **Editor's note:** The article is in press, **consequently,** the endnotes are unnumbered. In the submitted article pdf the referenced works have the author'(s) name(s) highlighted for hyperlinking, but they are not linked; **therefore,** the endnotes are in order as printed and not in order as referenced.

Fig. 1. How and Where Retail Interventions Can Influence Shoppers
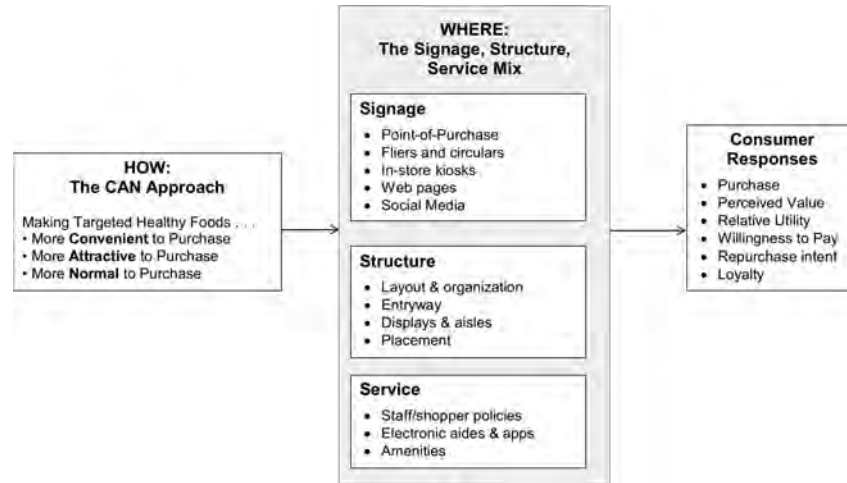
The Hierarchy of Health Predispostion

Not all shoppers shop alike. Health food enthusiasts shop differently than mothers shopping with kids; a "hot" fast-thinker shops differently than a "cold" slow-thinker; and variety-seekers shop differently than budget-constrained shoppers (*Hui, Huang, et al., 2013; Verhoef and van Doorn 2016*). There will always be an exception or an untested segment. This sometimes leads our results to appear frustratingly inconclusive when we have to admit that we do not know whether our new intervention works the same way with elderly shoppers as it does with shoppers using SNAP benefits (*Guthrie 2017*).

One solution is to only view shoppers based on how predisposed they are to making a healthier shopping decision. We can view them as belonging to one of three fluid groups that belong to a Hierarchy of Health Predisposition. The top segment of this hierarchy are Health Vigilant shoppers (*Fig. 2*). They are highly informed, conscious of calories, and are influenced by nutrition information. At the bottom extreme, Health Disinterested shoppers have little interest in changing their eating choices because of either the effort, sacrifice, or perceived futility. The segment in the middle are the Health Predisposed shoppers. They would prefer to make healthier food choices, but they have difficulty consistently doing so unless it involves very little sacrifice. This Predisposed segment is the one that buys the 100-calorie packages of snacks and the sugar-free yogurt. This segment is larger on New Year's Day than it was in December; it was larger this past Monday morning than it was during the prior Friday night's shopping trip.

One reason nutrition guidance systems (such traffic lights or Guiding Stars) have had only modest influences on the sales of healthy food (*Cawley, et al., 2015; Nikolova and Inman 2015*) may be because they mainly resonate with only the top of the Hierarchy. Health Disinterested shoppers ignore these programs, and heath predisposed shoppers inconsistently follow them. If the only segment they reach are the vigilant shoppers, interventions like this will have hardly any sizable impact on health since this segment is already shopping in a healthy way. Even if the same intervention is perfectly targeted at the bottom portion of the Hierarchy, it would have hardly any impact because the bottom segment does not care.

Fig. 2. The Hierarchy of Health Predisposition
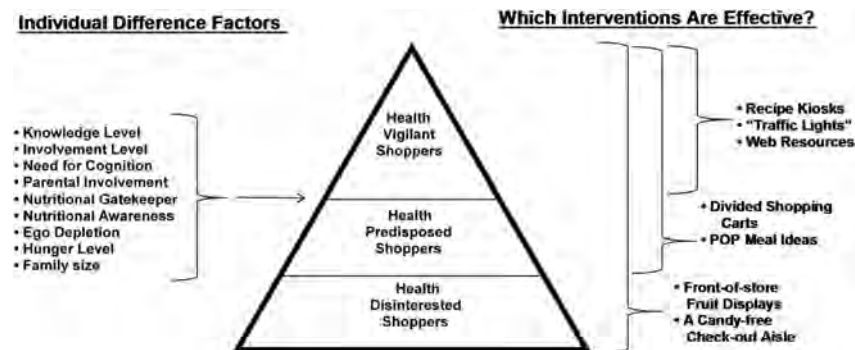
The *CAN* Approach to Improving Healthy Shopping

Changing widespread eating behavior does not happen by convincing shoppers that an apple is healthier than a Snickers nor does it happen by coaching them to improve their imperfect willpower. While these may be reminders to Health Vigilant shoppers, they will not reliably work with Health Predisposed shoppers, and almost certainly will not work with Health Disinterested shoppers. Instead, a more sensible and cost-effective solution would be to simply make sure that the apple is much more convenient, attractive, and normal to choose than the Snickers. Offering an apple sample at the front of the store primes more fruit sales (*Tal and Wansink 2015*) and offering an apple display at the checkout helps pre-empt Snickers sales (*Winkler, **et al.,** 2017*). Such changes are effective because they influence passive shoppers and not just the vigilant ones.

In 2011, Denmark started a public health initiative to reduce obesity—partly by trying to increase the sales of fish, fruits, and vegetables (fresh, frozen, and canned) in grocery stores (thereby hopefully decreasing the sales of less healthy foods). Starting with a list of dozens of retail changes that were believed to be revenue positive (see *Appendix A*), six were selected to be implemented over a 2 year period on the isolated Danish island of Bornholm (population 42,000). The six interventions selected were ones that retailers believed would both be profitable and easy to implement and maintain:

1. Fruit displays within 10′ of the entrance
2. At least one candy-free check-out line
3. Traffic interrupters (displays of healthy foods in the wideraisles)
4. End-aisle displays of fish
5. Traffic Light ("Green Key") labeling
6. In-Store Promotions = ½ Plate Rule Guidance System

In combination, these retail interventions were successful because they made it more convenient, attractive, and normal to purchase fish, fruits, and vegetables. For instance, putting fruit in an attractive display made it appear more *normal* (typical, or reasonable) to take fruit—partly because it was now also more *convenient* and looked more *attractive*. It was the *CAN* approach to changing behavior (*Wansink 2015*). Looking toward the future of retailing, the key to doing this successfully is to not handicap our imagination by too narrowly defining what is meant by convenient, attractive, and normal (*Bommelaer and Wansink, 2017*).

More Convenient *to Select*

As *Fig. 3* illustrates, a manager can help make healthy foods more convenient to see, to consider, and to purchase (*Desai and Trivedi 2014; Gilbride, Inman, and Stilley 2015*). For instance, one of the biggest barriers to purchasing fish is that many shoppers are not confident about how to prepare and serve it. With these shoppers, no nutrition scale or promotion would lead a person to buy more fish until they understood that it could be integrated into cooking routines that were familiar and convenient for them. This was similar with tofu and to counter this, the largest tofu manufacturer in the U.S. launched an in-store campaign that clearly illustrated that tofu is convenient to buy and to cook ("Fridge to pan in 10 minutes" and "Cooks

like chicken") which helped increase both shopper confidence and retail sales (*Hsu 2014*).

Even when shopping for familiar foods in familiar aisles, small changes can conveniently guide shoppers to make healthier choices. Vegetables placed near the front entrances are selected eight percent more than those that are not (*Wilson, et al., 2016*), floor decals that guide people to other vegetable displays increased sales by nine percent (*Payne and Niculeseu 2012*), and center-of-aisle "traffic interrupter" displays repeatedly increased 1 day sales of overlooked vegetables by 400% in Denmark. Convenience also helps explain why about 43% of interior aisle grocery sales are within 12″ of eye level (*Stein 2018*). This "you buy what you see" continues all the way to the checkout where fruit displays can increase short-term sales by 35% (*van Kleef, Often, and van Tripj 2012*).

Fig. 3. The CAN Approach To Influencing Shopping Decisions
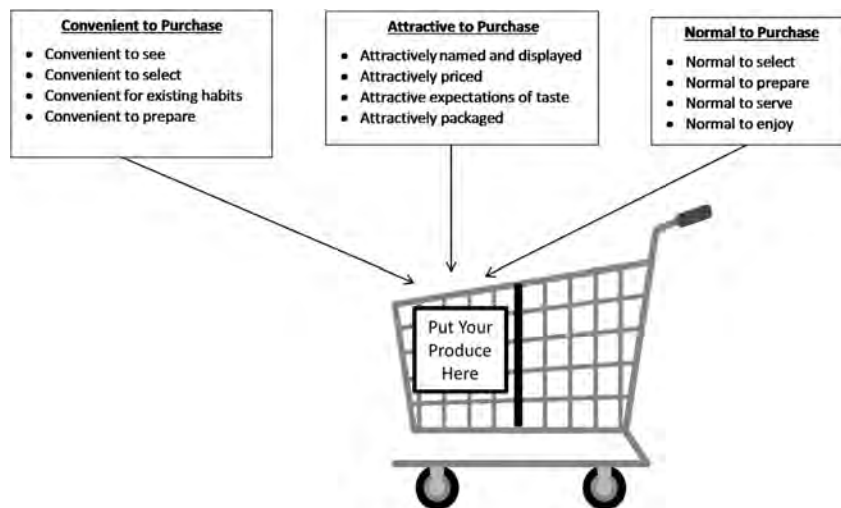
Along with saving physical effort, convenience can also refer to saving cognitive effort. This ranges from using easier-to-understand product category layouts (*de Wijk, et al., 2016; van Herpen 2016*) to leveraging technology in the form of GPS alerts or personal shopping profiles (*Sciandra and Inman 2014*). Such reminders can guide shoppers to healthier choices by making it both more cognitively convenient to select and more convenient to visualize this food being prepared and eaten at a home meal (*Hui, Inman, et al., 2013; Lowe, Souza-Monteiro, and Fraser 2013*).

More* Attractive *to Select

The second principle of the *CAN* approach is that the healthy choice needs to be made more attractive relative to less healthy (but usually more tastier) options. It could be more attractively named, more attractive in appearance, more attractively priced (*Hampson and McGoldrick 2013*), or it could evoke more attractive taste expectations than it usually does (*Trivedi, Sridhar, and Kumar 2016; Vega Zamora, et al., 2014*). Fruit that is haphazardly piled onto a flat table is less attractive than fruit that is angled on a display with a colored frame around it (*Stein 2018*). Even simply giving a fruit or vegetable a descriptive name—crisp carrots or Michigan cherries—makes them more attractive and increases a person's taste expectations (*Spence and Piqueras-Fiszman, 2014*) and selection by sixteen percent or more (*Wansink, et al., 2012*).

Attractive packaging, descriptive names, color, labels, and appearance have all been shown to bias evaluations of taste. Food can also be more attractive simply by being novel (curried pumpkin), attention-getting (heirloom Indian corn), or even more ethically attractive (meat-free turkey). Both the sustainability movement and the "ugly vegetable" movement have capitalized on ethically-motivated shoppers who find sustainable products to be more attractive.

Making a food more attractive by altering its price is a popular tool of behavioral economists, and it takes the standard form of taxes, subsidies, rebates, coupons, and bundling (*Carroll, Samek, and Zepeda 2016*). Unfortunately, when price rebates have been offered on fruits and vegetables, they can sometimes backfire by increas-

ing both the sales of healthy produce *in addition to* the sales of unhealthy foods—especially in low-income households (*Cawley, **et al.,** 2016*). That is, the money saved on fruit is then spent on Froot Loops (*Cawley, **et al.,** 2016*).

More Normal **to Select**

Last, many shoppers often prefer to buy the foods they believe are normal or popular to purchase, serve, and eat. For instance, signs that told people that chick peas were the favorite bean in that area (Harlem) shifted 21% of all bean selections over to chick peas (*Bhana 2017*). This also works with quantities. Shopping cart signs that stated that the average shopper purchased at least five fruits and vegetables increased produce sales by ten percent (*Payne, **et al.,** 2014*). Moreover, even the size of the store might subtly suggest to a customer how much is normal to purchase during a shopping trip (*Ailawadi, Ma, and Grewal 2016*).

Benchmarks provide visual purchase norms. Consider two benchmarks that increase fruit and vegetable sales. One is the Half-Plate rule which was originally designed to help consumers operationalize the spirit of USDA's MyPlate guidance system (*Wansink and Tran 2017*). The Half-Plate rule simply states that in order to eat more balanced meals, ½ of your plate needs to be fruits, vegetables, or salad and the other ½ can be whatever you wanted. You can have a second or third helping if you want, but ½ of your plate always has to be fruits, vegetables, or salad. This was successfully implemented in the leading grocery chain in the United States (*Kell 2016*) as "Half-Plate Healthy" because it had been shown to encourage shoppers to buy "considerably more" produce (*Wansink 2014*). After all, if consumers were going to eat half-plate healthy, they needed to shop half-plate healthy (see *Fig. 4*).

Fig. 4. The Half-Plate Rule and the Half-Cart Both Suggest Larger Portion Size Norms for Fruits and Vegetables

One of the reasons the half-plate healthy approach was effective for this leading retailer was because it offered a simple visual benchmark about how much fruit and vegetables are the right amount to eat—half the plate. Similarly, when consumers shop, little thought may be given as to whether a food is healthy or not. Yet if asked to categorize and separate each food they buy according to whether it is either a fruit or a vegetable (*versus* neither), it forces more mindful shopping. One set of studies involved shopping carts that had been physically divided across the middle and were accompanied with a sign in the front that instructed people to place their fruits and vegetables (fresh, frozen, or canned) in the front ½ of the cart and everything else in the back ½. Using this Half-Cart approach increased the sales of fruits and vegetables by eighteen percent (*Wansink, Payne, and Herbst 2017*). In a second set of studies, when the proportion of the cart allocated to fruits and vegetables was either at the 35% level or the 65% level, the amount that shoppers spent increased from $14.97 to $17.54 (*Wansink, Soman, and Herbst 2017*). When the same type of dividing lines were added to online shopper order forms for grocery delivery, the same results were found. The size of partitions indeed matters to shoppers.

Nearly all healthy interventions in retailing influence shoppers by increasing how convenient, attractive, or normal it is to purchase one food instead of another—an apple or a fish instead of crackers and beef (Bommelaer and Wansink, 2017). By organizing how our discoveries work, we open up new possibilities of influence. The CAN approach enables us to organize *how* our interventions influence shoppers. As *Table 1* foreshadows, the next section shows *where* they will work best in a store.

The Signage, Structure, Service Mix: Where Retailers Can Best Change Behavior

Although nearly all shopping interventions influence shoppers by altering how convenient, attractive, or normal it is to buy a product, there are endless ways they can do so. There are also three different areas where retailers can influence shoppers by using these tools. Shoppers can be influenced through *signage* (inside and outside the store), by the *structure* of the store (layout and product positioning), and by the *service* the store provides (on-line, in-person, or on-site). This signage, structure, service mix influences different shoppers in different ways. Improving service might work best for Health Vigilant shoppers (because they are most likely to seek out the extra information or assistance). Improving signage might work best for Health Predisposed shoppers (as well as those who are and Vigilant). Changing the store's structure might work well for all three segments.

Signage

Signage overlaps with the traditional "Promotion P" of the 4–P's framework. It involves all out-of-store, in-store, and online efforts that are directed toward influencing what a shopper buys (*Kovacheva and Inman 2014*). Outside the store it includes fliers, circulars, commercials, outdoor advertising, and coupons. Inside the store it includes posters, signs, shelf-hangers, floor decals, and kiosks as well as take-home media such as recipes, brochures, and magazines, and more stylized or person-based media, such as tailored ads, feedback or messages on shopping receipts (*Otterbring, et al., 2014*), and GPS alerts for promotions. On-line it includes the website, on-line tools, social media, e-mail alerts, sponsored apps, and GPS alerts for promotions that can be triggered both in and out of the store.

Table 1. How Sample Findings Fit Into the Retail Intervention Matrix

	More convenient to purchase	More attractive to purchase	More normal to purchase
Signage	• Floor decal arrow stickers asking people to follow the arrows to eat more nutritiously lead to a nine percent increase in produce sales (*Payne, et al., 2014*) • Joint efforts to provide fish dinner recipe cards and grilling instruction brochures were part of a larger campaign that increased fish sales by 28% (*Karevold, Tran, and Wansink 2017*)	• New recipe ideas, co-promotions, and end-of-aisle displays increased canned fish sales by eighteen percent (*Toft, et al., in preparation*) • Starring items as more healthy decreased the purchase of unstarred (less healthy foods) by two percent (*Cawley, et al., 2015*)	• Signage stating that garbonzo beans were the most popular beans, increased selection by fourteen percent (*Bhana 2017*) • Shopping cart signs stating that the average shopper purchased at least five fruits and vegetables increased produce sales by ten percent (*Payne, et al., 2014*)
Structure	• A fruit display near cash register increased sales 35%, even when product was not discounted (*van Kleef, Often, and van Tripj 2012*) • Items (including produce) that was within 12″ of a shopper's eye-level comprised over 43% of all sales (*Stein 2018*)	• Fruit samples provided to consumers upon entering the store increased sales fruit sales by seven percent (*Tal and Wansink 2015*) • People were sixteen percent more likely to purchase a product from the first full aisle they entered than any subsequent aisle (*Stein 2017*)	• Visually diving a shopping cart in ½ and suggesting that ½ should be used for fruits and vegetables, increased their sales by fourteen percent (*Wansink, Payne, and Herbst 2017; Wansink, Soman, and Herbst 2017; Wansink, Tran, and Karevold 2017*) • Using more islands than aisles in produce aisles increased shopping time and items purchased (*Mukund, Atakan, and Wansink 2018*)

Table 1. How Sample Findings Fit Into the Retail Intervention Matrix—Continued

	More convenient to purchase	More attractive to purchase	More normal to purchase
Service	• Healthy "Grab and Go" lines in store cafeterias led to a 82% increase in healthy food sales (*Hanks, et al., 2012*) • Mobil apps that indicated what percent of your food is healthy and which were missing, was rating as being most attractive to in-store consumers (*Mao and Atakan 2017*)	• In-store suggestions by staff contributed to increased fish sales (*Karevold, Tran, and Wansink 2017*) • One loyalty program rewarded fruit and vegetable purchases by providing a scaled discount based on how much was purchased [a]	• "Half-Plate Healthy" on-line planner, led to higher produce sales and more balanced meals [a] • Shopping receipt "scorecards" showed consumers how the percentage of fruits and vegetables purchased in this trip compared with past trips (based on loyalty card data) [a]

[a] Unpublished findings based on proprietary studies.

Signage builds awareness, offers reminders, changes attitudes, encourages comparisons, and so on. It can change the perceived convenience of purchasing healthy foods by making it more convenient or easy to consider ("Having turkey for dinner sounds good"), by changing perceptions of how attractive it would be to add organic parsnips into a routine meal, or changing how normal it would be to have a full fruit bowl sitting out when the kids return home from school (see *Fig. 5*).

Fig. 5. The Signage-Structure-Service Mix
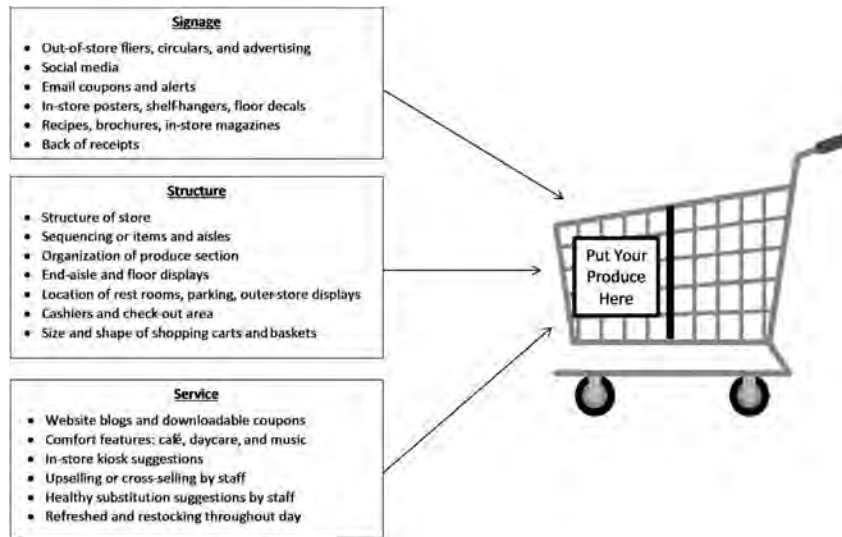
Structure

The structure of a store includes its layout and where and how foods are positioned, such as whether the healthier foods are nearest the door, at eye level, co-promoted with other displayed products, and whether they are located in the first two aisles where a consumer shops. But structure also influences people before they even enter the store. Starting in the entryway, the size and shape of the shopping carts structurally influences how much is purchased (bigger carts lead to bigger shopping trips) and what is purchased (divided carts lead to more fruit and vegetable sales). Any changes related to shopping carts and hand baskets continue to influence shoppers throughout their entire shopping trip, but shopping carts have their biggest impact before it fills up because this makes a shopper's budget constraints more salient (*van Ittersum, et al., 2013*).

A store's structure can be changed by using traffic interrupters and islands (instead of aisles) in the produce section. A recent analysis of 1,242 shoppers in four

different sections of various grocery stores shows that while purchases in many sections of a grocery store (such as meat and cereal) begin to level off after 2 minutes of shopping, the total number of dollars spent in the produce section continues rising for about 12 min. at a rate of $1.84/min. One objective for a store, therefore, is to determine how to keep people shopping in the produce section for up to 12 min. Islands (instead of aisles) may help. They appear to slow shoppers down which relates to them spending more money on produce (Mukund, Atakan, and Wansink 2018).

Service

Most obviously, service includes the sunny appearance, helpfulness, and friendliness of greeters, butchers, and cashiers (*Huneke, **et al.,** 2015; Keeling, McGoldrick, and Sadhu 2013*), the cleanliness of the store, and the restocking and upkeep of shelves (Robinson, ***et al.,** 2016*). Yet much of the service that really guides shoppers to healthier choices is surprisingly less face-to-face. It starts with how technology can influence the goals and expectations customers have before they enter the store (*Gustafsson, **et al.,** 2016; Hunneman, Verhoef, and Sloot 2015; Lee 2015*), such as when a Health Vigilant shopper reads a store blog on healthy food substitutes and prints off the related coupons. Once in the store, service can be efficiently boosted by new technologies, such as kiosks that give tailored recipes or a GPS cart-mounted tablet that gives real-time shopping advice (*Block and Platt 2014*). Last, service can influence a shopper's comfort and mood (*Atalay and Meloy 2011; Chen, Lee, and Yap 2011*). While the location of the restrooms and drinking fountains or the availability of near-the-entrance parking for new mothers appears to have little to do with sales, it increases a person's shopping time and store satisfaction, and it may indirectly trigger healthier sales (*Atakan and Finch 2018*).

Signage, structure, and service are the areas of the store where the *CAN* approach can be much more creatively leveraged to sell healthier foods. Still, aggressively pressuring shoppers to fill their shopping carts with healthy foods has diminishing returns, especially as their shopping trip progresses (*Biswas, Szocs, and Inman 2016; Sheehan and van Ittersum 2016; Van der Heide, van Ittersum, and van Doorn 2016*). There is a limit to how much more produce shoppers can be nudged to take (*Toft, **et al.,** in preparation; Trivedi, Gauri, and Ma 2016*). Unless total shopping volume rises, a short intervention study might heroically claim 30% increases in fruit and vegetable purchases, but a sustained long-term sales increase of three percent would be more realistic.

Although a long-term increase in sales of three percent for one intervention is much less exciting than 30%, there is an entire shopping experience or journey that needs to be taken into account (*Beatty, **et al.,** 2015; Lemon and Verhoef 2016*). This gradual healthy shift in the entire shopping experience could form the habits (*Cleeran, **et al.,** 2016*) that can nurture healthier store loyalty and healthier bodies.

Shaping Future Healthy Shopping

Organizing our findings into a Retail Intervention Matrix helps us make them more useful to retailers. If we can better see *how* one of our new discoveries influences choice (through the CAN Approach), and then better imagine *where* it will work best (the signage, structure, service mix of a store), we can help retailers far more than if we give them a nuanced, isolated finding. Moreover, knowing that there are three segments of shoppers with different degrees of health disposition (Vigilant, Predisposed, and Disinterested), helps us more realistically point to who we will have an impact on and who we will not.

Thinking Deeper

Within the signage, structure, service mix, much of the interdisciplinary retailing research focuses on using signage to make a healthy food more attractive through the way it is positioned or priced (Shah, ***et al.,** 2013). As the upper right corner of Fig. 6* indicates, what is less known is how signage can be used to establish new purchase norms or consumption norms (*Van Doorn and Verhoef 2015*). For instance, over the past 40 years, foods like yogurt and granola have gone from being foreign oddities to favorite staples. Knowing what created these new norms could help engineer sustainable healthy food trends of the future—regardless of whether they involve tofu or lab-grown meat (*Purdy 2016*).

Fig. 6. Where Research Is Most Needed

HOW
Retailers Can Best Influence Shoppers

WHERE Retailers Can Best Influence Shoppers	Convenient	Attractive	Norms
Signage	Research Is Needed	Research Is Needed	Research Is Highly Needed
Structure	Research Is Needed	Research Is Most Needed	Research Is Most Needed
Service	Research Is Highly Needed	Research Is Highly Needed	Research Is Most Needed

In contrast to signage, changes in "structure" have generally focused only on making a healthy food more convenient: Move the fruit to front of the store, over to the cash register, to eye level, to an end-aisle display, and so on. Now it is time for bigger questions such as how structure can make a healthy food more attractive or more normal or popular to buy. Again, consider healthy, high-margin, environmentally sustainable tofu (*Groening, Inman, and Ross 2014*). Using a store's structure to make tofu become more popular and trendy could be surprisingly transforming for retailers, manufacturers, and consumers.

Service is sometimes too narrowly defined as face-to-face or voice-to-voice encounters. New technologies both inside and outside the store give service the most unrealized potential by leveraging eye-tracking, smart shopping carts, video-tracking, and GPS technology (*Hue, et al., 2013; Nikolova, et al., 2014*). Whereas most interventions cannot easily show which of the three Hierarchy of Health predisposition segments they impact most, new technologies could show the results of these interventions by either directly linking them to sales or indirectly doing so through shopper loyalty cards.

Applying Wider

Some of what we know about improving healthy shopping in grocery stores has already been systematically adopted into the growing 24-h lifestyle of convenience stores, corner stores, and mini-stores (*Lenard and Schnare 2016*). In 2016, the National Association of Convenience Stores launched a new toolkit titled, "Ideas That Work to Grow Better-for-You Sales," and they include evidence-based tactics including (1) grab them immediately, (2) variety sells produce, (3) use creative adjectives, (4) remember the convenience factor, (5) have multiple displays, (6) let your store "talk," (7) direct their feet, and (8) remind them (*Lenard and Schnare 2016*). Given this success in C-Stores (note the fruit baskets that are now near most cash registers), there are three other retailing frontiers that are deserving of our attention.

Concessions and Kiosks

Entrenched managers in food concessions and kiosks have long justified their unhealthy food portfolio mix my reactively claiming they simply "sell what people buy." Yet they say this without really having given healthier food much of a chance. Indeed, when a healthier range of snacks (fruit, chicken sandwiches, granola bars, low-fat string cheese, trail mix, and so on) were offered alongside existing concession foods during one Iowa football season, sales of healthy snacks rose with each high school game until they comprised nine percent of sales in less than 2 months because of both switching and new sales (*Laroche, et al., 2015*). When Disney World followed by changing the defaults on kids' meals at their kiosks and offering fruit instead of french fries, it too generated more praise than pushback (*Peters, et al., 2016*). Discovering simple, evidence-based steps that help retail concessions profit-

ably move from selling snack foods to selling meal substitutes could be game changing (*Laroche, **et al.,** 2017*).

On-line Shopping and Delivery

After its initial growing pains, on-line shopping and delivery has been consistently growing across both North America and Europe. Yet the new adopters of this service are often families with children who steadily use the service once a week for a month; use it less consistently for the next 2 months; and often become inactive after that. Other than focusing on price promotions or loyalty programs (*Bodur, Klein, and Arora 2015*), a better solution would be to determine how to increase retention in a way that transforms how they eat in the same way it transformed *how* they order (*Marinova, **et al.,** 2016*). The opportunity to help people transform the way they view themselves (and their health) because of how they order food could sustain both this industry and their families (Lund and Marinova 2014).

Food Pantries

Helping food pantry shoppers make healthier decisions has typically involved research replicated from other contexts (*Bhana and Contento 2017; Wilson 2016*). There are limited numbers of products in food pantries and there are binding constraints (such as how much one can carry, or how much a person is allowed to take from a category such as pastries). Yet these limitations are precisely why a food pantry is a rich context for discovery. Without economic considerations, how do food shoppers behave? If they still take no fruits and vegetables, this might suggest that subsidizing cucumbers and taxing cupcakes may not have the intended policy impact that public health policy makers believe it would have (*Bhana 2017; Cawley, **et al.,** 2015*). Aside from being a rich context for research, applying useful insights to food pantries provides a world of value far from the office.

Why Healthy Field Study Interventions Appear to Fail

Applying this Retail Intervention Matrix framework is enticing. Yet one frustration when applying our theories deeper and wider is that health-focused interventions often fail when we move from the lab to the field (***e.g.,** van Herpen, **et al.,** 2016*). We usually believe it was because of poor implementation by our retail partner, or it was because of a noisy measurement problem. Instead, there are two reanalyses we could make ex post to more precisely determine if an intervention was more effective than it initially appears. We need to analyze the right people, and we need to analyze the right days of the week.

We Do Not Analyze the Right Consumer Segment

Not all interventions work with all people (recall *Fig. 2*). An expensive, digital, in-store calorie education program with a hip spokesperson and viral social media support will still have no impact on the top or bottom segments of this hierarchy. This is because the Health Vigilant Shoppers already know it, and the Health Disinterested Shoppers do not care. Yet most retail field studies show disappointingly modest results because they do not try to disaggregate the data and focus their analysis on the segment it was most intended to influence. A more targeted analysis could be done by segmenting shoppers into the Vigilant, Predisposed, or Disinterested segments based on their purchase history (which is linked to their loyalty cards) and then reanalyzing each segment.

Different interventions influence different segments (*Table 2*). Setting up a study when and where it is most likely to influence a targeted segment will better help sift out which interventions are actually working in the way they intended. Aside from segmenting shoppers based on their loyalty card purchase records, shoppers could also be segmented or targeted by where they shop (*e.g.,* Whole Foods, Target, Wal-Mart, the Co-op, and so on). If neither is possible, shoppers could be targeted by the time of the day or the day of the week when they shop.

Table 2. A Retail Intervention Matrix of How Scandinavian Retailers Doubled the Sales of Frozen Fish

Mix element	More convenient to purchase	More attractive to purchase	More normal to purchase
Signage	• Created recipe cards titled "Fish in 15" (min) • Offered a "Grill Tips" flier for the grilling salmon	• Co-promoted the fish with vegetables (suck as leeks and broccoli) • Named select fish and included a map showing the part of the world where it was caught	• Created "Native Norway" logos to promote fish as local • Used "Local Favorite" and "Managers Special" stickers

Table 2. A Retail Intervention Matrix of How Scandinavian Retailers Doubled the Sales of Frozen Fish—Continued

Mix element	More convenient to purchase	More attractive to purchase	More normal to purchase
Structure	• Utilized vertical display cases; moved fish to eye level and processed foods to the bottom	• Moved fish displays immediately after vegetables • Included a buffer of frozen vegetables between the fish and the beef so people would not make an unfair sensory comparison with beef	• Placed the single servings of fish and some of the lower priced "sales specials" near the highest traffic edges of the displays
Service	• Offered frozen freezer packages to keep fish frozen until home • Offered plastic bags to put shrink-wrapped fish in for extra separation protection from other foods in the basket	• Offered smaller, one-portion servings • Put markings on the wrapper to show how much to prepare for one, two, three, or four persons • E-mail promotions were send to loyalty card holders, with recipe ideas and web-links to downloadable coupons	• Employees were instructed to suggest the two best selling types of fish and the two most common items with which they were prepared (*e.g.,* rice pilaf and broccoli) • Employees were trained to suggest additional items commonly bought along with specific types of fish

We Do Not Analyze the Right Days of the Week

It is not surprising that people shop much less healthy at the end of the year—October through December—than they do after January 1st. The dollar amount of the healthy food we purchase increases 29.4% right after the first of the year (*Pope, et al., 2014*). This is not surprising but it would suggest that if an intervention has any chance of working, it would be better to test it in mid-January than in mid-December or even mid-June. In general, a healthy intervention's effectiveness might continually decline throughout the year. That is, healthy shopping-focused interventions may be most effective in the first quarter, moderately effective in the second quarter and third quarter, and least effective in the fourth quarter.

Yet if shoppers are on their best healthy shopping behavior during January, something similar may happen the beginning of each week in a smaller way. After a weekend of indulging, some people might have an unstated resolution to try and shop better, which makes them more susceptible to in-store nudges on a Monday than they would have been the prior Friday night. This Monday Morning Effect has been recently shown in both in cafeterias and grocery stores (*Wansink, Tran, and Karevold 2017*). In a 3 month study of over 15,000 diners, putting fish first (and beef last) on a buffet line increased fish selections on Mondays to Wednesdays but had no influence after Wednesday. Analogous results were found in grocery stores. Among people who made larger purchases (over $50 USD), interventions were most effective early in the week (Monday–Wednesday) than on Thursday–Sunday. If a field study intervention does not seem to have worked, reanalyze the sales results for only Mondays, Tuesdays, and Wednesdays. It may give a more accurate assessment of whether the intervention is worth dropping, reporting, or improving.

Using the Retail Intervention Matrix to Sell More Fish

Until now, the Retail Intervention Matrix has been presented as a way to organize research findings based on *how* they work (making healthier foods more convenient, attractive, or normal) and *where* they are implemented in the store (within the signage, structure, service mix). This framework can be used to organize key findings into a sensible pattern that is also useful in practice.

For example, a large Scandinavian grocer had the marketing objective of growing their market share by repositioning itself as the most environmentally sustainable retailer in Norway. One way they planned to accomplish this was by increasing their sales of fresh and frozen fish, which are much more environmentally sustainable than beef, pork, and lamb. They planned to first increase the variety of fish they offered (types, sizes, packaging, and so on) and to more actively promote this fish though advertising campaigns and price promotions. In addition to these traditional 4–P marketing mix methods of growing this category, the Retail Intervention Matrix was then used to create a broader set of interventions that could be used to further push the sales of fish by focusing on changes in the signage, structure, and service mix.

All 457 stores in the chain used the traditional marketing mix approach of altering the variety, packaging, advertising, and price promotions of fish. Over a 2 year

period, these marketing efforts consistently increased sales by nine percent. Following this, 239 stores selected various additional changes to make (see the Retail Intervention Matrix for increasing fish sales in *Table 2*). Because of these changes, the average store generated 28% more fresh fish sales per transaction than those stores that had initially changed only the marketing mix (*Karevold, Tran, and Wansink 2017*).

This brief example involving Norwegian fish shows one way research findings can be extrapolated, organized, and presented in a way that is compelling for mangers who have little time or tolerance for ambiguity and nuance. Showing how an intervention might work (the CAN approach) and where it can be implemented (through the signage, structure, service mix) enabled this retailer to provide a menu of actions or changes that each of its stores could pick and choose from. Similar adoptions of retail-based findings are also being explored by an American consortium of grocers (*Borstein 2015*) who are assembling an industry-wide Grocery Retail Scorecard that will show retailers how they can profitably help their customers shop healthier (*Convergencepolicy.org/scorecard/*).

Conclusion

Retailing research in the future will be different than that of the past. It will be partly judged on whether it delivers fresh, useful solutions. A common view in the past was that an academic's role was to generate insights, and the role of managers was to determine how to use them. In the future, determining and discovering which insights have the biggest impact will be broadly rewarded. Using the Retail Intervention Matrix—including the CAN approach and the signage, structure, service mix—can help determine what is known and what needs to be discovered. Last, the Hierarchy of Health Predisposition can show where an intervention can be most effective, most immediately.

Appendix A. An Abbreviated Scorecard To Help Retailers By Organizing Sample Findings Into the Retail Intervention Matrix [a–c]

	More convenient to purchase	More attractive to purchase	More normal to purchase
Signage	• Use display signs to draw attention to and promote the store's selection seasonal fruits and vegetables with display signs • Provide information sheets on healthier ways to shop near all entrances • Directs traffic entering the store such that most shoppers begin in the produce section • Provide a circular/ad publication featuring and promoting healthier value options at least once per week	• Use a guidance system, such as Guiding Stars or a stoplight approach, at the shelf edge • Use display signs to draw attention to and promote seasonal fruits and vegetables with display signs • Use signs which provide "Did You Know?" health benefit facts, positive messages about specific healthful foods throughout the store, or both • Bundle recipe ingredients for family meals next to recipe cards for a healthy meal • Make sure that soda and low-nutrient snacks (*i.e.,* chips) are not displayed or merchandised in the produce section	• Display educational posters around the store that encourage healthy eating, such as the Half-Plate Rule • Co-promote healthier options together in snack aisles • Highlight healthy alternative entrée options such as the salad bar on posters or signs within all dining areas • Place posters displaying healthier foods or a guidance system such as the Half-Plate Rule in visible areas in the dining area

Appendix A. An Abbreviated Scorecard To Help Retailers By Organizing Sample Findings Into the Retail Intervention Matrix [a–c]—Continued

	More convenient to purchase	More attractive to purchase	More normal to purchase
Structure	• Offer a "grab and go" area in the front of the store with a small selection of low fat milk, eggs, 100% juice, low-fat yogurt, and whole grain bread for the in-and-out shopper • Organize ingredients for a healthy meal by preparation method, such as a stir-fry section that includes mushrooms, eggplants, peppers, and so forth • Place healthier foods conveniently at eye level • Make available one percent or fat free milk, 100% juice, and water in all mini fridges in checkout aisles • Make sure there is at lest one checkout aisle [i]n which the only food for sale qualifies as healthier (no candy aisle) • Make sure that all beverage coolers have both water and low-fat non-flavored milk stocked and available	• Assign designated parking spots near at least one entrance for pregnant women and mothers with infants (similar to handicapped spots)[d] • Create a fresh produce display in the seafood section including items such as lemons, tomatoes, beans, and asparagus • Display whole fruits such as oranges, apples, pears, nectarines, and apricots next to prepared desserts • Make sure that there is at least one checkout aisle in which the only food for sale qualifies as healthier (no candy aisle)	• Offer at least three healthier foods for sale at all entrances to prime healthier shopping • Offer pre-printed shopping lists of basic staples near all entrances • Offer healthier food samples or demonstrations near at least one entrance and at least once per week • Offer ½ portions for all entrées and desserts that are served or pre-packaged, smaller containers for self-service entrees and desserts, or both • Make sure that takeout boxes are available for leftovers not eaten in the dining area • Offer divided shopping carts with a "place fruits and vegetables here" section
Service	• Supply simple five-ingredient recipes as tear-off cards next to specific produce in-store, on the store's website, mobile phone app, or both • Make pre-cut vegetables available in the meat section • Provide an area in the store for shoppers to sit and relax[d] • Provide an area in the store for shoppers to eat[d] • Offer a salad bar that includes lower calorie dressings options such as oil and vinegar • Promote mobile phone apps that encourage healthful eating such as Fooducate, MyFitnessPal or other Barcode/QR code scanners • Offer tips, features, or videos involving better shopping and better living on the store's website or social media outlets	• Provide calorie information on different types and cuts of meat in the form of posters, brochures, or labels • Make sure that the store's website, mobile app, or both (if they have one) has Shopper Loyalty specials that include deals on healthier items • Provide a loyalty card program which rewards customers with incentives such as bonus points or coupons for purchasing fruits and vegetables, making healthier choices, or both • Offer a discount for customers if a certain percentage of purchases are fruits and vegetables • Offer at least two daily healthier grab & go breakfast, lunch, and dinner options	• Supply useful tips related to preparation, storage, and food safety in produce section, via mobile phone app, or both • Use a receipt program which can create an itemized list indicating what percentage of purchases were fruits and vegetables, low-fat meat, and low-fat dairy • Use a receipt program that uses loyalty card information to show how much was spent on fruits and vegetables, and compares this amount to past trips

[a] Reprinted, with permission, ©Slim by Design, Wansink (2014).

[b] Findings are from published papers, working papers, and unpublished pilot studies (*Wansink 2014*).

[c] Comfort measures reduce stress. People make better food decisions when they are under lower stress conditions.

[d] **Editor's note:** No footnote in submitted article.

References

Ailawadi, Kusum L., Yu Ma and Dhruv Grewal (2016), "The Impact of Warehouse Club Stores on Our Packaged Food Consumption," working paper.

Atalay, Selin and Margaret G. Meloy (2011), "Retail Therapy: A Strategic Effort to Improve Mood," *Psychology & Marketing,* 28 (6), 638–59.

References—Continued

Atakan, Sinem Stet and Laura Finch (2018), "'Do You Have a Restroom?' How Environmental Comfort in Retail Stores Influences Sales," working paper, Cornell Food and Brand Lab.

Beatty, Sharon E., Alexa M. Givan, George R. Franke and Kristy E. Reynolds (2015), "Social Store Identification and Adolescent Females' Store Attitudes and Behaviors," *Journal of Marketing Theory and Practice,* 23 (1), 39–56.

Bhana, Hiershenee (2017), "Conducting Behavioral Field Research in Food Pantries: Lessons and Tactics for Testing Nutrition Interventions," working paper, Columbia University.

Bhana, Hiershenee and Issabella Contento (2017), "Social Norm Signage Shifts Pantry Patrons to Healthier Food," working paper, Columbia University.

Biswas, Dipayan, Courtney Szocs and Jeffrey Inman (2016), "Making Choices for a Sequence of Healthy and Unhealthy Options," in *Let's Get Engaged! Crossing the Threshold of Marketing's Engagement Era* Springer International Publishing 167–72.

Block, Martin P. and Steven Keith Platt (2014), *Consumer Location-Based Analytics Deliver Actionable Insights,* Platt Retail Institute.

Bodur, Onur, Noreen M. Klein and Neeraj Arora (2015), "Online Price Search: Impact of Price Comparison Sites on Offline Price Evaluations," *Journal of Retailing,* 91 (1), 125–39.

Bommelaer, Columbe and Brian Wansink (2017), "Healthy Shopping By Design: Redesigning Grocery Stores to Sell More Fruits and Vegetables," working paper, Cornell Food and Brand Lab.

Borstein, David (2015), "The Art of Getting Opponents to 'We'" *New York Times,* (November) (accessed July 12, 2016), [available at *http://opinionator.blogs.nytimes.com/2015/11/03/the-art-of-getting-opponents-to-we/*].

Carroll, Kathryn A., Anya Savikhin Samek and Lydia Zepeda (2016), "Product Bundling as a Behavioral Nudge: Investigating Consumer Fruit and Vegetable Selection using Dual-Self Theory," working paper, Agricultural and Applied Economics Association (2016 Annual Meeting, July 31–August 2, 2016, Boston, Massachusetts, No. 236130).

Cawley, John, Matthew J. Sweeney, Jeffrey Sobal, David R. Just, Harry M. Kaiser, William D. Schulze, Elaine Wethington and Brian Wansink (2015), "The Impact of a Supermarket Nutrition Rating System on Purchases of Nutritious and Less Nutritious Foods," *Public Health Nutrition,* 18, 8–14.

Cawley, John, Andrew S. Hanks, David R. Just and Brian Wansink (2016), "Incentivizing Nutritious Diets: A Field Experiment of Relative Price Changes and How They are Framed," NBER working paper no. w–21929.

Chandon, Pierre and Brian Wansink (2012), "Does Food Marketing Need to Make Us Fat? A Review and Solutions," *Nutrition Reviews,* 70 (October (10)), 571–93.

Chen, Charlene Y., Leonard Lee and Andy J. Yap (2011), "Do People Spend More in a Crowded Store? A Field Experiment on Control Deprivation and Compensatory Spending," *NA—Advances in Consumer Research,* 39 (1), 729–30.

Cleeran, Kathleen, Kelly Geyskens, Peter C. Verhoef and Joost M.E. Pennings (2016), "Regular or Low-fat? An Investigation of the Long-run Impact of the First Low-fat Purchase on Subsequent Purchase Volumes and Calories," *International Journal of Research in Marketing,* (in press).

Desai, Kalpesh and Minakshi Trivedi (2014), "Do Consumer Perceptions Matter in Measuring Choice Variety and Variety Seeking?," *Journal of Business Research,* 67 (1), 2786–92.

de Wijk, René A., Anna J. Maaskant, Ilse A. Polet, Nancy T.E. Holthuysen, Ellen van Kleef and Monique H. Vingerhoeds (2016), "An In-Store Experiment on the Effect of Accessibility on Sales of Wholegrain and White Bread in Supermarkets," *PLoS One,* 11 (3), e0151915.

Dzhogleva, Hristina, Jeff Inman and Jim Maurer (2013), "Does Reducing Nutritional Information Complexity Promote Healthier Food Choices?," *NA—Advances in Consumer Research,* 41.

Gilbride, Timothy J., Jeffrey Inman and Karen Melville Stilley (2015), "The Role of Within-trip Dynamics in Unplanned *Versus* Planned Purchase Behavior," *Journal of Marketing,* 79 (3), 57–73.

Groening, Christopher, Jeffrey Inman and William T. Ross, Jr. (2014), "Carbon Footprints in the Sand: Marketing in the Age of Sustainability," *Customer Needs and Solutions,* 1 (1), 40–51.

Grunert, Klaus G., Lisa E. Bolton and Monique M. Raats (2011), "Processing and Acting upon Nutrition Labeling on Food: The State of Knowledge and New Directions for Transformative Consumer Research," in *Transformative Consumer Research for Personal and Collective Well-Being,* Mick D.G., Pettigrew S., Ozanne J.L. and Pechmann C., eds. New York: Routledge, 333–51.

Guthrie, Joanne F. (2017), "Integrating Behavioral Economics into Nutrition Education Research and Practice," *Journal of Nutrition Education and Behavior, http://dx.doi.org/10.1016/J.Jneb.2016.09.006* (forthcoming)

Gustafsson, Anders, Crina Tarasi, Lars Witell and Ruth Bolton (2016), "How Goals, Emotions and Experiential Attributes Influence Shoppers' Satisfaction with their Retail Service Experience," working paper.

Hampson, Daniel P. and Peter J. McGoldrick (2013), "A Typology of Adaptive Shopping Patterns in Recession," *Journal of Business Research,* 66 (7), 831–8.

Haywood, Stephen (2016), "Farmers Blast Supermarkets over Falling Fruit and Veg Sales—Despite Plunging Prices," *Mirror* (Mirror.co.uk), (May).

Hsu, Christine (2014), "Weight Primary Reason for Increased in Tofu Consumption," Counsel & Heal, CounselHeal.com, (July) (accessed April 12, 2016), [available at *http://www.counselheal.com/articles/10425/20140710/weight-primary-reason-increase-tofu-consumption.htm*].

Hui, Sam K., Yanliu Huang, Jacob Suher and Jeffrey Inman (2013), "Deconstructing the First Moment of Truth: Understanding Unplanned Consideration and Purchase Conversion Using In-store Video Tracking," *Journal of Marketing Research,* 50 (4), 445–62.

Hui, Sam K., Jeffrey Inman, Yanliu Huang and Jacob Suher (2013), "The Effect of In-store Travel Distance on Unplanned Spending: Applications to Mobile Promotion Strategies," *Journal of Marketing,* 77 (2), 1–16.

Huneke, Tabea, Sabine Benoit, Poja Shams and Anders Gustafsson (2015), "Does Service Employees' Appearance Affect the Healthiness of Food Choice?," *Psychology and Marketing,* 32 (1), 94–106.

Hunneman, Auke, Peter C. Verhoef and Laurens M. Sloot (2015), "The Moderating Role of Shopping Trip Type in Store Satisfaction Formation," working paper, Oslo: BI Norweigan School of Management.

Inman, Jeffrey (2012), "The Elephant Not in the Room: The Need for Useful, Actionable Insights in Behavioral Research," *NA—Advances in Consumer Research,* 40.

Inman, Jeffrey and Hristina Nikolova (2016), "Shopper-Facing Retail Technology: An Adoption Decision Calculus," (2016).

Johnson, Eric J., Suzanne B. Shu, Benedict G.C. Dellaert, Craig Fox, Daniel G. Goldstein, Gerald Haeubl, Richard P. Larrick, John W. Payne, Ellen Peters, David Schkade, Brian Wansink and Elke U. Weber (2012), "Beyond Nudges: Tools of a Choice Architecture," *Marketing Letters,* 23 (June (2)), 487–504.

Karevold, Knut, Huy Quoc Tran and Brian Wansink (2017), "Supermarket Interventions to Sell Sustainable Foods: Better to Change the Selection or to Change the Store?," Food and Brand Lab working paper, Cornell University.

Kell, John (2016), "Wegmans Was Just Named the Best Grocery Chain in America," *Fortune,* (April) (accessed April 12, 2016) [available at *http://fortune.com/2016/04/14/best-grocery-store/*].

Keeling, Kathleen A., Peter J. McGoldrick and Henna Sadhu (2013), "Staff Word-of-Mouth (SWOM) and Retail Employee Recruitment," *Journal of Retailing,* 89 (1), 88–104.

Kovacheva, Aleksandra and Jeffrey Inman (2014), "Shopper Eye-Cue: Understating the In-Store Decision Process With Field Eye-Tracking Data," *NA—Advances in Consumer Research,* 42.

Laroche, Helena H., Christopher Ford, Kate Anderson, Xueya Cai, David R. Just, Andrew S. Hanks and Brian Wansink (2015), "Concession Stand Makeovers: A Pilot Study of Offering Healthy Foods at High School Concession Stands," *Journal of Public Health,* 37 (1), 116–24.

Laroche, Helena, Chrisne Hradek, Kate Hanson, Andrew S. Hanks, David R. Just and Brian Wansink (2017), "Healthy Concessions: High School Students' Responses to Healthy Concession Stand Changes," *Journal of School Health,* 87 (2), 98–105. *http://dx.doi.org/10.1111/josh.12472.*

Lee, Leonard (2015), "The Emotional Shopper: Assessing the Effectiveness of Retail Therapy," *Foundations and Trends in Marketing,* 8 (2), 69–145.

References—Continued

Lemon, Katherine N. and Peter C. Verhoef (2016), "Understanding Customer Experience throughout the Customer," *Journey Journal of Marketing,* (in press).

Lenard, Jeff and Carolyn Schnare (2016), "Eight Low-Cost—and Proven—Tactics for How C-Store Operators and Grow Their Healthy Offer," *NACS, Magazine,* (August), 30–6.

List, John A., Anya Savikhin Samek and Terri Zhu (2015), "Incentives to Eat Healthy: Evidence from a Grocery StoreField Experiment," CESR—Schaeffer working paper 2015–025.

Lowe, Ben, Diogo Souza-Monteiro and Iain Fraser (2013), "Exploring the Role of Technology in Consumer Processing of Nutritional Information," *Journal of Marketing Management,* 29 (11–12), 1337–66. *http://dx.doi.org/10.1080/0267257X.2013.798673.*

Lund, Donald J. and Detelina Marinova (2014), "Managing Revenue Across Retail Channels: The Interplay of Service Performance and Direct Marketing," *Journal of Marketing,* 78 (5), 99–118.

Mao, Ran and Sinem Atakan (2017), "What Future Technologies Will Help Grocery Shoppers to Shop Healthier?," working paper, Cornell University.

Marinova, Detelina, Irina V. Kozlenkova, Leona Cuttler and J.B. Silvers (2016), "To Prescribe or Not to Prescribe? Consumer Access to Life-Enhancing Products," *Journal of Consumer Research, http://dx.doi.org/10.1093/jcr/ucw057.*

Mukund, Anupama, Sinem Atakan and Brian Wansink (2018), "When Does More Time in the Aisle Mean More Food in the Cart?," working paper, Cornell Food and Brand Lab.

Nikolova, Hristina Dzhogleva, Jeffrey Inman, Jim Maurer, Andrew Greiner and Gala Amoroso (2014), *The Shopper-Centric Retailer: Three Case Studies on Deriving Shopper Insights from Frequent Shopper Data,* Emerald Group Publishing Limited.75–102.

Nikolova, Hristina Dzhogleva and J. Jeffrey Inman (2015), "Healthy Choice: The Effect of Simplified Point-of-Sale Nutritional Information on Consumer Food Choice Behavior," *Journal of Marketing Research,* 52 (6), 817–35.

Otterbring, Tobias, Erik Wästlund, Anders Gustafsson and Poja Shams (2014), "Vision (im)possible? The Effects of In-store Signage on Customers' Visual Attention," *Journal of Retailing and Consumer Sciences,* 21 (5), 676–84.

Payne, C.R., Mihai Niculescu, David R. Just and Michael P. Kelly (2014), "Shopper Marketing Nutrition Interventions," *Physiology & Behavior,* 136, 111–20.

Peters, John C., Jimikaye Beck, Jan Lande, Zhaoxing Pan, Michelle Cardel, Keith Ayoob and James Hill (2016), "Using Healthy Defaults in Walt Disney World Restaurants to Improve Nutritional Choices," *Journal of the Association for Consumer Research,* 1 (1) (forthcoming).

Pope, Lizzy, Andrew S. Hanks, David R. Just and Brian Wansink (2014), "New Year's Res-Illusions: Food Shopping in the New Year Competes with Healthy Intentions," *PLoS One,* 9 (12), e110561.

Produce for Better Health (2015), *State of the Plate: 2015 Study on America's Consumption of Fruit and Vegetables,* Washington, D.C.: Produce for Better Healthy Foundation.

Purdy, Chase (2016), "To Lure People Put Off by the Freakiness of Lab-Made Meat, This is What the Industry Wants to Call It," *Quartz,* (May) (accessed August 12, 2016) [available at *http://qz.com/772987/to-lure-people-put-off-by-the-freakiness-of-lab-made-meat-this-is-what-the-industry-wants-to-call-it/*].

Robinson, Stacey G., Michael K. Brady, Katherine N. Lemon and Michael Giebelhausen (2016), "Less of this One? I'll Take It: New Insights on the Influence of Shelf-based Scarcity," *International Journal of Research in Marketing,* (in press).

Sciandra, Michael and Jeffrey Inman (2014), "Smart Phones, Bad Calls? The Impact of In-Store Mobile Technology Use on Purchase Behavior," working paper.

Shah, Avni, Jim Bettman, Punam Anand Keller and Peter Ubel (2013), "'Does This Tax Make Me Look Fat?' Using Stigma-Inducing Labels to Decrease Unhealthy Food Consumption," *NA—Advances in Consumer Research,* 41.

Sheehan, D. and Koert van Ittersum (2016), "In-Store Spending Dynamics," working paper.

Spence, Charles and Betina Piqueras-Fiszman (2014), *The Perfect Meal: The Multisensory Science of Food and Dining,* John Wiley & Sons.

Stein, Kate (2017), "Do Supermarket Aisles Bias Spending?," working paper, Cornell Food and Brand Lab.

____ (2018), "Eyes in an Aisle: How Eye Gaze Level Relates to Healthy Grocery Store Purchases," working paper, Cornell University Food and Brand Lab.

Trivedi, Minakshi, Dinesh K. Gauri and Yu Ma (2016), "An Empirical Investigation of Inefficiencies for Sales Promotions in Stimulating Category Sales," *Management Science,* (forthcoming).

Trivedi, Minakshi, Karthik Sridhar and Ashish Kumar (2016), "Impact of Healthy Alternatives on Consumer Choice: A Balancing Act," *Journal of Retailing,* 92 (1), 65–82.

Trudel, Remi, Kyle B. Murray, Soyoung Kim and Shuo Chen (2015), "The Impact of Traffic Light Color-coding on Food Health Perceptions and Choice," *Journal of Experimental Psychology: Applied,* 21 (3), 255–75.

Tal, Aner and Brian Wansink (2015), "An Apple a Day Brings More Apples Your Way: Healthy Samples Prime Healthier Choices," *Psychology & Marketing,* 32 (5), 575–84.

Toft, Ulla, Lise Lawaetz Winkler, Frank Eriksson, Bent Egberg Mikkelsen and Charlotte Glumer, "The Effect of 20% Price Discount on Fruit and Vegetables Combined with a Space Management Intervention on Supermarket Purchases During the Three Month SoL Project," working paper, University of Copenhagen (in preparation).

van Herpen, Erica (2016), "Product Category Layout and Organization: Retail Placement of Food Products," in *Reference Module in Food Science* Elsevier.

van Herpen, Erica, Evan van den Broek, Hans C.M. van Trijp and Tian Yu (2016), "Can a Virtual Supermarket Bring Realism into the Lab? Comparing Shopping Behavior Using Virtual and Pictorial Store Representations to Behavior in a Physical Store," *Appetite,* 107, 196–207.

Van der Heide, Martine, Koert van Ittersum and Jenny van Doorn (2016), "Healthy Shopping Dynamics: The Relative healthiness of Food Purchases Throughout Shopping Trips," In *Advances in Consumer Research,* Vol. 44, Moreau Page and Puntoni S. eds. Duluth, MN: Association for Consumer Research.

Van Doorn, Jenny and Peter C. Verhoef (2015), "Drivers of and Barriers to Organic Purchase Behavior," *Journal of Retailing,* 91 (3), 436–50.

van Ittersum, Koert, Brian Wansink, Joost M.E. Pennings and Daniel Sheehan (2013), "Smart Shopping Carts: How Real-Time Feedback Influences Spending," *Journal of Marketing,* 77 (6), 21–36.

van Kleef, Ellen, Kai Otten and Hans C.M. van Trijp (2012), "Healthy Snacks at the Checkout Counter: A Lab and Field Study on the Impact of Shelf Arrangement and Assortment Structure on Consumer Choices," *BMC Public Health,* 12 (1), 1072.

Vega Zamora, Manuela, Francisco José Torres Ruiz, Eva M. Murgado Armenteros and Manuel Parras Rosa (2014), "Organic as a Heuristic Cue: What Spanish Consumers Mean by Organic Foods," *Psychology & Marketing,* 31 (5), 349–59.

Verhoef, Peter C. and Jenny van Doorn (2016), "Segmenting Consumers According to Their Purchase of Products with Organic, Fair-Trade, and Health Labels," *Journal of Marketing Behavior,* 2 (1), 19–37.

Vermeir, Iris and Patrick Van Kenhove (2005), "The Influence of Need for Closure and Perceived Time Pressure on Search Effort for Price and Promotional Information in a Grocery Shopping Context," *Psychology & Marketing,* 22 (1), 71–95.

Wansink, Brian (2014), *Slim by Design—Mindless Eating Solutions for Everyday Life,* New York, NY: William Morrow.

____ (2015), "Change their Choice! Changing Behavior Using the CAN Approach and Activism Research," *Psychology & Marketing,* 32 (5), 486–500.

Wansink, Brian, David R. Just, Collin R. Payne and Matthew Z. Klinger (2012), "Attractive Names Sustain Increased Vegetable Intake in Schools," *Preventive Medicine,* 55 (4), 330–2.

Wansink, Brian and Huy Quoc Tran (2017), *MyPlate, Half-Plate, or the Whole Plate: How Dietary Guidance Systems Influence Eating Behavior,* Cornell Food and Brand Lab working paper.

Wansink, Brian, Collin R. Payne and Kenneth C. Herbst (2017), "Half-Cart Approach to Increasing Fruit and Vegetable Purchases in Grocery Stores," working paper, Cornell Food and Brand Lab.

Wansink, Brian, Dilip Soman and Kenneth C. Herbst (2017), "Larger Partitions Lead to Larger Sales: Divided Grocery Carts Alter Purchase Norms and Increase Sales," *Journal of Business Research,* (forthcoming).

References—Continued

Wansink, Brian, Huy Quoc Tran and Knut Ivar Karevold (2017), "Healthy Eating Interventions Work Best on Mondays and Tuesdays, Food and Brand Lab," working paper, Cornell University.

Werle, C.O.C., G. Ardito, O. Trendal, A. Mallard and P. Nat (2011), "Unhealthy Food is Not Tastier for Everybody: The Healthy = Tasty French Intuition," *Actes du Congrès de l'AFM*.

Wilson, Norbert Lance Weston (2016), "When the Cupboards are Bare: Nudging Food Pantry Clients to Healthier Foods," *Journal of the Association for Consumer Research,* 1 (1) (forthcoming).

Wilson, Norbert L.W., David R. Just, Jeffery Swiger and Brian Wansink (2016), "Food Pantry Selection Solutions. A Randomized Controlled Trial in Client-Choice Food Pantries to Nudge Clients to Targeted Foods," *Journal of Public Health*.

Winkler, Lise L., Ulla Christensen, Charlotte Glümer, Paul Bloch, Bent E. Mikkelsen, Brian Wansink and Ulla Toft (2017), "Substituting Candy for Fruit and Healthy Snacks at the Checkout: A Win-Win Solution for Consumers and Food Stores," *BMC Public Health,* (forthcoming).

The CHAIRMAN. I thank our panel, terrific. I want to remind our Members that I am going to be relatively strict with the 5 minute clock in order to try to get everybody through the system. So if you want to use most of your 5 minutes to make editorial comments and ask a question with a second left on the clock, I will ask our witnesses to submit the answers for the record. I am just trying to be fair to everybody.

So with that, I will recognize the Chairman of the Subcommittee on Nutrition for his 5 minutes. G.T.?

Mr. THOMPSON. Thank you, Mr. Chairman. Thank you, members of the panel, for everything that you do, supporting the nutritional needs of American families. It is greatly appreciated.

This is such a great topic, obviously one that I am passionate about. We are looking at how Americans find themselves, and American families, individuals, a lot of children find themselves in some pretty challenging financial circumstances, get access to nutrition. Certainly in addition to personal resources and family support, community programs, and obviously our TEFAP program and other ways that this Committee supports those community programs, and then we have SNAP, the Supplemental Nutritional Assistance Program.

And this is an appropriate place to have this discussion. Quite frankly, this is the appropriate jurisdiction when you look, because there are two basic principles. First, nutrition matters in so many different ways; and second, it is farmers' feed.

And so my first question is to the gentleman from the Keystone State, Mr. Weidman. It is good to see you. Thank you for being here today, and congratulations on The Food Trust's 25th anniversary. We appreciate all that, sir, your organization does to improve access for those in need to affordable and nutritious food.

Your testimony mentions that in Pennsylvania, nutrition education programming is in both urban and rural environments. I represent the Pennsylvania 5th district. Obviously, on this topic I am concerned with all Americans, but in the 5th district, which is very rural by definition, 24 percent of the land mass of Pennsylvania, how does SNAP-Education reach into those rural areas?

Mr. WEIDMAN. Thank you, Congressman Thompson.

In Pennsylvania, we have a great SNAP-Ed program. There is a little variability from state to state in how the program is operated. In Pennsylvania, it is led by Penn State, and they do a great job. Because of the extension program, they have a lot of breadth to cover rural areas. We have stuff happening in almost every county in Pennsylvania. And it is similar to the work that we are doing in Pennsylvania, working with children, working with adults to get them to learn more about where food comes from, sometimes nutri-

tion science can be confusing to all of us, so helping them, kind of guide them to make good choices of the food around them.

One of the programs we work with is the Share Our Strength Program called Cooking Matters in the supermarkets. It is really taking seniors and other adults on tours of a grocery store literally and teaching them about how to shop healthy, how to shop on a budget. And this kind of work is happening all around the country. There is a great rural example of SNAP-Ed happening in New Mexico, the CHILE (Child Health Initiative for Lifelong Eating and Exercise) Plus Program, and that is doing work in Head Start centers as well as pre-K, working with kids and their families, basically, to help them, again, guide them on making healthier choices, teaching them how to cook healthy recipes, taste tests, and that is happening on Tribal lands as well in New Mexico, in addition to other sites. It is at about 80 sites in all in rural areas of New Mexico. And I am sure there are plenty of other examples.

SNAP-Ed is a great way to get at both this problem of improving health in urban and rural communities.

Mr. THOMPSON. It seems like from the testimony and past discussions I have had with key stakeholders and folks making sure that nutritional needs are met is really strengthened by a collaborative process, and obviously with programs like SNAP-Ed, food insecurity, nutrition incentives, Healthy Food Financing Initiative, all those, can you expand just in the short time we have on other types of collaboratives, other folks who have sat at the table. You mentioned my alma mater, the great land-grant university of Penn State. Are there other examples of collaboratives?

Mr. WEIDMAN. Sure.

Mr. THOMPSON. It seems like a model we should continue to strengthen.

Mr. WEIDMAN. Yes, There are great examples of collaboratives, a lot with the grocers. We work with a great local grocery chain in Pennsylvania called The Fresh Grocer, and The Fresh Grocer is partnering with us to provide us space for doing nutrition education, SNAP-Ed programming in their stores. As Brian said, these stores are a great place to meet customers where they shop and help guide them to make healthier choices. That same grocer is also helping us with SNAP incentives, doing our Philly Food Bucks inside The Fresh Grocer. Every time a customer spends $5, the grocer is the one that created the whole technology to put out a coupon, an electronic coupon for $2 in free fruits and vegetables at that store. And, again, this is something that we are seeing nationally, great partners with grocers, with farmers certainly at all of our farmers' markets in Pennsylvania and around the country have been great partners.

I also just quickly would mention that the U.S. Chamber of Commerce today in D.C. is having a conference called the Health Means Business conference, and they are recognizing partnerships between nonprofits and the corporate sector aimed at improving health. GSK has funded a citywide initiative called Get Hype Philly, working to get youth to be leaders in making healthy changes in their community. So we are working with nine other nonprofits and 50,000 kids in Philadelphia with GSK, and then Campbell Soup Foundation in Camden, New Jersey is midway

through a 10 year initiative working with a number of groups to improve health and childhood obesity.

Mr. THOMPSON. That is great, Mr. Weidman. Thank you.

I see my time has expired.

Mr. WEIDMAN. Okay, thank you.

The CHAIRMAN. The gentleman's time has expired.

Mr. Scott, 5 minutes.

Mr. DAVID SCOTT of Georgia. Thank you, Mr. Chairman.

This whole issue, to me, strikes right at the nerve of the foundation of our great country, which is founded on the principles of life, liberty, and the pursuit of happiness. And there is no other area of human endeavor that best manifests our foundation of life, of liberty, and happiness than our choice of food.

Think of what makes you happy. I know there are many things out there individually that make us happy, but none greater than food. And what bothers me with this is that we want to make subjections here that are just absolutely not true. Sodas, candy, sweet things, that is not what makes us obese. It is the lack of our children exercising. Look at the history of this country. Look at us 30 years ago, 20 years ago. What has happened? Our children and us, we don't go and exercise. We don't have physical education in the schools anymore. But what we have is this Blackberry, this Facebook, this going on the Internet. And instead of children going and saying let's go play basketball or let's hook up a game here, they go in the basement or they go in their room and they stay hour after hour on that.

My whole point is this. Food surveillance violates the basic principles of this great country, and first of all, you are going to discriminate between a low-income person simply because for 6 months on average that is all they stay on food stamps. They are gone. Look at the complexity you are going to put into the grocery store. Who is going to pick up that extra cost to have the food police there monitoring, and why?

Now I think that a better way of going about solving many of these things is to look at how we educate people. You can't force them. You can't deny them their freedoms to be able to make choices without violating their pursuit of happiness.

Think about it. When Thomas Jefferson wrote those words, he said to himself, and he wrote in one particular pamphlet, and he wrote this to his arch competitor, Alexander Hamilton. And what he said was, in this way, he said, "What I have declared here, my dear Mr. Hamilton, is has come to me these words, life, liberty, and the pursuit of happiness." He said by some divine providence intervention. In other words, what he was saying was those words, life, liberty, and the pursuit of happiness, he came and he wrote that Declaration of Independence under the inspiration of God Almighty. Let us not go against that.

Thank you, Mr. Chairman.

The CHAIRMAN. The gentleman yields back.

Mr. Crawford, 5 minutes.

Mr. CRAWFORD. Thank you, Mr. Chairman. That is a tough act to follow, Mr. Scott. I appreciate that.

I represent a part of the country, the Delta region, probably better than ½ of my district is, and as you can imagine, working with

a high degree of poverty. So many of my constituents are heavily dependent on SNAP benefits, and the problem they confront is that over the years, we have seen a decline in the number of supermarkets. So what we are dealing with ultimately here, ironically, is one of the most productive agricultural regions in the country is effectively a food desert. We have limited access to the healthy foods, so they rely on convenience stores and things like that. To restrict SNAP purchases to healthier food products, my question is would the compliance costs outweigh the benefits of accepting SNAP benefits at retail locations, or would it encourage SNAP retailers to offer a wider variety of healthy food products? And I will just leave that to any or all that want to make a comment on that.

Ms. SARASIN. It depends, frankly, on how any changes to the program were structured. Obviously, retailers want very much to be in areas where they can meet customer needs, and if the customer base is there and they can be profitable and successfully meet the needs locally, they will, and they want to.

The kinds of proposals that we are talking about here will definitely have an impact on how these companies can function. The potential increase in the administrative costs for a program that limits certain products, whatever they are, whatever kind of products we are talking about, is going to be oppressive, as I indicated in my testimony, given the sheer volume of products that are available in supermarkets today, and the number of new products that are introduced every year. The creation of a structure to monitor that and determine which products are in and which ones are out, is going to necessarily create pressure on the system, and also create pressure at the retail level for stores that are in existence, for stores that are being contemplated to be created, and the result could be that stores can't function profitably any longer in some areas. It could also be that some stores will have to determine that the administrative costs are so great that they would have to leave the SNAP program entirely.

Dr. SCHANZENBACH. Thank you.

I would echo that. I would be particularly concerned that these increased regulatory burdens would drive out some of the smaller retailers, especially in rural areas.

The other thing that I would like to add is that, as an economist, all of this comes down to supply and demand, and I have heard a lot of conversation about how do we increase the demand for healthy foods, whether that is through education, whether that is through pricing incentives. If people demand more healthy foods in those areas, those grocery stores are going to respond by supplying more of them. So that is why I would like to see the market work in this, and not restrict.

Mr. WEIDMAN. And I would just agree with you of the need for more grocery stores in the Delta. We are working with the Michael and Susan Dell Foundation and Hope Enterprises located in Jackson, Mississippi, to incentivize more grocery stores to come to the Delta region. I also think the USDA through the farm bill, the Healthy Food Financing Initiative offers real opportunities to bring more grocery stores to the region.

Mr. CRAWFORD. Dr. Rachidi, do you want to weigh in on that?

Dr. RACHIDI. Sure, just real quickly. If you placed restrictions on a very narrowly defined product such as *sweetened beverages,* it would not be overly burdensome for retailers, and I agree that it is really a supply and demand issue. So if you did a restriction on sweetened beverages, for example, which drove up demand for healthier products because that is all people could use their SNAP benefits for, you would hope that the retailers would then respond by providing more healthy options.

Dr. SCHANZENBACH. And just respectfully, we think based on economic theory that that is not what will happen. So many people are using both SNAP benefits and their own cash, it won't actually change behavior.

Ms. SARASIN. And if I could also respond to that.

I think we end up on a slippery slope when we start talking about sweet beverages, because I don't know what that means, and like most things, the devil is in the details. Because when we start talking about sweetened beverages, are we talking, I don't know exactly we are talking about. I mean, there are juices that bring lots of nutrition that are sweetened beverages. There are yogurt drinks that bring all kinds of nutrients to the consumers of them that also have sugar in them. We need to be careful about how we are discussing these, because we are talking about a category of products as if we all understand what that means.

Mr. CRAWFORD. Thank you. My time has expired.

The CHAIRMAN. The gentleman's time has expired.

Mr. McGovern, 5 minutes.

Mr. MCGOVERN. Well thank you.

It is safe to say that we all can make better choices and healthier choices, SNAP recipients and non-SNAP recipients. The avoidable health care costs that taxpayers pay for non-SNAP recipients, they get diabetes, heart disease. We all need to do better. But I don't think by limiting the choices of SNAP recipients you get there.

In fact, Ms. Rachidi said that we have a new President. Maybe this is a time to try a pilot project. So when you say that, I Googled Donald Trump's eating habits, and it is not a pretty picture. Domino's Pizza, Kentucky Fried Chicken, McDonald's, Diet Cokes. I mean, maybe we ought to begin with a pilot project that limits access to unhealthy foods at the White House, because we all pay for that. The taxpayers pay for that.

If we are serious about it, this ought to be a bigger discussion. And one of the things we ought not to do, and this is out of this Committee's purview, is cut back on the nutritional standards of the school feeding programs, which some have suggested. We ought to figure out the things that have worked. I visited a place in Dorchester, Massachusetts, called Daily Table. They provide access to nutritional foods at a lower cost. A lot of these vegetables and foods would otherwise be discarded by other grocery stores, but people go there and they can afford to be able to make healthier choices.

I personally think that one of the things that we could do is increase the SNAP benefit. It is about $1.40 per person per meal. You can't make a lot of choices in general with that kind of benefit. Research from the Center on Budget and Policy Priorities found that increasing SNAP benefits by a mere $30 per month would lower food insecurity, decrease fast food consumption, and increase

vegetable consumption. We have seen the Healthy Incentives Pilot which found that an ongoing investment of less than 15¢ per person per day may result in 25 percent increase in fresh fruit and vegetable consumption. And out of this pilot came the FINI grants, which are working across the country to incentivize healthy eating. All very positive stuff.

I have been to SNAP-Education programs, and I will be honest with you, the critique I get from some who attend these programs is that the ability to buy the stuff to have a healthier diet is difficult, because in their neighborhoods; they don't have supermarkets. They have to rely on convenience stores, and there are a lot of issues here that we need to talk about.

In our school programs, we ought to stress nutrition education at an earlier age. It is a lot easier to get people on a healthy pathway when they are younger.

But let me ask, Dr. Schanzenbach, do you support increasing SNAP benefits? Do you think that would promote healthy eating?

Dr. SCHANZENBACH. There is good evidence that an increase in SNAP benefits would increase consumption of healthy foods. Just like was testified earlier, when people have really tight budgets, they concentrate on getting the lowest cost calories; and then, if we expand purchasing power over time, then people will increase both the quantity and the quality of foods that they are eating.

We have really good evidence from the Summer Feeding Program, the Summer EBT Program that says, additional resources improve nutrition outcomes, and similar, this work that you cited from the Center on Budget and Policy Priorities suggests that additional $30 per month would change how people eat and make them consume more healthy foods.

Mr. McGOVERN. And I agree with what Ms. Sarasin said about how do you define a *sweetened beverage.* Does cranberry juice fall into that category? There are lots of nutritional benefits to cranberry juice, but it is a sweetened beverage. And would you take that off the list?

And again, from my experience talking to people on SNAP, a lot of times it comes down to the affordability as well as the access. We have lots of pilot programs going on all across the country. You mentioned one going on in Pennsylvania, all very, very positive stuff. We ought to understand that is how you do it, not by going and telling somebody that we are going to restrict your choices. I think that is something that we ought not to be doing here in Washington. But if you want to do a pilot program, I am happy to cosponsor one at the White House, because I am worried about our President's eating habits right now.

So thank you.

The CHAIRMAN. The gentleman's time has expired.

Mr. LaMalfa, for 5 minutes. Mr. LaMalfa, for 5 minutes? You pass? Mr. Davis, 5 minutes.

Mr. DAVIS. Thank you, Mr. Chairman, and thank you, Mr. LaMalfa.

Mr. LAMALFA. You are very welcome.

Mr. DAVIS. I appreciate that. It is always actually great to follow my colleague, Mr. McGovern, and outside of the comments about the President's eating habits, I actually agree with him on some of

these issues that maybe we ought to look at incentives. Having this debate is great for all of us, because this is isn't a partisan issue. I would challenge my colleague, Mr. McGovern, to go to some of those restaurants that he named and I believe he is going to be able to find that he can make healthy choices at every single one of those restaurants, and that is what is great about what we have seen in our country, in our access to healthy foods. The marketplace is demanding healthier choices, and all of those restaurants that he mentioned have so many more today at a very much more affordable cost than what they had even 5, 10 years ago.

So the marketplace is actually helping to supply that demand for healthier choices, and I agree with Mr. McGovern. I don't think that we have a role here in being the food police. And he mentioned some critics of the School Nutrition Program. Yes, I am one of those, and it is because the lunch ladies tell me stories about how kids are throwing food away that they are not eating. We don't have an adequate supply of healthy food to serve in our school lunches that tastes good. Kids are throwing it away, so how do we fix that? We do it by actually offering more healthier choice, but in a way that is less of a top down approach. Maybe incentivize it.

It is great to see so much testimony about expanding purchasing options. I was a big supporter of the Double Bucks Program in the last farm bill, and Dr. Wansink, I was actually leaving to go to another hearing, but listening to your testimony, and you talked about how do we have more incentives? What can we do to incentivize rather than punish? Because I don't drink cranberry juice. Sorry. It is probably good for me, Jim.

Mr. MCGOVERN. It is.

Mr. DAVIS. I don't drink it. It tastes like syrup to me. I can't handle the sugar content in it. But if I was a SNAP beneficiary, would I be able to buy cranberry juice and not what I live off of, Diet Coke or Diet Pepsi? Who is going to make that choice? It has zero calories. Actually, cranberry juice has a lot more sugar and a lot more calories. So I don't know who is going to make those choices, and frankly, I haven't seen the Federal Government be a good barometer of making choices like that for the constituents that I serve.

But Dr. Wansink, can you tell us what type of incentive program would you recommend?

Dr. WANSINK. Thank you very much.

Well if we can use schools as a parallel, as was brought up. One of the ways that we found that it is best to guide kids to eat healthier in schools is not necessarily nutrition education programs, because they are costly and they are tough to get into schools, but instead simply making the healthier products more convenient, more attractive, more normal. Having a basket of apples next to the checkout line, making foods taste better, reducing waste and it also increases how much people eat. And there are 29,000 schools who are now on that program.

Now a similar thing can be done in the stores, and you are right spot on when you say anybody goes in these restaurants can eat healthy, because there are the options that are now cheaper than they used to be. Making simple changes in grocery stores that are

incentive compatible with the grocery stores that are either profit neutral or profitable for them.

Mr. DAVIS. Haven't they already been doing that?

Dr. WANSINK. Not as widespread. I took last year off and went on sabbatical to implement this in Norway to show that it could be done as a tested concept, and even making small changes in these grocery stores, simply having things such as having fruits and vegetables within 10′ of the doorway increases how much people take by three percent. Making these changes are things that grocery stores find profitable, but then it also benefits all of us, not just SNAP beneficiaries.

Mr. DAVIS. But you wouldn't make the government force the stores to change?

Dr. WANSINK. Absolutely not.

Mr. DAVIS. Okay.

Dr. WANSINK. No, we would make the profit argument to them that they can make more money making people healthier.

Mr. DAVIS. Okay, because I know some stores would have to actually move their Starbucks out of the way to be within that 10′ of the door.

Does anybody else on the panel want to address the incentivization?

Ms. SARASIN. If I could just say that, apart from the incentive part of it, the thing that retailers are doing is a lot of the stuff is happening on their own without incentives. Our most recent data shows that something in the neighborhood of 95 percent of our member companies have nutritionists and dieticians onsite in their stores or at corporate headquarters helping direct what is going on with their customers and education. So there is a lot of this stuff that is happening even without the incentives.

Mr. DAVIS. Thank you. My time has expired.

The CHAIRMAN. The gentleman's time has expired.

Ms. Lujan Grisham, 5 minutes.

Ms. LUJAN GRISHAM. Thank you, Mr. Chairman, and I want to thank my colleagues, Mr. McGovern and Mr. Davis. The focus of all of our conversations ought to be on the incentives, and I don't want to lose momentum. And we do really want very specific ideas. In my state, we have incentives and initiatives that are both authorized and supported by the farm bill, and many of those that are solely state or corporate private-public partnership initiatives. We have programs at WIC, we have programs at Head Start that are uniquely focused on SNAP-Education. We have a program called CHILE Plus. For those of you not from New Mexico, we are the leaders and have the best-tasting New Mexico chile anywhere. In fact, our state question is whether it is red or green? But it is the Child Health Initiative for Lifelong Eating and Exercise, and it really is focused to integrate both purchasing and education and cooking and eating healthy that we pushed out into the rural areas.

The core issue is that we want the flexibility for states and rural communities and communities to really figure out how to do it, but we need the farm bill to be really clear that there is not only those incentives in terms of authorizations, but there is funding and incentives for those funding vehicles. I did the SNAP challenge, for

$30, so I just had a protein shake. I really think, as nearly a 60 year old woman with a fairly sedentary public policy lifestyle I am really proud of, I try to be cognizant of my calorie intakes. I work very hard at it. Well during my SNAP challenge, I wasn't so good at it, all right? I ate ramen noodles. I am trying to think of the other high carbohydrate kinds of foods. I tried to get peanut butter, high fat, and I couldn't get any organics. I bought one banana and one apple for my weekly benefit if I was going to have enough food and $1.50 left over.

Now if I am dealing with average benefits for my whole family, and God forbid somebody in your family is sick and they say we want high iron, high protein, you have a teenager who is playing football. With that SNAP benefit, you can try all you want to do healthy foods. It is impossible, because unhealthy, cheaper foods are all you can buy. And I ate it. I stayed true to doing what I was supposed to do, but it wasn't good.

So if we don't deal with that, in my state, seniors are about to get their SNAP benefits cut: $33 a month with the state portion that they are going to cut. I don't know about you. I am a caregiver for my mom. If I go to the grocery store for $33, I can't get anything that she ought to be eating. Anything. So if we don't increase SNAP-Education funding and we don't really put resources to allow folks to do these incentives, we can talk about how great they are all the time, and they are. I agree with that, my colleagues on the other side of the aisle, we really shouldn't be the food police. We ought to do incentives. We ought to do something about obesity. You do something about obesity, you have hundreds of millions of dollars to put back into economic incentives and farm bill incentives to grow better food and to do more in the areas that we all care about on this Committee. How can you get us, one of the most bipartisan committees, to really think long and hard about putting the resources where they need to be and seeing the evidence-based outcomes that we have the research, the Chairman teases me about research all the time. We have the research that shows us that you have to educate people.

Do you have ideas to help us get to that agreement about making sure that there are the resources that allow us to do the things that you know would make a difference?

Dr. WANSINK. I believe if we want to change things really quick, it is probably not going to be education. It is a nice long-term solution that is going to take a long time, and it is not going to be the payoff. Initially educating, in this case, retailers as to what they could do to guide people to these healthier options, which are also high margin foods, because they have to throw them away. If a banana goes bad, a retailer loses money on it. What they can do to guide people to these and get people to buy more of them. It is not just going to benefit SNAP recipients, but it is going to benefit all of us.

Ms. LUJAN GRISHAM. Anybody else? I have 10 seconds. Let's go.

Dr. RACHIDI. Just real quickly, there is really little evidence that, and I am in favor of incentive programs, but there is little evidence that incentive programs reduce consumption of unhealthy foods. And so I advocate for both, and so if you look at the integrity of the program, you could gain support for increasing incentive pro-

grams and education if you eliminate some of these other issues like allowing unhealthy foods to be purchased from the program.

Ms. LUJAN GRISHAM. My time is definitely up, Mr. Chairman.

The CHAIRMAN. Thank you.

Mr. Comer, 5 minutes. Mr. Comer, 5 minutes.

Mr. COMER. I was Commissioner of Agriculture in Kentucky for 4 years, and one of the things that worked really well for us with being able to provide healthy options to people with EBT cards was when I first got elected, we only had 21 farmers' markets that took EBT cards. When I went out of office, all 225 farmers' markets took EBT cards, and a lot of people said well, that will never be a factor in sales. In a lot of those farmers' markets, it was over 25 percent of the sales were from EBT cards because of food deserts, and access to healthy food.

The farmers' markets are a great way, a great option for people on SNAP because there are no bad foods at a farmers' market, or I have never seen candy or soft drinks sold at any Kentucky farmers' market, so I just wanted to share that story. That was a pretty successful way to get healthy food options to people that need it because of the obesity problem that we clearly have.

Shifting gears here, what percentage of people use their entire monthly SNAP benefits during the first week of the month? Does anybody know the answer to that?

Ms. SARASIN. I don't know the percentage, but I can tell you that the data that we have seen shows that a tremendous amount of it is spent in the first week, and that those purchases tend to be the largest of the month.

Mr. COMER. Right.

Ms. SARASIN. And the ones that have the most protein and the things that we would tend to expect that they would buy first.

Mr. COMER. In talking with retailers across the state about this issue, several have come up with this suggestion, and they use this example. The majority of the people that they deal with use their entire benefit, monthly benefit, the first week of the month. So if you want to provide milk and things like that, meat for low-income people to eat healthy, if this is their only source of revenue for their food, the milk expires or it is gone. They don't have access to milk or a lot of proteins that expire. I wonder how feasible it would be to have a bi-monthly benefit to encourage more people to try to manage their budgets to where they can have milk for the first half of the month and the second half of the month, because it is a big problem. I represent a very poor district and that is something that just about every retailer that I have talked to has mentioned that as a suggestion to be more efficient and to help the people. Because a lot of the people unfortunately don't have a high level of financial literacy, and that is an issue. So I just wanted to get your thoughts on that, Ms. Sarasin.

Ms. SARASIN. As a Kentuckian myself, and from the next county over from you, I can totally understand the discussions that you have had. And what we find in many states is that they have gone to not having single dates of the month when the benefits are available. There are multiple points in the month when recipients have access to their benefits. And so in the states where that has happened, it has been very beneficial, certainly from the retail per-

spective because it allows us, instead of having to have such pressure on both our labor pool on a certain day or in a certain week of the month, but also on the supply chain issues so that we have enough milk in different quantities and different styles and different sizes, for example. Being able to move these things out over the course of a month would certainly, from a retail perspective, be a better situation for us.

Mr. COMER. Yes, I am for less government, and I don't like the nanny state and all that, but is it clearly a problem, and the obesity issue, it is almost at epidemic levels. The poorer the county, the higher the obesity rate. And you can see that when you go into public schools and, unfortunately for the students in the poorer schools. You can just tell there is a higher obesity rate in those schools.

Ms. SARASIN. A couple of things. One is the data seems to indicate that everybody is getting fat, rich kids, poor kids alike. But to give my perspective on your question about the twice a month. Something that people raise as a concern there, especially for people with limited access to places to shop, breaking this benefit up into twice a month might make it harder for them to get to the store, because now instead of one big shopping trip, they have to do multiple. So it is just something to consider.

Mr. COMER. Thank you, Mr. Chairman.

The CHAIRMAN. The gentleman's time has expired.

Ms. Adams, 5 minutes.

Ms. ADAMS. Thank you, and thank you, Mr. Chairman and Ranking Member Peterson, for hosting the hearing, and thank you to the witnesses for being here today.

The SNAP program is very important to those in the 12th District of North Carolina. I represent that district, and the folks struggle with food insecurity a lot. We have a lot of food deserts. But as someone who lives with diabetes, I know that there will be times when someone that participates in the SNAP program and has diabetes will need to buy a candy bar to quickly raise their blood sugar, and they should be able to buy that candy bar with their SNAP benefits.

Dr. Schanzenbach, could you provide a brief summary of the findings of your research on the long-term health impacts on individuals who participated in SNAP as infants and toddlers?

Dr. SCHANZENBACH. Thank you. So my recent research study looked at the introduction of the Food Stamp Program, which was done over the 1960s and 1970s. Congress in its great wisdom decided to roll it out slowly, and so that gives us an opportunity to study, if you lived in this county when you were 5 years old *versus* that county, you had different access to the Food Stamp Program, as it was then called. And so then we can tease out well, what happens if people are given access to the Food Stamp Program.

What we found was a couple of things. First is children are born healthier if their moms have access to food stamps while she is pregnant. But then because this happened so long ago, we were able to follow the children who grew up in these areas over time. So now they are 40 and 50 years old. What we found was that we should really be thinking about food stamps as an investment in children. So we found that access to food stamps during childhood

increased the likelihood that they graduated from high school by 18 percentage points. Furthermore, we were able to look at their adult outcomes. We found that they are healthier in adulthood. We looked at this thing called metabolic syndrome, which is a clustered association between obesity, diabetes, high blood pressure, *et cetera*. What we found there was more access to food in early life sets up systems in your body to actually make you less obese in later life.

Then finally we found that, and this was particularly the case for women, that people who had access to food stamps in childhood grew up to be more economically self sufficient. They are more likely to be employed. They had higher earnings, and they themselves as adults were less likely to be reliant on food stamps or welfare programs.

And of course, as an economist, what I think is going on here is that the children were better able to make investments, right? They weren't going to school hungry so they could pay attention in school better and learn more. And so this is very important evidence, evidence I certainly want the Committee to know about, to think about this program as an investment.

Ms. ADAMS. Okay. So would you support a higher SNAP benefit?

Dr. SCHANZENBACH. Certainly, it is very important to preserve the program as it is, so that is sort of always my first worry. But then I do think with separate evidence that there is good evidence that increasing the benefit levels will increase the amount of healthy foods purchased, will reduce food insecurity, and of course, one out of every five children in this nation lives in a food-insecure household right now, and in nine states, it is one out of four children live in a food-insecure household. I think that is too high for this great nation of ours.

Ms. ADAMS. Okay. So why would SNAP restrictions on soft drinks, for example, be unlikely to change consumption patterns shared by all Americans?

Dr. SCHANZENBACH. Sure. So of course, remember that food stamps benefits are relatively modest, $4.50 per person per day, and if we think about an average household, which gets about $250 in food stamp benefits, and then they have to supplement their food purchases by additional cash resources. So it is $100, $150 additional. Then on average, households spend about $12 to $14 a month on soda, right? So $250 SNAP, $100 in cash, $12 on soda. Be very straightforward that even if we go through all this red tape and debate what is in a soda and what is out of a soda and is this sugar sweetened or not, if we did that, when they get to the checkout line, they would be able to say, "Okay, I still want to purchase my soda, my sugar sweetened beverage. I just need to do it out of this pot of money instead of that pot of money." That is a lot of red tape to go through to not change behavior.

Ms. ADAMS. Thank you very much, Mr. Chairman. I yield back.

The CHAIRMAN. The gentlelady yields back.

Mr. Yoho, 5 minutes.

Mr. YOHO. Thank you, Mr. Chairman, I appreciate it, and I appreciate you all being here. This is such an important topic that we look to reform and make it right, both for the recipient and for the taxpayers.

Ms. Sarasin, one of the common arguments against restricting SNAP purchases has been the operational challenges of implementing restrictions, and if you have gone over that, I apologize, and if you haven't, with regard to the tech needed to track the restricted items, what do you see as a hold up on that, or is there anything that we can do better legislatively, or leave you guys alone?

Ms. SARASIN. Well as I mentioned in testimony, one of the things that is challenging is that our cashiers end up being, to some degree, the food police at checkout time. And as you are probably aware, that holds up a line.

Mr. YOHO. Yes.

Ms. SARASIN. And if you have ever been in line behind somebody who is having a challenge like that, it is difficult. And sometimes, it ends up being a difficulty with some of our most vulnerable populations, and so it becomes also a stigma and a problem in that regard.

But when you are operating a business that in general is on a one to two percent profit margin a year, every second that is delayed at the checkout line is a problem. Our companies measure it because they want to keep things moving.

Mr. YOHO. Right.

Ms. SARASIN. It creates a lot of issues for us at checkout, and just the administrative function of trying to figure out what is in, what is out, as if we went into the role of trying to determine that certain things shouldn't be allowed and certain things should be allowed, it would create real havoc in our stores.

Mr. YOHO. Let me ask you this, because this has been brought up to me multiple times, in the big retailers' aisles that were restricted just to those things so people could go right there. It would expedite them going in there, buying those products, bringing them up and checking out with no confusion. Your thoughts on that, and then the other one is the financial impact. We hear people saying that on the retail side that this brings in 'X' amount of dollars for us, and we can't change it because we are dependent upon that. What is the pushback that you have experienced in your industry?

Ms. SARASIN. Well the real pushback is the administrative costs of trying to actually facilitate the program. One of the things that I hear regularly from our companies is that these programs are some of the most difficult regulatory programs for them to implement in their stores. And when you are talking about companies that have to deal with things like the Food Safety Modernization Act and all of the regulations that go along with that, if this is a more difficult challenge for them, that says a lot for what they are dealing with.

The costs associated in the store with doing this on such a low margin business is significant, and not that there shouldn't be changes to the program if they are desirable and if they achieve a policy goal, but just to unilaterally identify that certain types of products should or should not be in without a real basis for making the decision is problematic for us.

Mr. YOHO. Well, you can see how important it is, as many meetings as we have had on it, and I commend Chairman Conaway and

the Chairwoman of the Nutrition Subcommittee last year, Jackie Walorski.

Let me ask one other question, and this goes to Mr. Weidman. How is SNAP-Ed reached in the rural area? And I know in the State of Florida with the University of Florida, which is a land-grant, they have an extension office in every county, 67 counties in Florida. And they seem to do a good job of doing it. The nutritional educational programs, are they different based on regions? Like we are in Florida. We have a hot, humid climate. How is it in your area, and then can you do a one size fits all for nutritional program for the whole nation, or should it be more regionalized?

Mr. WEIDMAN. Yes, that is a great question, and SNAP-Ed does great work in rural and urban areas all around the country. I mentioned earlier a rural program in New Mexico, CHILE Plus, which is doing great work in pre-K and Head Start programs. But yet, to your point, the great thing about the SNAP-Ed program is it does have kind of oversight and guidance to all of the programs that the different states are doing, but it allows for local on the ground sort of innovation so that the right type of nutrition education is happening, based on region and based on the population that you are serving.

Mr. YOHO. Okay, I appreciate your time. I am out of time, and thank you. Mr. Chairman, I thank you.

The CHAIRMAN. The gentleman yields back.

Mr. Lawson, from Florida, 5 minutes.

Mr. LAWSON. Thank you, Mr. Chairman. I would like to thank all of you all who are here. I was just thinking, I am a country boy and so I couldn't think of anything more important on a Friday than RC Cola and a moon pie. And the other day, I was in the airport in Atlanta and I wanted to have a healthy choice, and I saw a long line at Subway, but there wasn't a line at Bojangles', so I tried to make the right decision, but Bojangles' won out. So I understand.

What I really want to say is that it appears that when they did this survey, and anyone can answer, the FNS did a survey, and they said that in order to change the program, put restriction on the program, that it could cost as much as $400 million or $600 million to administer the program. And I know that would be dollars well spent if you put that into the program, and people are going to do different things. And I have seen people go into these convenience stores, and even standing in line when they were making purchases, and saw that it was very difficult and they didn't really want to be there. But what I would say to you, and this question will go to anyone, is that in my state, we have an organization like Farm Share and Frenchtown Farmers Market that carry a similar initiative to alleviate hunger. From your success with Food Bucks programs and with nonprofit, how can I as a Congressman assist other food banks and various organizations to help be successful in this way and get this message out? Because you talk about the educational aspects of it, rural and urban. What can we do, because, you want to see this program continue, and I don't know whether the young people know about RC and a moon pie, but I want to make sure that it happens to all of us. But what can

we do as legislators to help in those areas? Anyone can answer that.

Mr. WEIDMAN. I will. As I said in my testimony, I really think what is working is this comprehensive approach that includes nutrition education, and the SNAP-Ed program is doing a great job at that. Through incentives like the new FINI Program, and I really appreciate Congress for launching the FINI Program. We, for years, have been hearing that you get the farmers' market in the neighborhood or if you get a grocery store in the neighborhood, what about price, and that can be an issue. And we have heard that today. The FINI Program does a great job of both, making healthy foods more affordable, and also allowing for innovation, again, at the local level in places all around the country. And then last, actually getting the stores located in areas so that people don't have to take three buses to get to the grocery store. And I really appreciate, again, the leadership of Congresswoman Fudge and many others on this Committee for their support of the Healthy Food Financing Initiative, which is a proven model that was launched in Pennsylvania, working in partnership with the grocers and other food retailers, to locate in under-served urban and rural areas, create jobs, and provide access to healthy food.

Mr. LAWSON. Okay, and I have one more question for, is it Raskins?

Ms. SARASIN. Sarasin.

Mr. LAWSON. Ms. Sarasin, okay. I'm seeing things—dyslexic. But why in the grocery stores are all the candies and stuff right up by the cash registers? It feels good to look at all of it, but I just ask that question, you know what I mean? Once you missed it you got it again. Once you miss it down in the candy aisle, it is back up there at the cash register.

Ms. SARASIN. What you will find is that increasingly in our stores, while there are still aisles with candy right up front, increasingly there are stores that have lots of other things right up front as well. Mr. Wansink referred earlier to the increasing incidents of bowls of fruit and other healthy products that are available at checkout for consumers who are interested in having them.

So from a retail perspective, our role is to provide the best service and create the best experience with the product lines that our customers seek, and at a price that they can afford, and hopefully as conveniently as possible. So that is what we strive to do for all of our customers, whether they be SNAP beneficiaries or others. And so we have this constant balance going on of trying to make sure that we are meeting all of these needs, and for some people, having a sweet treat as they walk out of the store is important. For others, it is other kinds of products. They would rather have a piece of fruit or they would rather have a yogurt as they walk out the door.

So our goal is to try to provide a balance of products for all of our customers, depending on what they are looking for.

The CHAIRMAN. The gentleman's time has expired.

Mr. LaMalfa, 5 minutes.

Mr. LAMALFA. Thank you, Mr. Chairman.

So today we are talking about the SNAP program, Supplemental Nutrition Assistance Program. *Supplemental* meaning in addition

to what might be someone's personal income, or other forms of aid a family might be receiving. *Nutrition,* generally thought of as something good for the body, making you healthier, stronger. *Assistance,* the idea that someone else is probably paying for this to help people.

Ms. Sarasin, you talked repeatedly about how what basically a hassle this will be for stores to have the system in place to differentiate between more of these food products, so do people that come through the checkout line that are SNAP users not have other products that are ineligible for SNAP very frequently, such as house cleaning items, toiletries, other things that they are paying for that are not eligible? Is there anything that is not eligible for SNAP, I guess, that would have to cause a second transaction at the checkout counter?

Ms. SARASIN. Yes. Yes, there are many types of products that are not——

Mr. LAMALFA. Tobacco, alcohol, like that?

Ms. SARASIN. Alcohol and tobacco are not SNAP eligible.

Mr. LAMALFA. Okay.

Ms. SARASIN. SNAP is applicable to food products.

Mr. LAMALFA. Yes. So if you have someone in line that is making one trip to the store, they are buying all the needs for their household for the next week or 2. They are buying multiple items. Some are eligible, some are not.

Ms. SARASIN. Correct.

Mr. LAMALFA. So if we were to have this discussion about things that are nutritional and we have items on the list that maybe are now eligible for SNAP but determined somehow to not be nutritional, is it really that much tougher to differentiate between soda pop and tobacco?

Ms. SARASIN. The challenge is in how you are defining *soda pop* or how you are defining *nutrition* or how you are defining a *healthy product.* We have had a lot——

Mr. LAMALFA. Well shouldn't we try, because we are having all this effort made in recent years over fighting obesity and kind of differentiating between what things are contributing to obesity and what are not?

Ms. SARASIN. We have had testimony this morning that has provided the evidence that doing so is going to be at great cost, and that the ultimate benefit——

Mr. LAMALFA. It is great cost to the people that are the assistance part of this program, and it is also of great cost to the people, for lack of maybe knowledge or the idea that the government is incentivizing it, sending them home with candy bars and soda pop. So maybe it is worth the trouble.

Let me shift to Dr. Rachidi here. I thank you for appearing as well. When we talk about the SNAP program's intention to alleviate hunger and malnutrition, and permit low-income households to obtain a more nutritious diet through normal sources, that is in statute, so with these aims and the idea that we are approaching nearly ten percent of beverages are accounting for expenditure, as was mentioned, we don't have data to determine how the restriction should impact the program, but we should at least try.

The recent USDA study was troubling, and I think kind of a red flag for a lot of folks. A couple thoughts for you on that is you discussed a study also that evaluated the impact of a hybrid pilot of incentives and restrictions. So do you think this could be a feasible demonstration we could take more widely for entire states, and with some more cooperation from USDA, which seems to want to shut down states from making their own determination? Please expound upon that.

Dr. RACHIDI. Yes, I definitely think it is something that should be tested, and at the state level or the local level. Like I mentioned, we tried to do it in 2011 in New York City. The USDA at the time denied it, as they denied a few other states that had——

Mr. LAMALFA. What do you think the USDA's incentive is to deny these possible studies and the learning we can get from that at state level or New York City level?

Dr. RACHIDI. I think there is a general aversion to restrictions, as we have heard today, and that is part of it. An additional reason that was given to us was also that it is, they felt that our evaluation was not going to be rigorous enough, which we did not——

Mr. LAMALFA. Do you think we have rigor now in separating these——

Dr. RACHIDI. Meaning that the evaluation design was not rigorous enough that in the end, even with an evaluation, we still wouldn't have been able to tell if it was effective or not. Which we didn't necessarily agree with, but that was one of the reasons. And the other reason was what we have also heard today about the difficulties in defining what is a *sweetened beverage* or not. We actually came up with what we thought was a pretty clear definition, which is it excludes juice, 100 percent juice, and any other beverage that has 10 calories per 8 ounces is a sweetened beverage, with a few exclusions like Pedialyte, for example. But it was a pretty straightforward definition.

Mr. LAMALFA. So we have super computers that could probably program this in at the register and not make it that tough, right?

Dr. RACHIDI. Exactly, and we talked to retailers in New York City, and there have been other retailers that we have talked to through other efforts that have said exactly what you said. They already restrict alcoholic beverages, for example, non-food products, and this would just be one more thing to add to the list.

Mr. LAMALFA. Thank you.

The CHAIRMAN. The gentleman's time has expired.

Mr. O'Halleran?

Mr. O'HALLERAN. Thank you, Mr. Chairman. I just have a couple of brief statements. I will have plenty of questions for the record.

But one of the statements I heard today was this pot instead of that pot, and another one was three buses. And my district is kind of a little bit different. It is a district the size of Pennsylvania. It has 12 Native American reservations on it, and some of the kids go to school on a bus 2 hours one way. Some of them have anywhere from a 50 percent to an 80 percent unemployment rate. And sometimes, people can't get out of their homes after a big storm because of the condition of the roads to get to the store. So we have the urban setting, the rural setting, and then we have these very rural settings. And I am just trying caution us that as we look at

this whole problem, the cost of stores is an important aspect to me, because in my area, stores are very far apart, obviously, and the food that is in those stores is much more limited in scope than other stores in urban areas. We also have the concern that the education level on nutrition is very low, and I appreciate the cooking classes and everything else, but it is kind of hard to get to a cooking class if you are 2 hours away from the nearest class.

And so between the quality of the merchandise, the concern I have for the distances traveled, the unacceptable unemployment rates, I just want to just caution everybody when we start to think about this a little more that the entire process, and I don't think there is anybody here that doesn't care about nutrition for our families and our children, but we also have to understand the realities of life in some areas of America.

Thank you. I yield back.

The CHAIRMAN. The gentleman yields back.

Mr. Marshall, 5 minutes.

Mr. MARSHALL. Thank you, Mr. Chairman. My first question is for Dr. Rachidi.

As you may know, I am an obstetrician and very familiar with WIC programs. Of all the things that my patients and nurses seem to think is a good thing, is WIC. What can we learn from WIC that we could apply to SNAP? What makes it successful? Tell me what we are doing differently between the two programs briefly, if you could?

Dr. RACHIDI. Well sure. Real briefly, I mean, WIC has a set of products that are eligible products to be purchased, and so there is a list that is put together and it is intended to be healthy products, and also they cater towards infants and new mothers and pregnant women. SNAP, on the other hand, does not have that. There are a few restrictions as we have heard today, alcoholic beverages, non-food items, hot prepared foods, but in general, there are no restrictions on what can be purchased with SNAP benefits.

Mr. MARSHALL. Tell us a little bit about that education, what is going on with those pregnant women and breastfeeding moms that WIC is doing that seems to me to be so beneficial?

Dr. RACHIDI. Yes, so WIC also has a large education component, and again, it is a little bit of a different program because it is focused on new mothers and infants primarily, and young children. The education efforts are very much geared towards that, but also very much geared towards nutrition.

On the SNAP side, as we have also heard today, there is a nutrition and education program, and it is very different across the states. States can choose how to implement it. Some choose to have very robust programs. Some choose to have maybe not so robust, but reach a lot of people, and so it is just a little bit different program than WIC.

Mr. MARSHALL. Okay. Dr. Wansink, I guess my next question is for you.

Certainly, I am concerned about health and diabetes and obesity and these things, but my question for you is: have any of the current educational or in city-based efforts resulted in large scale changes, in your opinion, large scale changes in dietary habits? Is it working?

Dr. WANSINK. There is some of this going on that is very good that has been effective, and back when I was Executive Director for the Center for Nutrition Policy and Promotion, I kind of said, this is too big of a thing for the government to figure out, because government can't be where everybody purchases and prepares food everywhere they work and they play, but all of the things around us can, the companies and things like this. So we started a program called Partnering with MyPyramid. It's now called Partnering with MyPlate. And the idea was to give credit and incentives to any company or any nonprofit that would help make it easier for people to move toward eating following the *Dietary Guidelines.* It was tremendously successful under the last year of President Bush's term, and it still is in place but it is not being encouraged as much as it could be. And that would be great, because it would enlist everybody to help more people eating toward the *Dietary Guidelines.*

Mr. MARSHALL. Okay. I am going to stick with this theme of lifestyle changes a little bit, and this is probably your questioning, Dr. Wansink.

In my lifetime experiences, as a physician, trying to change people's lifestyles, when they are pregnant seems to be their most willing to do it. I have given up trying to convince people to stop smoking unless they are pregnant or they ask me about it. Trying to help a newly developed diabetic pregnant woman to talk to them about diet modifications, they are very motivated. They start wearing seatbelts. There are reasons that this woman is motivated for lifestyle changes.

Why are they so motivated, and how can we apply that to SNAP as well? I just think that pregnant women, by the time they are 45, it is too late, but when they are 21, there are opportunities here. So help me with what the next step is for SNAP to take?

Dr. WANSINK. I think that is an outstanding question, because you are looking at, there is somebody who is doing something for a bigger cause than themselves, and we see this with people making changes in their diet, too. They will do it for a bigger cause and become a vegetarian for a bigger cause, but not for their health. And in trying to apply some of these things to SNAP benefits, maybe what we need to do is we need to start focusing on the impact this has on a person's family or on their children, and start talking about SNAP benefits not in terms of, oh, he was going to buy some groceries, but on the implication this has on their family. And I love the stats that you had about what happens that graduation rates go up by 18 percent for kids on SNAP benefits——

Mr. MARSHALL. I am sorry to cut you off, but I appreciate the answer. My biggest concern is lack of activity as opposed to calories in. I think that is the biggest problem with obesity. Do any of you—can you—are we doing anything with SNAP related to encouraging activity as opposed to playing video games all day? My time is out. Sorry. I yield back.

The CHAIRMAN. The gentleman yields back.

Mr. Panetta, 5 minutes.

Mr. PANETTA. Thank you, Mr. Chairman. I appreciate it, and thanks to all of the witnesses who are here. I appreciate your testimony, your preparation. I know it took quite a bit of time, I am

sure, to put together your statements today, so thank you very much. I appreciate that.

My question kind of stems around education. As many Members are starting to know, and as many people do know, I come from the salad bowl of the world there on the central coast of California. But we are looking to change that name actually. We are going to call it the salad bar of the world. No, I am serious. The reason they are doing that is because a lot of the growers and the shippers, what they realized is the people who work for them weren't eating the same foods that they are picking. And they realized how to get to them is by getting to their kids. And so what a lot of our ag companies have done is donated salad bars, over 100, to the local schools to start getting our children, including my two daughters, to start eating more healthy foods, having that salad bar option. And they are doing that. And what they are seeing is that when their children start to eat more at schools, those trends go home and their parents start to develop those same trends, and that is actually working to a certain extent.

And so my question is how do we continue, besides ag companies donating salad bars to our schools, how do we continue to educate our children when it comes to getting them to eat healthier in our schools? How do we do that?

Ms. SARASIN. A couple of things that the food retailers are working on, one is a very high percentage of our companies do in-store tours. I mentioned earlier that about 95 percent of them have on staff nutritionists and dieticians, and what they are doing is actually bringing school groups into the stores, and the nutritionists and the dieticians take the children through the store, and help them understand about nutrition, help them understand the kinds of nutrients and vitamins they get from various products, and the balance that they need to be trying to achieve in their lives. So that is one thing that has worked well and will continue to work well.

Another thing that we have done at FMI through our FMI Foundation is we just had our second annual National Family Meals Month in September. And the notion of National Family Meals Month is sort of multi-fold. One is that some of the societal challenges that we have are improved by having more frequent family meals, and I am talking now about school truancy, underage drinking, drug abuse, *et cetera.* The research shows that more family meals tends to bring down the incidences with young children and teenagers. But in addition to that, what we find is that children who engage with their families at mealtime, both by cooking, by purchasing the food, by being involved in preparation and serving, they tend to have a better understanding of nutrition and diet and health than those that don't. So we are promoting national family meals within our organization, but also at store level. And we have had, as I mentioned, our second annual in September of 2016, so this is something that we are doing on an annual basis so that our retailers can actually be engaged with their customers in helping children engage more with the preparation of food in their homes.

Mr. PANETTA. I appreciate that.

With the FINI Program and the SNAP-Ed program, what do those entail?

Mr. WEIDMAN. Yes, I was just going to say we work in 100 schools in Pennsylvania, doing SNAP-Ed, nutrition education work. So teaching kids to try new foods, a lot of it is also peer-to-peer marketing, so getting kids to be leaders in changing their school environment, youth-led wellness councils, and you really find that when the students are kind of marketing to their peers around healthier eating, that has a big impact. We also do, to the Congressman's point, our Get Hype Philly program is about healthy eating and exercise, so the combination of both of those is really important.

Mr. PANETTA. Great. In regards to you, Dr. Wansink, you talked about middle of the road consumers. You mentioned signage, service, and structure, is there anything else we can do to target them? What else can we do?

Dr. WANSINK. Well what can be done at a retail level is to make sure that the foods we want to guide them to are the healthier foods, and they are being the ones that are most convenient to purchase, they are most attractive to purchase, not just by price, but attractively looking, attractively named, attractively positioned, and then also that are more normal, because right now it is just not normal to buy a lot of healthy things at the grocery store, because you feel like you are kind of a strange person. Simply a lot of placement changes can make a big difference. Thank you very much for your questions.

Mr. PANETTA. Thank you. Thank you, Mr. Chairman.

The CHAIRMAN. The gentleman yields back.

Mr. Faso, 5 minutes.

Mr. FASO. Thank you, Mr. Chairman. I am intrigued, we had a table here that came from USDA that suggests in 2011 that there were approximately six billion purchases of sweetened beverages in 2011. I don't know, do any of the witnesses have an idea of how much of that six billion would be what we call *soda* in the East and my colleagues like Mrs. Hartzler call *pop* in the West. Although in western New York, they do call soda *pop*.

Dr. RACHIDI. I believe it is a little more than ½.

Mr. FASO. A little more than ½. And would any of the witnesses contend to me that soda, sweetened soda has nutritional value?

This would be for Dr. Schanzenbach, and maybe Dr. Rachidi as well. I take it by no answer from any of the witnesses that no one believes soda has nutritional value. What would be the problem with our, especially if we are looking at more than $3 billion of taxpayer money going to buy something that no one, as far as I can tell, believes has nutritional value? What would be the issue in your mind of a carefully designed study by the USDA to actually analyze this question as to whether if we had a restriction on certain sugared beverages that it could result in altered buying habits and dietary consequences and nutritional consequences for the families, particularly the children who live in those households where that $3 billion of taxpayer money is spent to buy soda?

Dr. SCHANZENBACH. You are asking a researcher if we should have more research and that is the first thing they teach you in grad school is yes, I would welcome any sort of a demonstration program, but I would be quick to add that it needs to be high quality, and so in particular that includes it needs to be real random-

ized controlled trial, and that it also needs to do a couple of other things. One, it needs to measure consumption, not just compliance, but how does this change what people consume, because some of the research out there that maybe looks at the impact of soda taxes and other things like that show that yes, people substitute away from soda sometimes, but what they replace it with isn't necessarily much better.

Mr. FASO. Right, and so how many people do you think would be appropriate in such a study?

Dr. SCHANZENBACH. Oh boy. I can't do power calculations on the fly. I would be happy to submit something.

Mr. FASO. Perhaps you could submit that for the record.

Dr. SCHANZENBACH. I would be happy to.

Mr. FASO. Ms. Sarasin, at the risk of getting my friends in the food merchants, and my friend, Mike Rosen, in Albany upset, the fact is that now that SNAP benefits are in EBT form by and large for the vast majority of those purchases, the merchants are able to differentiate among taxable items and non-taxable items. We had an issue in New York State for years where certain marshmallows that were used if you put them on a stick and you roasted them over the fire, those were tax exempt, but if you bought the small marshmallows, those were taxable. I realize the administrative complexity argument, but it does seem to me that we are now at a point where we could be able to more readily differentiate, just as we do with tobacco and beer. You can't buy that with food stamps.

Ms. SARASIN. Well as I said in my testimony, could it be done, yes, probably so. The question is at what cost, and is the cost of trying to put together a means through which to define the products that are in clearly, define the products that are out clearly, such that electronically they could be contained in a system and therefore would be able electronically to be able to segregate? Absolutely, that would certainly help, but again, we are talking about many tens of thousands of products that would have to be done every year, and the infrastructure to be able to make those determinations.

Mr. FASO. My point would be that we have these wonderful academic researchers and experts. Perhaps we could design a study that was statistically valid and which would consider the difficulty that the food merchants have, but also get to the core of the fact that when we were kids, the only time we ever had soda or pop was when it was someone's birthday. And when I see $6 billion, perhaps $3 billion of taxpayer dollars being spent on soda, which has no nutritional value, in a program that is called Supplemental Nutrition Assistance, something is wrong.

Thank you, Mr. Chairman.

The CHAIRMAN. The gentleman's time has expired.

Mr. Soto, 5 minutes.

Mr. SOTO. Thank you, Mr. Chairman.

In Florida, we have our Fresh From Florida Program, which has tried to cue in local farmers with our schools, which has had some pretty good success. In listening to your testimony, it appears that most of you are encouraging us to have incentives, to have a carrot rather than a stick, pun intended on that—and to have greater ac-

cess to folks in food deserts rather than desserts. And I agree with both those things.

I did, however, read a *Washington Post* article this morning that went right into this issue, and they had a conclusion that a SNAP purged of sodas or candy or both could be less vulnerable to cuts, and supporters can seek full funding. That every dollar for SNAP would help nurse the poor, just as Congress intended. And it got me thinking, first, how many of you by a show of hands would support a ban on soda and candy? Go ahead, how many? Okay, we have one. How many of you believe that it would save money if we banned these two products? Raise your hand. Okay.

And so I think that is what my main quandary is now is whether or not the real goal is to have these sorts of bans to get people to eat healthier, whether the real goal would be to try to save money to expand a lot of the pilot programs that you all have discussed. And I am one who doesn't want food police or a big brother society or any of these other things that we are all so worried about. And so it would be great in the time I have remaining for you all to either support or not the concept of whether this would save money, and why? And I would like to hear from all of you on it.

Dr. RACHIDI. Well I guess I will start.

In terms of saving money, just the opportunity or the potential to save medical-related expenses, especially on the public health side, Medicaid/Medicare, I think that there is potential there. And then——

Mr. SOTO. Excuse me, I didn't mean to interrupt. Just with regard to the SNAP program, whether we would save money in SNAP funds.

Dr. RACHIDI. Right. Well, I don't know if this is exactly what you are getting at, but in terms of the article this morning, again, I look at it as a program integrity issue. It is difficult to talk about expanding SNAP benefits, for example, when that ten percent of SNAP benefits are spent on sweetened beverages which have no nutritional value and do nothing to further the goals of the program.

Dr. SCHANZENBACH. I think that this won't save SNAP dollars. In fact, as I testified earlier, it will increase the administrative cost of the program to no benefit. My professional opinion as an economist, I don't think it is going to change behavior.

Ms. SARASIN. And as I have said before, I don't think it is going to save money either. The administrative costs associated with making these determinations in the context of USDA would be astronomical.

Mr. WEIDMAN. We recommend an access to healthy food incentives and nutrition education, and we think that approach is the best way to create jobs, lift people out of poverty so they don't need SNAP, and reduce healthcare costs.

Dr. WANSINK. There are easier ways to get at that objective, and I don't think just cutting that is going to have the benefits we want.

Mr. SOTO. Now my next question is what would be the administrative costs, knowing that we already ban alcohol, and that seems to be something that hasn't mushroomed costs.

Dr. RACHIDI. When I hear the discussion about how the cost would be astronomical, I don't quite understand how that could be with items, for example, like sweetened beverages that are very straightforward. I understand moving more towards a WIC model, how that could potentially increase administrative costs, but the things that I am talking about I don't see how that would increase administrative costs.

Mr. SOTO. And this is a reference just to a ban on candy and soda, no other items.

Dr. SCHANZENBACH. So I guess I would add to that that restricting alcoholic beverages, that is sort of a different product category and it is real easy for the person who is checking you out to know oh, this is a bottle of wine and not something else. But when it comes to something like sugar sweetened beverages, what we saw in the New York pilot proposal was it is really hard to decide how to define this. For example, two what I would call similar beverages, V8 you could still purchase, but V8 Splash, which is the same sort of thing but it has a little kiwi fruit in it, was not eligible. I think that it gets to something that is very complicated at the store, and it is going to cause confusion. Do we have great estimates of how much it will cost? We have some evidence from the Healthy Incentives Pilot that maybe $5 billion a year, something like that.

The CHAIRMAN. The gentleman's time has expired.

Mr. Arrington, 5 minutes.

Mr. ARRINGTON. Thank you, Mr. Chairman. I admittedly come to the table to discuss as with tension between the consumers' freedom to choose what they purchase to eat, and our responsibility as stewards of taxpayer money to guide in the most responsible way. And I must say, I am undecided, quite frankly, and I am sorry I couldn't get all your testimonies and be a part of the discussion. I had another hearing.

Dr. Rachidi, I understand that you ran the SNAP program for New York City and that you requested a waiver so that you could apply restrictions to people on SNAP and their purchases. Why were you denied that flexibility?

Dr. RACHIDI. And just to be clear, I didn't run the program, but I was the director for policy, and so we proposed the restriction.

But ultimately, what we were told in terms of being denied was related to the evaluation design and that it wasn't rigorous enough to be able to conclude whether a restriction would be effective or not. And that was the main reason that was given, and then given that other states in the past had also proposed similar things, we suspected it was just a general aversion to wanting to do any type of restrictions.

Mr. ARRINGTON. Have they granted—go ahead.

Ms. SARASIN. If I could, just one comment that I don't think has been mentioned today and it is worth mentioning in the context of waivers for various reasons. This Committee several years ago under the leadership of Mr. Goodlatte spent an awful lot of time and energy working toward a state by state interoperability type of process with SNAP. In this mobile society that we are in right now, there has been the need for SNAP recipients to be able to use their benefits where they find themselves, and so with EBT cards,

et cetera, that has been facilitated, so these waivers have created a tension within USDA as well, because once you start doing waivers piecemeal around the country, the interoperability that this Committee spent so much time trying to achieve is compromised.

Mr. ARRINGTON. When is the last time the USDA has granted a waiver for such restrictions?

Dr. RACHIDI. They have not.

Mr. ARRINGTON. Ever, okay. Yes?

Dr. SCHANZENBACH. But, if you wanted to do a real demonstration project, we would just really need to make sure that it is set up so that we can learn something from it. Not only studying the impact on consumption, which I will let you know I have a prediction what that will be, but also the impact on retailers and others. It is going to cost you if you elect to do it.

Mr. ARRINGTON. Yes, that is a good idea and it is fair to include all stakeholders, with states bearing much of the cost in healthcare, or let's just say significant costs for healthcare of their citizens, why not enter another freedom to choose? Why not block grant SNAP, let states choose if they want to go higher with support and supplemental support and work any reforms they want in on work requirements and other requirements and other reforms that have been discussed, not for this hearing? And then let them decide if they find it useful and meaningful to restrict purchases based on the nutritional value? Let states do that. Has that been discussed, and what are your thoughts about that?

Dr. SCHANZENBACH. So my grave concern around a potential block grant is that one of the things that makes SNAP most successful, especially to the broader economy, is that it is designed to respond quickly to changing economic conditions and to times of need. So the program, as you saw during the great recession, expanded in response to the greater need that we saw. It is starting to come back down as the economy is starting to get a foothold.

You may be aware that the dollars that we spend in SNAP also they are very promptly spent and they are spent in the local communities, and so they provide an economic stimulus to the whole area. For every dollar that we spend, at the height of the great recession we got $1.74 in local economic activity because of this. A block grant takes that important aspect of this program off the table. I think it would be a mistake.

Mr. ARRINGTON. So it seems to me that in terms of who is more nimble, the Federal Government, Federal program or a state and local government and program, I am going to put my money on the state and local program in terms of nimbleness. I don't think we have anything to compare it to with respect to this specific program, but I bet there are other ways to compare it.

I am running out of time.

The CHAIRMAN. The gentleman's time has expired.

Mr. Evans. Mr. Evans, 5 minutes.

Mr. EVANS. Thank you, Mr. Chairman.

One question that I have, and maybe all of you can deal with this, my inquiry is what is the impact a reduction in SNAP would mean for retailers from a job perspective? Can someone shed light on the impact of jobs and a reduction of SNAP would create?

Mr. WEIDMAN. One of the things that we have been doing around the country since we started in Pennsylvania with the Fresh Food Financing Initiative is convening groups that include grocers, but other stakeholders around the issue of access to healthy food and grocery store access. That is one thing that we heard loud and clear is that in order to have a successful enterprise in low-income communities, SNAP has become a very critical component there. So in our view, reductions to SNAP is not only going to result in more hunger and less food on the table for American families who are struggling with hard times, but it is going to have an economic effect. Oftentimes grocery stores are the anchor in a community, so if the grocery store closes down, that can have a domino effect, affecting other retail in the community. This happens in rural small towns and urban neighborhoods.

Mr. EVANS. Is anybody as, with the national retailer, able to quantify it in some way what you think it means in terms of numbers?

Dr. SCHANZENBACH. Sure. During normal economic times, every dollar that we spend on SNAP returns about $1.25 to the local area, so I would think the way to think about it during normal economic times, although this would be worse during downturns, but during normal economic times if we took $1 away from SNAP, we would expect to see a reduction of $1.25 in local economic activity.

Mr. EVANS. Can each of you shed light from your perspective on what a SNAP benefit impact would be on recipients?

Dr. SCHANZENBACH. Sure. We have strong predictions that if benefits were reduced, I would predict that we would see an increase in food insecurity. Currently one out of every five children in this great nation lives in a food-insecure household. I also think that, just the opposite of what I talked about before, having fewer dollars to spend at the grocery store means that people are going to substitute towards cheaper forms of calories, and that is exactly the opposite of the direction that we like to see people go. We like to see people eat healthier foods, which tend to be more expensive per calorie.

Mr. EVANS. Thank you, Mr. Chairman.

The CHAIRMAN. The gentleman yields back.

Mr. Allen, 5 minutes.

Mr. ALLEN. Thank you, Mr. Chairman, and the reason I an the last one to ask questions is because I was in a conference meeting this morning talking about spiraling cost of healthcare in this country. And as I look at, statistically, at the growth of this program from 17 million people in 2000 to over 40 million people today, and the fact that this program was initially started during World War II, because I am military, our generals felt like they didn't have the nourishment that they needed to battle the enemy. So we have seen tremendous growth in this program, and then we see tremendous growth in the cost of healthcare.

We are talking about nutrition, and then what is that doing to healthcare? Do we have any studies that tell us, okay, are they related, and if they are related, how do we fix this?

Dr. SCHANZENBACH. To be sure, obesity rates have skyrocketed, not just among the poor, but all across the distribution. And there are studies, we could nitpick them, but common sense dictates that

this increase in obesity that we have seen across the income distribution has real ramifications for the cost of healthcare.

Mr. ALLEN. Obviously, the retailers have a stake in this, the producers, our farmers obviously have a stake in this. We have talked about some options here available to us, but it sounds like to me we better fix this problem because when you look, for example, at Medicaid costs, I mean, it is skyrocketing and the number of people on Medicaid is skyrocketing. And it is because folks are having health problems because of, it may be other factors, but a large part of it is nutrition.

Doctor, would you like to comment on what your thoughts are? I mean, how do we fix this?

Dr. WANSINK. Yes, absolutely. We have all the health concerns that we face, diet-related disease and obesity are the only ones that we can deal with and change immediately. Now you bring up a great point that most grocery stores, maybe they don't really care that much about the shoppers who are there, and to use a health motivation to try to encourage them to get people to buy more fruits and vegetables wouldn't be the right way to do it. But instead, it is aligned in their interest to get more people to buy fresh fruits and vegetables, lean meat and dairy, things like this because when that stuff goes bad, they actually lose money. The margin on it might be thin at the register, but the loss is huge compared to Fruity Pebbles if they don't sell it. Being able to show them that these are easy ways that we can help you get that stuff moving through your store is going to be a win/win situation, just like it was with convenience stores when the Association of Convenience Stores started giving their members ways that they could accelerate sales of healthy foods.

Mr. ALLEN. I am sure you would like to respond to that.

Ms. SARASIN. Yes, I would like to respond to that. Thank you.

I think the notion that food retailers don't care about the health of their customers is just incorrect.

Dr. WANSINK. We will——

Ms. SARASIN. It is incorrect. Just not factually correct. Of course we care about the health of our customers, and of course we are doing things to try to enhance the health of our customers. And we do that every single day, and in my longer testimony, there are multiple examples of the things that we do in store, in our communities, and across the board to try to make sure that we are doing everything we can to meet the needs of our customers.

So while the convenience stores are relatively new to this process and apparently are doing some good things, that is wonderful, but your broad line grocers have been engaged in this process for decades in trying to assist their customers in meeting their dietary needs, and they do it by bringing in nutritionists and dieticians and other professionals in the store to work with their customers on a daily basis to meet those needs, and will continue to do so.

Mr. ALLEN. And of course, we have the food deserts that we have to deal with now. We had testimony here with Amazon, which is becoming a big player in the grocery market. Obviously, we have to come up with a solution to this issue, and so thank you for your help here today, and hopefully we can get our arms around this and solve this problem.

The CHAIRMAN. The gentleman's time has expired.

I want to thank our witnesses. The great news about this Committee, and today's hearing is a terrific example of it, is that if you took the names off the questions and the comments made, you would be hard pressed to determine which were Republicans and which were Democrats. You all have given us great information. The panel has given us terrific information to chew on. This is not the last conversation we will have on SNAP restrictions. I have some folks who feel really strongly about both sides, and the Committee will work its will when we get to this point and place, but this is an important conversation to have had today. You have been incredibly respectful and I appreciate everyone's participation, and I wish more of our work here in the House was as nonpartisan as this is. Not a person here doesn't care about nutrition. Not a person here doesn't care that people eat healthy and that they exercise, and that they make good decisions.

I was particularly informed by the triangle from Dr. Wansink. I wish it was reversed. I wish the health vigilant was the big piece and that the health-disinterested, or the ones who don't care, was the smaller piece of that triangle, but that is correct. There are far more people in America who really don't care. And then there is that group that we can hit, that can change their habits. It is a convenience issue. It is an opportunity to have their kids tell them to do it.

So this program is important, and what they spend their benefit on is important. I am not convinced that the more decisions we make on people's behalf doesn't make them less capable of making good decisions on their own, so it takes education. Somebody said in their testimony there is no silver bullet to fixing this issue. Sugar drinks have a clear impact on people's health, but if we eliminated them off the face of the Earth, I don't know that obesity rates would be any different than they are right now. There are some other systemic changes that have to go on in people's choices and the way they conduct their lives to make this happen.

Under the Rules of the Committee, the record of today's hearing will remain open for 10 calendar days to receive additional material and supplementary written responses from the witnesses to any question posed by a Member.

This hearing of the Committee on Agriculture is adjourned. Thank you.

[Whereupon, at 12:20 p.m., the Committee was adjourned.]

[Material submitted for inclusion in the record follows:]

SUBMITTED REPORT BY HON. K. MICHAEL CONAWAY, A REPRESENTATIVE IN CONGRESS FROM TEXAS

Foods Typically Purchased by Supplemental Nutrition Assistance Program (SNAP) Households

November 2016
Nutrition Assistance Program Report
Food and Nutrition Service, Office of Policy Support

Authors:
Steven Garasky
Kassim Mbwana
Andres Romualdo
Alex Tenaglio
Manan Roy

Submitted by:
IMPAQ International, LLC,
10420 Little Patuxent Parkway, Suite 300,
Columbia, MD 21044

Project Director:
Steven Garasky

Submitted to:
Office of Policy Support,
Food and Nutrition Service,
3101 Park Center Drive,
Alexandria, VA 22302–1500

Project Officer:
Sarah Zapolsky

This study was conducted under Contract number GS–10–F–0240U with the Food and Nutrition Service, United States Department of Agriculture.

This report is available on the Food and Nutrition website: *http://www.fns.usda.gov/research-and-analysis*.

Table of Contents

Table of Exhibits

Executive Summary

Purpose and Overview

The Food and Nutrition Service (FNS) awarded a contract to IMPAQ International, LLC, to determine what foods are typically purchased by households receiving Supplemental Nutrition Assistance Program (SNAP) benefits. This study examined point-of-sale (POS) food purchase data to determine for what foods SNAP households have the largest expenditures, including both SNAP benefits and other resources, and how their expenditures compare to those made by non-SNAP households.

SNAP, administered by FNS, is the nation's largest nutrition assistance program. In 2011, SNAP participants redeemed over $71 billion in SNAP benefits in more than 230,000 SNAP-authorized stores.[1] Given the magnitude of SNAP, FNS has a sustained interest in understanding the effects of the program. To date, FNS has studied SNAP household food consumption and expenditures using national surveys that generally rely on consumers to recall what they ate or to report or scan every purchase. This previous research has shown that the similarities in food purchases, consumption patterns, and dietary outcomes among low-income families and higher-income households are more striking than the differences.[2]

---

*Editor's note: the report entitled, Foods Typically Purchased By Supplemental Nutrition Assistance Program (SNAP) Households and Foods Typically Purchased By Supplemental Nutrition Assistance Program (SNAP) Households—Appendices are two different documents. For purposes of publication in this hearing they are treated as one document.

[1] USDA FNS. (2011). *Supplemental Nutrition Assistance Program 2011 Annual Report.* Benefit Redemption Division. Available at *http://www.fns.usda.gov/snap/retailers/pdfs/2011-annual-report-revised.pdf.*

[2] See, for example, Office of Research and Analysis (2012). *Building a Healthy America: A Profile of the Supplemental Nutrition Assistance Program.* Food and Nutrition Service, USDA (available on line at *www.fns.usda.gov/ora/MENU/Published/snap/FILES/Other/BuildingHealthy America.pdf*).

By using POS data to compare the purchases of SNAP households to those of non-SNAP households, the current study provides more detail on food expenditure patterns than previous studies. This study examines two major questions:

- What food items are purchased by SNAP households?
- How do foods purchased by SNAP households compare to food purchased by non-SNAP households?

Methodology

Data Overview

POS transaction data from January 1, 2011 through December 31, 2011 from a leading grocery retailer were examined for this study.[3] The majority of stores from which the data came would be classified as grocery stores, supermarkets, and combination food and drug stores per FNS Retailer Policy and Management Division food retailer definitions.[4] On average, each of the 12 monthly data files contained over one billion records of food items purchased by 26.5 million households, reflecting 127 million unique transactions. Each monthly data file included an average of 3.2 million SNAP households, identified using the methodology described below. Total expenditures on all SNAP-eligible food items in the dataset by SNAP and non-SNAP households over the 12 months were $39.0 billion, or approximately $3.3 billion per month. SNAP households spent approximately $555 million on SNAP-eligible items each month in this dataset, using both SNAP benefits and other resources such as cash or credit cards.[5]

Identifying SNAP Households and Creating Analysis Categories

SNAP households were identified in the data for each month. This identification was performed monthly because, in any given month, some households enter or leave the program. The analysis identified SNAP households each month by first identifying any transaction in which SNAP electronic benefit transfer (EBT) was used to pay for at least ½ of the value of the purchase and designating the household that made that transaction as a SNAP household.[6] It then linked all other transactions made by that household during that month to estimate total monthly spending by SNAP households. All other transactions in these stores were designated as non-SNAP household purchases.[7]

IMPAQ analyzed SNAP-eligible food items given the focus of the study. Per the Food and Nutrition Act of 2008 (the Act), eligible food includes any food or food product for home consumption, as well as seeds and plants which produce food for consumption. The Act precludes alcoholic beverages, tobacco products, hot food and any food sold for on-premises consumption from being purchased with SNAP benefits.[8] The unit of analysis for the study was a food-related subcommodity, with subcommodities and commodities defined by the data provider. Each subcommodity typically consisted of multiple food items, often distinguished by brand or package size, identified by a Universal Product Code (UPC) or a Price Look Up (PLU) code. Each commodity was an aggregation of similar subcommodities. The "apples" commodity group, for example, combined different varieties (Gala, Fuji, Honeycrisp) and forms (bagged, bulk) that were presented separately as subcommodities.

Although subcommodities and commodities provide adequate comparison reference points, these groupings were designed to help retailers classify purchases for their own needs (*e.g.,* marketing purposes). Therefore, this study analyzed purchases at two higher levels of aggregation. Thirty summary categories were created—for example, meat/poultry/seafood, fruits, vegetables, and frozen prepared foods—to be roughly analogous to the major sections or departments in a typical grocery store. These categories were constructed to enhance discussion of similarities and dif-

---

[3] Per the data sharing agreement between the data provider and IMPAQ, a description of the source of these data must be limited to the following: "From a leading U.S. grocery retailer data examining POS transactions from January 1, 2011 through December 31, 2011 across approximately 11 million SNAP households. The majority of stores would be classified as grocery stores, supermarkets, and combination food and drug stores per USDA/FNS food retailer definitions."

[4] Stores that opened or closed during 2011 were not included in these analyses.

[5] By way of comparison, in FY 2011, 21.1 million households participated in SNAP in an average month (*http://www.fns.usda.gov/ora/MENU/Published/snap/FILES/Participation/2011Characteristics.pdf*) and redeemed $6.0 billion in benefits in an average month (*http://www.fns.usda.gov/snap/retailers/pdfs/2011-annual-report-revised.pdf*).

[6] SNAP transactions in which SNAP EBT was not the majority tender were not identifiable in the data.

[7] Some of these transactions may, in fact, have included SNAP purchases. Some SNAP households may never have presented EBT as the majority tender in any transaction, for example.

[8] See *http://www.fns.usda.gov/snap/retailers/eligible.htm* for more details.

ferences between purchasing patterns of SNAP and non-SNAP households. *Appendix B* provides a crosswalk of subcommodities to summary categories.

IMPAQ also mapped food subcommodities to USDA Food Pattern categories (dairy, fruits, grains, oils, protein foods, solid fats and added sugars (SoFAS), and vegetables). Not all subcommodities could be classified into a single Food Pattern category. Subcommodities incorporating multiple food categories, such as foods packaged as complete meals, were classified as composite foods. In addition, some subcommodities did not contain any Food Pattern categories, or the labels were not descriptive enough to permit categorization even with the addition of the composite category. A ninth category, other, was created to capture such subcommodities. "Other" captured all items that could not be classified using USDA Food Patterns, such as water, isotonic drinks, and baby food.

Data Caveats and Limitations

Although POS data provide a wealth of information on the food purchase patterns of SNAP households, some limitations existed in the data analyzed for this study. The data used for this study captured only transactions completed at a specific set of retail outlets. As stated before, the majority of stores from which the data came would be classified as grocery stores, supermarkets, and combination food and drug stores per FNS Retailer Policy and Management Division food retailer definitions.[9] Purchases made at other SNAP-authorized retailers or other venues (*e.g.,* farmers['] markets) were not included in these data. On average, SNAP households in the data spent approximately $229 per month on SNAP-eligible foods using a combination of SNAP benefits, cash and other forms of payment.[10] In contrast, the national average monthly SNAP benefit per household was $284 in FY 2011.[11] Therefore, although these data account for a significant proportion of SNAP-eligible food expenditures by SNAP households, they do not include all SNAP benefit expenditures.

SNAP transactions were identified as those for which a SNAP EBT card was the majority tender. Because some transactions included both SNAP and cash or credit tenders, these data could not differentiate between items purchased with SNAP benefits and those purchased with other funds. These data, therefore, represent food purchases made by SNAP households, rather than the foods purchased with SNAP EBT specifically.

Rankings of expenditure categories depend in part on the level of food item aggregation (whether at the Food Pattern, summary, commodity or subcommodity levels). As discussed above, the data provider aggregated food items into subcommodities and commodities, considering other factors outside of the needs of this particular analysis. These classifications at times presented analytic challenges that may have affected the rank ordering of purchases. For example, subcommodity groups categorized as "composite" or "other" for these analyses likely included food items that would more appropriately be included in one of the Food Pattern categories had more information been available. Similarly, some distinctions of potential nutritional importance were not available in these data. For example, it was not possible to distinguish between fat-free or low-fat varieties of some dairy products, such as fluid milk or yogurt, from whole milk varieties.

Key Findings

Food Items Purchased by SNAP Households

Overall, the findings from this study indicate that SNAP households and non-SNAP households purchased similar foods in the retail outlets in these data. *Exhibits 1* and *2* summarize the findings.

- There were no major differences in the expenditure patterns of SNAP and non-SNAP households, no matter how the data were categorized. Similar to most American households:

  ○ About 40¢ of every dollar of food expenditures by SNAP households was spent on basic items such as meat, fruits, vegetables, milk, eggs, and bread.

  ○ Another 20¢ out of every dollar was spent on sweetened beverages, desserts, salty snacks, candy and sugar.

  ○ The remaining 40¢ were spent on a variety of items such as cereal, prepared foods, dairy products, rice, and beans.

---

[9] Stores that opened or closed during 2011 were not included in these analyses.

[10] On average, SNAP households in the data made 8.5 transactions per month. The average total expenditure on SNAP-eligible foods per transaction was $26.99.

[11] *http://www.fns.usda.gov/pd/19SNAPavg$HH.htm.*

- The top ten summary categories and the top seven commodities by expenditure were the same for SNAP and non-SNAP households, although ranked in slightly different orders.
- Expenditure shares for each of the USDA Food Pattern categories (dairy, fruits, grains, oils, protein foods, solid fats and added sugars (SoFAS), and vegetables) varied by no more than 3¢ per dollar when comparing SNAP and non-SNAP households. Protein foods represented the largest expenditure share for both household types, while proportionally more was spent on fruits and vegetables than on SoFAS, grains, or dairy.
- Less healthy food items were common purchases for both SNAP and non-SNAP households. Sweetened beverages, prepared desserts and salty snacks were among the top ten summary categories for both groups. Expenditures were greater for sweetened beverages compared to all milk for both groups, as well.
- Expenditures were concentrated in a relatively small number of similar food-item categories. The top five summary groups totaled ½ (50%) of the expenditures for SNAP households and nearly ½ (47%) for non-SNAP households. Twenty-five commodities accounted for over forty percent of the food expenditures in these data with SNAP and non-SNAP households having 20 of them in common. The top 25 subcommodities for SNAP households and non-SNAP households, respectively, accounted for between ⅕ to ¼ of total food expenditures for each group with 16 subcommodities in common for the two groups.

Exhibit 1: SNAP and Non-SNAP Household Food Expenditure Patterns

Finding	SNAP Households	Non-SNAP Households
Total annual expenditures on SNAP-eligible foods in dataset	$6.7 billion	$32.3 billion
Percentage of all transactions by all households	12%	88%
Percentage of total annual expenditures by all households	17%	83%
Top 1,000 subcommodity (of 1,792) expenditures as a percentage of all expenditures	99%	98%
Top 100 subcommodity expenditures as a percentage of all expenditures	51%	46%
Top 25 subcommodity expenditures as a percentage of all expenditures	25%	21%
Top 25 commodity (of 238) expenditures as a percentage of all expenditures	45%	41%
Top 10 summary categories (of 30) by expenditure	Meat/Poultry/Seafood Sweetened Beverages Vegetables Frozen Prepared Foods Prepared Desserts High-fat Dairy/Cheese Bread and Crackers Fruits Milk Salty Snacks	Meat/Poultry/Seafood Vegetables High-fat Dairy/Cheese Fruits Sweetened Beverages Prepared Desserts Bread and Crackers Frozen Prepared Foods Milk Salty Snacks
Top 10 commodities (of 238) by expenditure	Soft Drinks Fluid Milk Products Beef Grinds Bag Snacks Cheese Baked Breads Cold Cereal Chicken Fresh Frozen Handhelds and Snacks Lunchmeat	Fluid Milk Products Soft Drinks Cheese Baked Breads Bag Snacks Beef Grinds Cold Cereal Candy—Packaged Coffee and Creamers Ice Cream, Ice Milk, and Sherbets
Top 10 subcommodities (of 1,792) by expenditure	Fluid Milk/White Only Soft Drinks 12–18 pack Lean Beef Kids' Cereal Shredded Cheese 2-Liter Soft Drink Potato Chips Primal Beef Lunchmeat—Deli fresh Infant Formula/Starter Solution	Fluid Milk/White Only Soft Drinks 12–18 pack Shredded Cheese Chicken Breast—Boneless Frozen Premium Nutritional Meals Pure Orange Juice—Dairy Case Lean Beef Potato Chips Large Eggs Bananas
USDA Food Pattern categories, by expenditure:		
• Dairy	9%	10%
• Fruits	6%	9%
• Grains	12%	13%
• Oils	2%	2%
• Protein Foods	23%	20%
• Solid Fats and Added Sugars	13%	12%
• Vegetables	8%	10%
• Composite	19%	16%

Exhibit 1: SNAP and Non-SNAP Household Food Expenditure Patterns—Continued

Finding	SNAP Households	Non-SNAP Households
• Other	8%	8%

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.

Chapter 1. Introduction and Background

1.1 Introduction

The Food and Nutrition Service (FNS) awarded a contract to IMPAQ International, LLC, to determine what foods are typically purchased by households receiving Supplemental Nutrition Assistance Program (SNAP) benefits. More specifically, this study examined POS food purchase data to determine for what foods SNAP households have the largest expenditures, including both SNAP benefits and other resources, and how these expenditures compare to those made by non-SNAP households.

1.2 Background

The mission of FNS is to provide children and needy families with improved access to food and a more healthful diet through a range of nutrition assistance programs and comprehensive nutrition education efforts. SNAP, administered by FNS, is the nation's largest nutrition assistance program, providing benefits to more than 15% of the U.S. population. In 2011, SNAP participants redeemed over $71 billion in SNAP benefits in more than 230,000 SNAP-authorized stores.[12] Total program costs in FY 2011 were nearly $76 billion.[13] Given the magnitude of SNAP, FNS has a sustained interest in understanding the effects of the program.

SNAP aims to alleviate hunger and improve the nutritional status of participants by increasing the resources available to households to purchase food. Paradoxically, one-in-six people in the U.S. experiences food insecurity,[14] while ⅔ of adults and ⅓ of children are overweight or obese.[15] These public health problems disproportionately affect low-income populations.[16] While no evidence exists that SNAP participation causes obesity, the high rates of obesity and food insecurity among low-income Americans underscore the importance of exploring ways to continue to employ SNAP strategically as a tool to promote healthier nutrition, as well as to reduce obesity rates among program participants of whom nearly 50% are children.

1.3 Research Questions

The project addressed two key research questions.
Research Question 1: What food items are purchased by SNAP households? Specifically, the study examined SNAP household food expenditure data by four categorizations: U.S. Department of Agriculture (USDA) Food Pattern categories, "summary categories," commodities, and subcommodities.
Research Question 2: How do foods purchased by SNAP households compare to purchases made by non-SNAP households? Analyses paralleled those for Research Question 1, but for non-SNAP households. Comparisons were then drawn between the food expenditures of SNAP and non-SNAP households.

---

[12] USDA FNS. (2011). *Supplemental Nutrition Assistance Program 2011 Annual Report.* Benefit Redemption Division. Available at *http://www.fns.usda.gov/snap/retailers/pdfs/2011-annual-report-revised.pdf.*

[13] *http://www.fns.usda.gov/pd/SNAPsummary.htm.*

[14] Coleman-Jensen, A., Nord, M., Andrews, M., & Carlson, S. (2011). *Household food security in the United States in 2010.* Economic Research Report, No. ERR–125. Available at *http://www.ers.usda.gov/media/884525/err141.pdf.*

[15] Flegal, K.M., Carroll, M.D., Ogden, C.L., & Curtin, L.R. (2010). "Prevalence and trends in obesity among U.S. adults, 1999–2008," *Journal of the American Medical Association,* 303, 235–241; Burgstahler, R., Gundersen, C., & Garasky, S. (forthcoming). "The Supplemental Nutrition Assistance Program, financial stress, and childhood obesity." *Agricultural and Resource Economics Review;* Eisenmann, J.C., Gundersen, C., Lohman, B.J., Garasky, S., & Stewart, S.D. (2011). "Is food insecurity related to overweight and obesity in children and adolescents? A summary of studies, 1995–2009." *Obesity Reviews,* 12, e73–e83; Lohman, B.J., Stewart, S., Gundersen, C., Garasky, S., & Eisenmann, J.C. (2009). "Adolescent overweight and obesity: Links to food insecurity and individual, maternal, and family stressors." *Journal of Adolescent Health,* 45, 230–237; Gundersen, C., Garasky, S., & Lohman, B.J. (2009) "Food insecurity is not associated with childhood obesity as assessed using multiple measures of obesity." *Journal of Nutrition,* 139, 1173–1178.

[16] Trust for America's Health. (2011). *F as in fat: How obesity threatens America's future.* Available at *http://healthyamericans.org/reports/obesity2010/Obesity2010Report.pdf.*

159

1.4 Challenges of Collecting Point-of-Sale Data

Understanding the food choices and purchasing patterns of SNAP participants is an important part of promoting healthy choices. FNS analyzes various extant data that describe the diets and food purchasing patterns of SNAP households. For example, The *National Health and Nutrition Examination Survey* is an annual nationally representative survey of approximately 5,000 respondents that collects, among other data, dietary behavior and 24-hour dietary recall data.[17] The *Nielsen Homescan* data include a panel of households that records grocery purchases using a scanning device.[18] Panelists scan the barcodes of the products they purchase, recording information such as price and quantity. The *Consumer Expenditure Survey* gathers expenditure information from participants every 3 months over a 15 month period through interviews and a diary survey.[19] The interview is designed to gather expenditure data on items that are easy to recall, while the diary survey records purchases made each day during a 2 week period.

An outstanding question is whether food purchase data collected at the point-of-sale offers a different or more detailed perspective on the food choices of SNAP and other households. Ideally, retail data on SNAP electronic benefit transfer (EBT) purchases would be collected in a timely manner—preferably at the point of sale—and with sufficient sample size to be nationally representative. To date, there have been numerous challenges to collecting such retail data:

- The immense volume of SNAP retail data—in FY 2011, over $71 billion in SNAP benefits were redeemed at over 230,000 participating stores, farmers['] markets and other venues authorized to accept SNAP benefits.[20] These transactions represent billions of food items purchased each month via an estimated 250 million or more unique transactions.
- The wide variety of food products and package sizes sold by the over 230,000 SNAP-authorized retailers—roughly 40,000 items in larger stores [21]—and the diverse ways retailers identify and track these items.
- Industry reluctance to share detailed sales data, a key competitive tool for food marketers.
- Equipment and system changes needed to capture item-level data at SNAP-approved stores. The numerous cash register technologies currently in use vary in their sophistication and their ability to collect item-level data. Data transmission and storage are also important issues.
- Distinguishing between SNAP and non-SNAP transactions and purchases, given that SNAP households at times combine SNAP benefits and their own funds when making purchases.

The current study provides a snapshot of food purchasing patterns using POS data from a set of retailers to compare expenditures on SNAP-eligible food items made by SNAP and non-SNAP households.

Chapter 2. Methodology

2.1 Data Overview

POS transaction data from January 1, 2011 through December 31, 2011 from a leading grocery retailer were examined in this study.[22] The majority of stores from which the data came would be classified as grocery stores, supermarkets, and combination food and drug stores per FNS Retailer Policy and Management Division food retailer definitions.[23] On average, each of the 12 monthly data files contained over one billion records of food items purchased by 26.5 million households, reflecting 127 million unique transactions. Each monthly data file included an average of 3.2 million SNAP households, identified using the methodology described below. Total expenditures on all SNAP-eligible food items in the dataset by SNAP and non-

---

[17] *http://www.cdc.gov/nchs/tutorials/Dietary/SurveyOrientation/intro.htm.*
[18] *http://www.ncppanel.com.*
[19] *http://www.bls.gov/cex.*
[20] Supplemental Nutrition Assistance Program, USDA FNS Benefit Redemption Division 2011 Annual Report. Available from *http://www.fns.usda.gov/snap/retailers/pdfs/2011-annual-report-revised.pdf.*
[21] *http://www.fmi.org/facts_figs/?fuseaction=superfact.*
[22] Per the data sharing agreement between the data provider and IMPAQ, a description of the source of these data must be limited to the following: "From a leading U.S. grocery retailer data examining POS transactions from January 1, 2011 through December 31, 2011 across approximately 11 million SNAP households. The majority of stores would be classified as grocery stores, supermarkets, and combination food and drug stores per USDA/FNS food retailer definitions."
[23] Stores that opened or closed during 2011 were not included in these analyses.

SNAP households over the 12 months were $39.0 billion, or approximately $3.3 billion per month. SNAP households expended approximately $555 million on SNAP-eligible food items each month in this dataset, using both SNAP benefits and other resources such as cash or credit cards.[24]

2.2 Identification of SNAP Households and Creation of Analysis Categories

SNAP households were identified in the data for each month. This identification was performed monthly because, in any given month, some households enter or leave the program. The analysis identified SNAP households each month by first identifying any transaction in which SNAP EBT was used to pay for at least ½ of the value of the purchase and designating the household that made that transaction as a SNAP household.[25] It then linked all other transactions made by that household during that month to estimate total monthly spending by SNAP households. All other transactions in these stores were designated as non-SNAP household purchases.[26] *Exhibit 2* illustrates the identification of SNAP households.

Exhibit 2: Conceptual Map for Identification of SNAP Households in the POS Data
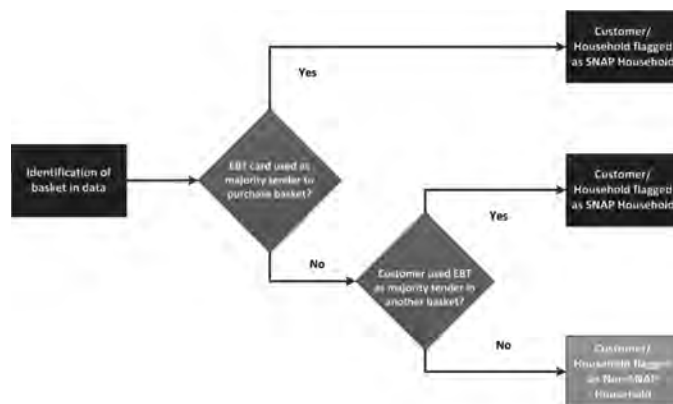
IMPAQ analyzed SNAP-eligible food items given the focus of the study. Per the Food and Nutrition Act of 2008 (the Act), eligible food include any food or food product for home consumption, as well as seeds and plants which produce food for consumption. The Act precludes alcoholic beverages, tobacco products, hot food and any food sold for on-premises consumption from being purchased with SNAP benefits.[27] The unit of analysis for the study was a food-related subcommodity, with subcommodities and commodities defined by the data provider. Each subcommodity typically consisted of multiple food items, often distinguished by brand or package size, identified by a Universal Product Code (UPC) or a Price Look Up (PLU) code. Each commodity was an aggregation of similar subcommodities. The "apples" commodity group, for example, combined different varieties (Gala, Fuji, Honeycrisp) and forms (bagged, bulk) that were presented separately as subcommodities. The decision to rely on subcommodity groupings follows procedures established in published studies.[28] These studies prefer subcommodity-level analyses over item-level analyses because UPCs and PLUs assigned by manufacturers and retailers can change over

---

[24] By way of comparison, in FY 2011, 21.1 million households participated in SNAP in an average month (*http://www.fns.usda.gov/ora/MENU/Published/snap/FILES/Participation/2011Characteristics.pdf*) and redeemed $6.0 billion in benefits in an average month (*http://www.fns.usda.gov/snap/retailers/pdfs/2011-annual-report-revised.pdf*).

[25] SNAP transactions in which SNAP EBT was not the majority tender were not identifiable in the data.

[26] Some of these transactions may, in fact, have included SNAP purchases. Some SNAP households may never have presented EBT as the majority tender in any transaction, for example.

[27] See *http://www.fns.usda.gov/snap/retailers/eligible.htm* for more details.

[28] For examples, see Hamilton, S., *et al.* (2007). "Food and nutrient availability in New Zealand: An analysis of supermarket sales data." *Public Health Nutrition,* 10(12): 1448–1455; Van Wave, T.W., & Decker, M. (2003). "Secondary analysis of a marketing research database reveals patterns in dairy product purchases over time." *Journal of American Dietetic Association,* 103(4), 445–453.

time. Additionally, the same food item may be sold in multiple forms with different brands and labels, each with its own unique UPC.[29]

Exhibit 3 details expenditures on SNAP-eligible food items in the dataset. As can be seen, expenditures on all 1,792 subcommodities in the dataset sum up to $6.7 billion and $32.3 billion for SNAP and non-SNAP households, respectively. Notably, expenditures on the top 1,000 subcommodities account for 99% of expenditures for SNAP households and 98% for non-SNAP households. For this reason, all subsequent analyses and tables in the report are generated using the top 1,000 subcommodities.

Exhibit 3: Summary of SNAP and Non-SNAP Household Food Expenditures in the Dataset by Subcommodity

Finding	SNAP Households	Non-SNAP Households
Total annual expenditures on SNAP-eligible foods in dataset	$6.7 billion	$32.3 billion
Percentage of all transactions by all households	12%	88%
Percentage of total annual expenditures by all households	17%	83%
Top 1,000 (of 1,792) subcommodity expenditures as a percentage of all expenditures	99%	98%
Top 100 (of 1,792) subcommodity expenditures as a percentage of all expenditures	51%	46%
Top 25 (of 1,792) subcommodity expenditures as a percentage of all expenditures	25%	21%
Top 25 commodity (of 238) expenditures as a percentage of all expenditures	45%	41%
Total annual expenditures on top 1,000 subcommodities	**$6.5805 billion**	**$31.5138 billion**

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.

The data provider aggregated the subcommodities to commodities. The top 1,000 subcommodities represented 238 commodities. Although subcommodities and commodities provide adequate comparison reference points, these groupings were designed to help retailers classify purchases for their own needs (*e.g.,* marketing purposes). Therefore, this study analyzed purchases at two higher levels of aggregation. Thirty summary categories were created—for example, meat/poultry/seafood, fruits, vegetables, cereal, candy, and frozen prepared foods—to be roughly analogous to the major sections or departments in a typical grocery store. These categories were constructed to enhance discussion of similarities and differences between the purchasing patterns of SNAP and non-SNAP households. Appendix B provides a crosswalk of subcommodities to summary categories.

IMPAQ also mapped food subcommodities to USDA Food Pattern categories (dairy, fruits, grains, oils, protein foods, solid fats and added sugars (SoFAS), and vegetables).[30] A crosswalk of subcommodities to USDA Food Pattern categories can be found in *Appendix C.* Relative to the 30 summary categories, there are only seven USDA Food Pattern categories. As a result, more subcommodities were included in each Food Pattern category, on average, relative to the summary categories which at times lead to differing results for categories with the same name. For example, for the USDA Food Patterns analysis, 100% pure orange juice was classified as a fruit. Juice, however, is a specific category among the summary categories. Therefore, expenditures on 100% orange juice were not included as fruit expenditures for the summary categories analysis as they were for the Food Patterns analysis. Readers should keep this in mind when comparing results for categories such as fruits or vegetables across analyses.

Not all subcommodities could be classified into single Food Pattern categories. Subcommodities incorporating multiple food categories, such as foods packaged as complete meals, were classified as *composite* foods. In addition, some subcommodities did not fit any Food Pattern categories, or the labels were not descriptive enough to permit categorization even with the addition of the composite category. A ninth category, *other,* was created to capture such subcommodities. "Other" captured all items that could not be classified using USDA Food Patterns, such as water, isotonic drinks, and baby food. *Exhibit 4* describes the aggregations of food items used for these analyses, using fluid milk products as an example.

---

[29] Baxter, J., *et al.* (1996). *Experiences in using computerized sales data to evaluate a nutrition intervention program.* JOURNAL OF NUTRITION EDUCATION, 28, 443–445.

[30] USDA Center for Nutrition Policy and Promotion Food Patterns (*http://www.cnpp.usda.gov/USDAFoodPatterns.htm*).

Exhibit 4: Aggregating Food Items
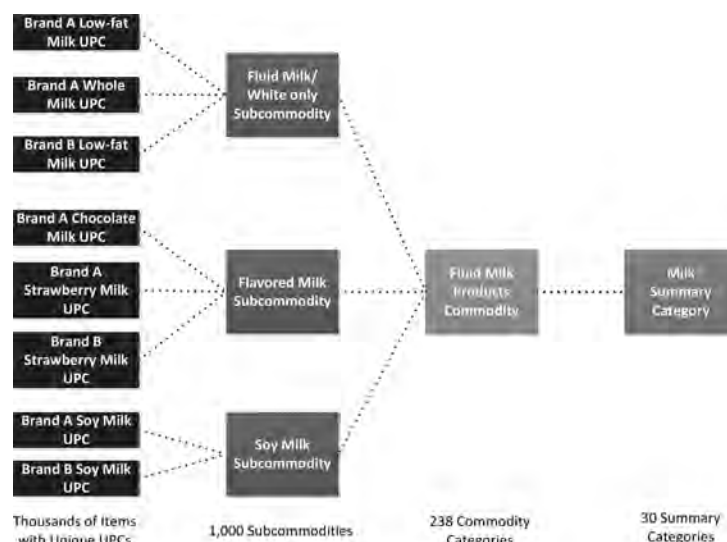
Note: The vast majority of commodities included subcommodities that could be mapped to a single summary category as shown above. However, a small number of commodities included subcommodities that did not map to the same summary category. For example, the commodity group *Authentic Hispanic Foods and Products* included *authentic vegetables and foods, Hispanic carbonated beverages, and authentic pasta/rice/beans subcommodities* which mapped to the vegetables, sweetened beverages, and rice summary categories, respectively. The top 1,000 subcommodities accounted for 99% of all expenditures on SNAP-eligible food items in the dataset for SNAP households and 98% of all expenditures on SNAP-eligible food items by non-SNAP households.

2.3 Data Caveats and Limitations

Although POS data provide a wealth of information on the food purchase patterns of SNAP households, some limitations existed in the data analyzed for this study. The data used for this study captured only transactions completed at a specific set of retail outlets. As stated before, the majority of stores from which the data came would be classified as grocery stores, supermarkets, and combination food and drug stores per FNS Retailer Policy and Management Division food retailer definitions.[31] Purchases made at other SNAP-authorized retailers or other venues (*e.g., farmers[']* markets) were not included in these data. On average, SNAP households in the data spent approximately $229 per month on SNAP-eligible foods using a combination of SNAP benefits, cash and other forms of payment.[32] In contrast, the national average monthly SNAP benefit per household was $284 in FY 2011.[33] Therefore, although these data account for a significant proportion of SNAP-eligible food expenditures by SNAP households, they do not include all SNAP benefit expenditures.

SNAP transactions were identified as those for which a SNAP EBT card was the majority tender. Because some transactions included both SNAP and cash or credit tenders, these data could not differentiate between items purchased with SNAP benefits and those purchased with other funds. These data, therefore, represent food purchases made by SNAP households rather than the foods purchased with SNAP EBT.

Rankings of expenditure categories depend in part on the level of food item aggregation (whether at the Food Pattern category, summary category, commodity or subcommodity levels). As discussed above, the data provider aggregated food items into subcommodities and commodities considering other factors outside of the needs of

---

[31] Stores that opened or closed during 2011 were not included in these analyses.

[32] On average, SNAP households in the data made 8.5 transactions per month. The average total expenditure on SNAP-eligible foods per transaction was $26.99.

[33] *http://www.fns.usda.gov/pd/19SNAPavg$HH.htm.*

this particular analysis. These classifications at times presented analytic challenges that may have affected the rank ordering of expenditures. For example, subcommodity groups categorized as "composite" or "other" for these analyses likely included food items that would more appropriately be included in one of the Food Pattern categories had more information been available. Similarly, some distinctions of potential nutritional importance were not available in these data. For example, it was not possible to distinguish between fat-free or low-fat varieties of some dairy products, such as fluid milk or yogurt, from whole milk varieties.

Chapter 3. Findings: Top Expenditures by SNAP and Non-SNAP Households

---

Key Findings

- There were no major differences in the expenditure patterns of SNAP and non-SNAP households, no matter how the data were categorized. Similar to most American households:

  - About 40¢ of every dollar of food expenditures by SNAP households was spent on basic items such as meat, fruits, vegetables, milk, eggs, and bread.
  - Another 20¢ out of every dollar was spent on sweetened beverages, desserts, salty snacks, candy and sugar.
  - The remaining 40¢ were spent on a variety of items such as cereal, prepared foods, dairy products, rice, and beans.

- The top ten summary categories and the top seven commodities by expenditure were the same for SNAP and non-SNAP households, although ranked in slightly different orders.

- Less healthy food items were common purchases for both SNAP and non-SNAP households. Sweetened beverages, prepared desserts and salty snacks were among the top ten summary categories for both groups. Expenditures were greater for sweetened beverages compared to all milk for both groups, as well.

- Expenditures were concentrated in a relatively small number of similar food-item categories. The top five summary groups totaled ½ (50%) of the expenditures for SNAP households and nearly ½ (47%) for non-SNAP households. Twenty-five commodities accounted for nearly ½ of the food expenditures in these data with SNAP and non-SNAP households having 20 of them in common. The top 25 subcommodities for SNAP households and non-SNAP households, respectively, accounted for over ⅕ of food expenditures for each group with 16 subcommodities in common for the two groups.

3.1 Distribution of Expenditures by Summary Categories

Exhibit 5 provides an overview of expenditures by the summary categories described in Chapter 2. In general, SNAP and non-SNAP household expenditure rankings and proportions were similar. Expenditures on basic or staple foods (meat/poultry/seafood, fruits, vegetables, milk, eggs and bread/crackers) comprised over 40¢ of every food purchase dollar for both SNAP and non-SNAP households (41¢ and 44¢/dollar, respectively). Another 20¢ per dollar was spent on less healthy foods such as sweetened beverages, prepared desserts, salty snacks, candy and sugars by both household groups (SNAP households—23¢; non-SNAP households—20¢).

Expenditures were generally concentrated in a small number of summary groups for both SNAP and non-SNAP households. The top five groups total ½ (50%) of the expenditures for SNAP households and nearly ½ (47%) for non-SNAP households. The top three categories by expenditures for SNAP households were meat/poultry/seafood, sweetened beverages, and vegetables. The top three categories for non-SNAP households were meat/poultry/seafood, vegetables, and high fat dairy/cheese; sweetened beverages ranked fifth. Both SNAP and non-SNAP households spent a greater proportion of total expenditures on meat, poultry and seafood than any other category. Both household groups spent more on fruits and vegetables than on prepared foods, and more on sweetened beverages than on milk.

Exhibit 5: Summary Categories by Expenditure

Summary Category	SNAP Household Expenditures			Non-SNAP Household Expenditures		
	Rank	$ in Millions	% of Expenditures	Rank	$ in Millions	% of Expenditures
Meat, Poultry and Seafood	1	$1,262.9	19.19%	1	$5,016.3	15.92%
Sweetened Beverages	2	$608.7	9.25%	5	$2,238.8	7.10%
Vegetables	3	$473.4	7.19%	2	$2,873.9	9.12%
Frozen Prepared Foods	4	$455.2	6.92%	8	$1,592.3	5.05%
Prepared Desserts	5	$453.8	6.90%	6	$2,021.2	6.41%
High Fat Dairy/Cheese	6	$427.8	6.50%	3	$2,483.2	7.88%
Bread and Crackers	7	$354.9	5.39%	7	$1,978.2	6.28%
Fruits	8	$308.2	4.68%	4	$2,271.2	7.21%
Milk	9	$232.7	3.54%	9	$1,211.0	3.84%
Salty Snacks	10	$225.6	3.43%	10	$969.7	3.08%
Prepared Foods	11	$202.2	3.07%	14	$707.0	2.24%
Cereal	12	$186.9	2.84%	11	$933.9	2.96%
Condiments and Seasoning	13	$174.6	2.65%	12	$878.9	2.79%
Fats and Oils	14	$155.1	2.36%	13	$766.9	2.43%
Candy	15	$138.2	2.10%	15	$701.4	2.23%
Baby Food	16	$126.8	1.93%	27	$198.2	0.63%
Juices	17	$110.4	1.68%	16	$605.4	1.92%
Coffee and Tea	18	$83.4	1.27%	17	$568.8	1.80%
Bottled Water	19	$78.1	1.19%	22	$377.4	1.20%
Eggs	20	$73.8	1.12%	21	$388.2	1.23%
Other Dairy Products	21	$69.8	1.06%	18	$549.5	1.74%
Pasta, Cornmeal, Other Cereal Products	22	$66.4	1.01%	23	$281.5	0.89%
Soups	23	$62.7	0.95%	20	$414.1	1.31%
Sugars	24	$60.9	0.93%	24	$260.3	0.83%
Nuts and Seeds	25	$53.2	0.81%	19	$445.9	1.41%
Beans	26	$38.3	0.58%	25	$234.5	0.74%
Rice	27	$30.1	0.46%	28	$131.0	0.42%
Jams, Jellies, Preserves and Other Sweets	28	$29.1	0.44%	29	$117.5	0.37%
Flour and Prepared Flour Mixes	29	$18.7	0.28%	30	$94.9	0.30%
Miscellaneous	30	$18.6	0.28%	26	$202.6	0.64%
Total Summary Category Expenditures (Top 1,000 subcommodities)		**$6,580.5**	**100%**		**$31,513.8**	**100%**

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.
Note: Columns may not sum to total shown due to rounding.

3.2 Distribution of Expenditures by Commodities

Exhibit 6 examines expenditures at the commodity level, listing the top 100 commodities by expenditure for SNAP households while providing corresponding rankings of these commodities for non-SNAP households. The top 100 commodities accounted for nearly all expenditures for both SNAP (87%) and non-SNAP (82%) households. The top 25 SNAP household commodities accounted for nearly ½ (46%) of the food expenditures for SNAP households; the top 25 commodities for non-SNAP households accounted for 42%. Among the top 25 commodities, the two households groups had 20 in common.

The top two commodities were the same for SNAP and non-SNAP households, namely soft drinks and fluid milk products, although the order was reversed with soft drinks ranked first for SNAP households compared to fluid milk products for non-SNAP households. However, while expenditure proportions were similar for fluid milk products across the two household types (4¢ per dollar), expenditure proportions on soft drinks were slightly higher for SNAP households compared to non-SNAP households (5¢ *versus* 4¢ per dollar). Overall, the expenditure rankings and patterns should be assessed with caution as a small difference in the expenditure share of a commodity can lead to a major difference in the ranking of the commodity. For example, among SNAP households, the difference in expenditure shares between lunchmeat, ranked tenth, and aseptic juice, ranked sixty-ninth, is approximately 1¢ per dollar.

Exhibit 6: Top 100 Commodities for SNAP Households by Expenditure

Commodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
	Rank	$ in Millions	% of Expenditures	Rank	$ in Millions	% of Expenditures
Soft drinks	1	$357.7	5.44%	2	$1,263.3	4.01%
Fluid milk products	2	$253.7	3.85%	1	$1,270.3	4.03%
Beef grinds	3	$201.0	3.05%	6	$621.1	1.97%
Bag snacks	4	$199.3	3.03%	5	$793.9	2.52%
Cheese	5	$186.4	2.83%	3	$948.9	3.01%

**Exhibit 6: Top 100 Commodities for SNAP Households by Expenditure—
Continued**

Commodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
	Rank	$ in Millions	% of Expenditures	Rank	$ in Millions	% of Expenditures
Baked breads	6	$163.7	2.49%	4	$874.8	2.78%
Cold cereal	7	$139.2	2.12%	7	$583.9	1.85%
Chicken fresh	8	$121.4	1.85%	11	$477.8	1.52%
Frozen handhelds and snacks	9	$101.5	1.54%	47	$214.6	0.68%
Lunchmeat	10	$99.4	1.51%	17	$386.1	1.23%
Candy—packaged	11	$96.2	1.46%	8	$527.7	1.67%
Infant formula	12	$95.7	1.45%	80	$124.8	0.40%
Frozen pizza	13	$90.2	1.37%	23	$305.7	0.97%
Refrigerated juices/drinks	14	$88.5	1.35%	14	$412.8	1.31%
Ice cream, ice milk, sherbets	15	$86.0	1.31%	10	$481.8	1.53%
Coffee and creamers	16	$82.3	1.25%	9	$519.4	1.65%
Cookies	17	$78.2	1.19%	16	$408.3	1.30%
Water—(sparkling and still)	18	$77.0	1.17%	18	$379.2	1.20%
Shelf stable juice	19	$73.1	1.11%	28	$282.2	0.90%
Eggs/muffins/potatoes	20	$72.0	1.09%	20	$358.7	1.14%
Frozen single serving premium meals	21	$68.6	1.04%	12	$447.1	1.42%
Cakes	22	$68.2	1.04%	38	$240.9	0.76%
Bacon	23	$66.1	1.00%	27	$283.2	0.90%
Traditional Mexican foods	24	$62.6	0.95%	25	$286.9	0.91%
Yogurt	25	$59.9	0.91%	13	$442.3	1.40%
Salad dressing and sandwich spreads	26	$59.7	0.91%	30	$280.9	0.89%
Dinner sausage	27	$59.3	0.90%	46	$222.6	0.71%
Frozen prepared chicken	28	$58.6	0.89%	74	$136.4	0.43%
Baked sweet goods	29	$57.5	0.87%	62	$159.6	0.51%
Beef loins	30	$56.3	0.86%	31	$280.3	0.89%
Chicken frozen	31	$54.8	0.83%	85	$123.0	0.39%
Deli meat: bulk	32	$54.6	0.83%	15	$411.0	1.30%
Frozen multi-serve meals	33	$53.0	0.81%	54	$183.5	0.58%
Dinner mixes-dry	34	$51.8	0.79%	72	$140.3	0.45%
Frozen breakfast foods	35	$51.3	0.78%	55	$180.9	0.57%
Crackers and misc baked food	36	$50.9	0.77%	21	$323.7	1.03%
Frozen novelties-water ice	37	$50.7	0.77%	43	$229.7	0.73%
Margarines	38	$50.3	0.76%	24	$303.0	0.96%
Condiments and sauces	39	$49.8	0.76%	52	$187.2	0.59%
Potatoes	40	$48.8	0.74%	34	$265.2	0.84%
Frozen vegetable and veg dish	41	$48.2	0.73%	33	$266.9	0.85%
Hot dogs	42	$45.5	0.69%	63	$158.4	0.50%
Can vegetables—shelf stable	43	$45.3	0.69%	50	$191.7	0.61%
Shortening and oil	44	$44.6	0.68%	57	$174.2	0.55%
Sugars and sweeteners	45	$43.3	0.66%	60	$162.4	0.52%
Isotonic drinks	46	$42.8	0.65%	53	$185.3	0.59%
Salad mix	47	$42.8	0.65%	22	$319.4	1.01%
Milk by-products	48	$42.5	0.65%	32	$268.9	0.85%
Pork boneless loin/rib	49	$41.5	0.63%	58	$168.0	0.53%
Convenience breakfasts and wholesome snacks	50	$41.1	0.62%	45	$226.1	0.72%
Frozen single serve economy meals	51	$40.9	0.62%	109	$80.7	0.26%
Refrigerated dough products	52	$40.5	0.62%	56	$176.6	0.56%
Beef round	53	$40.4	0.61%	75	$134.2	0.43%
Dry bean vegetables and rice	54	$39.9	0.61%	59	$166.1	0.53%
Convenient meals	55	$38.7	0.59%	108	$81.0	0.26%
Tomatoes	56	$38.3	0.58%	35	$261.3	0.83%
Candy—checklane	57	$37.9	0.58%	64	$154.0	0.49%
Berries	58	$37.4	0.57%	19	$373.5	1.19%
Grapes	59	$36.1	0.55%	39	$235.7	0.75%
Bananas	60	$36.1	0.55%	36	$261.4	0.83%
Peanut	61	$36.0	0.55%	42	$231.0	0.73%
Pork thin meats	62	$35.0	0.53%	93	$106.8	0.34%
Citrus	63	$34.3	0.52%	37	$251.7	0.80%
Breakfast sausage	64	$34.2	0.52%	79	$126.7	0.40%
Dry sauce, gravy, potatoes, stuffing	65	$34.0	0.52%	87	$119.2	0.38%
Salad and dips	66	$33.9	0.52%	40	$235.3	0.75%
Apples	67	$33.7	0.51%	29	$281.7	0.89%
Meat—shelf stable	68	$33.3	0.51%	91	$109.2	0.35%
Aseptic juice	69	$33.1	0.50%	112	$78.9	0.25%
Sweet goods	70	$32.5	0.49%	66	$152.9	0.49%
Frozen potatoes	71	$32.2	0.49%	95	$104.5	0.33%
Meat frozen	72	$31.9	0.48%	120	$69.9	0.22%
Baby foods	73	$30.6	0.46%	121	$67.8	0.22%
Vegetables salad	74	$30.0	0.46%	44	$228.6	0.73%
Beef: thin meats	75	$30.0	0.46%	78	$127.7	0.41%
Seafood—shrimp	76	$29.8	0.45%	84	$123.1	0.39%
Canned soups	77	$29.7	0.45%	65	$153.6	0.49%
Baking mixes	78	$28.3	0.43%	69	$148.1	0.47%
Pasta and pizza sauce	79	$27.6	0.42%	99	$96.7	0.31%
Dry noodles and pasta	80	$27.5	0.42%	71	$141.5	0.45%
Can seafood—shelf stable	81	$26.5	0.40%	77	$132.3	0.42%
Rts/micro soup/broth	82	$26.0	0.40%	48	$200.8	0.64%
Canned pasta and microwave food	83	$25.9	0.39%	135	$56.7	0.18%
Smoked hams	84	$25.7	0.39%	92	$108.8	0.35%

Exhibit 6: Top 100 Commodities for SNAP Households by Expenditure—Continued

Commodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
	Rank	$ in Millions	% of Expenditures	Rank	$ in Millions	% of Expenditures
Nuts	85	$25.6	0.39%	41	$234.2	0.74%
Value-added fruit	86	$25.3	0.38%	70	$146.6	0.47%
Can beans	87	$24.0	0.36%	82	$123.3	0.39%
Dry/ramen bouillon	88	$21.7	0.33%	133	$61.0	0.19%
Powder and crystal drink mix	89	$21.6	0.33%	119	$75.2	0.24%
Rtd tea/new age juice	90	$21.5	0.33%	103	$93.8	0.30%
Baking needs	91	$21.3	0.32%	51	$188.9	0.60%
Can fruit/jar applesauce	92	$20.9	0.32%	96	$104.0	0.33%
Spices and extracts	93	$20.4	0.31%	86	$121.9	0.39%
Energy drinks	94	$20.1	0.30%	102	$94.1	0.30%
Onions	95	$20.0	0.30%	81	$123.5	0.39%
Tropical fruit	96	$19.8	0.30%	61	$160.1	0.51%
Bagels and cream cheese	97	$19.8	0.30%	83	$123.2	0.39%
Frozen bread/dough	98	$19.7	0.30%	114	$77.7	0.25%
Rolls	99	$18.9	0.29%	88	$113.9	0.36%
Hot cereal	100	$18.9	0.29%	100	$96.1	0.30%
Expenditures on Listed Commodities		**$5,700.3**	**86.62%**		**$25,800.4**	**81.93%**
Expenditures on Top 1,000 Subcommodities		**$6,580.5**	**100%**		**$31,513.8**	**100%**

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.
Note: The table lists the top 100 commodities for SNAP households and the corresponding rankings of these commodities for non-SNAP households. Columns may not sum to total shown due to rounding.

3.3 Distribution of Expenditures by Subcommodities

Exhibit 7 presents the top 100 subcommodities purchased by SNAP households, along with corresponding expenditures and ranks of these subcommodities for non-SNAP households.[34] These 100 subcommodities accounted for over ½ (51%) of the food expenditures in these data for SNAP households. Comparatively, the food purchases of non-SNAP households on these 100 subcommodities represented only 43% of their total expenditures. As expected, the level of detail provided by the subcommodity classifications resulted in relatively small proportions of total expenditures being spent on any single subcommodity. Individually, only six subcommodities represented more than 1% of the expenditures of SNAP households. As with the commodity rankings, a small difference in the expenditure share of a subcommodity translated into a substantial difference in its ranking. For example, among SNAP households, the difference in shares of expenditures between potato chips, ranked seventh, and bananas, ranked thirty-fifth, is less than ½ of one percentage point.

The top two subcommodities purchased by SNAP households, fluid milk/white only and carbonated soft drinks in 12–18 can packages, were the top subcommodities for non-SNAP households as well. An interesting difference in rankings of subcommodities between SNAP households and non-SNAP households was for infant formula/starter solution. This subcommodity ranked tenth among SNAP households. The majority of these formula purchases were made when SNAP EBT was not the majority tender (results not presented here), perhaps because WIC (Special Supplemental Nutrition Program for Women, Infants, and Children) benefits were used. Infant formula/starter solution purchases ranked well out of the top 100 for non-SNAP households, at 190.

Exhibit 7: Top 100 Subcommodities for SNAP Households by Expenditure

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
	Rank	$ in Millions	% of Expenditures	Rank	$ in Millions	% of Expenditures
Fluid Milk/White Only	1	$191.1	2.90%	1	$853.8	2.71%
Soft Drinks 12/18 &15pk Can Car	2	$164.6	2.50%	2	$601.2	1.91%
Lean [Beef]	3	$112.4	1.71%	7	$257.9	0.82%
Kids' Cereal	4	$78.1	1.19%	20	$186.4	0.59%
Shredded Cheese	5	$74.7	1.14%	3	$342.0	1.09%
Soft Drink 2 Liter Btl Carb Incl	6	$70.9	1.08%	12	$230.1	0.73%
Potato Chips	7	$64.4	0.98%	8	$253.2	0.80%

---

[34] See *Appendix A* for the commodity that corresponds to each subcommodity for the top 1,000 subcommodities.

Exhibit 7: Top 100 Subcommodities for SNAP Households by Expenditure—Continued

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
	Rank	$ in Millions	% of Expenditures	Rank	$ in Millions	% of Expenditures
Primal [Beef]	8	$62.4	0.95%	14	$219.8	0.70%
Lunchmeat—Deli Fresh	9	$55.8	0.85%	11	$242.6	0.77%
Infant Formula Starter/Solution	10	$54.2	0.82%	190	$45.3	0.14%
Eggs—Large	11	$52.1	0.79%	9	$251.6	0.80%
Chicken Breast Boneless	12	$49.6	0.75%	4	$292.9	0.93%
Still Water Drinking/Mineral Water	13	$48.8	0.74%	19	$187.7	0.60%
Mainstream White Bread	14	$48.0	0.73%	39	$136.8	0.43%
Tortilla/Nacho Chips	15	$47.4	0.72%	17	$209.0	0.66%
Snacks/Appetizers	16	$44.6	0.68%	65	$100.5	0.32%
American Single Cheese	17	$44.1	0.67%	41	$136.6	0.43%
Frozen Single Serve Premium Traditional Meals	18	$43.8	0.67%	24	$175.4	0.56%
Dairy Case 100% Pure Juice—Orange	19	$43.5	0.66%	6	$269.0	0.85%
Snack Cake—Multi-Pack	20	$41.6	0.63%	63	$101.7	0.32%
Enhanced [Pork Boneless Loin/Rib]	21	$41.5	0.63%	27	$168.0	0.53%
Unflavored Can Coffee	22	$41.3	0.63%	18	$198.0	0.63%
Frozen Single Serve Economy Meals All	23	$40.9	0.62%	81	$80.7	0.26%
Bacon—Trad 16oz Or Less	24	$40.7	0.62%	29	$157.6	0.50%
Soft Drinks 20pk & 24pk Can Carb	25	$39.7	0.60%	60	$106.4	0.34%
Pizza/Premium	26	$39.7	0.60%	32	$153.3	0.49%
Mainstream Variety Breads	27	$38.4	0.58%	26	$173.2	0.55%
Sugar	28	$36.9	0.56%	55	$112.7	0.36%
All Family Cereal	29	$36.2	0.55%	16	$214.9	0.68%
Sandwiches and Handhelds	30	$35.9	0.54%	91	$73.6	0.23%
Potatoes Russet (Bulk & Bag)	31	$35.8	0.54%	30	$154.5	0.49%
Natural Cheese Chunks	32	$35.3	0.54%	15	$216.1	0.69%
Ribs [Pork]	33	$35.0	0.53%	59	$106.8	0.34%
Convenient Meals—Kids Meal	34	$34.2	0.52%	96	$69.7	0.22%
Bananas	35	$34.2	0.52%	10	$242.7	0.77%
Soft Drink Mlt-Pk Btl Carb	36	$34.0	0.52%	25	$173.6	0.55%
Premium [Ice Cream & Sherbert]	37	$31.2	0.47%	13	$226.0	0.72%
Isotonic Drinks Single Serve	38	$30.5	0.46%	47	$119.5	0.38%
Frozen Chicken—White Meat	39	$30.0	0.46%	66	$99.8	0.32%
Condensed Soup	40	$29.7	0.45%	31	$153.6	0.49%
Pourable Salad Dressings	41	$29.0	0.44%	37	$139.4	0.44%
Choice Beef	42	$28.4	0.43%	40	$136.6	0.43%
Select Beef	43	$27.9	0.42%	36	$143.7	0.46%
Soft Drink Single Srv Btl Carb	44	$27.8	0.42%	94	$71.4	0.23%
Frozen Family Style Entrees	45	$27.6	0.42%	77	$83.5	0.26%
Mayonnaise & Whipped Dressing	46	$27.3	0.41%	48	$119.1	0.38%
Frozen Bag Vegetables—Plain	47	$25.7	0.39%	42	$131.9	0.42%
Traditional [Ice Cream and Sherbert]	48	$25.6	0.39%	49	$118.7	0.38%
Hot Dogs—Base Meat	49	$25.1	0.38%	138	$56.8	0.18%
Adult Cereal	50	$24.9	0.38%	21	$182.6	0.58%
Frozen Single Serve Premium Nutritional Meals	51	$24.7	0.38%	5	$271.6	0.86%
Macaroni and Cheese Dinners	52	$24.3	0.37%	125	$59.7	0.19%
Aseptic Pack Juice and Drinks	53	$24.2	0.37%	134	$57.1	0.18%
Refrigerated Coffee Creamers	54	$24.1	0.37%	34	$147.2	0.47%
Choice Beef	55	$24.0	0.37%	92	$72.5	0.23%
Mexican Soft Tortillas and Wraps	56	$23.7	0.36%	54	$113.1	0.36%
Strawberries	57	$23.5	0.36%	22	$178.4	0.57%
Margarine: Tubs and Bowls	58	$23.4	0.36%	64	$100.9	0.32%
Mainstream [Pasta & Pizza]	59	$23.0	0.35%	80	$81.0	0.26%
Chicken Wings	60	$22.2	0.34%	300	$28.6	0.09%
Can Pasta	61	$22.2	0.34%	179	$47.7	0.15%
Frozen Chicken—Wings	62	$22.2	0.34%	452	$17.4	0.06%
Lunchmeat—Bologna/Sausage	63	$21.8	0.33%	121	$60.9	0.19%
Multi-Pack Bag Snacks	64	$21.6	0.33%	199	$43.4	0.14%
Candy Bags-Chocolate	65	$21.5	0.33%	33	$147.5	0.47%
Sweet Goods: Donuts	66	$21.3	0.32%	78	$82.3	0.26%
Tuna	67	$21.1	0.32%	57	$109.9	0.35%
Vegetable Oil	68	$20.5	0.31%	246	$35.4	0.11%
Frozen French Fries	69	$20.5	0.31%	163	$50.3	0.16%
Peanut Butter	70	$20.4	0.31%	43	$127.8	0.41%
Pizza/Economy	71	$19.8	0.30%	192	$45.1	0.14%
Butter	72	$19.6	0.30%	23	$175.6	0.56%
Meat: Turkey Bulk	73	$19.3	0.29%	28	$159.6	0.51%
Frozen Breakfast Sandwiches	74	$19.1	0.29%	142	$55.7	0.18%
Frozen Meat—Beef	75	$19.0	0.29%	185	$46.3	0.15%
Frozen Skillet Meals	76	$18.8	0.29%	83	$79.3	0.25%
Value Forms/18oz and Larger [Chicken]	77	$18.6	0.28%	209	$42.6	0.14%
Cakes: Birthday/Celebration	78	$18.6	0.28%	164	$50.3	0.16%
Sandwich Cookies	79	$18.0	0.27%	93	$71.8	0.23%
Pizza/Traditional	80	$17.9	0.27%	111	$64.1	0.20%
Fruit Snacks	81	$17.6	0.27%	202	$43.2	0.14%
Rts Soup: Chunky/Homestyle	82	$17.6	0.27%	46	$119.9	0.38%
Sour Creams	83	$17.5	0.27%	70	$95.2	0.30%
Waffles/Pancakes/French Toast	84	$17.3	0.26%	90	$77.4	0.25%
Chicken Drums	85	$17.3	0.26%	270	$31.5	0.10%
Cream Cheese	86	$17.2	0.26%	51	$115.5	0.37%

Exhibit 7: Top 100 Subcommodities for SNAP Households by Expenditure—Continued

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
	Rank	$ in Millions	% of Expenditures	Rank	$ in Millions	% of Expenditures
Angus [Beef]	87	$17.1	0.26%	61	$103.8	0.33%
Bagged Cheese Snacks	88	$17.1	0.26%	157	$52.0	0.16%
Salsa and Dips	89	$17.1	0.26%	135	$57.0	0.18%
Sandwiches—(Cold)	90	$16.9	0.26%	106	$67.7	0.21%
Ramen Noodles/Ramen Cups	91	$16.7	0.25%	304	$28.1	0.09%
Cheese Crackers	92	$16.5	0.25%	72	$90.2	0.29%
Dinner Sausage—Links Pork	93	$16.4	0.25%	233	$37.6	0.12%
Candy Bars (Singles)	94	$16.3	0.25%	146	$54.9	0.17%
Hamburger Buns	95	$16.2	0.25%	95	$70.2	0.22%
Hot Dog Buns	96	$16.2	0.25%	117	$62.2	0.20%
Spring Water	97	$16.2	0.25%	69	$95.6	0.30%
Dairy Case Juice Drink Under 10oz	98	$16.0	0.24%	177	$48.0	0.15%
Flavored Milk	99	$16.0	0.24%	128	$59.4	0.19%
Sweet Goods—Full Size	100	$15.8	0.24%	133	$57.9	0.18%
Expenditures on Listed Subcommodities		**$3,372.2**	**51.01%**		**$13,390.0**	**42.14%**
Expenditures on Top 1,000 subcommodities		**$6,580.5**	**100%**		**$31,513.8**	**100%**

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.
Note: The table lists the top 100 subcommodities for SNAP households and the corresponding rankings of these subcommodities for non-SNAP households. Columns may not sum to total shown due to rounding.

3.4 Distribution of Expenditures by Household Demographics, Store Characteristics, Type of Resource Used, and Month of Purchase

In addition to analyzing purchase patterns as a whole, IMPAQ also analyzed the POS purchase data by household demographic and store characteristic subgroups based on information from the data provider. Appendix E provides these analyses. More transactions in these data were made by households without children than by households with children. In addition, a larger proportion of transactions were made at retail outlets in metropolitan areas than in rural or suburban areas;[35] at larger stores rather than smaller ones;[36] and in counties with 10–20% poverty rates, the median of the three poverty rate categories into which the counties in which the stores were located were classified.[37] Compared to non-SNAP household transactions, SNAP household transactions were more likely to be made by households headed by adults 19–44 years of age, in stores located in the Midwest, and in medium-sized grocery stores. A larger proportion of SNAP household transactions than of non-SNAP household transactions took place in the most impoverished counties (counties with poverty rates greater than 20%). Notably, the distribution of transactions by household demographic and store characteristics was relatively consistent whether SNAP households used SNAP benefits or other resources.

In addition to analyzing the POS data for the full year, analyses were completed at the monthly level to investigate monthly or seasonal patterns in purchases. There was little month-to-month variation in expenditure patterns for either SNAP or non-SNAP households. A notable exception was that for both household types expenditure shares for vegetables were 2–3 percentage points lower during the summer months, while expenditure shares for fruits were 2–3 percentage points higher (data not shown).

Chapter 4. Findings: Top Expenditures by USDA Food Pattern Categories

Key Findings

---

[35] USDA Economic Research Service Urban Influence Codes (*http://www.ers.usda.gov/data-products/urban-influence-codes.aspx*).

[36] Following Food Marketing Institute conventions from *http://www.fmi.org/about/* and *http://www.fmi.org/facts—figs/?fuseaction=superfact* and FNS Retailer Policy and Management Division food retailer definitions from *http://www.fns.usda.gov/snap/retailers/pdfs/2012-annual-report.pdf*.

[37] Census Bureau data from *http://www.census.gov/did/www/saipe/county.html*.

- Overall, there were few differences between SNAP and non-SNAP household expenditures by USDA Food Pattern categories. Expenditure shares for each of the USDA Food Pattern categories (dairy, fruits, grains, oils, protein foods, solid fats and added sugars (SoFAS), and vegetables) varied by no more than 3¢ per dollar when comparing SNAP and non-SNAP households.

- Protein foods represented the largest expenditure share for both household types, while proportionally more was spent on fruits and vegetables than on solid fats and added sugars, grains or dairy.

SNAP and Non-SNAP Household Expenditures by USDA Food Pattern Categories
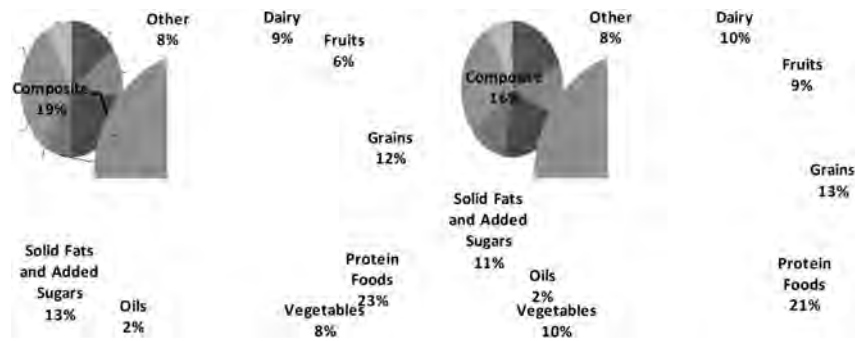
SNAP Households   **Non-SNAP Households**

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.

4.1 Top Expenditures for Dairy

There are few differences in dairy expenditure patterns between SNAP households and non-SNAP households. Shown in *Exhibit 8,* the top four dairy subcommodities for both household groups were identical—fluid milk/white only, shredded cheese, American single cheese, and natural cheese chunks. These top four accounted for 60% of all dairy expenditures for SNAP households and 47% for non-SNAP households. The biggest driver of the proportional difference was the purchase of fluid milk/white only. Fluid white milk was the top subcommodity representing 33% of all dairy expenditures by SNAP households. In comparison, this subcommodity accounted for 26% of non-SNAP household dairy expenditures. Overall, 23 dairy subcommodities in the top 25 for SNAP households were also among the top 25 for non-SNAP households. The top 25 dairy subcommodities for SNAP households represented almost all dairy expenditures, 93%, while these 25 subcommodities represented 85% of dairy expenditures for non-SNAP households.

Exhibit 8: Top 25 SNAP Household Dairy Subcommodity Expenditures

Dairy Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
	Rank	$ in Millions	% of Expenditures	Rank	$ in Millions	% of Expenditures
Fluid Milk/White Only	1	$191.1	33.25%	1	$853.8	25.69%
Shredded Cheese	2	$74.7	13.00%	2	$342.0	10.29%
American Single Cheese	3	$44.1	7.67%	4	$136.6	4.11%
Natural Cheese Chunks	4	$35.3	6.14%	3	$216.1	6.50%
Bagged Cheese Snacks	5	$17.1	2.98%	16	$52.0	1.56%
Flavored Fluid Milk	6	$16.0	2.78%	14	$59.4	1.79%
String Cheese	7	$15.1	2.63%	9	$99.0	2.98%
Yogurt/Kids	8	$14.0	2.44%	20	$42.4	1.28%
Cottage Cheese	9	$13.9	2.42%	7	$108.8	3.27%
Natural Cheese Slices	10	$13.4	2.33%	6	$113.2	3.41%
Yogurt/Single Serving Regular	11	$11.0	1.91%	11	$69.0	2.07%
Loaf Cheese	12	$10.9	1.90%	23	$38.1	1.15%
Yogurt/Single Serve Light	13	$10.2	1.78%	8	$103.1	3.10%

Exhibit 8: Top 25 SNAP Household Dairy Subcommodity Expenditures—Continued

Dairy Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
	Rank	$ in Millions	% of Expenditures	Rank	$ in Millions	% of Expenditures
Yogurt/Pro Active Health	14	$7.4	1.29%	13	$63.5	1.91%
Yogurt/Adult Multi-Packs	15	$7.2	1.25%	19	$42.5	1.28%
Specialty/Lactose Free Milk	16	$6.7	1.17%	17	$48.4	1.46%
Grated Cheese	17	$6.2	1.08%	25	$33.6	1.01%
Bulk Semi-Hard (Cheese)	18	$6.1	1.05%	18	$44.0	1.32%
Fluid Milk	19	$5.9	1.02%	5	$113.3	3.41%
Canned Milk	20	$5.5	0.96%	27	$27.9	0.84%
Yogurt/Specialty Greek	21	$5.0	0.86%	10	$77.4	2.33%
Half & Half	22	$4.4	0.77%	15	$54.6	1.64%
Yogurt/Large Size (16oz or More)	23	$4.4	0.76%	22	$40.4	1.22%
Miscellaneous Cheese	24	$3.8	0.67%	21	$42.1	1.27%
Bulk Processed (Cheese)	25	$3.4	0.59%	29	$19.8	0.60%
Sum of Listed Dairy Expenditures		**$532.9**	**92.70%**		**$2,841.0**	**85.49%**
Total Dairy Expenditures Among Top 1,000 Subcommodities		**$571.2**	**100%**		**$3,257.4**	**100%**

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.
Note: The table lists the top 25 dairy subcommodities for SNAP households and the corresponding ranking of these subcommodities for non-SNAP households. Columns may not sum to total shown due to rounding.

4.2 Top Expenditures for Fruits

The top 25 fruit subcommodities by expenditure for SNAP households included whole fruits as well as 100% fruit juices, as shown in *Exhibit 9* below. The top fruit subcommodity for both SNAP and non-SNAP households was 100% orange juice. This top fruit subcommodity represented 10% of all SNAP household fruit expenditures, 9% for non-SNAP households. Bananas and strawberries rank second and third, respectively, for both household groups. Together, the top three fruit subcommodities account for about ¼ (24%) of the fruit expenditures for both SNAP and non-SNAP households. The top 25 SNAP household fruit subcommodities accounted for 71% of all SNAP household fruit expenditures. These 25 subcommodities accounted for 66% of fruit expenditures for non-SNAP households. Twenty-one of the top 25 fruit subcommodities for SNAP households were also in the top 25 for non-SNAP households.

Exhibit 9: Top 25 SNAP Household Fruit Subcommodity Expenditures

Fruit Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
	Rank	$ in Millions	% of Expenditures	Rank	$ in Millions	% of Expenditures
100% Pure Juice—Orange; Dairy Case	1	$43.5	10.18%	1	$269.0	9.35%
Bananas	2	$34.2	8.00%	2	$242.7	8.43%
Strawberries	3	$23.5	5.48%	3	$178.4	6.20%
Fruit Snacks	4	$17.6	4.13%	17	$43.2	1.50%
Grapes Red	5	$15.8	3.70%	4	$121.7	4.23%
Grapes White	6	$15.5	3.61%	6	$84.9	2.95%
Apple Juice & Cider (Over 50% Pure Juice)	7	$13.3	3.11%	14	$45.8	1.59%
Instore Cut Fruit	8	$13.2	3.09%	5	$85.8	2.98%
Oranges Navels	9	$12.6	2.94%	8	$79.3	2.75%
Fruit Cup	10	$10.6	2.47%	19	$42.7	1.49%
Blended Juice & Combinations	11	$9.3	2.17%	29	$29.6	1.03%
Clementines	12	$8.8	2.06%	9	$78.6	2.73%
Melons Instore Cut	13	$8.2	1.93%	18	$42.8	1.49%
Watermelon Seedless Whole	14	$7.9	1.84%	16	$43.9	1.53%
Cherries Red	15	$6.9	1.61%	11	$56.7	1.97%
Apples Gala (Bulk & Bag)	16	$6.6	1.54%	10	$69.3	2.41%
Cranapple/Cran Grape Juice	17	$6.1	1.43%	31	$27.3	0.95%
Apples Red Delicious (Bulk & Bag)	18	$5.8	1.35%	23	$35.2	1.22%
100% Pure Juice—Other; Dairy Case	19	$5.4	1.26%	25	$32.3	1.12%
Cantaloupe Whole	20	$5.3	1.24%	15	$44.4	1.54%
Blueberries	21	$5.1	1.19%	7	$79.4	2.76%
Pineapple	22	$4.9	1.15%	33	$24.0	0.83%
Peaches Yellow Flesh	23	$4.8	1.13%	22	$35.6	1.24%
Grape Juice (Over 50% Juice)	24	$4.8	1.12%	44	$17.1	0.60%
Lemons	25	$4.6	1.08%	24	$33.6	1.17%
Sum of Listed Fruit Expenditures		**$294.3**	**68.81%**		**$1,843.4**	**64.06%**

Exhibit 9: Top 25 SNAP Household Fruit Subcommodity Expenditures—Continued

Fruit Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
	Rank	$ in Millions	% of Expenditures	Rank	$ in Millions	% of Expenditures
Total Fruit Expenditures Among Top 1,000 Subcommodities		**$416.8**	**100%**		**$2,772.4**	**100%**

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.
Note: The table lists the top 25 fruit subcommodities for SNAP households and the corresponding rankings of these subcommodities for non-SNAP households. Columns may not sum to total shown due to rounding.

4.3 Top Expenditures for Grains

Exhibit 10 details the top 25 grain subcommodities purchased by SNAP households. Cereals are a popular purchase among grain subcommodities for both SNAP and non-SNAP households. The top grain subcommodity for SNAP households was kids cereal, representing almost 10% of all grain expenditures. Kids cereal, ranked third for non-SNAP households. All family cereal was ranked first for non-SNAP households and fifth for SNAP households. Adult cereals were also common purchases ranking sixth for SNAP households and fourth for non-SNAP households. The top 25 grain subcommodities purchased by SNAP households made up 67% of their grain expenditures. Comparatively, these 25 subcommodities comprised 57% of expenditures on grains subcommodities for non-SNAP households. Ninteen subcommodities in the top 25 for SNAP households were also among the top 25 for non-SNAP households.

Exhibit 10: Top 25 SNAP Household Grains Subcommodity Expenditures

Grains Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
	Rank	$ in Millions	% of Expenditures	Rank	$ in Millions	% of Expenditures
Kids Cereal	1	$78.1	9.88%	3	$186.4	4.51%
Mainstream White Bread	2	$48.0	6.07%	7	$136.8	3.31%
Tortilla/Nacho Chips	3	$47.4	5.99%	2	$209.0	5.05%
Mainstream Variety Breads	4	$38.4	4.86%	5	$173.2	4.19%
All Family Cereal	5	$36.2	4.58%	1	$214.9	5.20%
Adult Cereal	6	$24.9	3.15%	4	$182.6	4.42%
Mexican Soft Tortillas and Wraps	7	$23.7	3.00%	8	$113.1	2.74%
Waffles/Pancakes/French Toast	8	$17.3	2.19%	13	$77.4	1.87%
Ramen Noodles/Ramen Cups	9	$16.7	2.12%	43	$28.1	0.68%
Cheese Crackers	10	$16.5	2.08%	10	$90.2	2.18%
Hamburger Buns	11	$16.2	2.05%	14	$70.2	1.70%
Hot Dog Buns	12	$16.2	2.05%	18	$62.2	1.50%
Refrigerated Biscuits	13	$14.7	1.86%	30	$45.2	1.09%
Butter Spray Crackers	14	$14.6	1.85%	15	$68.7	1.66%
Toaster Pastries	15	$14.0	1.77%	27	$47.6	1.15%
Rice Side Dish Mixes Dry	16	$14.0	1.76%	28	$46.7	1.13%
Popcorn—Microwave	17	$13.1	1.65%	17	$63.4	1.53%
Long Cut Pasta	18	$13.0	1.64%	19	$60.4	1.46%
Granola Bars	19	$12.8	1.61%	11	$88.9	.15%
Premium Bread	20	$12.3	1.55%	6	$144.7	3.50%
Cereal Bars	21	$10.9	1.38%	12	$78.4	1.90%
Short Cut Pasta	22	$9.9	1.25%	21	$56.2	1.36%
Rolls: Dinner	23	$9.5	1.21%	23	$50.5	1.22%
Frozen Garlic Toast	24	$9.1	1.16%	44	$27.8	0.67%
Corn Chips	25	$9.1	1.15%	29	$45.6	1.10%
Sum of Listed Grain Expenditures		**$536.6**	**67.86%**		**$2,368.4**	**57.27%**
Total Grain Expenditures Among Top 1,000 Subcommodities		**$783.8**	**100%**		**$4,049.9**	**100%**

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.
Note: The table lists the top 25 grain subcommodities for SNAP households and the corresponding ranking of these subcommodities for non-SNAP households. Columns may not sum to total shown due to rounding.

4.4 Top Expenditures for Oils

The top oils subcommodity expenditures are shown in *Exhibit 11*. Pourable salad dressings was the top oils subcommodity by expenditure for both SNAP and non-SNAP households, accounting for nearly ¼ of their total expenditures on oils. The second and third ranked oils subcommodities, mayonnaise/whipped dressing and margarine in tubs and bowls, were the same for both household groups, as well.

Exhibit 11: Oils Subcommodity Expenditures

Oils Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
	Rank	$ in Millions	% of Expenditures	Rank	$ in Millions	% of Expenditures
Pourable Salad Dressings	1	$29.0	22.71%	1	$139.4	24.28%
Mayonnaise and Whipped Dressing	2	$27.3	21.34%	2	$119.1	20.73%
Margarine: Tubs and Bowls	3	$23.4	18.37%	3	$100.9	17.56%
Vegetable Oils	4	$20.5	16.07%	5	$35.4	6.16%
Canola Oils	5	$8.3	6.49%	6	$29.3	5.10%
Olive Oils	6	$7.3	5.69%	4	$63.8	11.11%
Cooking Sprays	7	$3.2	2.49%	7	$21.0	3.65%
Dressing Creamy	8	$1.6	1.23%	8	$14.5	2.53%
Sandwich/Horseradish and Tartar Sauce	9	$1.4	1.14%	10	$7.2	1.26%
Corn Oils	10	$1.3	1.01%	14	$4.1	0.71%
Cooking Oils: Peanut/Safflower	11	$1.1	0.89%	11	$6.7	1.17%
Dressing Blue Cheese	12	$0.9	0.71%	9	$9.5	1.65%
Margarine: Squeeze	13	$0.6	0.44%	13	$4.2	0.74%
Sum of Listed Oils Expenditures		**$125.9**	**98.58%**		**$555.0**	**96.65%**
Total Oils Expenditures Among the Top 1,000 Subcommodities		**$125.9**	**100%**		**$555.0**	**100%**

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.
Note: The data included only 13 oils subcommodities in the top 1,000 subcommodities. Columns may not sum to total shown due to rounding.

4.5 Top Expenditures for Protein Foods

The top 25 protein foods subcommodities based on expenditures of SNAP households are shown in *Exhibit 12*. For SNAP households, the top 25 represented over ½ (54%) of all protein foods expenditures. These same 25 subcommodities comprised 48% of the protein foods expenditures for non-SNAP households. The top five subcommodities were the same for both household groups, although in slightly different order and accounted for ⅕ of all protein expenditures for both households. The protein foods included in the top five were beef, lunchmeat, eggs, and chicken. Lean ground beef was the top protein foods subcommodity by expenditure for SNAP households, totaling just over 7% of all protein foods expenditures. The top protein foods subcommodity for non-SNAP households was boneless chicken breasts at 5% of their expenditures. Eighteen of the SNAP household top 25 subcommodities were also ranked in the top 25 for non-SNAP households.

Exhibit 12: Top 25 SNAP Household Protein Foods Subcommodity Expenditures

Protein Foods Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
	Rank	$ in Millions	% of Expenditures	Rank	$ in Millions	% of Expenditures
Lean Ground Beef	1	$112.4	7.38%	2	$257.9	4.03%
Primal Ground Beef	2	$62.4	4.10%	5	$219.8	3.43%
Lunchmeat—Deli Fresh	3	$55.8	3.67%	4	$242.6	3.79%
Eggs—Large	4	$52.1	3.43%	3	$251.6	.93%
Chicken Breast Boneless	5	$49.6	3.26%	1	$292.9	4.57%
Enhanced Pork Boneless Loin/Rib	6	$41.5	2.73%	6	$168.0	2.62%
Bacon—Trad 16oz Or Less	7	$40.7	2.68%	8	$157.6	2.46%
Ribs (Pork)	8	$35.0	2.30%	15	$106.8	1.67%
Frozen Chicken—White Meat	9	$30.0	1.97%	17	$99.8	1.56%
Choice Beef (Loins)	10	$28.4	1.87%	11	$136.6	2.13%
Select Beef	11	$27.9	1.83%	9	$143.7	2.24%
Hot Dogs—Base Meat	12	$25.1	1.65%	27	$56.8	0.89%
Choice Beef (Rounds)	13	$24.0	1.58%	20	$72.5	1.13%
Chicken Wings	14	$22.2	1.46%	58	$28.6	0.45%
Frozen Chicken—Wings	15	$22.2	1.46%	97	$17.4	0.27%
Lunchmeat—Bologna/Sausage	16	$21.8	1.43%	24	$60.9	0.95%
Tuna	17	$21.1	1.39%	14	$109.9	1.72%
Peanut Butter	18	$20.4	1.34%	12	$127.8	1.99%
Meat: Turkey Bulk	19	$19.3	1.27%	7	$159.6	2.49%
Frozen Meat—Beef	20	$19.0	1.25%	34	$46.3	0.72%
Value Forms/18oz & Larger	21	$18.6	1.22%	41	$42.6	0.67%
Chicken Drumsticks	22	$17.3	1.14%	49	$31.5	0.49%
Angus Beef	23	$17.1	1.13%	16	$103.8	1.62%
Dinner Sausage—Links Pork Ckd	24	$16.4	1.08%	45	$37.6	0.59%
Meat: Ham Bulk	25	$15.3	1.00%	13	$115.9	1.81%
Sum of Listed Protein Foods Expenditures		**$815.7**	**53.62%**		**$3,088.3**	**48.22%**

Exhibit 12: Top 25 SNAP Household Protein Foods Subcommodity Expenditures—Continued

Protein Foods Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
	Rank	$ in Millions	% of Expenditures	Rank	$ in Millions	% of Expenditures
Total Protein Foods Expenditures Among Top 1,000 Subcommodities		**$1,512.2**	**100%**		**$6,288.8**	**100%**

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.
Note: The table lists the top 25 protein foods subcommodities for SNAP households and the corresponding ranking of these subcommodities for non-SNAP households. Columns may not sum to total shown due to rounding.

4.6   Top Expenditures for Solid Fats and Added Sugars (SoFAS)

The top 25 SoFAS subcommodities by expenditure for SNAP households are shown in *Exhibit 13*. Twenty two subcommodities in the top 25 for SNAP households were also among the top 25 for non-SNAP households. In addition, the top two subcommodities were the same. They were carbonated soft drinks packaged as 12–18 pack cans and 2-liter bottles. These two subcommodities represented approximately ¼ of the SoFAS expenditures for both types of households. Sugar, ranked fourth, was the highest ranked non-beverage SoFAS subcommodity for SNAP households. It was eighth ranked for non-SNAP households. Butter ranked higher (third) for non-SNAP households compared to tenth for SNAP households. Overall, the top 25 SNAP household SoFAS subcommodities in *Exhibit 13* totaled 75% of SNAP household SoFAS expenditures. These 25 subcommodities totaled 71% of the SoFAS expenditures for non-SNAP households.

Exhibit 13: Top 25 SNAP Household Solid Fats and Added Sugars (SoFAS) Subcommodity Expenditures

Solid Fats and Added Sugars (SoFAS) Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
	Rank	$ in Millions	% of Expenditures	Rank	$ in Millions	% of Expenditures
Soft Drinks 12/18 & 15pk Can Car	1	$164.6	18.86%	1	$601.2	16.11%
Soft Drinks 2 Liter Btl Carb Incl	2	$70.9	8.12%	2	$230.1	6.17%
Soft Drinks 20pk & 24pk Can Carb	3	$39.7	4.55%	9	$106.4	2.85%
Sugar	4	$36.9	4.23%	8	$112.7	3.02%
Soft Drink Mlt-Pk Btl Carb	5	$34.0	3.90%	4	$173.6	4.65%
Soft Drink Single Serve Btl Carb	6	$27.8	3.18%	11	$71.4	1.91%
Aseptic Pack Juice And Drinks	7	$24.2	2.78%	16	$57.1	1.53%
Refrigerated Coffee Creamers	8	$24.1	2.76%	6	$147.2	3.95%
Candy Bags-Chocolate	9	$21.5	2.46%	5	$147.5	3.95%
Butter	10	$19.6	2.24%	3	$175.6	4.71%
Sour Creams	11	$17.5	2.00%	10	$95.2	2.55%
Cream Cheese	12	$17.2	1.97%	7	$115.5	3.10%
Candy Bars (Singles)	13	$16.3	1.87%	18	$54.9	1.47%
Dairy Case Juice Drink Under 10 Oz	14	$16.0	1.83%	22	$48.0	1.29%
Candy Bars (Multi Pack)	15	$15.6	1.79%	12	$69.6	1.86%
Tea Sweetened	16	$13.9	1.59%	13	$68.7	1.84%
Chewing Gum	17	$13.2	1.51%	14	$68.3	1.83%
Candy Bags-Non Chocolate	18	$12.6	1.44%	19	$54.9	1.47%
Molasses and Syrups	19	$11.7	1.34%	15	$58.7	1.57%
Dairy Case Citrus Punch/OJ Subs	20	$11.0	1.26%	27	$34.4	0.92%
Fruit Drinks: Canned & Glass	21	$10.6	1.21%	60	$10.9	0.29%
Non Dairy Creamer	22	$10.5	1.20%	25	$35.4	0.95%
Seasonal Miscellaneous	23	$9.2	1.05%	23	$46.9	1.26%
Dairy Case Tea With Sugar	24	$8.4	0.96%	36	$23.1	0.62%
Seasonal Candy Bags-Chocolate	25	$7.9	0.90%	20	$54.8	1.47%
Sum of Listed SoFAS Expenditures		**$655.0**	**75.00%**		**$2,662.3**	**71.34%**
Total SoFAS Expenditures Among Top 1,000 Subcommodities		**$864.1**	**100%**		**$3,673.1**	**100%**

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.
Note: The table lists the top 25 SoFAS subcommodities for SNAP households and the corresponding ranking of these subcommodities for non-SNAP households. Columns may not sum to total shown due to rounding.

SoFAS were divided into three broad subcategories to inform the analyses: butter/cream/solid fats, candy/sweets, and sweetened beverages.[38] The distribution of these subcategories for both household types is shown in *Exhibit 14.* As a share of total SoFAS expenditures, sweetened beverage expenditures were more than ten percentage points higher in SNAP households than non-SNAP households. In contrast, non-SNAP households spent a larger share of their SoFAS expenditures on the butter/cream/solid fats and candy/sweets subcategories.

Exhibit 14: Solid Fats and Added Sugars (SoFAS) Expenditures by Subcategory

| **SNAP Households** | **Non-SNAP Households** |
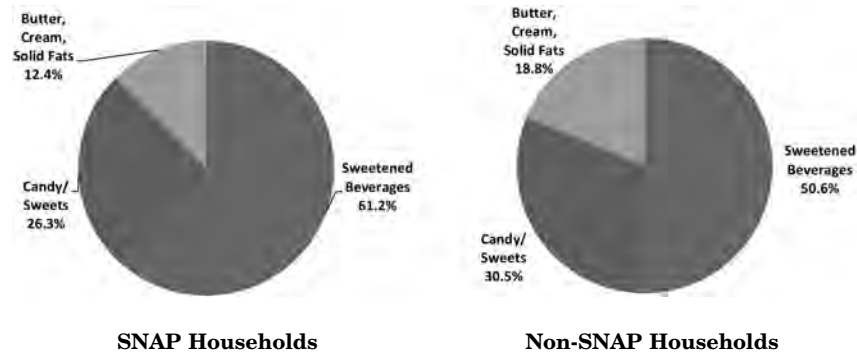
Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.

4.7   Top Expenditures for Vegetables

As shown in *Exhibit 15,* russet potatoes and plain frozen bag vegetables were the top two vegetable subcommodities by expenditure purchased by SNAP and non-SNAP households. Overall, 18 of the top 25 vegetable subcommodities for SNAP households were among the top 25 for non-SNAP households. The top 25 SNAP household subcommodities comprised 56% of total vegetable expenditures for SNAP households. These same 25 subcommodities comprised 47% of total vegetable expenditures for non-SNAP households. The top 25 subcommodities for both SNAP and non-SNAP households for this Food Pattern category included a range of vegetables such as potatoes, avocados, green beans, corn, lettuce and cucumbers to name a few.

Exhibit 15: Top 25 SNAP Household Vegetables Subcommodity Expenditures

Vegetables Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
	Rank	$ in Millions	% of Expenditures	Rank	$ in Millions	% of Expenditures
Potatoes Russet (Bulk & Bag)	1	$35.8	6.74%	1	$154.5	4.60%
Frozen Bag Vegetables—Plain	2	$25.7	4.85%	2	$131.9	3.93%
Mainstream Pasta & Pizza Sauce	3	$23.0	4.33%	6	$81.0	2.41%
Frozen French Fries	4	$20.5	3.86%	19	$50.3	1.50%
Avocado	5	$13.4	2.52%	4	$112.6	3.35%
Blends Salad Mix	6	$13.1	2.47%	3	$124.0	3.69%
Green Beans: Fs/Whl/Cut	7	$12.8	2.41%	15	$53.1	1.58%
Potatoes: Dry	8	$12.3	2.31%	33	$32.3	0.96%
Corn	9	$12.1	2.28%	22	$44.0	1.31%
Head Lettuce	10	$11.6	2.18%	13	$55.5	1.65%
Frozen Steamable Vegetables	11	$10.5	1.98%	5	$81.4	2.42%
Mexican Sauces and Picante Sauce	12	$10.2	1.93%	9	$62.3	1.85%
Tomatoes Diced	13	$9.5	1.79%	11	$59.9	1.78%
Tomatoes Hothouse On The Vine	14	$9.2	1.74%	7	$77.7	2.31%
Onions Yellow (Bulk & Bag)	15	$8.7	1.65%	27	$39.3	1.17%
Cucumbers	16	$8.2	1.55%	12	$58.9	1.75%
Vegetable Salads—Prepack	17	$7.8	1.48%	29	$36.6	1.09%
Peppers Green Bell	18	$7.8	1.47%	25	$41.5	1.24%

---

[38] Fruit drinks that are over 50% juice are categorized as fruits. All other fruit drinks are categorized as SoFAS. In our discussion, fruit drinks that are less than 50% juice are grouped into "sweetened beverages."

Exhibit 15: Top 25 SNAP Household Vegetables Subcommodity Expenditures—Continued

Vegetables Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
	Rank	$ in Millions	% of Expendi-tures	Rank	$ in Millions	% of Expendi-tures
Regular Garden	19	$7.8	1.46%	35	$31.9	0.95%
Roma Tomatoes (Bulk/Pkg)	20	$7.5	1.41%	26	$39.6	1.18%
Carrots Mini Peeled	21	$7.0	1.32%	10	$61.4	1.83%
Onions Sweet (Bulk & Bag)	22	$6.2	1.16%	20	$47.4	1.41%
Celery	23	$5.9	1.11%	17	$51.2	1.52%
Tomatoes Vine Ripe Bulk	24	$5.7	1.07%	51	$22.5	0.67%
Garden Plus Salad Mix	25	$5.5	1.03%	36	$31.8	0.95%
Sum of Listed Vegetable Expenditures		**$297.7**	**56.10%**		**$1,582.6**	**47.10%**
Total Vegetable Expenditures Among Top 1,000 Subcommodities		**$520.5**	**100%**		**$3,251.8**	**100%**

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.
Note: The table lists the top 25 vegetable subcommodities for SNAP households and the corresponding ranking of these subcommodities for non-SNAP households. Columns may not sum to total shown due to rounding.

4.8 Top Expenditures for Composite Foods

Composite foods include those subcommodities that contain more than one USDA Food Pattern category. As a result, they could not be assigned specifically to a single category. For example, composite foods include both dairy and grains (macaroni and cheese), dairy and SoFAS (ice cream), vegetables and oils (potato chips), or protein foods, vegetables and grains (frozen meals). The top 25 composite foods subcommodities based on the expenditures of SNAP households are presented in *Exhibit 16.* Potato chips were the top composite subcommodity by expenditure for SNAP households, representing 5% of their overall expenditures on composite items. Potato chips were ranked second for non-SNAP households. Overall, expenditures on composite subcommodities were similar for SNAP and non-SNAP households with 19 subcommodities in the top 25 for both groups. The top 25 SNAP household subcommodities shown in Exhibit 16 represented 58% of all SNAP household composite foods expenditures, while expenditures on these 25 subcommodities by non-SNAP households accounted for 51% of their total composite foods expenditures.

Exhibit 16: Top 25 SNAP Household Composite Subcommodity Expenditures

Composite Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
	Rank	$ in Millions	% of Expendi-tures	Rank	$ in Millions	% of Expendi-tures
Potato Chips	1	$64.4	5.19%	2	$253.2	4.88%
Snacks/Appetizers	2	$44.6	3.59%	10	$100.5	1.94%
Frozen Single Serve Premium Traditional Meals	3	$43.8	3.53%	4	$175.4	3.38%
Snack Cake—Multi Pack	4	$41.6	3.36%	9	$101.7	1.96%
Frozen Single Serve Economy Meals	5	$40.9	3.30%	15	$80.7	1.56%
Pizza/Premium	6	$39.7	3.20%	6	$153.3	2.95%
Sandwiches and Handhelds	7	$35.9	2.89%	17	$73.6	1.42%
Convenient Meals—Kids Meal	8	$34.2	2.76%	19	$69.7	1.34%
Premium (Ice Cream & Sherbert)	9	$31.2	2.52%	3	$226.0	4.35%
Condensed Soup	10	$29.7	2.39%	5	$153.6	2.96%
Frozen Family Style Entrees	11	$27.6	2.23%	13	$83.5	1.61%
Traditional	12	$25.6	2.07%	8	$118.7	2.29%
Frozen Single Serve Premium Nutritional Meals	13	$24.7	1.99%	1	$271.6	5.23%
Macaroni and Cheese Dinners	14	$24.3	1.96%	24	$59.7	1.15%
Can Pasta	15	$22.2	1.79%	36	$47.7	0.92%
Multi-Pack Bag Snacks	16	$21.6	1.74%	38	$43.4	0.84%
Sweet Goods: Donuts	17	$21.3	1.72%	14	$82.3	1.58%
Pizza/Economy	18	$19.8	1.60%	37	$45.1	0.87%
Frozen Breakfast Sandwiches	19	$19.1	1.54%	29	$55.7	1.07%
Frozen Skillet Meals	20	$18.8	1.51%	16	$79.3	1.53%
Cakes: Birthday/Celebration	21	$18.6	1.50%	33	$50.3	0.97%
Sandwich Cookies	22	$18.0	1.45%	18	$71.8	1.38%
Pizza/Traditional	23	$17.9	1.44%	22	$64.1	1.24%
Rts Soup: Chunky/Homestyle	24	$17.6	1.42%	7	$119.9	2.31%
Salsa and Dips	25	$17.1	1.38%	28	$57.0	1.10%
Sum of Listed Composite Expenditures		**$720.5**	**58.07%**		**$2,637.7**	**50.83%**

Exhibit 16: Top 25 SNAP Household Composite Subcommodity Expenditures—Continued

Composite Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
	Rank	$ in Millions	% of Expenditures	Rank	$ in Millions	% of Expenditures
Total Composite Expenditures Among Top 1,000 Subcommodities		**$1,235.4**	**100%**		**$5,132.0**	**100%**

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.

Note: The table lists the top 25 composite subcommodities for SNAP households and the corresponding ranking of these subcommodities for non-SNAP households. Columns may not sum to total shown due to rounding.

The composite subcommodities were further categorized as snacks, soups, desserts, and entrée/meal items to inform the analyses. *Exhibit 17* suggests some differences in SNAP and non-SNAP household expenditure distributions on these subgroups. SNAP households spent a larger share of their composite expenditures on entrée/meal subcommodities, while non-SNAP households spent larger shares on desserts and soup. Expenditures on snacks were not very different across the two groups.

Exhibit 17: Composite Expenditures by Subcategory

SNAP Households   **Non-SNAP Households**
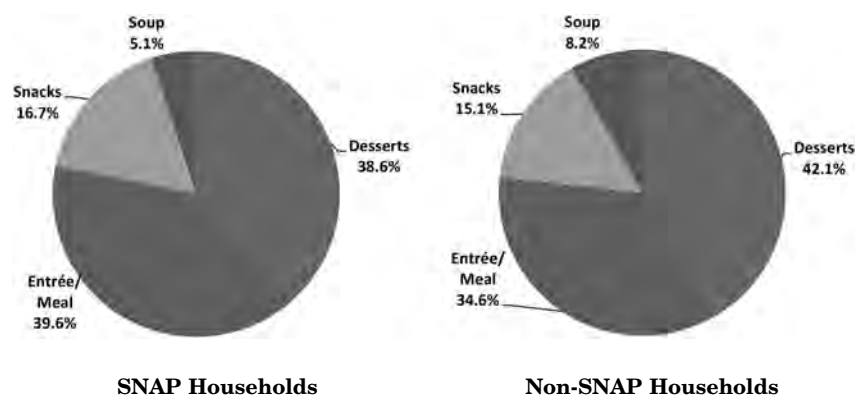
Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.

4.9   Top Expenditures for Other Subcommodities

Some subcommodities did not contain any USDA Food Pattern categories, or the subcommodity labels were not descriptive enough to permit categorization even with the addition of the composite category. As a result, a ninth category, *other,* was created to capture such subcommodities. "Other" included subcommodities such as water, isotonic drinks, and baby food. The top 25 other subcommodities based on the expenditures of SNAP households are shown in Exhibit 18 and accounted for 66% of their overall other subcommodity expenditures. These subcommodities accounted for 54% of all other expenditures for non-SNAP households. Overall, expenditures on other subcommodities were similar for SNAP and non-SNAP households with 19 subcommodities in common in the top 25 for both groups. The top other subcommodity purchased by SNAP households was infant formula/starter solution, accounting for almost 10% of the total SNAP household expenditures on these items. Subcommodities reflecting drinking water and coffee were ranked second and third, respectively. Coffee subcommodities were ranked first and third for non-SNAP households with the same water subcommodity that was ranked second for SNAP households ranked second for non-SNAP households, as well. Interestingly, infant formula/starter solution that was ranked first for SNAP households was ranked 14th for non-SNAP households.

Exhibit 18: Top 25 SNAP Household Other Subcommodity Expenditures

Other Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
	Rank	$ in Millions	% of Expenditures	Rank	$ in Millions	% of Expenditures
Infant Formula/Starter Solution	1	$54.2	9.60%	14	$45.3	1.70%
Still Water Drinking/Mineral Water	2	$48.8	8.64%	2	$187.7	7.03%
Unflavored Can Coffee	3	$41.3	7.32%	1	$198.0	7.41%
Isotonic Drinks Single Serve	4	$30.5	5.40%	4	$119.5	4.47%
Spring Water	5	$16.2	2.87%	5	$95.6	3.58%
Traditional Spices	6	$14.1	2.49%	8	$61.2	2.29%
Bbq Sauce	7	$12.3	2.17%	16	$38.6	1.45%
Baby Food—Beginner	8	$11.7	2.07%	21	$28.1	1.05%
Non-Carb Water Flavor—Drink/Mnr	9	$11.6	2.05%	7	$63.4	2.37%
Catsup	10	$11.5	2.03%	15	$41.5	1.55%
Sauce Mixes/Gravy Mixes Dry	11	$11.5	2.03%	13	$46.7	1.75%
Baby Food Junior/All Brands	12	$11.2	1.98%	22	$27.5	1.03%
Isotonic Drinks Multi-Pack	13	$10.8	1.92%	9	$58.1	2.17%
Ice—Crushed/Cubed	14	$9.3	1.65%	11	$49.9	1.87%
Unflavored Bag Coffee	15	$8.5	1.50%	3	$137.3	5.14%
Infant Formula Specialty	16	$8.4	1.49%	71	$9.1	0.34%
Infant Formula Starter Large	17	$8.3	1.46%	30	$22.8	0.85%
Steak & Worchester Sauce	18	$8.2	1.44%	25	$26.7	1.00%
Unflavored Instant Coffee	19	$7.6	1.34%	23	$27.3	1.02%
Non-Dairy Milk	20	$7.1	1.25%	6	$67.7	2.53%
Unsweetened Envelope (Powder Drink Mix)	21	$7.0	1.25%	88	$6.2	0.23%
Malted Milk/Syrup/Powders/Eggnog	22	$6.9	1.23%	28	$25.3	0.95%
Still Water Flavored Drink/Mineral Water	23	$6.3	1.11%	17	$38.1	1.43%
Infant Formula Toddler	24	$6.0	1.06%	55	$12.4	0.46%
Mexican Seasoning Mixes	25	$5.9	1.05%	33	$20.6	0.77%
Sum of Listed Other Expenditures		**$374.8**	**66.40%**		**$1,454.7**	**54.44%**
Total Other Expenditures Among Top 1,000 Subcommodities		**$550.7**	**100%**		**$2,533.2**	**100%**

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.
Note: The table lists the top 25 "other" subcommodities for SNAP households and the corresponding ranking of these subcommodities for non-SNAP households. Columns may not sum to total shown due to rounding.

All other subcommodities were divided into the following six subcategories for additional analysis: condiments; infant formula/baby food; seasoning/baking needs; supplements/meal replacements/energy drinks; unsweetened beverages; and miscellaneous. *Exhibit 19* shows that SNAP households spent a notably larger share—about 15 percentage points more than non-SNAP households—on infant formulas and baby foods in these data. Non-SNAP households spent a larger share on unsweetened beverages.

Exhibit 19: Other Expenditures by Subcategory
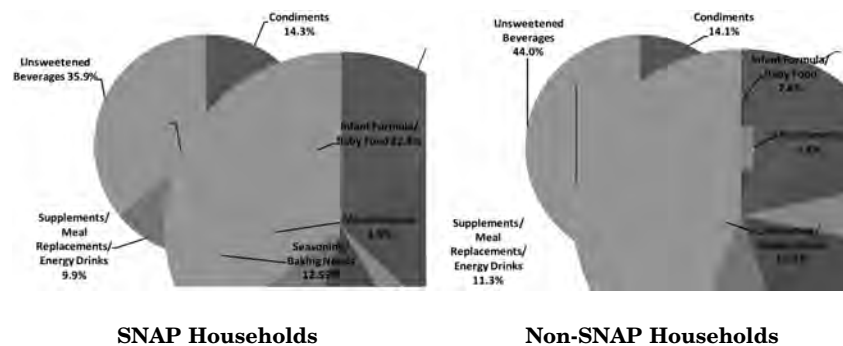
SNAP Households   **Non-SNAP Households**

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.

Chapter 5. Conclusion

IMPAQ analyzed point-of-sale transaction data from January 1, 2011 through December 31, 2011 from a leading grocery retailer to understand what food items are typically purchased by SNAP households and how these purchases compare to those made by non-SNAP households. The majority of stores from which the data came would be classified as grocery stores, supermarkets, and combination food and drug

stores per FNS Retailer Policy and Management Division food retailer definitions.[39] Expenditures on SNAP-eligible food items were examined at four levels: by USDA Food Pattern categories, summary categories, commodities, and subcommodities, as shown in *Exhibit 20.*

Overall, the findings from this study indicate that SNAP households and non-SNAP households purchased similar foods in the retail outlets in these data. The findings hold true after assessing food expenditure patterns of SNAP and non-SNAP households using multiple categorization methods. Both groups of households spent about 40¢ of every dollar of food expenditures on basic items such as meat, fruits, vegetables, milk, eggs, and bread. Another 20¢ out of every dollar was spent on sweetened beverages, desserts, salty snacks, candy and sugar. The remaining 40¢ were spent on a variety of items such as cereal, prepared foods, dairy products, rice, and beans.

Exhibit 20: SNAP and Non-SNAP Household Food Expenditure Patterns

Finding	SNAP Households	Non-SNAP Households
Total annual expenditures on SNAP-eligible foods in dataset	$6.7 billion	$32.3 billion
Percentage of all transactions by all households	12%	88%
Percentage of total annual expenditures by all households	17%	83%
Top 1,000 (of 1,792) subcommodity expenditures as a percentage of all expenditures	99%	98%
Top 100 subcommodity expenditures as a percentage of all expenditures	51%	46%
Top 25 subcommodity expenditures as a percentage of all expenditures	25%	21%
Top 25 commodity (of 238) expenditures as a percentage of all expenditures	45%	41%
Top 10 summary categories (of 30) by expenditure	Meat, Poultry and Seafood	Meat, Poultry and Seafood
	Sweetened Beverages	Vegetables
	Vegetables	High-fat Dairy/Cheese
	Frozen Prepared Foods	Fruits
	Prepared Desserts	Sweetened Beverages
	High-fat Dairy/Cheese	Prepared Desserts
	Bread and Crackers	Bread and Crackers
	Fruits	Frozen Prepared Foods
	Milk	Milk
	Salty Snacks	Salty Snacks
Top 10 commodities (of 238) by expenditure	Soft Drinks	Fluid Milk Products
	Fluid Milk Products	Soft Drinks
	Beef Grinds	Cheese
	Bag Snacks	Baked Breads
	Cheese	Bag Snacks
	Baked Breads	Beef Grinds
	Cold Cereal	Cold Cereal
	Chicken Fresh	Candy—Packaged
	Frozen Handhelds and Snacks	Coffee and Creamers
	Lunchmeat	Ice Cream, Ice Milk, and Sherbets
Top 10 subcommodities (of 1,792) by expenditure	Fluid Milk/White Only	Fluid Milk/White Only
	Soft Drinks 12–18 pack	Soft Drinks 12–18 pack
	Lean Beef	Shredded Cheese
	Kids' Cereal	Chicken Breast—Boneless
	Shredded Cheese	Frozen Premium Nutritional Meals
	2-Liter Soft Drink	Pure Orange Juice—Dairy Case
	Potato Chips	Lean Beef
	Primal Beef	Potato Chips
	Lunchmeat—Deli fresh	Large Eggs
	Infant Formula/Starter Solution	Bananas

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.
* All SNAP totals represent purchases by SNAP households in the dataset, not SNAP dollars.

In summary, after assessing food expenditure patterns of SNAP households and non-SNAP households using multiple categorization methods, both household types made similar food expenditures in 2011 from the retail outlets included in these data.

---

[39] Stores that opened or closed during 2011 were not included in these analyses.

Appendix A: Top Purchases by Expenditure for SNAP and Non-SNAP Households

Exhibit A–1: All Commodities

Commodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
	Rank	$ in Millions	% of Expenditures	Rank	$ in Millions	% of Expenditures
Soft drinks	1	$357.7	5.44%	2	$1,263.3	4.01%
Fluid milk products	2	$253.7	3.85%	1	$1,270.3	4.03%
Beef: grinds	3	$201.0	3.05%	6	$621.1	1.97%
Bag snacks	4	$199.3	3.03%	5	$793.9	2.52%
Cheese	5	$186.4	2.83%	3	$948.9	3.01%
Baked breads	6	$163.7	2.49%	4	$874.8	2.78%
Cold cereal	7	$139.2	2.12%	7	$583.9	1.85%
Chicken fresh	8	$121.4	1.85%	11	$477.8	1.52%
Frozen handhelds & snacks	9	$101.5	1.54%	47	$214.6	0.68%
Lunchmeat	10	$99.4	1.51%	17	$386.1	1.23%
Candy—packaged	11	$96.2	1.46%	8	$527.7	1.67%
Infant formula	12	$95.7	1.45%	80	$124.8	0.40%
Frozen pizza	13	$90.2	1.37%	23	$305.7	0.97%
Refrigerated juices/drinks	14	$88.5	1.35%	14	$412.8	1.31%
Ice cream ice milk & sherbets	15	$86.0	1.31%	10	$481.8	1.53%
Coffee & creamers	16	$82.3	1.25%	9	$519.4	1.65%
Cookies	17	$78.2	1.19%	16	$408.3	1.30%
Water—(sparkling & still)	18	$77.0	1.17%	18	$379.2	1.20%
Shelf stable juice	19	$73.1	1.11%	28	$282.2	0.90%
Eggs/muffins/potatoes	20	$72.0	1.09%	20	$358.7	1.14%
Frozen ss premium meals	21	$68.6	1.04%	12	$447.1	1.42%
Cakes	22	$68.2	1.04%	38	$240.9	0.76%
Bacon	23	$66.1	1.00%	27	$283.2	0.90%
Traditional Mexican foods	24	$62.6	0.95%	25	$286.9	0.91%
Yogurt	25	$59.9	0.91%	13	$442.3	1.40%
Salad dressing & sandwich spreads	26	$59.7	0.91%	30	$280.9	0.89%
Dinner sausage	27	$59.3	0.90%	46	$222.6	0.71%
Frozen prepared chicken	28	$58.6	0.89%	74	$136.4	0.43%
Baked sweet goods	29	$57.5	0.87%	62	$159.6	0.51%
Beef loins	30	$56.3	0.86%	31	$280.3	0.89%
Chicken frozen	31	$54.8	0.83%	85	$123.0	0.39%
Deli meat: bulk	32	$54.6	0.83%	15	$411.0	1.30%
Frozen multi serve	33	$53.0	0.81%	54	$183.5	0.58%
Dinner mixes—dry	34	$51.8	0.79%	72	$140.3	0.45%
Frozen breakfast foods	35	$51.3	0.78%	55	$180.9	0.57%
Crackers & misc baked food	36	$50.9	0.77%	21	$323.7	1.03%
Frozen novelties—water ice	37	$50.7	0.77%	43	$229.7	0.73%
Margarines	38	$50.3	0.76%	24	$303.0	0.96%
Condiments & sauces	39	$49.8	0.76%	52	$187.2	0.59%
Potatoes	40	$48.8	0.74%	34	$265.2	0.84%
Frozen vegetable & veg dish	41	$48.2	0.73%	33	$266.9	0.85%
Hot dogs	42	$45.5	0.69%	63	$158.4	0.50%
Can vegetables—shelf stable	43	$45.3	0.69%	50	$191.7	0.61%
Shortening & oil	44	$44.6	0.68%	57	$174.2	0.55%
Sugars & sweeteners	45	$43.3	0.66%	60	$162.4	0.52%
Isotonic drinks	46	$42.8	0.65%	53	$185.3	0.59%
Salad mix	47	$42.8	0.65%	22	$319.4	1.01%
Milk by-products	48	$42.5	0.65%	32	$268.9	0.85%
Pork boneless loin/rib	49	$41.5	0.63%	58	$168.0	0.53%
Cnv breakfast & wholesome snacks	50	$41.1	0.62%	45	$226.1	0.72%
Frozen ss economy meals	51	$40.9	0.62%	109	$80.7	0.26%
Refrigerated dough products	52	$40.5	0.62%	56	$176.6	0.56%
Beef: round	53	$40.4	0.61%	75	$134.2	0.43%
Dry bean veg & rice	54	$39.9	0.61%	59	$166.1	0.53%
Convenient meals	55	$38.7	0.59%	108	$81.0	0.26%
Tomatoes	56	$38.3	0.58%	35	$261.7	0.83%
Candy—checklane	57	$37.9	0.58%	64	$154.0	0.49%
Berries	58	$37.4	0.57%	19	$373.5	1.19%
Grapes	59	$36.1	0.55%	39	$235.7	0.75%
Bananas	60	$36.1	0.55%	36	$261.4	0.83%
Peanut butter/jelly/jams & honey	61	$36.0	0.55%	42	$231.0	0.73%
Pork thin meats	62	$35.0	0.53%	93	$106.8	0.34%
Citrus	63	$34.3	0.52%	37	$251.7	0.80%
Breakfast sausage	64	$34.2	0.52%	79	$126.7	0.40%
Dry sauce/gravy/potatoes/stuffing	65	$34.0	0.52%	87	$119.2	0.38%
Salad & dips	66	$33.9	0.52%	40	$235.3	0.75%
Apples	67	$33.7	0.51%	29	$281.7	0.89%
Meat—shelf stable	68	$33.3	0.51%	91	$109.2	0.35%
Aseptic juice	69	$33.1	0.50%	112	$78.9	0.25%
Sweet goods	70	$32.5	0.49%	66	$152.9	0.49%
Frozen potatoes	71	$32.2	0.49%	95	$104.5	0.33%
Meat frozen	72	$31.9	0.48%	120	$69.9	0.22%
Baby foods	73	$30.6	0.46%	121	$67.8	0.22%
Vegetables salad	74	$30.0	0.46%	44	$228.6	0.73%
Beef: thin meats	75	$30.0	0.46%	78	$127.7	0.41%
Seafood—shrimp	76	$29.8	0.45%	84	$123.1	0.39%
Canned soups	77	$29.7	0.45%	65	$153.6	0.49%

Exhibit A–1: All Commodities—Continued

Commodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
	Rank	$ in Millions	% of Expenditures	Rank	$ in Millions	% of Expenditures
Baking mixes	78	$28.3	0.43%	69	$148.1	0.47%
Pasta & pizza sauce	79	$27.6	0.42%	99	$96.7	0.31%
Dry noodles & pasta	80	$27.5	0.42%	71	$141.5	0.45%
Can seafood—shelf stable	81	$26.5	0.40%	77	$132.3	0.42%
Rts/micro soup/broth	82	$26.0	0.40%	48	$200.8	0.64%
Canned pasta & mwv fd-shlf stbl	83	$25.9	0.39%	135	$56.7	0.18%
Smoked hams	84	$25.7	0.39%	92	$108.8	0.35%
Nuts	85	$25.6	0.39%	41	$234.2	0.74%
Value-added fruit	86	$25.3	0.38%	70	$146.6	0.47%
Can beans	87	$24.0	0.36%	82	$123.3	0.39%
Dry/ramen bouillon	88	$21.7	0.33%	133	$61.0	0.19%
Powder & crystal drink mix	89	$21.6	0.33%	119	$75.2	0.24%
Rtd tea/new age juice	90	$21.5	0.33%	103	$93.8	0.30%
Baking needs	91	$21.3	0.32%	51	$188.9	0.60%
Can fruit/jar applesauce	92	$20.9	0.32%	96	$104.0	0.33%
Spices & extracts	93	$20.4	0.31%	86	$121.9	0.39%
Energy drinks	94	$20.1	0.30%	102	$94.1	0.30%
Onions	95	$20.0	0.30%	81	$123.5	0.39%
Tropical fruit	96	$19.8	0.30%	61	$160.1	0.51%
Bagels & cream cheese	97	$19.8	0.30%	83	$123.2	0.39%
Frozen bread/dough	98	$19.7	0.30%	114	$77.7	0.25%
Rolls	99	$18.9	0.29%	88	$113.9	0.36%
Hot cereal	100	$18.9	0.29%	100	$96.1	0.30%
Tomato products-shelf stable	101	$18.8	0.29%	90	$112.5	0.36%
Bread	102	$18.7	0.28%	49	$194.7	0.62%
Frozen desserts	103	$18.7	0.28%	107	$82.9	0.26%
Chicken & poultry	104	$18.7	0.28%	140	$50.3	0.16%
Refrigerated dairy case	105	$18.6	0.28%	26	$284.7	0.90%
Dry cheese	106	$18.5	0.28%	111	$79.1	0.25%
Stone fruit	107	$18.3	0.28%	73	$138.6	0.44%
Molasses/syrups/pancake mixes	108	$17.9	0.27%	110	$80.6	0.26%
Peppers	109	$17.7	0.27%	76	$133.4	0.42%
Fruit snacks	110	$17.6	0.27%	152	$43.2	0.14%
Vegetables cooking bulk	111	$17.3	0.26%	68	$150.6	0.48%
Sandwiches	112	$16.9	0.26%	124	$67.7	0.21%
Service case meat	113	$16.8	0.26%	97	$101.4	0.32%
Melons	114	$16.7	0.25%	89	$113.2	0.36%
Popcorn	115	$15.3	0.23%	117	$76.6	0.24%
Warehouse snacks	116	$14.7	0.22%	125	$67.1	0.21%
Dry mix desserts	117	$14.7	0.22%	128	$65.0	0.21%
Single serve fruit/applesauce	118	$14.6	0.22%	127	$65.4	0.21%
Frozen seafood	119	$13.8	0.21%	155	$41.0	0.13%
Flour & meals	120	$13.8	0.21%	126	$65.7	0.21%
Pickle/relish/pckld veg & olives	121	$13.5	0.21%	106	$83.1	0.26%
Turkey grinds	122	$13.1	0.20%	113	$78.0	0.25%
Bulk service case cheese	123	$12.5	0.19%	104	$87.1	0.28%
Pies	124	$12.3	0.19%	123	$67.7	0.21%
Water	125	$12.3	0.19%	122	$67.8	0.22%
Sushi	126	$11.8	0.18%	94	$104.6	0.33%
Teas	127	$11.4	0.17%	116	$76.9	0.24%
Authentic Hispanic foods & products	128	$11.0	0.17%	165	$31.7	0.10%
Cookie/cracker multi-pks	129	$10.9	0.16%	136	$52.7	0.17%
Carrots	130	$10.6	0.16%	98	$97.3	0.31%
Pork shoulder	131	$10.5	0.16%	164	$32.1	0.10%
Cocoa mixes	132	$10.4	0.16%	153	$43.0	0.14%
Juices super premium	133	$10.3	0.16%	130	$63.2	0.20%
Snack meat	134	$10.3	0.16%	147	$47.9	0.15%
Seafood—catfish	135	$9.8	0.15%	191	$17.6	0.06%
Turkey frozen	136	$9.7	0.15%	138	$51.8	0.16%
Specialty cheese pre pack	137	$9.6	0.15%	67	$152.4	0.48%
Smoked pork	138	$9.4	0.14%	156	$39.2	0.12%
Frozen ice	139	$9.3	0.14%	142	$49.9	0.16%
Seafood—crab	140	$9.2	0.14%	182	$24.5	0.08%
Mushrooms	141	$9.1	0.14%	105	$85.7	0.27%
Value-added vegetables	142	$9.0	0.14%	115	$77.0	0.24%
Seafood—value-added seafood	143	$8.9	0.14%	178	$25.6	0.08%
Sweet goods & snacks	144	$8.6	0.13%	146	$48.3	0.15%
Meat snacks	145	$8.5	0.13%	170	$29.3	0.09%
Single serve/vending—salty snacks	146	$8.4	0.13%	197	$15.8	0.05%
Traditional Asian foods	147	$8.3	0.13%	134	$59.8	0.19%
Frozen juice and smoothies	148	$7.7	0.12%	150	$44.9	0.14%
Broccoli/cauliflower	149	$7.4	0.11%	118	$76.5	0.24%
Beef: rib	150	$7.3	0.11%	151	$43.3	0.14%
Refrigerated desserts	151	$7.0	0.11%	143	$49.5	0.16%
Croutons/bread stick & salad top	152	$6.9	0.11%	171	$29.1	0.09%
Dietary aid product/med liq nutr	153	$6.8	0.10%	132	$62.9	0.20%
Dressings/dips	154	$6.6	0.10%	139	$51.7	0.16%
Party tray	155	$6.6	0.10%	154	$42.6	0.14%
Corn	156	$6.5	0.10%	149	$45.3	0.14%
Canned & dry milk	157	$6.1	0.09%	163	$33.1	0.10%
Fitness & diet	158	$5.8	0.09%	101	$95.8	0.30%

Exhibit A–1: All Commodities—Continued

Commodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
	Rank	$ in Millions	% of Expenditures	Rank	$ in Millions	% of Expenditures
Juice	159	$5.8	0.09%	148	$46.2	0.15%
Single serve sweet goods	160	$5.7	0.09%	196	$16.2	0.05%
Refrigerated hispanic grocery	161	$5.7	0.09%	177	$26.5	0.08%
Enhancements (Pickles/Spreads)	162	$5.6	0.08%	174	$27.3	0.09%
Convenience/snacking	163	$5.5	0.08%	173	$28.5	0.09%
Dried fruit	164	$5.4	0.08%	137	$52.6	0.17%
Seafood—salmon-farm raised	165	$5.0	0.08%	144	$48.8	0.15%
Frozen whipped topping	166	$5.0	0.08%	167	$30.9	0.10%
Deli meat: presliced	167	$4.9	0.07%	129	$63.8	0.20%
Herbs/garlic	168	$4.8	0.07%	141	$50.0	0.16%
Seafood—party trays	169	$4.8	0.07%	181	$24.8	0.08%
Salad bar	170	$4.5	0.07%	188	$18.2	0.06%
Seafood—salmon—wild caught	171	$4.5	0.07%	158	$36.7	0.12%
Frozen fruits	172	$4.3	0.07%	145	$48.6	0.15%
Single serve/vending—cookie/cracker	173	$4.1	0.06%	211	$9.1	0.03%
Chicken specialty/natural	174	$3.8	0.06%	166	$31.5	0.10%
Cereals	175	$3.8	0.06%	131	$63.0	0.20%
Pork offal	176	$3.5	0.05%	232	$4.2	0.01%
Pears	177	$3.5	0.05%	162	$33.6	0.11%
Frozen meatless	178	$3.3	0.05%	169	$30.0	0.10%
Seafood—tilapia	179	$3.2	0.05%	194	$16.4	0.05%
Non-dairy/dairy aseptic	180	$3.1	0.05%	168	$30.5	0.10%
Refrigerated italian	181	$2.9	0.04%	159	$36.6	0.12%
Rice cakes	182	$2.8	0.04%	184	$22.4	0.07%
Vinegar & cooking wines	183	$2.8	0.04%	176	$27.2	0.09%
Seafood—salad/dip/sce/cond	184	$2.8	0.04%	223	$6.2	0.02%
Refrigerated vegetarian	185	$2.8	0.04%	180	$24.8	0.08%
Cake decor	186	$2.7	0.04%	199	$15.4	0.05%
Frozen pasta	187	$2.6	0.04%	193	$16.9	0.05%
Syrups toppings & cones	188	$2.6	0.04%	202	$14.1	0.04%
Snacks	189	$2.6	0.04%	157	$37.6	0.12%
Trail mix & snacks	190	$2.5	0.04%	189	$18.1	0.06%
Snack	191	$2.5	0.04%	160	$35.6	0.11%
Prepared/pdgd foods	192	$2.3	0.04%	161	$34.1	0.11%
Turkey fresh	193	$2.3	0.04%	192	$17.0	0.05%
Condiments	194	$2.3	0.03%	175	$27.2	0.09%
Seafood—fin fish other	195	$2.2	0.03%	225	$5.8	0.02%
Seafood—lobster	196	$2.2	0.03%	204	$13.0	0.04%
Pre-slice service case cheese	197	$2.1	0.03%	172	$28.6	0.09%
Spices/jarred garlic	198	$2.1	0.03%	205	$12.4	0.04%
Vegetables cooking packaged	199	$2.0	0.03%	187	$18.3	0.06%
Mixers	200	$1.9	0.03%	195	$16.4	0.05%
Poultry other	201	$1.8	0.03%	219	$6.7	0.02%
Pork bone in loin/rib	202	$1.8	0.03%	214	$7.6	0.02%
Turkey offal	203	$1.6	0.02%	235	$2.0	0.01%
Organics fruit & vegetables	204	$1.6	0.02%	185	$22.2	0.07%
Frozen ethnic	205	$1.6	0.02%	218	$6.7	0.02%
Lamb	206	$1.6	0.02%	207	$11.4	0.04%
Seasonal	207	$1.5	0.02%	209	$10.3	0.03%
Chicken offal	208	$1.5	0.02%	230	$4.3	0.01%
Turkey smoked	209	$1.5	0.02%	234	$2.5	0.01%
Seafood—cod	210	$1.5	0.02%	206	$12.0	0.04%
Frozen meat alternatives	211	$1.5	0.02%	203	$13.6	0.04%
Soup	212	$1.4	0.02%	179	$25.4	0.08%
Authentic central american fds	213	$1.4	0.02%	227	$5.5	0.02%
Cereal bars	214	$1.4	0.02%	183	$23.6	0.07%
Frozen entrées	215	$1.4	0.02%	186	$21.5	0.07%
Authentic asian foods	216	$1.4	0.02%	208	$11.3	0.04%
Bulk food	217	$1.3	0.02%	190	$18.0	0.06%
Baking	218	$1.2	0.02%	201	$14.6	0.05%
Random weight meat products	219	$1.1	0.02%	233	$4.0	0.01%
Processed (dry mixes/squeezed fruit)	220	$1.0	0.02%	222	$6.2	0.02%
Mediterranean bar	221	$1.0	0.02%	198	$15.5	0.05%
Chicken grinds	222	$0.9	0.01%	217	$6.9	0.02%
Chilled ready meals	223	$0.9	0.01%	231	$4.2	0.01%
Dry tea/coffee/coco mixes	224	$0.9	0.01%	210	$9.2	0.03%
Crackers	225	$0.8	0.01%	200	$14.6	0.05%
Seafood—trout	226	$0.7	0.01%	224	$6.0	0.02%
Beverages	227	$0.7	0.01%	215	$7.6	0.02%
Seafood—scallops	228	$0.6	0.01%	221	$6.4	0.02%
Baby food	229	$0.6	0.01%	226	$5.5	0.02%
Deli specialties (retail pk)	230	$0.6	0.01%	228	$5.3	0.02%
Buffalo	231	$0.5	0.01%	213	$8.3	0.03%
Seafood—smoked seafood	232	$0.5	0.01%	212	$8.4	0.03%
Pork grinds	233	$0.5	0.01%	229	$4.3	0.01%
Authentic italian foods	234	$0.5	0.01%	216	$7.4	0.02%
Bakery party trays	235	$0.4	0.01%	236	$1.9	0.01%
Candy	236	$0.4	0.01%	220	$6.5	0.02%
Authentic caribbean foods	237	$0.4	0.01%	238	$1.1	0.00%
Seafood—shellfish other	238	$0.4	0.01%	237	$1.3	0.00%

Exhibit A–1: All Commodities—Continued

Commodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
	Rank	$ in Millions	% of Expenditures	Rank	$ in Millions	% of Expenditures
Totals		**$6,580.5**	**100%**		**$31,513.8**	**100%**

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.
Note: Columns may not sum to total shown due to rounding.

Exhibit A–2: Top 1,000 Subcommodities by Expenditures of SNAP Households

Commodity	Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
		Rank	$ in Millions	% of Expenditures	Rank	$ in Millions	% of Expenditures
Fluid Milk Products	Milk/White Only	1	$191.1	2.90%	1	$853.8	2.71%
Soft Drinks	Soft Drinks 12/18 & 15pk Can Car	2	$164.6	2.50%	2	$601.2	1.91%
Beef: Grinds	Lean [Beef]	3	$112.4	1.71%	7	$257.9	0.82%
Cold Cereal	Kids Cereal	4	$78.1	1.19%	20	$186.4	0.59%
Cheese	Shredded Cheese	5	$74.7	1.14%	3	$342.0	1.09%
Soft Drinks	Sft Drnk 2 Liter Btl Carb Incl	6	$70.9	1.08%	12	$230.1	0.73%
Bag Snacks	Potato Chips	7	$64.4	0.98%	8	$253.2	0.80%
Beef: Grinds	Primal [Beef]	8	$62.4	0.95%	14	$219.8	0.70%
Lunchmeat	Lunchmeat—Deli Fresh	9	$55.8	0.85%	11	$242.6	0.77%
Infant Formula	Infant Formula Starter/ Solution	10	$54.2	0.82%	190	$45.3	0.14%
Eggs/Muffins/Potatoes	Eggs—Large	11	$52.1	0.79%	9	$251.6	0.80%
Chicken Fresh	Chicken Breast Boneless	12	$49.6	0.75%	4	$292.9	0.93%
Water—(Sparkling & Still)	Still Water Drnking/ Mnrl Water	13	$48.8	0.74%	19	$187.7	0.60%
Baked Breads	Mainstream White Bread	14	$48.0	0.73%	39	$136.8	0.43%
Bag Snacks	Tortilla/Nacho Chips	15	$47.4	0.72%	17	$209.0	0.66%
Frozen Handhelds & Snacks	Snacks/Appetizers	16	$44.6	0.68%	65	$100.5	0.32%
Cheese	American Single Cheese	17	$44.1	0.67%	41	$136.6	0.43%
Frzn Ss Premium Meals	Fz Ss Prem Traditional Meals	18	$43.8	0.67%	24	$175.4	0.56%
Refrgratd Juices/Drinks	Dairy Case 100% Pure Juice—O	19	$43.5	0.66%	6	$269.0	0.85%
Baked Sweet Goods	Snack Cake—Multi Pack	20	$41.6	0.63%	63	$101.7	0.32%
Pork Boneless Loin/Rib	Enhanced [Pork Boneless Loin/Rib]	21	$41.5	0.63%	27	$168.0	0.53%
Coffee & Creamers	Unflavored Can Coffee	22	$41.3	0.63%	18	$198.0	0.63%
Frzn Ss Economy Meals	Fz Ss Economy Meals All	23	$40.9	0.62%	81	$80.7	0.26%
Bacon	Bacon—Trad 16oz Or Less	24	$40.7	0.62%	29	$157.6	0.50%
Soft Drinks	Soft Drinks 20pk & 24pk Can Carb	25	$39.7	0.60%	60	$106.4	0.34%
Frozen Pizza	Pizza/Premium	26	$39.7	0.60%	32	$153.3	0.49%
Baked Breads	Mainstream Variety Breads	27	$38.4	0.58%	26	$173.2	0.55%
Sugars & Sweeteners	Sugar	28	$36.9	0.56%	55	$112.7	0.36%
Cold Cereal	All Family Cereal	29	$36.2	0.55%	16	$214.9	0.68%
Frozen Handhelds & Snacks	Sandwiches & Handhelds	30	$35.9	0.54%	91	$73.6	0.23%
Potatoes	Potatoes Russet (Bulk & Bag)	31	$35.8	0.54%	30	$154.5	0.49%
Cheese	Natural Cheese Chunks	32	$35.3	0.54%	15	$216.1	0.69%
Pork Thin Meats	Ribs [Pork]	33	$35.0	0.53%	59	$106.8	0.34%
Convenient Meals	Convenient Meals—Kids Meal C	34	$34.2	0.52%	96	$69.7	0.22%
Bananas	Bananas	35	$34.2	0.52%	10	$242.7	0.77%
Soft Drinks	Sft Drnk Mlt-Pk Btl Carb (Excp)	36	$34.0	0.52%	25	$173.6	0.55%
Ice Cream Ice Milk & Sherbets	Premium [Ice Cream & Sherbert]	37	$31.2	0.47%	13	$226.0	0.72%
Isotonic Drinks	Isotonic Drinks Single Serve	38	$30.5	0.46%	47	$119.5	0.38%
Chicken Frozen	Frzn Chicken—Wht Meat	39	$30.0	0.46%	66	$99.8	0.32%
Canned Soups	Condensed Soup	40	$29.7	0.45%	31	$153.6	0.49%
Salad Dresing & Sandwich Spreads	Pourable Salad Dressings	41	$29.0	0.44%	37	$139.4	0.44%
Beef: Loins	Choice Beef	42	$28.4	0.43%	40	$136.6	0.43%
Beef: Loins	Select Beef	43	$27.9	0.42%	36	$143.7	0.46%
Soft Drinks	Sft Drnk Sngl Srv Btl Carb (Ex)	44	$27.8	0.42%	94	$71.4	0.23%
Frzn Multi Serve	Fz Family Style Entrées	45	$27.6	0.42%	77	$83.5	0.26%

Exhibit A–2: Top 1,000 Subcommodities by Expenditures of SNAP Households—Continued

Commodity	Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
		Rank	$ in Millions	% of Expenditures	Rank	$ in Millions	% of Expenditures
Salad Dresing & Sandwich Spreads	Mayonnaise & Whipped Dressing	46	$27.3	0.41%	48	$119.1	0.38%
Frozen Vegetable & Veg Dish	Fz Bag Vegetables—Plain	47	$25.7	0.39%	42	$131.9	0.42%
Ice Cream Ice Milk & Sherbets	Traditional [Ice Cream & Sherbert]	48	$25.6	0.39%	49	$118.7	0.38%
Hot Dogs	Hot Dogs—Base Meat	49	$25.1	0.38%	138	$56.8	0.18%
Cold Cereal	Adult Cereal	50	$24.9	0.38%	21	$182.6	0.58%
Frzn Ss Premium Meals	Fz Ss Prem Nutritional Meals	51	$24.7	0.38%	5	$271.6	0.86%
Dinner Mixes-Dry	Macaroni & Cheese Dnrs	52	$24.3	0.37%	125	$59.7	0.19%
Aseptic Juice	Aseptic Pack Juice And Drinks	53	$24.2	0.37%	134	$57.1	0.18%
Fluid Milk Products	Refrigerated Coffee Creamers	54	$24.1	0.37%	34	$147.2	0.47%
Beef: Round	Choice Beef	55	$24.0	0.37%	92	$72.5	0.23%
Traditional Mexican Foods	Mexican Soft Tortillas And Wraps	56	$23.7	0.36%	54	$113.1	0.36%
Berries	Strawberries	57	$23.5	0.36%	22	$178.4	0.57%
Margarines	Margarine: Tubs And Bowls	58	$23.4	0.36%	64	$100.9	0.32%
Pasta & Pizza Sauce	Mainstream [Pasta & Pizza Sauce]	59	$23.0	0.35%	80	$81.0	0.26%
Chicken Fresh	Chicken Wings	60	$22.2	0.34%	300	$28.6	0.09%
Canned Pasta & Mwv Fd-Shlf Stbl	Can Pasta	61	$22.2	0.34%	179	$47.7	0.15%
Chicken Frozen	Frzn Chicken—Wings	62	$22.2	0.34%	452	$17.4	0.06%
Lunchmeat	Lunchmeat—Bologna/Sausage	63	$21.8	0.33%	121	$60.9	0.19%
Bag Snacks	Mult Pk Bag Snacks	64	$21.6	0.33%	199	$43.4	0.14%
Candy—Packaged	Candy Bags-Chocolate	65	$21.5	0.33%	33	$147.5	0.47%
Sweet Goods	Sw Gds: Donuts	66	$21.3	0.32%	78	$82.3	0.26%
Can Seafood—Shelf Stable	Tuna	67	$21.1	0.32%	57	$109.9	0.35%
Shortening & Oil	Vegetable Oil	68	$20.5	0.31%	246	$35.4	0.11%
Frozen Potatoes	Frzn French Fries	69	$20.5	0.31%	163	$50.3	0.16%
Peanut Butter/Jelly/Jams & Honey	Peanut Butter	70	$20.4	0.31%	43	$127.8	0.41%
Frozen Pizza	Pizza/Economy	71	$19.8	0.30%	192	$45.1	0.14%
Margarines	Butter	72	$19.6	0.30%	23	$175.6	0.56%
Deli Meat: Bulk	Meat: Turkey Bulk	73	$19.3	0.29%	28	$159.6	0.51%
Frozen Breakfast Foods	Frzn Breakfast Sandwiches	74	$19.1	0.29%	142	$55.7	0.18%
Meat Frozen	Frzn Meat—Beef	75	$19.0	0.29%	185	$46.3	0.15%
Frzn Multi Serve	Fz Skillet Meals	76	$18.8	0.29%	83	$79.3	0.25%
Frzn Prepared Chicken	Value Forms/18oz And Larger [Chicken]	77	$18.6	0.28%	209	$42.6	0.14%
Cakes	Cakes: Birthday/Celebration	78	$18.6	0.28%	164	$50.3	0.16%
Cookies	Sandwich Cookies	79	$18.0	0.27%	93	$71.8	0.23%
Frozen Pizza	Pizza/Traditional	80	$17.9	0.27%	111	$64.1	0.20%
Fruit Snacks	Fruit Snacks	81	$17.6	0.27%	202	$43.2	0.14%
Rts/Micro Soup/Broth Rts	Soup: Chunky/Homestyle	82	$17.6	0.27%	46	$119.9	0.38%
Milk By-Products	Sour Creams	83	$17.5	0.27%	70	$95.2	0.30%
Frozen Breakfast Foods	Waffles/Pancakes/French Toast	84	$17.3	0.26%	90	$77.4	0.25%
Chicken Fresh	Chicken Drums	85	$17.3	0.26%	270	$31.5	0.10%
Bagels & Cream Cheese	Cream Cheese	86	$17.2	0.26%	51	$115.5	0.37%
Beef: Grinds	Angus [Beef]	87	$17.1	0.26%	61	$103.8	0.33%
Bag Snacks	Bagged Cheese Snacks	88	$17.1	0.26%	157	$52.0	0.16%
Bag Snacks	Salsa & Dips	89	$17.1	0.26%	135	$57.0	0.18%
Sandwiches	Sandwiches—(Cold)	90	$16.9	0.26%	106	$67.7	0.21%
Dry/Ramen Bouillon	Ramen Noodles/Ramen Cups	91	$16.7	0.25%	304	$28.1	0.09%
Crackers & Misc Baked Food	Cheese Crackers	92	$16.5	0.25%	72	$90.2	0.29%
Dinner Sausage	Dnr Sausage—Links Pork Ckd	93	$16.4	0.25%	233	$37.6	0.12%
Candy—Checklane	Candy Bars (Singles)	94	$16.3	0.25%	146	$54.9	0.17%
Baked Breads	Hamburger Buns	95	$16.2	0.25%	95	$70.2	0.22%
Baked Breads	Hot Dog Buns	96	$16.2	0.25%	117	$62.2	0.20%
Water—(Sparkling & Still)	Spring Water	97	$16.2	0.25%	69	$95.6	0.30%
Refrgratd Juices/Drinks	Dairy Case Juice Drnk Under 10 oz	98	$16.0	0.24%	177	$48.0	0.15%
Fluid Milk Products	Flavored Milk	99	$16.0	0.24%	128	$59.4	0.19%
Baked Sweet Goods	Sweet Goods—Full Size	100	$15.8	0.24%	133	$57.9	0.18%
Grapes	Grapes Red	101	$15.8	0.24%	45	$121.7	0.39%
Candy—Packaged	Candy Bars (Multi Pack)	102	$15.6	0.24%	97	$69.6	0.22%

Exhibit A–2: Top 1,000 Subcommodities by Expenditures of SNAP
Households—Continued

Commodity	Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
		Rank	$ in Millions	% of Expenditures	Rank	$ in Millions	% of Expenditures
Grapes	Grapes White	103	$15.5	0.23%	76	$84.9	0.27%
Cookies	Tray Pack/Choc Chip Cookies	104	$15.3	0.23%	153	$53.9	0.17%
Deli Meat: Bulk	Meat: Ham Bulk	105	$15.3	0.23%	50	$115.9	0.37%
Cheese	String Cheese	106	$15.1	0.23%	67	$99.0	0.31%
Breakfast Sausage	Bkfst Sausage—Fresh Rolls	107	$15.1	0.23%	119	$61.4	0.19%
Seafood—Shrimp	Shrimp—Raw	108	$15.0	0.23%	99	$69.0	0.22%
Seafood—Shrimp	Shrimp—Cooked	109	$14.8	0.22%	152	$54.0	0.17%
Refrgrated Dough Products	Refrigerated Biscuits	110	$14.7	0.22%	191	$45.2	0.14%
Crackers & Misc Baked Food	Butter Spray Cracker	111	$14.6	0.22%	101	$68.7	0.22%
Frozen Novelties—Water Ice	Sticks/Enrobed [Frozen Novelties]	112	$14.2	0.22%	126	$59.7	0.19%
Spices & Extracts	Traditional Spices	113	$14.1	0.21%	120	$61.2	0.19%
Frozen Novelties—Water Ice	Water Ice [Frozen Novelties]	114	$14.0	0.21%	160	$50.6	0.16%
Yogurt	Yogurt/Kids	115	$14.0	0.21%	212	$42.4	0.13%
Cnv Breakfast & Wholesome Snks	Toaster Pastries	116	$14.0	0.21%	180	$47.6	0.15%
Dry Bean Veg & Rice	Rice Side Dish Mixes Dry	117	$14.0	0.21%	184	$46.7	0.15%
Ice Cream Ice Milk & Sherbets	Pails [Ice Cream & Sherbert]	118	$13.9	0.21%	250	$35.1	0.11%
Milk By-Products	Cottage Cheese	119	$13.9	0.21%	58	$108.8	0.35%
Rtd Tea/New Age Juice	Tea Sweetened	120	$13.9	0.21%	102	$68.7	0.22%
Can Beans	Prepared Beans—Baked W/Pork	121	$13.4	0.20%	145	$55.3	0.18%
Cheese	Natural Cheese Slices	122	$13.4	0.20%	53	$113.2	0.36%
Tropical Fruit	Avocado	123	$13.4	0.20%	56	$112.6	0.36%
Meat—Shelf Stable	Chili: Canned	124	$13.3	0.20%	206	$42.8	0.14%
Shelf Stable Juice	Apple Juice & Cider (Over 50%)	125	$13.3	0.20%	187	$45.8	0.15%
Value-Added Fruit	Instore Cut Fruit	126	$13.2	0.20%	74	$85.8	0.27%
Candy—Checklane	Chewing Gum	127	$13.2	0.20%	103	$68.3	0.22%
Salad Mix	Blends [Salad Mix]	128	$13.1	0.20%	44	$124.0	0.39%
Popcorn	Popcorn—Microwave	129	$13.1	0.20%	114	$63.4	0.20%
Turkey Grinds	Ground Turkey	130	$13.1	0.20%	87	$78.0	0.25%
Dinner Sausage	Dnr Sausage—Links Fresh	131	$13.0	0.20%	132	$58.0	0.18%
Dinner Mixes-Dry	Skillet Dinners	132	$13.0	0.20%	332	$25.8	0.08%
Dry Noodles & Pasta	Long Cut Pasta	133	$13.0	0.20%	122	$60.4	0.19%
Chicken Fresh	Whole Chicken (Roasters/Fryer)	134	$12.9	0.20%	136	$56.9	0.18%
Frozen Pizza	Pizza/Single Serve/Microwave	135	$12.8	0.19%	203	$43.2	0.14%
Can Vegetables—Shelf Stable	Green Beans: Fs/Whl/Cut	136	$12.8	0.19%	155	$53.1	0.17%
Cnv Breakfast & Wholesome Snks	Granola Bars	137	$12.8	0.19%	73	$88.9	0.28%
Candy—Packaged	Candy Bags-Non Chocolate	138	$12.6	0.19%	147	$54.9	0.17%
Citrus	Oranges Navels All	139	$12.6	0.19%	84	$79.3	0.25%
Baked Breads	Premium Bread	140	$12.3	0.19%	35	$144.7	0.46%
Dry Sce/Gravy/Potatoes/Stuffng	Potatoes: Dry	141	$12.3	0.19%	262	$32.3	0.10%
Condiments & Sauces	Bbq Sauce	142	$12.3	0.19%	226	$38.6	0.12%
Chicken Fresh	Chicken Thighs	143	$12.2	0.19%	165	$50.0	0.16%
Dinner Sausage	Dnr Sausage—Pork Rope Ckd	144	$12.1	0.18%	227	$38.2	0.12%
Can Vegetables—Shelf Stable	Corn	145	$12.1	0.18%	197	$44.0	0.14%
Bacon	Bacon—Trad Greater Than 16oz	146	$12.0	0.18%	193	$44.6	0.14%
Ice Cream Ice Milk & Sherbets	Super Premium Pints [Ice Cream & Sherbert]	147	$11.8	0.18%	71	$91.1	0.29%
Baby Foods	Baby Food—Beginner	148	$11.7	0.18%	303	$28.1	0.09%
Molasses/Syrups/Pancake Mixes	Molasses & Syrups	149	$11.7	0.18%	130	$58.7	0.19%
Water	Non-Carb Water Flvr—Drnk/Mnr	150	$11.6	0.18%	115	$63.4	0.20%
Vegetables Salad	Head Lettuce	151	$11.6	0.18%	143	$55.5	0.18%
Condiments & Sauces	Catsup	152	$11.5	0.17%	216	$41.5	0.13%
Dry Sce/Gravy/Potatoes/Stuffng	Sauce Mixes/Gravy Mixes Dry	153	$11.5	0.17%	183	$46.7	0.15%
Beef: Thin Meats	Soup/Stew	154	$11.2	0.17%	195	$44.1	0.14%
Baby Foods	Baby Food Junior/All Brands	155	$11.2	0.17%	311	$27.5	0.09%

Exhibit A–2: Top 1,000 Subcommodities by Expenditures of SNAP Households—Continued

Commodity	Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
		Rank	$ in Millions	% of Expenditures	Rank	$ in Millions	% of Expenditures
Frzn Prepared Chicken	Whole Muscle Breaded/18oz	156	$11.1	0.17%	285	$29.9	0.09%
Cakes	Cakes: Cupcakes	157	$11.1	0.17%	247	$35.3	0.11%
Refrgratd Juices/Drinks	Dairy Case Citrus Pnch/Oj Subs	158	$11.0	0.17%	254	$34.4	0.11%
Yogurt	Yogurt/Ss Regular	159	$11.0	0.17%	100	$69.0	0.22%
Dry Cheese	Loaf Cheese	160	$10.9	0.17%	229	$38.1	0.12%
Frozen Handhelds & Snacks	Corn Dogs	161	$10.9	0.17%	401	$20.6	0.07%
Cnv Breakfast & Wholesome Snks	Cereal Bars	162	$10.9	0.17%	86	$78.4	0.25%
Isotonic Drinks	Isotonic Drinks Multi-Pack	163	$10.8	0.16%	131	$58.1	0.18%
Cookies	Cookies: Regular	164	$10.8	0.16%	127	$59.6	0.19%
Shelf Stable Juice	Fruit Drinks: Canned & Glass	165	$10.6	0.16%	617	$10.9	0.03%
Single Serve Fruit/Applesauce	Fruit Cup	166	$10.6	0.16%	207	$42.7	0.14%
Can Beans	Variety Beans—Kidney/Pinto	167	$10.5	0.16%	104	$68.0	0.22%
Frozen Vegetable & Veg Dish	Frzn Steamable Vegetables	168	$10.5	0.16%	79	$81.4	0.26%
Coffee & Creamers	Non Dairy Creamer	169	$10.5	0.16%	244	$35.4	0.11%
Beef: Thin Meats	Cubed Meats [Beef]	170	$10.5	0.16%	286	$29.8	0.09%
Hot Dogs	Hot Dogs—Base Beef	171	$10.3	0.16%	171	$49.4	0.16%
Yogurt	Yogurt/Ss Light	172	$10.2	0.16%	62	$103.1	0.33%
Traditional Mexican Foods	Mexican Sauces And Picante Sauce	173	$10.2	0.16%	116	$62.3	0.20%
Frozen Handhelds & Snacks	Burritos	174	$10.2	0.15%	406	$20.0	0.06%
Eggs/Muffins/Potatoes	Eggs—Medium	175	$10.1	0.15%	394	$21.0	0.07%
Dry Noodles & Pasta	Short Cut Pasta	176	$9.9	0.15%	140	$56.2	0.18%
Dinner Mixes-Dry	Microwave Dinners	177	$9.8	0.15%	220	$39.9	0.13%
Cakes	Cakes: Layers	178	$9.8	0.15%	228	$38.2	0.12%
Pork Shoulder	Butts [Pork Shoulder]	179	$9.7	0.15%	292	$29.2	0.09%
Frzn Prepared Chicken	Boneless Snack/18oz And Larger	180	$9.6	0.15%	384	$21.5	0.07%
Rolls	Rolls: Dinner	181	$9.5	0.14%	161	$50.5	0.16%
Chicken & Poultry	Chix: Value-Added (Cold)	182	$9.5	0.14%	323	$26.7	0.08%
Tomato Products-Shelf Stable	Tomatoes Diced	183	$9.5	0.14%	123	$59.9	0.19%
Frozen Ice	Ice—Crushed/Cubed	184	$9.3	0.14%	166	$49.9	0.16%
Beef: Round	Angus [Beef]	185	$9.3	0.14%	271	$31.4	0.10%
Shelf Stable Juice	Blended Juice & Combinations	186	$9.3	0.14%	287	$29.6	0.09%
Sushi	Sushi—In Store Prepared	187	$9.2	0.14%	75	$85.4	0.27%
Tomatoes	Tomatoes Hothouse On The Vine	188	$9.2	0.14%	88	$77.7	0.25%
Candy—Packaged	Seasonal Miscellaneous [Candy]	189	$9.2	0.14%	182	$46.9	0.15%
Frozen Bread/Dough	Frzn Garlic Toast	190	$9.1	0.14%	307	$27.8	0.09%
Warehouse Snacks	Canister Snacks	191	$9.1	0.14%	241	$36.4	0.12%
Beef: Grinds	Patties [Beef]	192	$9.1	0.14%	221	$39.7	0.13%
Bag Snacks	Corn Chips	193	$9.1	0.14%	188	$45.6	0.14%
Hot Cereal	Instant Oatmeal	194	$8.9	0.14%	218	$41.1	0.13%
Breakfast Sausage	Bkfst Sausage—Fresh Links	195	$8.9	0.14%	325	$26.3	0.08%
Crackers & Misc Baked Food	Snack Crackers	196	$8.9	0.14%	68	$98.6	0.31%
Citrus	Clementines	197	$8.8	0.13%	85	$78.6	0.25%
Frzn Prepared Chicken	Bone-In Wings	198	$8.8	0.13%	586	$12.0	0.04%
Onions	Onions Yellow (Bulk & Bag)	199	$8.7	0.13%	225	$39.3	0.12%
Dry Mix Desserts	Pudding & Gelatin Cups/Cans	200	$8.7	0.13%	310	$27.6	0.09%
Coffee & Creamers	Unflavored Bag Coffee	201	$8.5	0.13%	38	$137.3	0.44%
Refrgratd Juices/Drinks	Dairy Case Tea With Sugar	202	$8.4	0.13%	364	$23.1	0.07%
Infant Formula	Infant Formula Specialty	203	$8.4	0.13%	687	$9.1	0.03%
Ss/Vending—Salty Snacks	Salty Snacks Vending	204	$8.4	0.13%	480	$15.8	0.05%
Shortening & Oil	Canola Oils	205	$8.3	0.13%	291	$29.3	0.09%
Infant Formula	Infant Formula Starter Large	206	$8.3	0.13%	368	$22.8	0.07%
Value-Added Fruit	Melons Instore Cut	207	$8.2	0.13%	205	$42.8	0.14%
Vegetables Salad	Cucumbers	208	$8.2	0.13%	129	$58.9	0.19%
Smoked Hams	Hams—Half/Port Bone-In	209	$8.2	0.12%	282	$30.0	0.10%

Exhibit A–2: Top 1,000 Subcommodities by Expenditures of SNAP Households—Continued

Commodity	Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
		Rank	$ in Millions	% of Expenditures	Rank	$ in Millions	% of Expenditures
Crackers & Misc Baked Food	Saltine/Oyster	210	$8.2	0.12%	204	$43.1	0.14%
Condiments & Sauces	Steak & Worchester Sauce	211	$8.2	0.12%	321	$26.7	0.08%
Cookie/Cracker Multi-Pks	Multi-Pack Crackers	212	$8.0	0.12%	217	$41.3	0.13%
Frozen Novelties—Water Ice	Cones [Frozen Novelties]	213	$7.9	0.12%	273	$31.2	0.10%
Deli Meat: Bulk	Meat: Beef Bulk	214	$7.9	0.12%	154	$53.4	0.17%
Melons	Watermelon Seedless Whole	215	$7.9	0.12%	198	$43.9	0.14%
Candy—Packaged	Seasonal Candy Bags—Chocolate	216	$7.9	0.12%	148	$54.8	0.17%
Salad & Dips	Vegetable Salads—Prepack	217	$7.8	0.12%	238	$36.6	0.12%
Baked Breads	Bagels	218	$7.8	0.12%	108	$66.9	0.21%
Peppers	Peppers Green Bell	219	$7.8	0.12%	215	$41.5	0.13%
Salad Mix	Regular Garden Salad	220	$7.8	0.12%	265	$31.9	0.10%
Energy Drinks	Energy Drink—Single Serve	221	$7.7	0.12%	327	$26.3	0.08%
Smoked Hams	Hams—Spiral	222	$7.6	0.12%	240	$36.5	0.12%
Coffee & Creamers	Unflavored Instant Coffee	223	$7.6	0.12%	316	$27.3	0.09%
Tomatoes	Roma Tomatoes (Bulk/Pkg)	224	$7.5	0.11%	222	$39.6	0.13%
Cookies	Vanilla Wafer/Kids Cookies	225	$7.5	0.11%	236	$36.7	0.12%
Frozen Novelties—Water Ice	Ice Cream Sandwiches	226	$7.4	0.11%	354	$24.2	0.08%
Hot Dogs	Hot Dogs—Premium	227	$7.4	0.11%	208	$42.7	0.14%
Yogurt	Yogurt/Pro Active Health	228	$7.4	0.11%	113	$63.5	0.20%
Snack Meat	Snack Meat—Pepperoni	229	$7.4	0.11%	263	$32.1	0.10%
Cakes	Cakes: Creme/Pudding	230	$7.4	0.11%	333	$25.8	0.08%
Meat Frozen	Frzn Meat—Breakfast Sausage	231	$7.3	0.11%	602	$11.3	0.04%
Beef: Rib	Angus [Beef]	232	$7.3	0.11%	200	$43.3	0.14%
Shortening & Oil	Olive Oil	233	$7.3	0.11%	112	$63.8	0.20%
Dry Bean Veg & Rice	Noodle Side Dish Mixes	234	$7.3	0.11%	390	$21.1	0.07%
Yogurt	Yogurt/Adult Multi-Packs	235	$7.2	0.11%	210	$42.5	0.14%
Dry Bean Veg & Rice	Rice—Dry Bag And Box	236	$7.1	0.11%	255	$33.9	0.11%
Energy Drinks	Energy Drink—Single Serve	237	$7.1	0.11%	224	$39.5	0.13%
Baked Breads	Sandwich Buns	238	$7.1	0.11%	137	$56.8	0.18%
Refrigerated Dairy Case	Non-Dairy Milks	239	$7.1	0.11%	105	$67.7	0.21%
Beef: Round	Select Beef	240	$7.1	0.11%	278	$30.4	0.10%
Powder & Crystal Drink Mix	Unsweetened Envelope [Powder Drink Mix]	241	$7.0	0.11%	802	$6.2	0.02%
Refrigerated Desserts	Refrigerated Pudding	242	$7.0	0.11%	170	$49.5	0.16%
Carrots	Carrots Mini Peeled	243	$7.0	0.11%	118	$61.4	0.19%
Baking Mixes	Layer Cake Mix	244	$7.0	0.11%	251	$35.1	0.11%
Cocoa Mixes	Malted Mlk/Syrup/Pwdrs (Eggnog)	245	$6.9	0.11%	339	$25.3	0.08%
Stone Fruit	Cherries Red	246	$6.9	0.10%	139	$56.7	0.18%
Frzn Seafood	Frz Coated Fish Fillets	247	$6.9	0.10%	389	$21.1	0.07%
Meat Snacks	Jerky/Nuggets/Tenders	248	$6.8	0.10%	334	$25.8	0.08%
Dry Bean Veg & Rice	Rice—Instant & Microwave	249	$6.8	0.10%	231	$38.0	0.12%
Seafood—Catfish	Catfish—Fillet	250	$6.8	0.10%	544	$13.1	0.04%
Refrgrated Dough Products	Refrigerated Cookies-Brand	251	$6.8	0.10%	296	$28.8	0.09%
Fluid Milk Products	Specialty/Lactose Free Milk	252	$6.7	0.10%	175	$48.4	0.15%
Peanut Butter/Jelly/Jams & Honey	Preserves/Jam/Marmalade	253	$6.7	0.10%	141	$56.2	0.18%
Margarines	Margarine Stick	254	$6.7	0.10%	376	$22.3	0.07%
Rts/Micro Soup/Broth	Broth	255	$6.7	0.10%	109	$65.6	0.21%
Rtd Tea/New Age Juice	Juice (Under 10% Juice)	256	$6.7	0.10%	374	$22.4	0.07%
Apples	Apples Gala (Bulk & Bag)	257	$6.6	0.10%	98	$69.3	0.22%
Chicken Fresh	Chicken Legs/Quarters	258	$6.6	0.10%	536	$13.5	0.04%
Frozen Breakfast Foods	Frzn Breakfast Pastry	259	$6.5	0.10%	420	$19.0	0.06%
Flour & Meals	Flour: White & Self Rising	260	$6.4	0.10%	297	$28.8	0.09%
Seafood—Value-Added	Seafood Value-Added Breaded Shrimp	261	$6.4	0.10%	459	$16.9	0.05%
Sugars & Sweeteners	Sweeteners	262	$6.4	0.10%	168	$49.8	0.16%
Baking Mixes	Frosting	263	$6.3	0.10%	318	$27.0	0.09%
Pies	Pies: Fruit/Nut	264	$6.3	0.10%	223	$39.6	0.13%
Molasses/Syrups/Pancake Mixes	Pancake Mixes	265	$6.3	0.10%	379	$21.9	0.07%

Exhibit A–2: Top 1,000 Subcommodities by Expenditures of SNAP Households—Continued

Commodity	Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
		Rank	$ in Millions	% of Expenditures	Rank	$ in Millions	% of Expenditures
Water—(Sparkling & Still)	Still Water Flvrd Drnk/ Mnrl Wtr	266	$6.3	0.10%	230	$38.1	0.12%
Bag Snacks	Pretzels	267	$6.2	0.09%	144	$55.4	0.18%
Dry Cheese	Grated Cheese	268	$6.2	0.09%	256	$33.6	0.11%
Onions	Onions Sweet (Bulk & Bag)	269	$6.2	0.09%	181	$47.4	0.15%
Shelf Stable Juice	Cranapple/Cran Grape Juice	270	$6.1	0.09%	315	$27.3	0.09%
Frzn Seafood	Frz Fishsticks/Tenders/ Nuggets	271	$6.1	0.09%	506	$14.7	0.05%
Seafood—Crab	Crab—Snow	272	$6.1	0.09%	598	$11.4	0.04%
Bread	Bread:Italian/French	273	$6.1	0.09%	172	$49.0	0.16%
Bulk Service Case Cheese	Bulk Semi-Hard Cheese	274	$6.1	0.09%	196	$44.0	0.14%
Baking Mixes	Muffin & Corn Bread Mix	275	$6.0	0.09%	295	$28.9	0.09%
Chicken & Poultry	Chix: Frd 8pc/Cut Up (Cold)	276	$6.0	0.09%	558	$12.7	0.04%
Infant Formula	Infant Formula Toddler	277	$6.0	0.09%	570	$12.4	0.04%
Vegetables Cooking Bulk	Celery	278	$5.9	0.09%	158	$51.2	0.16%
Traditional Mexican Foods	Mexican Seasoning Mixes	279	$5.9	0.09%	402	$20.6	0.07%
Refrigerated Dairy Case	Fluid Milk	280	$5.9	0.09%	52	$113.3	0.36%
Soft Drinks	Soft Drinks Can Non-Carb	281	$5.9	0.09%	592	$11.5	0.04%
Condiments & Sauces	Hot Sauce	282	$5.8	0.09%	466	$16.4	0.05%
Apples	Apples Red Delicious (Bulk & Bag)	283	$5.8	0.09%	248	$35.2	0.11%
Single Serve Sweet Goods	Snack Cake—Single Serve	284	$5.7	0.09%	470	$16.2	0.05%
Milk By-Products	Refrig Dips	285	$5.7	0.09%	350	$24.7	0.08%
Tomatoes	Tomatoes Vine Ripe Bulk	286	$5.7	0.09%	373	$22.5	0.07%
Bag Snacks	Brand Snacks	287	$5.6	0.09%	176	$48.1	0.15%
Refrgrated Dough Products	Refrigerated Specialty Rolls	288	$5.5	0.08%	312	$27.5	0.09%
Canned & Dry Milk	Canned Milk	289	$5.5	0.08%	305	$27.9	0.09%
Coffee & Creamers	Ready To Drink Coffee	290	$5.5	0.08%	403	$20.5	0.06%
Salad Mix	Garden Plus [Salad Mix]	291	$5.5	0.08%	267	$31.8	0.10%
Cookies	Cookies: Holiday/Special Occas	292	$5.5	0.08%	320	$26.8	0.08%
Bag Snacks	Misc Bag Snacks	293	$5.5	0.08%	591	$11.5	0.04%
Refrgrated Juices/Drinks Dairy Case	100% Pure Juice Other	294	$5.4	0.08%	261	$32.3	0.10%
Refrgrated Dough Products	Refrigerated Crescent Rolls	295	$5.4	0.08%	274	$31.2	0.10%
Teas	Tea Bags & Bulk Tea	296	$5.4	0.08%	317	$27.2	0.09%
Aseptic Juice	Aseptic Pack Juice And Drinks	297	$5.3	0.08%	449	$17.5	0.06%
Infant Formula	Infant Formula Solutions Large	298	$5.3	0.08%	497	$15.2	0.05%
Vegetables Cooking Bulk	Cabbage	299	$5.3	0.08%	340	$25.1	0.08%
Melons	Cantaloupe Whole	300	$5.3	0.08%	194	$44.4	0.14%
Dry Sce/Gravy/Potatoes/ Stuffng	Stuffing Mixes	301	$5.3	0.08%	378	$22.1	0.07%
Frozen Desserts	Frozen Fruit Pies & Cobblers	302	$5.3	0.08%	359	$23.7	0.08%
Frozen Potatoes	Frzn Tater Tots/Other Extruded	303	$5.2	0.08%	424	$18.8	0.06%
Traditional Mexican Foods	Mexican Taco/Tostado/ Shells	304	$5.2	0.08%	417	$19.1	0.06%
Broccoli/Cauliflower	Broccoli Whole & Crowns	305	$5.2	0.08%	156	$52.0	0.16%
Tomato Products-Shelf Stable	Tomato Sauce	306	$5.1	0.08%	353	$24.2	0.08%
Candy—Checklane	Candy Bars (Singles)	307	$5.1	0.08%	476	$15.9	0.05%
Lunchmeat	Lunchmeat—Chop/Form Pltry	308	$5.1	0.08%	583	$12.1	0.04%
Vegetables Salad	Variety Lettuce	309	$5.1	0.08%	110	$65.2	0.21%
Berries	Blueberries	310	$5.1	0.08%	82	$79.4	0.25%
Shelf Stable Juice	Cranberry Juice (50% And Under)	311	$5.0	0.08%	371	$22.6	0.07%
Seafood—Salmon-Farm Raised	Salmon Fr—Atlantic	312	$5.0	0.08%	173	$48.8	0.15%
Tomatoes	Tomatoes Hot House Bulk	313	$5.0	0.08%	280	$30.3	0.10%
Yogurt	Yogurt/Specialty Greek	314	$5.0	0.08%	89	$77.4	0.25%
Frozen Whipped Topping	Frzn Whipped Topping	315	$5.0	0.08%	276	$30.9	0.10%
Can Fruit/Jar Applesauce	Pineapple	316	$4.9	0.07%	357	$24.0	0.08%
Frozen Desserts	Frozen Cream Pies	317	$4.9	0.07%	423	$18.9	0.06%

Exhibit A–2: Top 1,000 Subcommodities by Expenditures of SNAP Households—Continued

Commodity	Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
		Rank	$ in Millions	% of Expendi-tures	Rank	$ in Millions	% of Expendi-tures
Infant Formula	Infant Formula Con-centrate	318	$4.9	0.07%	954	$3.9	0.01%
Stone Fruit	Peaches Yellow Flesh	319	$4.8	0.07%	243	$35.6	0.11%
Sweet Goods	Sw Gds: Sw Rolls/Dan	320	$4.8	0.07%	319	$26.9	0.09%
Potatoes	Potatoes Sweet & Yams	321	$4.8	0.07%	234	$37.1	0.12%
Seafood—Party Trays	Party Tray—Shrimp	322	$4.8	0.07%	347	$24.8	0.08%
Shelf Stable Juice	Blended Juice & Com-binations	323	$4.8	0.07%	365	$22.9	0.07%
Baking Mixes	Brownie Mix	324	$4.8	0.07%	313	$27.5	0.09%
Shelf Stable Juice	Grape Juice (Over 50% Juice)	325	$4.8	0.07%	455	$17.1	0.05%
Frzn Prepared Chicken	Fz Meal Kits/Stuffed/Other	326	$4.8	0.07%	578	$12.2	0.04%
Peanut Butter/Jelly/Jams & Honey	Jelly	327	$4.7	0.07%	439	$18.1	0.06%
Smoked Pork	Ham Steaks/Cubes/Slices	328	$4.7	0.07%	324	$26.3	0.08%
Tomatoes	Tomatoes Grape	329	$4.7	0.07%	150	$54.6	0.17%
Traditional Mexican Foods	Mexican Beans/Refried	330	$4.7	0.07%	393	$21.0	0.07%
Citrus	Lemons	331	$4.6	0.07%	257	$33.6	0.11%
Can Fruit/Jar Applesauce	Peaches	332	$4.6	0.07%	387	$21.3	0.07%
Frozen Potatoes	Frzn Hashbrown Pota-toes	333	$4.6	0.07%	348	$24.8	0.08%
Dry Noodles & Pasta	Noodles Dry	334	$4.5	0.07%	344	$24.9	0.08%
Salad Bar	Salad Bar Other	335	$4.5	0.07%	438	$18.2	0.06%
Corn	Corn Bulk	336	$4.5	0.07%	260	$32.5	0.10%
Sweet Goods	Sw Gds: Muffins	337	$4.5	0.07%	266	$31.8	0.10%
Frozen Breakfast Foods	Frzn Breakfast Entrées	338	$4.5	0.07%	473	$16.2	0.05%
Eggs/Muffins/Potatoes	Eggs—X-Large	339	$4.5	0.07%	232	$37.9	0.12%
Convenient Meals	Convenient Meals—Adult Meal	340	$4.5	0.07%	603	$11.2	0.04%
Bacon	Bacon—Poultry	341	$4.5	0.07%	435	$18.4	0.06%
Smoked Hams	Hams—Whole Boneless	342	$4.5	0.07%	510	$14.6	0.05%
Fluid Milk Products	Half & Half	343	$4.4	0.07%	149	$54.6	0.17%
Deli Meat: Bulk	Meat Bulk: Specialty Dry Meats	344	$4.4	0.07%	302	$28.3	0.09%
Frozen Vegetable & Veg Dish	Fz Box Vegetables—Value-Added	345	$4.4	0.07%	349	$24.7	0.08%
Apples	Apples Granny Smith (Bulk & Bag)	346	$4.4	0.07%	277	$30.9	0.10%
Baking Needs	Bits & Morsels [Baking Needs]	347	$4.4	0.07%	162	$50.3	0.16%
Meat—Shelf Stable	Chunk Meats—Chix/Ham/*Etc.*	348	$4.4	0.07%	338	$25.3	0.08%
Yogurt	Yogurt/Large Size (16oz Or Larger)	349	$4.4	0.07%	219	$40.4	0.13%
Energy Drinks	Energy Drink—Multi-Pack	350	$4.3	0.07%	421	$19.0	0.06%
Frozen Fruits	Frozen Fruit	351	$4.3	0.07%	174	$48.6	0.15%
Turkey Frozen	Whole Toms (Over 16lbs) [Turkey]	352	$4.3	0.06%	407	$20.0	0.06%
Lunchmeat	Lunchmeat—Whole Mus-cle Pltry	353	$4.2	0.06%	413	$19.7	0.06%
Dry Bean Veg & Rice	Dry Beans/Peas/Barley: Bag & Bulk	354	$4.2	0.06%	425	$18.8	0.06%
Frozen Novelties—Water Ice	Adult Premium [Frozen Novelties]	355	$4.2	0.06%	151	$54.5	0.17%
Traditional Mexican Foods	Mexican Dinners And Foods	356	$4.2	0.06%	597	$11.4	0.04%
Salad Mix	Kits [Salad Mix]	357	$4.2	0.06%	258	$33.5	0.11%
Cookies	Premium Cookies	358	$4.2	0.06%	269	$31.5	0.10%
Peanut Butter/Jelly/Jams & Honey	Honey	359	$4.1	0.06%	294	$28.9	0.09%
Pickle/Relish/Pckld Veg & Olives	Ripe Olives	360	$4.1	0.06%	337	$25.3	0.08%
Bacon	Bacon—Pre-Cooked	361	$4.1	0.06%	346	$24.8	0.08%
Rolls	Rolls: Sandwich	362	$4.1	0.06%	322	$26.7	0.08%
Potatoes	Potatoes Red (Bulk & Bag)	363	$4.1	0.06%	264	$32.0	0.10%
Croutons/Bread Stick & Salad Top	Salad Toppers	364	$4.1	0.06%	500	$15.1	0.05%
Candy—Packaged	Gum (Packaged)	365	$4.1	0.06%	331	$25.9	0.08%
Baking Needs	Baking Nuts	366	$4.1	0.06%	201	$43.2	0.14%
Soft Drinks	Soft Drinks 6pk Can Carb	367	$4.1	0.06%	308	$27.8	0.09%
Single Serve Fruit/Apple-sauce	Applesauce Cup	368	$4.1	0.06%	370	$22.6	0.07%
Dry Sce/Gravy/Potatoes/Stuffng	Gravy Can/Glass	369	$4.0	0.06%	485	$15.7	0.05%

Exhibit A–2: Top 1,000 Subcommodities by Expenditures of SNAP Households—Continued

Commodity	Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
		Rank	$ in Millions	% of Expenditures	Rank	$ in Millions	% of Expenditures
Cookies	Graham Crackers	370	$4.0	0.06%	342	$24.9	0.08%
Candy—Packaged	Miscellaneous Candy	371	$4.0	0.06%	418	$19.0	0.06%
Frozen Vegetable & Veg Dish	Frzn Corn On The Cob	372	$4.0	0.06%	708	$8.4	0.03%
Cookies	Chocolate Covered Cookies	373	$4.0	0.06%	432	$18.5	0.06%
Value-Added Vegetables	Vegetable Party Tray	374	$4.0	0.06%	341	$25.1	0.08%
Value-Added Vegetables	Cut Vegetables All Other	375	$4.0	0.06%	213	$42.2	0.13%
Deli Meat: Bulk	Bologna/Loaves/Franks	376	$4.0	0.06%	415	$19.2	0.06%
Condiments & Sauces	Marinades	377	$3.9	0.06%	434	$18.4	0.06%
Nuts	Pistachios	378	$3.9	0.06%	293	$29.1	0.09%
Service Case Meat	Seasoned Poultry	379	$3.9	0.06%	463	$16.5	0.05%
Salad & Dips	Protein Salads—Bulk	380	$3.9	0.06%	326	$26.3	0.08%
Hot Cereal	Standard Oatmeal	381	$3.9	0.06%	284	$29.9	0.09%
Cheese	Miscellaneous Cheese	382	$3.8	0.06%	214	$42.1	0.13%
Salad & Dips	Vegetable Salads—Bulk	383	$3.8	0.06%	275	$31.0	0.10%
Shelf Stable Juice	Veg Juice (Except Tomato)	384	$3.8	0.06%	279	$30.4	0.10%
Juices Super Premium	Juices Superfoods/Enhanced	385	$3.8	0.06%	367	$22.8	0.07%
Breakfast Sausage	Bkfst Sausage—Fresh Patties	386	$3.8	0.06%	651	$9.8	0.03%
Vegetables Cooking Bulk	Asparagus	387	$3.8	0.06%	159	$50.7	0.16%
Baby Foods	Baby Food Cereals	388	$3.8	0.06%	756	$7.1	0.02%
Baked Breads	English Muffins/Waffles	389	$3.8	0.06%	169	$49.5	0.16%
Baked Breads	Main Meal Bread	390	$3.8	0.06%	252	$34.9	0.11%
Juice	Non-Carb Jce (Over 50% Juice)	391	$3.8	0.06%	268	$31.7	0.10%
Deli Meat: Bulk	Meat: Chicken Bulk	392	$3.7	0.06%	253	$34.6	0.11%
Breakfast Sausage	Bkfst Sausage—Precooked	393	$3.7	0.06%	385	$21.4	0.07%
Dietary Aid Prdct/Med Liq Nutr	Diet Cntrl Liqs Nutritional	394	$3.7	0.06%	281	$30.3	0.10%
Refrgratd Juices/Drinks Dairy Case	Fruit Drinks	395	$3.7	0.06%	1,041	$2.8	0.01%
Dinner Sausage	Dnr Sausage—Beef Rope Ckd	396	$3.7	0.06%	577	$12.2	0.04%
Canned Pasta & Mwv Fd-Shlf Stbl	Microwavable Cups	397	$3.7	0.06%	690	$9.0	0.03%
Turkey Frozen	Whole Hens (Under 16lbs) [Turkey]	398	$3.6	0.06%	419	$19.0	0.06%
Cakes	Cakes: Cheesecake	399	$3.6	0.06%	507	$14.7	0.05%
Enhancements (Pickles/Spreads)	Enhancements—Pickles/Kraut	400	$3.6	0.06%	410	$19.8	0.06%
Tomatoes	Tomatoes Vine Ripe Pkg	401	$3.6	0.06%	743	$7.3	0.02%
Peppers	Peppers Red Bell	402	$3.6	0.05%	211	$42.5	0.13%
Dinner Sausage	Dnr Sausage—Other Forms	403	$3.6	0.05%	381	$21.6	0.07%
Pork Offal	External Fresh	404	$3.5	0.05%	937	$4.2	0.01%
Pasta & Pizza Sauce	Value [Pasta & Pizza Sauce]	405	$3.5	0.05%	657	$9.7	0.03%
Aseptic Juice	Aseptic Pack Juice And Drinks	406	$3.5	0.05%	934	$4.2	0.01%
Berries	Raspberries	407	$3.5	0.05%	186	$45.8	0.15%
Beef: Thin Meats	Corned Beef	408	$3.5	0.05%	461	$16.9	0.05%
Party Tray	Deli Tray: Meat And Cheese	409	$3.5	0.05%	383	$21.5	0.07%
Can Vegetables—Shelf Stable	Peas/Green	410	$3.5	0.05%	504	$14.7	0.05%
Dry/Ramen Bouillon	Dry Soup	411	$3.5	0.05%	362	$23.3	0.07%
Can Vegetables—Shelf Stable	Spinach & Greens	412	$3.5	0.05%	765	$7.0	0.02%
Frzn Multi Serve	Fz Meatballs	413	$3.5	0.05%	447	$17.7	0.06%
Milk By-Products	Aerosol Toppings [Milk By-Products]	414	$3.5	0.05%	351	$24.5	0.08%
Baked Breads	Dinner Rolls	415	$3.5	0.05%	513	$14.5	0.05%
Cocoa Mixes	Hot Chocolate/Cocoa Mix	416	$3.5	0.05%	445	$17.8	0.06%
Infant Formula	Infant Formula Ready To Use	417	$3.5	0.05%	768	$6.9	0.02%
Powder & Crystal Drink Mix	Sugar Free Canister [Powder Drink Mix]	418	$3.5	0.05%	391	$21.1	0.07%
Cnv Breakfast & Wholesome Snks	Treats [Breakfast]	419	$3.5	0.05%	605	$11.2	0.04%
Smoked Hams	Hams—Half/Port Boneless	420	$3.4	0.05%	392	$21.0	0.07%
Fitness & Diet	Fitness & Diet—Bars W/ Flour	421	$3.4	0.05%	124	$59.8	0.19%
Refrgrated Dough Products	Refrigerated Cookie Dough	422	$3.4	0.05%	551	$12.9	0.04%

Exhibit A–2: Top 1,000 Subcommodities by Expenditures of SNAP Households—Continued

Commodity	Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
		Rank	$ in Millions	% of Expenditures	Rank	$ in Millions	% of Expenditures
Grapes	Grapes Black/Blue	423	$3.4	0.05%	380	$21.8	0.07%
Bulk Service Case Cheese	Bulk Processed [Cheese]	424	$3.4	0.05%	411	$19.8	0.06%
Candy—Packaged	Seasonal Candy Box—Chocolate	425	$3.4	0.05%	462	$16.6	0.05%
Coffee & Creamers	Coffee Pods/Singles/Filter Pack	426	$3.4	0.05%	167	$49.8	0.16%
Can Fruit/Jar Applesauce	Fruit Cocktail/Fruit Salad	427	$3.4	0.05%	569	$12.5	0.04%
Peppers	Peppers Other Bell	428	$3.4	0.05%	301	$28.4	0.09%
Mushrooms	Mushrooms White Sliced Pkg	429	$3.3	0.05%	306	$27.8	0.09%
Lunchmeat	Lunchmeat—Chip Meat	430	$3.3	0.05%	653	$9.7	0.03%
Soft Drinks	Sft Drnk 1 Liter Btl Carb	431	$3.3	0.05%	716	$8.2	0.03%
Cakes	Cakes: Fancy/Service Case	432	$3.3	0.05%	451	$17.4	0.06%
Salad Mix	Shredded Lettuce	433	$3.3	0.05%	616	$10.9	0.03%
Powder & Crystal Drink Mix	Sugar Free Sticks [Powder Drink Mix]	434	$3.3	0.05%	426	$18.8	0.06%
Dinner Mixes-Dry	Package Dinners/Pasta Salads	435	$3.3	0.05%	664	$9.5	0.03%
Cakes	Cakes: Layers/Sheets Novelties	436	$3.3	0.05%	565	$12.5	0.04%
Flour & Meals	Breadings/Coatings/Crumbs	437	$3.2	0.05%	474	$16.0	0.05%
Pies	Pies: Pumpkin/Custard	438	$3.2	0.05%	545	$13.1	0.04%
Refrigerated Dairy Case	Yogurt	439	$3.2	0.05%	107	$67.0	0.21%
Apples	Mixed Fruit Bags	440	$3.2	0.05%	829	$5.7	0.02%
Shelf Stable Juice	Fruit Drinks: Canned & Glass	441	$3.2	0.05%	870	$5.0	0.02%
Dry Mix Desserts	Puddings Dry	442	$3.2	0.05%	400	$20.8	0.07%
Can Seafood—Shelf Stable	Salmon	443	$3.2	0.05%	534	$13.6	0.04%
Shortening & Oil	Cooking Sprays	444	$3.2	0.05%	396	$21.0	0.07%
Meat—Shelf Stable	Sandwich Sauce (Manwich)	445	$3.2	0.05%	733	$7.7	0.02%
Bread	Bread: Specialty	446	$3.2	0.05%	366	$22.9	0.07%
Seafood—Tilapia	Tilapia—Fillet	447	$3.2	0.05%	465	$16.4	0.05%
Frzn Multi Serve	Frzn Burgers	448	$3.2	0.05%	1,010	$3.1	0.01%
Convenience/Snacking	Jarred Fruit Single Serve	449	$3.1	0.05%	511	$14.6	0.05%
Powder & Crystal Drink Mix	Soft Drink Canisters	450	$3.1	0.05%	723	$7.9	0.03%
Frozen Breakfast Foods	Frzn Breakfast Sausage	451	$3.1	0.05%	647	$9.8	0.03%
Ss/Vending—Cookie/Cracker	Vendor Size/Single Serve Cookie	452	$3.1	0.05%	770	$6.8	0.02%
Water—(Sparkling & Still)	Sparkling Water—Flvrd Sweet	453	$3.1	0.05%	355	$24.1	0.08%
Service Case Meat	Stuffed/Mixed Beef	454	$3.1	0.05%	416	$19.2	0.06%
Meat—Shelf Stable	Vienna Sausage	455	$3.1	0.05%	867	$5.1	0.02%
Mushrooms	Mushrooms White Whole Pkg	456	$3.1	0.05%	288	$29.6	0.09%
Teas	Tea Bags/Herbal	457	$3.1	0.05%	272	$31.2	0.10%
Meat Frozen	Frzn Meat—Offals	458	$3.0	0.05%	1,053	$2.6	0.01%
Bulk Service Case Cheese	Bulk Semi-Soft	459	$3.0	0.05%	363	$23.3	0.07%
Bag Snacks	Bagged Popped Popcorn	460	$3.0	0.05%	566	$12.5	0.04%
Condiments & Sauces	Yellow Mustard	461	$3.0	0.05%	571	$12.4	0.04%
Vegetables Salad	Green Onions	462	$3.0	0.05%	361	$23.5	0.07%
Frozen Bread/Dough	Frzn Dinner Rolls	463	$3.0	0.05%	398	$20.9	0.07%
Baking Needs	Marshmallows	464	$3.0	0.05%	467	$16.4	0.05%
Warehouse Snacks	Snack Mix	465	$3.0	0.05%	450	$17.5	0.06%
Fluid Milk Products	Whipping Cream	466	$3.0	0.04%	249	$35.2	0.11%
Dried Fruit	Raisins	467	$2.9	0.04%	330	$26.0	0.08%
Dinner Sausage	Dnr Sausage—Links Beef Ckd	468	$2.9	0.04%	722	$8.0	0.03%
Rolls	Rolls: Croissants/Breadsticks	469	$2.9	0.04%	464	$16.5	0.05%
Lunchmeat	Lunchmeat—Brauns/Liver/Loave	470	$2.9	0.04%	632	$10.3	0.03%
Cookie/Cracker Multi-Pks	Multi-Pack Cookies	471	$2.9	0.04%	596	$11.4	0.04%
Snack Meat	Snack Meat—Salami/Smr Sausage	472	$2.9	0.04%	481	$15.8	0.05%
Shortening & Oil	Solid Shortening	473	$2.9	0.04%	525	$14.0	0.04%
Salad Mix	Salad Bowls	474	$2.9	0.04%	572	$12.3	0.04%
Hot Cereal	Grits	475	$2.8	0.04%	774	$6.7	0.02%
Cereals	Cereal—Cold	476	$2.8	0.04%	178	$47.8	0.15%
Frozen Vegetable & Veg Dish	Fz Bag Vegetables—Value-Added	477	$2.8	0.04%	505	$14.7	0.05%

Exhibit A–2: Top 1,000 Subcommodities by Expenditures of SNAP Households—Continued

Commodity	Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
		Rank	$ in Millions	% of Expenditures	Rank	$ in Millions	% of Expenditures
Traditional Asian Foods	Asian Other Sauces/ Marinade	478	$2.8	0.04%	422	$18.9	0.06%
Frozen Novelties—Water Ice	Cups/Push Ups/Other [Frozen Novelties]	479	$2.8	0.04%	661	$9.6	0.03%
Refrigerated Hispanic Grocery	Refrigerated Tortillas	480	$2.8	0.04%	669	$9.4	0.03%
Frzn Prepared Chicken	Whole Muscle Unbreaded Chicken	481	$2.8	0.04%	555	$12.8	0.04%
Meat—Shelf Stable	Luncheon Meat (Spam)	482	$2.8	0.04%	693	$8.9	0.03%
Frzn Prepared Chicken	Boneless Snack/Value/ Small	483	$2.8	0.04%	836	$5.5	0.02%
Croutons/Bread Stick & Salad Top	Croutons	484	$2.8	0.04%	526	$14.0	0.04%
Apples	Apples Other (Bulk & Bag)	485	$2.8	0.04%	314	$27.4	0.09%
Apples	Apples Fuji (Bulk & Bag)	486	$2.8	0.04%	242	$36.2	0.11%
Apples	Apples Gold Delicious (Bulk & Bag)	487	$2.8	0.04%	443	$17.9	0.06%
Salad & Dips	Sal: Hommus	488	$2.8	0.04%	189	$45.4	0.14%
Dinner Sausage	Dnr Sausage—Cocktails	489	$2.7	0.04%	562	$12.7	0.04%
Can Vegetables—Shelf Stable	Mushrooms Cnd & Glass	490	$2.7	0.04%	521	$14.3	0.05%
Frozen Desserts	Frzn Pie Shells/Pastry Shell	491	$2.7	0.04%	475	$16.0	0.05%
Lunchmeat	Lunchmeat—Variety Pack	492	$2.7	0.04%	677	$9.3	0.03%
Frozen Desserts	Frozen Cakes/Desserts	493	$2.7	0.04%	611	$11.0	0.03%
Pickle/Relish/Pckld Veg & Olives	Peppers	494	$2.7	0.04%	537	$13.5	0.04%
Cakes	Cakes: Angel Fds/Cke Rolls	495	$2.7	0.04%	440	$18.1	0.06%
Berries	Blackberries	496	$2.7	0.04%	283	$29.9	0.09%
Frozen Bread/Dough	Frzn Garlic Bread	497	$2.7	0.04%	608	$11.1	0.04%
Traditional Mexican Foods	Mexican Enchilada Sauce	498	$2.7	0.04%	532	$13.7	0.04%
Fluid Milk Products	Egg Nog/Boiled Custard	499	$2.7	0.04%	539	$13.3	0.04%
Hot Dogs	Hot Dogs—Base Poultry	500	$2.7	0.04%	667	$9.4	0.03%
Beef: Thin Meats	Brisket [Beef]	501	$2.7	0.04%	446	$17.8	0.06%
Cookies	Wellness/Portion Control [Cookies]	502	$2.7	0.04%	358	$23.8	0.08%
Baking Needs	Pie Filling/Mincemeat/ Glazes	503	$2.7	0.04%	345	$24.8	0.08%
Soft Drinks	Tea Can With Sweet- ener/Sugar	504	$2.7	0.04%	807	$6.1	0.02%
Citrus	Limes	505	$2.7	0.04%	369	$22.7	0.07%
Warehouse Snacks	Misc Snacks	506	$2.6	0.04%	541	$13.2	0.04%
Traditional Mexican Foods	Mexican Taco Sauce	507	$2.6	0.04%	761	$7.0	0.02%
Soft Drinks	Soft Drink Bottle Non- Carb	508	$2.6	0.04%	887	$4.7	0.02%
Seafood—Salmon-Wild Caught	Salmon Wc—Pink	509	$2.6	0.04%	612	$11.0	0.03%
Frozen Bread/Dough	Frzn Biscuits	510	$2.6	0.04%	550	$12.9	0.04%
Frzn Pasta	Frozen Pasta	511	$2.6	0.04%	458	$16.9	0.05%
Chicken Frozen	Frzn Chicken—Drk Meat	512	$2.6	0.04%	818	$5.9	0.02%
Syrups Toppings & Cones	Ice Cream Toppings	513	$2.6	0.04%	524	$14.1	0.04%
Candy—Packaged	Seasonal Candy Bags Non-Chocolate	514	$2.6	0.04%	502	$14.9	0.05%
Salad & Dips	Pasta/Grain Salads— Prepack	515	$2.6	0.04%	631	$10.3	0.03%
Cakes	Cakes: Ice Cream	516	$2.6	0.04%	700	$8.6	0.03%
Nuts	Mixed Nuts	517	$2.6	0.04%	309	$27.6	0.09%
Sushi	Sushi—Prepackaged	518	$2.6	0.04%	414	$19.2	0.06%
Pickle/Relish/Pckld Veg & Olives	Green Olives	519	$2.6	0.04%	483	$15.8	0.05%
Candy—Packaged	Candy Bars Multi Pack W/Flour	520	$2.6	0.04%	695	$8.8	0.03%
Stone Fruit	Nectarines Yellow Flesh	521	$2.5	0.04%	430	$18.6	0.06%
Onions	Onions Red (Bulk & Bag)	522	$2.5	0.04%	397	$20.9	0.07%
Flour & Meals	Cornmeal	523	$2.5	0.04%	746	$7.3	0.02%
Tropical Fruit	Pineapple Whole & Peel/ Cored	524	$2.5	0.04%	377	$22.1	0.07%
Bagels & Cream Cheese	Refrigerated Bagels	525	$2.5	0.04%	731	$7.7	0.02%
Onions	Onions White (Bulk & Bag)	526	$2.5	0.04%	482	$15.8	0.05%
Meat Frozen	Frzn Meat—Turkey	527	$2.5	0.04%	652	$9.7	0.03%
Pickle/Relish/Pckld Veg & Olives	Relishes	528	$2.5	0.04%	590	$11.6	0.04%

Exhibit A–2: Top 1,000 Subcommodities by Expenditures of SNAP Households—Continued

Commodity	Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
		Rank	$ in Millions	% of Expenditures	Rank	$ in Millions	% of Expenditures
Candy—Packaged	Candy Bags—Chocolate W/Flour	529	$2.5	0.04%	496	$15.2	0.05%
Nuts	Cashews	530	$2.5	0.04%	437	$18.3	0.06%
Cakes	Cakes:Birthday/Celebration Lay	531	$2.5	0.04%	684	$9.1	0.03%
Smoked Pork	Smoked Offal [Pork]	532	$2.4	0.04%	940	$4.1	0.01%
Apples	Apples Honeycrisp	533	$2.4	0.04%	235	$36.9	0.12%
Sweet Goods & Snacks	Sw Gds: Swt/Flvrd Loaves	534	$2.4	0.04%	528	$13.9	0.04%
Fluid Milk Products	Buttermilk	535	$2.4	0.04%	478	$15.9	0.05%
Cakes	Cakes: Sheet	536	$2.4	0.04%	750	$7.2	0.02%
Cookies	Cookies: Gourmet	537	$2.4	0.04%	399	$20.8	0.07%
Citrus	Grapefruit	538	$2.4	0.04%	388	$21.2	0.07%
Coffee & Creamers	Flavored Bag Coffee	539	$2.4	0.04%	328	$26.2	0.08%
Stone Fruit	Plums	540	$2.4	0.04%	543	$13.1	0.04%
Refrigerated Italian	Refrigerated Pasta	541	$2.4	0.04%	290	$29.3	0.09%
Spices & Extracts	Gourmet Spices	542	$2.4	0.04%	259	$33.2	0.11%
Baked Breads	Diet/Light Bread	543	$2.4	0.04%	356	$24.0	0.08%
Bacon	Bacon—Trad Center Cut	544	$2.3	0.04%	395	$21.0	0.07%
Salad & Dips	Pasta/Grain Salads—Bulk	545	$2.3	0.04%	460	$16.9	0.05%
Rice Cakes	Mini-Cakes	546	$2.3	0.04%	454	$17.2	0.05%
Authentic Hispanic Fds & Product	Authentic Sauces/Salsa/Picante	547	$2.3	0.03%	678	$9.2	0.03%
Ice Cream Ice Milk & Sherbets	Premium Pints [Ice Cream & Sherbert]	548	$2.3	0.03%	787	$6.5	0.02%
Can Fruit/Jar Applesauce	Mandarin Oranges/Citrus Sect	549	$2.3	0.03%	564	$12.6	0.04%
Baby Foods	Baby Juices	550	$2.3	0.03%	1013	$3.1	0.01%
Salad Mix	Salad Mix Blends Organic	551	$2.3	0.03%	239	$36.5	0.12%
Salad & Dips	Salad: Lettuce	552	$2.2	0.03%	576	$12.2	0.04%
Baked Breads	Fruit/Breakfast Bread	553	$2.2	0.03%	427	$18.7	0.06%
Seafood—Salad/Dip/Sce/Cond	Breading [Seafood]	554	$2.2	0.03%	966	$3.7	0.01%
Seafood—Finfish Other	Finfish—Other	555	$2.2	0.03%	826	$5.8	0.02%
Frozen Bread/Dough	Frzn Breadsticks	556	$2.2	0.03%	871	$5.0	0.02%
Bag Snacks	Pork Skins/Cracklins	557	$2.2	0.03%	804	$6.2	0.02%
Frozen Juice And Smoothies	Frzn Conc Allieds Over 50% Juice	558	$2.2	0.03%	638	$10.1	0.03%
Broccoli/Cauliflower	Cauliflower Whole	559	$2.2	0.03%	352	$24.5	0.08%
Mushrooms	Mushrooms Portabella	560	$2.2	0.03%	372	$22.6	0.07%
Tropical Fruit	Mango	561	$2.2	0.03%	522	$14.1	0.04%
Seafood—Lobster	Lobster—Tails	562	$2.2	0.03%	546	$13.0	0.04%
Can Fruit/Jar Applesauce	Apple Sauce (Excludes Cup)	563	$2.2	0.03%	530	$13.8	0.04%
Traditional Mexican Foods	Mexican Peppers Chilies	564	$2.2	0.03%	487	$15.7	0.05%
Candy—Checklane	Mints/Candy & Breath	565	$2.1	0.03%	582	$12.1	0.04%
Citrus	Tangerines & Tangelos	566	$2.1	0.03%	600	$11.3	0.04%
Juices Super Premium	Juices Smoothies/Blended	567	$2.1	0.03%	613	$11.0	0.03%
Can Vegetables—Shelf Stable	Fried Onions	568	$2.1	0.03%	574	$12.3	0.04%
Carrots	Carrots Bagged	569	$2.0	0.03%	453	$17.2	0.05%
Eggs/Muffins/Potatoes	Eggs—Jumbo	570	$2.0	0.03%	548	$13.0	0.04%
Potatoes	Potatoes Gourmet	571	$2.0	0.03%	405	$20.3	0.06%
Can Vegetables—Shelf Stable	Sweet Potatoes	572	$2.0	0.03%	777	$6.7	0.02%
Seafood—Value-Added Seafood	Value-Added Shrimp	573	$2.0	0.03%	840	$5.4	0.02%
Baked Breads	Rye Breads	574	$2.0	0.03%	375	$22.3	0.07%
Salad Dresing & Sandwich Spreads	Dry Salad Dressing & Dip Mixes	575	$2.0	0.03%	498	$15.1	0.05%
Condiments & Sauces	Mustard—All Other	576	$2.0	0.03%	436	$18.3	0.06%
Fluid Milk Products	Organic Milk	577	$2.0	0.03%	245	$35.4	0.11%
Dry Mix Desserts	Gelatin	578	$2.0	0.03%	517	$14.3	0.05%
Nuts	Sunflower/Other Seeds	579	$1.9	0.03%	656	$9.7	0.03%
Vinegar & Cooking Wines	Vinegar/White & Cider	580	$1.9	0.03%	515	$14.4	0.05%
Dinner Sausage	Dnr Sausage—Poultry Rope Ckd	581	$1.9	0.03%	618	$10.9	0.03%
Corn	Corn Is Packaged	582	$1.9	0.03%	556	$12.8	0.04%
Candy—Packaged	Miscellaneous Candy	583	$1.9	0.03%	607	$11.2	0.04%
Milk By-Products	Ricotta Cheese	584	$1.9	0.03%	490	$15.6	0.05%
Hot Cereal	Other Hot Cereal	585	$1.9	0.03%	628	$10.3	0.03%
Frozen Juice And Smoothies	Frzn Oj&Oj Substitutes (Over 50%)	586	$1.9	0.03%	472	$16.2	0.05%
Sweet Goods & Snacks	Sw Gds: Brownie/Bar Cookie	587	$1.9	0.03%	606	$11.2	0.04%

Exhibit A–2: Top 1,000 Subcommodities by Expenditures of SNAP Households—Continued

Commodity	Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
		Rank	$ in Millions	% of Expenditures	Rank	$ in Millions	% of Expenditures
Rolls	Rolls: Bagels	588	$1.9	0.03%	494	$15.4	0.05%
Melons	Watermelon Personal	589	$1.9	0.03%	477	$15.9	0.05%
Nuts	Pecans Shelled	590	$1.9	0.03%	448	$17.6	0.06%
Infant Formula	Baby Isotonic Drinks	591	$1.9	0.03%	878	$4.9	0.02%
Mixers	Cocktail Mixes-Fluid: Add Liq	592	$1.9	0.03%	468	$16.4	0.05%
Bananas	Bananas Organic	593	$1.9	0.03%	428	$18.7	0.06%
Seafood—Crab	Crab—King	594	$1.9	0.03%	725	$7.9	0.02%
Bacon	Bacon—Other	595	$1.9	0.03%	655	$9.7	0.03%
Can Fruit/Jar Applesauce	Pears	596	$1.9	0.03%	646	$10.0	0.03%
Baking Mixes	Biscuit Flour & Mixes	597	$1.9	0.03%	529	$13.8	0.04%
Chicken Specialty/Natural	Chicken Breast Boneless	598	$1.9	0.03%	343	$24.9	0.08%
Sweet Goods	Sw Gds: Coffee Cakes	599	$1.8	0.03%	588	$11.9	0.04%
Refrigerated Dairy Case	Eggs	600	$1.8	0.03%	289	$29.5	0.09%
Condiments & Sauces	Wing Sauce	601	$1.8	0.03%	872	$5.0	0.02%
Seafood—Salmon-Wild Caught	Salmon Wc—Sockeye	602	$1.8	0.03%	335	$25.7	0.08%
Baking Needs	Pie Crust Mixes & Shells	603	$1.8	0.03%	676	$9.3	0.03%
Salad Mix	Salad Spinach	604	$1.8	0.03%	442	$17.9	0.06%
Eggs/Muffins/Potatoes	Eggs Substitute	605	$1.8	0.03%	329	$26.2	0.08%
Crackers & Misc Baked Food	Aerosol Cheese	606	$1.8	0.03%	857	$5.2	0.02%
Poultry Other	Cornish Hen	607	$1.8	0.03%	773	$6.7	0.02%
Tomato Products-Shelf Stable	Tomato Paste	608	$1.8	0.03%	633	$10.2	0.03%
Turkey Frozen	Turkey Breast Bone In	609	$1.8	0.03%	553	$12.8	0.04%
Sweet Goods & Snacks	Sw Gds: Puff Pastry	610	$1.8	0.03%	573	$12.3	0.04%
Seafood—Catfish	Catfish—Whole	611	$1.8	0.03%	1,055	$2.6	0.01%
Cake Décor	Cake Décors & Icing	612	$1.8	0.03%	645	$10.0	0.03%
Convenience/Snacking	Convenience/Snacking Fruit	613	$1.8	0.03%	670	$9.4	0.03%
Salad & Dips	Sal: Salsa/Dips Bulk	614	$1.8	0.03%	730	$7.7	0.02%
Pork Bone In Loin/Rib	Dry [Pork Bone In Loin/Rib]	615	$1.8	0.03%	734	$7.6	0.02%
Authentic Hispanic Fds & Product	Authentic Pasta/Rice/Beans	616	$1.7	0.03%	884	$4.8	0.02%
Spices & Extracts	Pure Extracts	617	$1.7	0.03%	493	$15.4	0.05%
Powder & Crystal Drink Mix	Enhanced Stick [Powder Drink Mix]	618	$1.7	0.03%	621	$10.7	0.03%
Bread	Bread: Artisan	619	$1.7	0.03%	237	$36.7	0.12%
Infant Formula	Infant Formula Soy Base	620	$1.7	0.03%	1,270	$1.1	0.00%
Juices Super Premium	Juices Proteins	621	$1.7	0.03%	640	$10.1	0.03%
Salad & Dips	Sal: Dip Prepack [Salad & Dips]	622	$1.7	0.03%	584	$12.1	0.04%
Dietary Aid Prdct/Med Liq Nutr	Diet Energy Drinks	623	$1.7	0.03%	554	$12.8	0.04%
Nuts	Peanuts All	624	$1.7	0.03%	594	$11.5	0.04%
Rts/Micro Soup/Broth	Microwavable Soups	625	$1.7	0.03%	495	$15.3	0.05%
Service Case Meat	Marinated Pork	626	$1.7	0.03%	519	$14.3	0.05%
Chicken & Poultry	Chix: Baked 8pc Cut Up (Cold)	627	$1.7	0.03%	837	$5.5	0.02%
Vegetables Cooking Bulk	Beans	628	$1.7	0.03%	457	$16.9	0.05%
Baby Foods	Baby Spring Waters	629	$1.7	0.03%	1,128	$2.0	0.01%
Shelf Stable Juice	Tomato Juice (Over 50% Jce)	630	$1.7	0.03%	662	$9.6	0.03%
Authentic Hispanic Fds & Product	Authentic Vegetables And Foods	631	$1.7	0.03%	998	$3.2	0.01%
Meat Snacks	Meat Sticks/Bites	632	$1.7	0.03%	972	$3.6	0.01%
Refrigerated Hispanic Grocery	Hispanic Cheese	633	$1.7	0.03%	769	$6.9	0.02%
Can Fruit/Jar Applesauce	Cranberry Sauce	634	$1.7	0.03%	642	$10.0	0.03%
Fitness & Diet	Fitness & Diet—Bars W/O Flour	635	$1.7	0.03%	298	$28.7	0.09%
Pies	Pies: Cream/Meringue	636	$1.6	0.02%	728	$7.8	0.02%
Berries	Strawberries Organic	637	$1.6	0.02%	386	$21.4	0.07%
Candy—Packaged	Novelty Candy	638	$1.6	0.02%	827	$5.7	0.02%
Party Tray	Deli Tray: Sandwiches	639	$1.6	0.02%	636	$10.2	0.03%
Value-Added Fruit	Cut Fruit All Other Prepack	640	$1.6	0.02%	704	$8.5	0.03%
Nuts	Walnuts Shelled	641	$1.6	0.02%	431	$18.5	0.06%
Turkey Offal	External [Turkey]	642	$1.6	0.02%	1,133	$2.0	0.01%
Flour & Meals	Flour: Misc/Specialty/Blend	643	$1.6	0.02%	533	$13.6	0.04%
Frozen Ethnic	Frozen Internaional [Ethnic Foods]	644	$1.6	0.02%	771	$6.7	0.02%
Deli Meat: Presliced	Deli Meat: Specialty Dry Meats	645	$1.6	0.02%	336	$25.5	0.08%
Dressings/Dips	Dressing Creamy	646	$1.6	0.02%	512	$14.5	0.05%

Exhibit A–2: Top 1,000 Subcommodities by Expenditures of SNAP Households—Continued

Commodity	Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
		Rank	$ in Millions	% of Expenditures	Rank	$ in Millions	% of Expenditures
Spices & Extracts	Table Salt/Popcorn Salt	647	$1.6	0.02%	698	$8.6	0.03%
Meat—Shelf Stable	Hash: Canned [Meat]	648	$1.6	0.02%	863	$5.1	0.02%
Water—(Sparkling & Still)	Distilled Water	649	$1.6	0.02%	579	$12.2	0.04%
Frozen Desserts	Frzn Pastry & Cookies	650	$1.6	0.02%	694	$8.8	0.03%
Potatoes	Potatoes Gold (Bulk & Bag)	651	$1.6	0.02%	503	$14.8	0.05%
Herbs/Garlic	Garlic Whole Cloves	652	$1.6	0.02%	557	$12.7	0.04%
Salad Mix	Coleslaw	653	$1.6	0.02%	589	$11.9	0.04%
Apples	Caramel/Candy Apples	654	$1.6	0.02%	985	$3.4	0.01%
Nuts	Almonds Shelled	655	$1.5	0.02%	412	$19.8	0.06%
Service Case Meat	Marinated Poultry	656	$1.5	0.02%	702	$8.5	0.03%
Carrots	Carrots Bagged Organic	657	$1.5	0.02%	429	$18.6	0.06%
Frozen Desserts	Single Serv/Portion Control	658	$1.5	0.02%	898	$4.6	0.01%
Seasonal	Pumpkins	659	$1.5	0.02%	626	$10.3	0.03%
Chicken Offal	Internal [Chicken Offal]	660	$1.5	0.02%	929	$4.3	0.01%
Specialty Cheese Pre Pack	Specialty Ppk Cheese Hard/Grated	661	$1.5	0.02%	299	$28.7	0.09%
Pears	Pears Bartlett	662	$1.5	0.02%	486	$15.7	0.05%
Meat—Shelf Stable	Beef Stew	663	$1.5	0.02%	897	$4.6	0.01%
Bread	Bread: Pita/Pocket/Flatbrd	664	$1.5	0.02%	523	$14.1	0.04%
Chicken & Poultry	Chix: Rotisserie Cold	665	$1.5	0.02%	848	$5.4	0.02%
Dry/Ramen Bouillon	Bouillon	666	$1.5	0.02%	663	$9.6	0.03%
Nuts	Trail Mix	667	$1.5	0.02%	610	$11.0	0.03%
Enhancements (Pickles/Spreads)	Enhancements—Salads/Spreads	668	$1.5	0.02%	858	$5.2	0.02%
Smoked Pork	Bacon—Belly/Jowl	669	$1.5	0.02%	783	$6.6	0.02%
Seafood—Cod	Cod—Fillet	670	$1.5	0.02%	587	$12.0	0.04%
Refrgrated Dough Products	Refrigerated Cookies—Seasonal	671	$1.5	0.02%	834	$5.5	0.02%
Traditional Asian Foods	Asian Soy Sauce	672	$1.5	0.02%	630	$10.3	0.03%
Salad Dresing & Sandwich Spreads	Sand/Horseradish & Tartar Sauce	673	$1.4	0.02%	749	$7.2	0.02%
Refrgrated Dough Products	Refrigerated Pie Crust	674	$1.4	0.02%	538	$13.5	0.04%
Frozen Juice And Smoothies	Frzn Fruit Drinks (Under 10% Juice)	675	$1.4	0.02%	685	$9.1	0.03%
Sweet Goods & Snacks	Sw Gds: Specialty Desserts	676	$1.4	0.02%	784	$6.6	0.02%
Dinner Mixes-Dry	Pizza Mix Dry	677	$1.4	0.02%	845	$5.4	0.02%
Authentic Central American Fds	Central American Foods	678	$1.4	0.02%	838	$5.5	0.02%
Cereal Bars	Breakfast Bars/Tarts/Scones	679	$1.4	0.02%	360	$23.6	0.07%
Service Case Meat	Seasoned Beef	680	$1.4	0.02%	724	$7.9	0.03%
Herbs/Garlic	Herbs Cilanto	681	$1.4	0.02%	637	$10.1	0.03%
Value-Added Fruit	Fruit Party Tray Prepack	682	$1.4	0.02%	785	$6.5	0.02%
Dried Fruit	Dried Fruit—Other	683	$1.4	0.02%	491	$15.6	0.05%
Non-Dairy/Dairy Aseptic	Aseptic Milk	684	$1.4	0.02%	535	$13.6	0.04%
Eggs/Muffins/Potatoes	Misc Dairy Refigerated	685	$1.4	0.02%	686	$9.1	0.03%
Shelf Stable Juice	Pineapple Juice (Over 50% Juice)	686	$1.4	0.02%	788	$6.4	0.02%
Frozen Entrées	Meatless/Vegetarian	687	$1.4	0.02%	382	$21.5	0.07%
Powder & Crystal Drink Mix	Sugar Sweetened Sticks	688	$1.4	0.02%	1,071	$2.5	0.01%
Lunchmeat	Lunchmeat—Other	689	$1.4	0.02%	951	$3.9	0.01%
Dietary Aid Prdct/Med Liq Nutr	Diet Cntrl Bars Nutritional	690	$1.4	0.02%	409	$19.9	0.06%
Popcorn	Popcorn—Other	691	$1.4	0.02%	641	$10.0	0.03%
Salad & Dips	Sal: Desserts-Prepack	692	$1.4	0.02%	906	$4.5	0.01%
Dry Cheese	Misc Dry Cheese	693	$1.4	0.02%	739	$7.3	0.02%
Shelf Stable Juice	Cranberry Juice (Over 50% Juice)	694	$1.4	0.02%	706	$8.4	0.03%
Baking Mixes	Cookies Mix	695	$1.4	0.02%	699	$8.6	0.03%
Frozen Potatoes	Frzn Baked/Stuffed/Mashed	696	$1.3	0.02%	689	$9.0	0.03%
Turkey Fresh	Whole Hen (Under 16lbs) [Turkey]	697	$1.3	0.02%	658	$9.7	0.03%
Vegetables Cooking Packaged	Broccoli/Cauliflower Processed	698	$1.3	0.02%	567	$12.5	0.04%
Dressings/Dips	Dips Caramel/Fruit Glazes	699	$1.3	0.02%	819	$5.9	0.02%
Dressings/Dips	Dips Guacamole/Salsa/Queso	700	$1.3	0.02%	563	$12.6	0.04%
Meat—Shelf Stable	Hot Dog Chili Sauce	701	$1.3	0.02%	1,063	$2.6	0.01%
Breakfast Sausage	Bkfst Sausage—Bkfast Side	702	$1.3	0.02%	986	$3.4	0.01%

Exhibit A–2: Top 1,000 Subcommodities by Expenditures of SNAP Households—Continued

Commodity	Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
		Rank	$ in Millions	% of Expenditures	Rank	$ in Millions	% of Expenditures
Traditional Asian Foods	Asian Noodles/Rice	703	$1.3	0.02%	623	$10.5	0.03%
Deli Meat: Presliced	Deli Meat: Semi-Dry Sausage	704	$1.3	0.02%	674	$9.3	0.03%
Breakfast Sausage	Bkfst Sausage—Other Forms	705	$1.3	0.02%	916	$4.4	0.01%
Shortening & Oil	Corn Oil	706	$1.3	0.02%	943	$4.1	0.01%
Nuts	Almonds	707	$1.3	0.02%	404	$20.5	0.06%
Hot Cereal	Instant Breakfast	708	$1.3	0.02%	718	$8.1	0.03%
Traditional Asian Foods	Asian Foods And Meals	709	$1.3	0.02%	793	$6.3	0.02%
Can Vegetables—Shelf Stable	Mixed Vegetables	710	$1.3	0.02%	905	$4.5	0.01%
Authentic Hispanic Fds & Product	Authentic Peppers	711	$1.3	0.02%	910	$4.5	0.01%
Dinner Sausage	Dnr Sausage—Links Poultry Ck	712	$1.3	0.02%	766	$7.0	0.02%
Snack	Tortilla Chips	713	$1.3	0.02%	408	$19.9	0.06%
Salad & Dips	Sal: Salsa Prepack	714	$1.3	0.02%	531	$13.7	0.04%
Fluid Milk Products	Soy Milk	715	$1.3	0.02%	753	$7.1	0.02%
Bread	Bread: Sweet/Breakfast	716	$1.3	0.02%	707	$8.4	0.03%
Bulk Food	Trail Mix/Nuts Bulk	717	$1.3	0.02%	441	$18.0	0.06%
Service Case Meat	Seasoned Pork	718	$1.3	0.02%	744	$7.3	0.02%
Refrigerated Vegetarian	Vegetarian Meats	719	$1.3	0.02%	625	$10.4	0.03%
Candy—Packaged	Seasonal Miscellaneous W/Flour [Candy]	720	$1.2	0.02%	754	$7.1	0.02%
Teas	Tea Bags/Green	721	$1.2	0.02%	604	$11.2	0.04%
Chicken Specialty/Natural	Chicken Wings	722	$1.2	0.02%	1,111	$2.1	0.01%
Refrgrated Dough Products	Refrigerated Breads	723	$1.2	0.02%	634	$10.2	0.03%
Shelf Stable Juice	Lemon Juice & Lime Juice	724	$1.2	0.02%	727	$7.8	0.02%
Specialty Cheese Pre Pack	Specialty Ppk Cheese Spreads	725	$1.2	0.02%	469	$16.2	0.05%
Baking	Flours/Grains/Sugar	726	$1.2	0.02%	509	$14.6	0.05%
Smoked Hams	Hams—Dry Cured-Country	727	$1.2	0.02%	917	$4.4	0.01%
Coffee & Creamers	Specialty Instant Coffee W/Swe	728	$1.2	0.02%	732	$7.7	0.02%
Cookies	Fruit Filled Cookies	729	$1.2	0.02%	601	$11.3	0.04%
Traditional Mexican Foods	Mexican Con Queso	730	$1.2	0.02%	1,009	$3.1	0.01%
Nuts	Dry Roast Peanuts	731	$1.2	0.02%	479	$15.9	0.05%
Can Seafood—Shelf Stable	Sardines	732	$1.2	0.02%	822	$5.8	0.02%
Service Case Meat	Stuffed/Mixed Poultry	733	$1.2	0.02%	717	$8.2	0.03%
Citrus	Oranges Non Navel All	734	$1.2	0.02%	868	$5.0	0.02%
Seafood—Catfish	Catfish—Nuggets	735	$1.2	0.02%	1,151	$1.8	0.01%
Snack	Soy/Rice Snacks	736	$1.2	0.02%	488	$15.7	0.05%
Bread	Bread: Sourdough	737	$1.2	0.02%	456	$17.1	0.05%
Refrigerated Hispanic Grocery	Misc Hispanic Grocery	738	$1.2	0.02%	635	$10.2	0.03%
Prepared/Pdgd Foods	Boxed Prepared/Entrée/Dry Prep	739	$1.2	0.02%	489	$15.6	0.05%
Shelf Stable Juice	Prune Juice (Over 50% Juice)	740	$1.2	0.02%	711	$8.3	0.03%
Specialty Cheese Pre Pack	Specialty Ppk Cheese Feta	741	$1.2	0.02%	433	$18.5	0.06%
Teas	Instant Tea & Tea Mix (W/Sugar)	742	$1.1	0.02%	914	$4.4	0.01%
Pre-Slice Service Case Cheese	Pre-Sliced Semi-Soft Cheese	743	$1.1	0.02%	514	$14.4	0.05%
Shortening & Oil	Cooking Oil: Peanut/Safflower	744	$1.1	0.02%	775	$6.7	0.02%
Authentic Hispanic Fds & Product	Hispanic Cookies Crackers	745	$1.1	0.02%	1,152	$1.8	0.01%
Can Vegetables—Shelf Stable	Carrots	746	$1.1	0.02%	900	$4.5	0.01%
Juice Drinks—Carb	Juice (Over 50% juice)	747	$1.1	0.02%	659	$9.7	0.03%
Juices Super Premium	Juice Single Blend	748	$1.1	0.02%	673	$9.4	0.03%
Nuts	Oil Roast Peanuts	749	$1.1	0.02%	615	$10.9	0.03%
Beef: Thin Meats	Skirt [Beef]	750	$1.1	0.02%	798	$6.3	0.02%
Nuts	Nuts Other	751	$1.1	0.02%	593	$11.5	0.04%
Peppers	Peppers Yellow Bell	752	$1.1	0.02%	599	$11.4	0.04%
Baking Needs	Baking Powder & Soda	753	$1.1	0.02%	715	$8.2	0.03%
Frzn Meatless	Meatless Burgers	754	$1.1	0.02%	639	$10.1	0.03%
Candy—Checklane	Misc Checklane Candy	755	$1.1	0.02%	1,052	$2.6	0.01%
Pears	Pears Anjou	756	$1.1	0.02%	649	$9.8	0.03%
Powder & Crystal Drink Mix	Fluid Pouch [Powder Drink Mix]	757	$1.1	0.02%	781	$6.6	0.02%

Exhibit A–2: Top 1,000 Subcommodities by Expenditures of SNAP Households—Continued

Commodity	Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
		Rank	$ in Millions	% of Expenditures	Rank	$ in Millions	% of Expenditures
Pasta & Pizza Sauce	Pizza Sauce	758	$1.1	0.02%	810	$6.1	0.02%
Spices/Jarred Garlic	Garlic Jar	759	$1.1	0.02%	729	$7.7	0.02%
Sweet Goods & Snacks	Sweet Goods: Candy	760	$1.1	0.02%	920	$4.4	0.01%
Soft Drinks	Tea Bottles With Sweetener/Sugar	761	$1.1	0.02%	1,148	$1.9	0.01%
Random Weight Meat Products	Lunch Meats	762	$1.1	0.02%	947	$4.0	0.01%
Authentic Hispanic Fds & Product	Hispanic Carbonated Beverages	763	$1.1	0.02%	979	$3.5	0.01%
Isotonic Drinks	Isotonic Drinks Multi-Serve	764	$1.1	0.02%	889	$4.7	0.01%
Juices Super Premium	Juices Antioxidant/Wellness	765	$1.0	0.02%	719	$8.1	0.03%
Spices/Jarred Garlic	Spices & Seasonings	766	$1.0	0.02%	892	$4.6	0.01%
Trail Mix & Snacks	Trail Mixes/Snack	767	$1.0	0.02%	650	$9.8	0.03%
Lunchmeat	Lunchmeat—Natural/Organic	768	$1.0	0.02%	559	$12.7	0.04%
Lunchmeat	Lunchmeat—Peggable Deli Fresh	769	$1.0	0.02%	877	$4.9	0.02%
Bread	Bread: Tortillas/Wraps	770	$1.0	0.02%	648	$9.8	0.03%
Ice Cream Ice Milk & Sherbets	Quarts [Ice Cream & Sherbert]	771	$1.0	0.02%	924	$4.3	0.01%
Infant Formula	Infant Formula Up Age	772	$1.0	0.02%	1,015	$3.0	0.01%
Tropical Fruit	Kiwi Fruit	773	$1.0	0.02%	764	$7.0	0.02%
Peppers	Peppers Jalapeño	774	$1.0	0.02%	911	$4.4	0.01%
Tomatoes	Tomatoes Cherry	775	$1.0	0.02%	580	$12.1	0.04%
Trail Mix & Snacks	Candy W/O Flour	776	$1.0	0.02%	844	$5.4	0.02%
Condiments	Oils/Vinegar	777	$1.0	0.02%	643	$10.0	0.03%
Value-Added Vegetables	Instore Cut Vegetables	778	$1.0	0.02%	654	$9.7	0.03%
Candy—Packaged	Candy Boxed Chocolates W/Flour	779	$1.0	0.02%	852	$5.3	0.02%
Dried Fruit	Dried Plums	780	$1.0	0.02%	609	$11.0	0.03%
Shelf Stable Juice	Apple Juice & Cider (50% And Under)	781	$1.0	0.02%	1,024	$3.0	0.01%
Pre-Slice Service Case Cheese	Pre-Sliced Semi-Hard [Cheese]	782	$1.0	0.02%	520	$14.3	0.05%
Tomato Products-Shelf Stable	Tomato Stewed	783	$1.0	0.02%	790	$6.4	0.02%
Nuts	Misc Snack Nuts	784	$1.0	0.02%	726	$7.8	0.02%
Beef: Thin Meats	Flank [Beef]	785	$1.0	0.02%	547	$13.0	0.04%
Cookies	Cookies: Message	786	$1.0	0.02%	876	$4.9	0.02%
Baking Mixes	Miscellaneous Package Mixes	787	$1.0	0.02%	752	$7.2	0.02%
Mediterranean Bar	Sal: Olives/Pickles—Bulk	788	$1.0	0.02%	492	$15.5	0.05%
Dry Sce/Gravy/Potatoes/Stuffng	Cooking Bags With Spices/Season	789	$1.0	0.01%	1,078	$2.4	0.01%
Stone Fruit	Cherries Ranier	790	$1.0	0.01%	691	$9.0	0.03%
Energy Drinks	Energy Drink—Multi-Pack	791	$1.0	0.01%	671	$9.4	0.03%
Meat—Shelf Stable	Beef/Pork—Dried Sliced	792	$1.0	0.01%	990	$3.3	0.01%
Cookies	Cookies/Sweet Goods	793	$1.0	0.01%	542	$13.1	0.04%
Turkey Fresh	Whole Tom (Over 16lbs) [Turkey]	794	$1.0	0.01%	747	$7.3	0.02%
Ss/Vending—Cookie/Cracker	Vending Size/Sngl Serve Cracker	795	$1.0	0.01%	1,090	$2.3	0.01%
Can Vegetables—Shelf Stable	White Potatoes	796	$1.0	0.01%	927	$4.3	0.01%
Can Seafood—Shelf Stable	Oysters	797	$0.9	0.01%	1,025	$3.0	0.01%
Dressings/Dips	Dips Veggie	798	$0.9	0.01%	740	$7.3	0.02%
Snacks	Snacks: Pita Chips	799	$0.9	0.01%	484	$15.7	0.05%
Candy—Packaged	Candy Boxed Chocolates	800	$0.9	0.01%	772	$6.7	0.02%
Chicken Grinds	Ground Chicken	801	$0.9	0.01%	767	$6.9	0.02%
Candy—Packaged	Seasonal Candy Box Non-Chocola	802	$0.9	0.01%	949	$4.0	0.01%
Frozen Meat	Alternatives Soy/Tofu	803	$0.9	0.01%	688	$9.0	0.03%
Can Vegetables—Shelf Stable	Kraut & Cabbage	804	$0.9	0.01%	814	$6.0	0.02%
Cereals	Granola	805	$0.9	0.01%	501	$15.1	0.05%
Baking Needs	Cooking Chocolate (Ex Smi-Swt)	806	$0.9	0.01%	627	$10.3	0.03%
Candy—Packaged	Candy Box Non-Chocolate	807	$0.9	0.01%	953	$3.9	0.01%
Dinner Sausage	Dnr Sausage—Natural/Organic	808	$0.9	0.01%	585	$12.1	0.04%
Dressings/Dips	Dressing Blue Cheese	809	$0.9	0.01%	666	$9.5	0.03%
Herbs/Garlic	Herbs Fresh Other Organic	810	$0.9	0.01%	518	$14.3	0.05%
Shelf Stable Juice	Tomato Juice (50% And Under)	811	$0.9	0.01%	975	$3.5	0.01%

Exhibit A–2: Top 1,000 Subcommodities by Expenditures of SNAP Households—Continued

Commodity	Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
		Rank	$ in Millions	% of Expenditures	Rank	$ in Millions	% of Expenditures
Popcorn	Caramel Coated Snacks	812	$0.9	0.01%	1,006	$3.1	0.01%
Deli Meat: Presliced	Deli Meat: Turkey	813	$0.9	0.01%	516	$14.3	0.05%
Cake Décor	Cake Décors—Candies	814	$0.9	0.01%	841	$5.4	0.02%
Specialty Cheese Pre Pack	Specialty Ppk Cheese Mozzarell	815	$0.9	0.01%	471	$16.2	0.05%
Shelf Stable Juice	Cranapple/Cran Grape Juice	816	$0.9	0.01%	797	$6.3	0.02%
Rtd Tea/New Age Juice	Juice (Over 50% Juice)	817	$0.9	0.01%	1,047	$2.7	0.01%
Crackers & Misc Baked Food	Specialty Crackers	818	$0.9	0.01%	444	$17.8	0.06%
Salad & Dips	Salad Bar	819	$0.9	0.01%	644	$10.0	0.03%
Service Case Meat	Marinated Beef	820	$0.9	0.01%	782	$6.6	0.02%
Juice	Non-Carb Jce (Under 50% Juice)	821	$0.9	0.01%	880	$4.8	0.02%
Organics Fruit & Vegetables	Organic Salad Mix	822	$0.9	0.01%	499	$15.1	0.05%
Chilled Ready Meals	Store Brand	823	$0.9	0.01%	932	$4.2	0.01%
Frzn Meatless	Meatless Breakfast	824	$0.9	0.01%	697	$8.6	0.03%
Dry Tea/Coffee/Coco Mixes	Tea Bags (Supplement)	825	$0.9	0.01%	681	$9.2	0.03%
Melons	Watermelon W/Seeds Whole	826	$0.9	0.01%	1,019	$3.0	0.01%
Dry Mix Desserts	Misc: Cheesecake/Mousse Mixes	827	$0.9	0.01%	1,087	$2.3	0.01%
Value-Added Fruit	Parfait Cups Instore	828	$0.8	0.01%	1,032	$2.9	0.01%
Vinegar & Cooking Wines	Specialty Vinegar	829	$0.8	0.01%	552	$12.9	0.04%
Pork Shoulder	Fresh Hams	830	$0.8	0.01%	1,030	$2.9	0.01%
Specialty Cheese Pre Pack	Specialty Ppk Cheese Processed	831	$0.8	0.01%	815	$6.0	0.02%
Turkey Smoked	Turkey Wings	832	$0.8	0.01%	1,228	$1.3	0.00%
Frzn Seafood	Frz Non-Coated Fish Fillets	833	$0.8	0.01%	860	$5.2	0.02%
Vegetables Salad	Radish	834	$0.8	0.01%	713	$8.3	0.03%
Cookies	Specialty Cookies	835	$0.8	0.01%	622	$10.7	0.03%
Traditional Asian Foods	Traditional Thai Foods	836	$0.8	0.01%	710	$8.3	0.03%
Yogurt	Yogurt/Adult Drinks	837	$0.8	0.01%	958	$3.8	0.01%
Specialty Cheese Pre Pack	Specialty Ppk Cheese Cheddar	838	$0.8	0.01%	527	$13.9	0.04%
Peppers	Peppers All Other	839	$0.8	0.01%	864	$5.1	0.02%
Pickle/Relish/Pckld Veg & Olives	Pickld Veg/Peppers/*Etc.*	840	$0.8	0.01%	820	$5.9	0.02%
Candy—Packaged	Candy Bags-Non Chocolate W/Flour	841	$0.8	0.01%	965	$3.7	0.01%
Frozen Juice And Smoothies	Frzn Conc Under 50% Juice	842	$0.8	0.01%	983	$3.4	0.01%
Pickle/Relish/Pckld Veg & Olives	Specialty Olives	843	$0.8	0.01%	614	$11.0	0.03%
Salad & Dips	Sal: Desserts—Bulk	844	$0.8	0.01%	890	$4.7	0.01%
Authentic Asian Foods	Authentic Japanese Foods	845	$0.8	0.01%	755	$7.1	0.02%
Crackers	Crackers	846	$0.8	0.01%	508	$14.6	0.05%
Smoked Pork	Smoked Picnics [Pork]	847	$0.8	0.01%	1,105	$2.2	0.01%
Condiments	Nut Butters/Peanut Butter	848	$0.8	0.01%	549	$12.9	0.04%
Tomato Products-Shelf Stable	Tomatoes/Whole	849	$0.8	0.01%	865	$5.1	0.02%
Party Tray Deli	Tray: Appetizers & Hors D'oe	850	$0.8	0.01%	957	$3.9	0.01%
Soup	Cans Soup/Chili	851	$0.8	0.01%	561	$12.7	0.04%
Service Case Meat	Kabobs Beef	852	$0.8	0.01%	843	$5.4	0.02%
Vegetables Salad	Variety Lettuce Organic	853	$0.8	0.01%	568	$12.5	0.04%
Melons	Honeydew Whole	854	$0.8	0.01%	817	$5.9	0.02%
Grapes	Grapes Red Globe	855	$0.8	0.01%	980	$3.5	0.01%
Condiments & Sauces	Chili Sauce/Cocktail Sauce	856	$0.7	0.01%	813	$6.0	0.02%
Tropical Fruit	Pomegranates	857	$0.7	0.01%	926	$4.3	0.01%
Organics Fruit & Vegetables	Organic Value-Added Vegetables	858	$0.7	0.01%	762	$7.0	0.02%
Grapes	Grapes Other	859	$0.7	0.01%	960	$3.8	0.01%
Chicken Fresh	Mixed Packs [Chicken]	860	$0.7	0.01%	923	$4.3	0.01%
Nuts	Nuts Inshell	861	$0.7	0.01%	894	$4.6	0.01%
Authentic Hispanic Fds & Product	Hispanic Juice Under 50% Juice	862	$0.7	0.01%	1,123	$2.0	0.01%
Coffee & Creamers	Flavored Can Coffee	863	$0.7	0.01%	823	$5.8	0.02%
Prepared/Pdgd Foods	Vegetables/Dry Beans	864	$0.7	0.01%	575	$12.2	0.04%
Bread	Bread: Rye/Cocktail	865	$0.7	0.01%	720	$8.1	0.03%
Baking Needs	Maraschino Cherries	866	$0.7	0.01%	944	$4.1	0.01%
Seafood—Crab	Crab—Dungy	867	$0.7	0.01%	952	$3.9	0.01%
Bread	Whole Grain Bread	868	$0.7	0.01%	680	$9.2	0.03%

Exhibit A–2: Top 1,000 Subcommodities by Expenditures of SNAP Households—Continued

Commodity	Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
		Rank	$ in Millions	% of Expenditures	Rank	$ in Millions	% of Expenditures
Smoked Hams	Hams—Whole Bone-In	869	$0.7	0.01%	1,092	$2.3	0.01%
Apples	Apples Braeburn (Bulk & Bag)	870	$0.7	0.01%	668	$9.4	0.03%
Shelf Stable Juice	Grapefruit Juice (Over 50% Juice)	871	$0.7	0.01%	939	$4.1	0.01%
Water	Fortified/Water	872	$0.7	0.01%	913	$4.4	0.01%
Meat—Shelf Stable	Potted Meats And Spreads	873	$0.7	0.01%	1,103	$2.2	0.01%
Water—(Sparkling & Still)	Sparkling Water—Unflavored	874	$0.7	0.01%	581	$12.1	0.04%
Seafood—Trout	Steelhead Fr [Trout]	875	$0.7	0.01%	812	$6.0	0.02%
Can Vegetables—Shelf Stable	Beets	876	$0.7	0.01%	825	$5.8	0.02%
Frozen Juice And Smoothies	Smoothies-Frozen	877	$0.7	0.01%	950	$4.0	0.01%
Frozen Breakfast Foods	Frzn Bagels	878	$0.7	0.01%	1,035	$2.9	0.01%
Party Tray Deli	Tray: Fruit And Vegetable	879	$0.7	0.01%	758	$7.1	0.02%
Chicken Specialty/Natural	Whole Chicken (Roasters/Fryer)	880	$0.7	0.01%	902	$4.5	0.01%
Bread	Bread: Wheat/Whl Grain	881	$0.7	0.01%	629	$10.3	0.03%
Non-Dairy/Dairy Aseptic	Soy Beverage	882	$0.7	0.01%	849	$5.3	0.02%
Fitness & Diet	Fitness & Diet-Powder Ntrtnl	883	$0.7	0.01%	741	$7.3	0.02%
Frzn Meatless	Meatless Poultry	884	$0.7	0.01%	799	$6.2	0.02%
Pies	Pies: Sugar Free	885	$0.7	0.01%	904	$4.5	0.01%
Dinner Sausage	Dnr Sausage—Fresh Poultry	886	$0.7	0.01%	918	$4.4	0.01%
Spices & Extracts	Imitation Extracts	887	$0.7	0.01%	973	$3.5	0.01%
Beverages	Can/Btl Carb Beve 50% And Under	888	$0.7	0.01%	736	$7.6	0.02%
Vegetables Cooking Packaged	Vegetables Cooking Packaged	889	$0.7	0.01%	821	$5.9	0.02%
Frozen Vegetable & Veg Dish	Fz Box Vegetables—Plain	890	$0.7	0.01%	824	$5.8	0.02%
Soup	Broths	891	$0.7	0.01%	560	$12.7	0.04%
Bread	Bread: Brand	892	$0.7	0.01%	679	$9.2	0.03%
Can Vegetables—Shelf Stable	Peas Fresh Pack/Crowder	893	$0.7	0.01%	978	$3.5	0.01%
Snacks	Snacks: Salty	894	$0.7	0.01%	703	$8.5	0.03%
Salad & Dips	Protein Salads—Prepack	895	$0.6	0.01%	946	$4.0	0.01%
Turkey Smoked	Turkey Drums	896	$0.6	0.01%	1,250	$1.2	0.00%
Apples	Apples Gala (Bulk & Bag) Organic	897	$0.6	0.01%	672	$9.4	0.03%
Stone Fruit	Peaches White Flesh	898	$0.6	0.01%	833	$5.5	0.02%
Tomatoes	Tomatoes—Other	899	$0.6	0.01%	1,003	$3.2	0.01%
Service Case Meat	Kabobs Poultry	900	$0.6	0.01%	879	$4.9	0.02%
Frzn Meatless	Meatless Miscellaneous	901	$0.6	0.01%	869	$5.0	0.02%
Seafood—Scallops	Scallops—Sea	902	$0.6	0.01%	791	$6.4	0.02%
Convenience/Snacking	Jarred Fruit Multi Serve	903	$0.6	0.01%	901	$4.5	0.01%
Traditional Asian Foods	Asian Vegetables	904	$0.6	0.01%	847	$5.4	0.02%
Shelf Stable Juice	Cranapple/Cran Grape Juice	905	$0.6	0.01%	760	$7.0	0.02%
Frozen Juice And Smoothies	Cocktail Mixes-Frz	906	$0.6	0.01%	1,107	$2.2	0.01%
Shelf Stable Juice	Grapefruit Juice (50% And Under)	907	$0.6	0.01%	1,007	$3.1	0.01%
Tomato Products-Shelf Stable	Tomato Crushed	908	$0.6	0.01%	780	$6.6	0.02%
Condiments & Sauces	Misc Meat Sauces	909	$0.6	0.01%	962	$3.7	0.01%
Shelf Stable Juice	Blended Juice & Combinations	910	$0.6	0.01%	1,022	$3.0	0.01%
Coffee & Creamers	Bulk Coffee	911	$0.6	0.01%	701	$8.6	0.03%
Specialty Cheese Pre Pack	Specialty Ppk Cheese Semi Soft	912	$0.6	0.01%	595	$11.4	0.04%
Non-Dairy/Dairy Aseptic	Nut Milk	913	$0.6	0.01%	763	$7.0	0.02%
Specialty Cheese Pre Pack	Specialty Ppk Cheese Soft & Ripe	914	$0.6	0.01%	620	$10.8	0.03%
Authentic Hispanic Fds & Product	Authentic Soups/Bouillons	915	$0.6	0.01%	1,200	$1.5	0.00%
Authentic Asian Foods	Authentic Chinese Foods	916	$0.6	0.01%	931	$4.2	0.01%
Baby Food	Baby Food	917	$0.6	0.01%	835	$5.5	0.02%
Deli Meat: Presliced	Deli Meat: Ham	918	$0.6	0.01%	665	$9.5	0.03%
Bacon	Bacon—Natural/Organic	919	$0.6	0.01%	759	$7.1	0.02%
Frozen Potatoes	Frzn Onion Rings	920	$0.6	0.01%	1,177	$1.6	0.01%
Margarines	Margarine: Squeeze	921	$0.6	0.01%	930	$4.2	0.01%
Deli Specialties (Retail Pk)	Dl Spec: Dry/Refrig Pastas	922	$0.6	0.01%	850	$5.3	0.02%
Seafood—Crab	Crab—Other	923	$0.6	0.01%	1,213	$1.4	0.00%

Exhibit A–2: Top 1,000 Subcommodities by Expenditures of SNAP Households—Continued

Commodity	Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
		Rank	$ in Millions	% of Expenditures	Rank	$ in Millions	% of Expenditures
Specialty Cheese Pre Pack	Specialty Ppk Cheese Blue/Gorg	924	$0.6	0.01%	619	$10.8	0.03%
Tomatoes	Tomatoes Others Organic	925	$0.6	0.01%	808	$6.1	0.02%
Teas	Instant Tea & Tea Mix	926	$0.6	0.01%	1,038	$2.9	0.01%
Refrigerated Vegetarian	Vegetarian Misc	927	$0.6	0.01%	963	$3.7	0.01%
Canned & Dry Milk	Non Fat Dry Milk	928	$0.6	0.01%	859	$5.2	0.02%
Refrigerated Dairy Case	Kefir	929	$0.6	0.01%	751	$7.2	0.02%
Coffee & Creamers	Specialty Instant Coffee	930	$0.6	0.01%	1,043	$2.8	0.01%
Can Vegetables—Shelf Stable	Artichokes	931	$0.6	0.01%	682	$9.1	0.03%
Soft Drinks	Mixers (Tonic Water/Gngr Ale)	932	$0.5	0.01%	540	$13.2	0.04%
Refrigerated Italian	Refrigerated Pasta Sauce	933	$0.5	0.01%	742	$7.3	0.02%
Baking Needs	Baking Cocoa	934	$0.5	0.01%	851	$5.3	0.02%
Vegetables Salad	Spinach Bulk	935	$0.5	0.01%	883	$4.8	0.02%
Infant Formula	Infant Formula Milk Base	936	$0.5	0.01%	1,455	$0.3	0.00%
Seafood—Salad/Dip/Sce/Cond	Dips/Spreads	937	$0.5	0.01%	1,069	$2.5	0.01%
Authentic Hispanic Fds & Product	Hispanic Baking Needs	938	$0.5	0.01%	1,233	$1.3	0.00%
Baking Needs	Marshmallow Crème	939	$0.5	0.01%	977	$3.5	0.01%
Buffalo	Grinds [Buffalo]	940	$0.5	0.01%	712	$8.3	0.03%
Baking Needs	Yeast: Dry	941	$0.5	0.01%	816	$5.9	0.02%
Lamb	Round/Leg [Lamb]	942	$0.5	0.01%	936	$4.2	0.01%
Seafood—Smoked	Seafood Smoked Salmon	943	$0.5	0.01%	709	$8.4	0.03%
Processed	Packaged Dry Mixes	944	$0.5	0.01%	1,039	$2.9	0.01%
Frozen Meat Alternatives	Micro Protein [Meats]	945	$0.5	0.01%	899	$4.6	0.01%
Refrgrated Dough Products	Misc Refrig Dough Products	946	$0.5	0.01%	1,162	$1.7	0.01%
Deli Meat: Presliced	Deli Meat: Beef	947	$0.5	0.01%	862	$5.2	0.02%
Vegetables Cooking Bulk	Celery Organic	948	$0.5	0.01%	779	$6.6	0.02%
Cakes	Cakes: Creme/Pudding Novelties	949	$0.5	0.01%	1,171	$1.7	0.01%
Lamb	Loin [Lamb]	950	$0.5	0.01%	882	$4.8	0.02%
Refrgratd Juices/Drinks	Dairy Case Tea No Sugar Or Sweetner	951	$0.5	0.01%	1,002	$3.2	0.01%
Baking Needs	Coconut [Baking Needs]	952	$0.5	0.01%	873	$4.9	0.02%
Salad Mix	Salad Spinach Organic	953	$0.5	0.01%	696	$8.7	0.03%
Pork Grinds	Ground Pork	954	$0.5	0.01%	928	$4.3	0.01%
Processed	Squeeze Lemons/Limes	955	$0.5	0.01%	988	$3.3	0.01%
Lamb	Chuck/Shoulder [Lamb]	956	$0.5	0.01%	1,083	$2.4	0.01%
Berries	Raspberries Organic	957	$0.5	0.01%	683	$9.1	0.03%
Rolls	Rolls: Biscuits/Eng Muffins	958	$0.5	0.01%	886	$4.7	0.02%
Snacks	Snacks: Tortilla Chips	959	$0.5	0.01%	874	$4.9	0.02%
Condiments	Honey/Syrup	960	$0.5	0.01%	921	$4.3	0.01%
Rice Cakes	Large Cakes	961	$0.5	0.01%	855	$5.2	0.02%
Authentic Italian Foods	Italian Vegetables	962	$0.5	0.01%	738	$7.4	0.02%
Dressings/Dips	Dips Fruit And Chocolate	963	$0.5	0.01%	1,149	$1.9	0.01%
Potatoes	Potatoes Other Organic	964	$0.5	0.01%	789	$6.4	0.02%
Juices Super Premium	Juices (50% And Under Juice)	965	$0.5	0.01%	1,141	$1.9	0.01%
Specialty Cheese Pre Pack	Specialty Ppk Cheese Hispanic	966	$0.5	0.01%	1,192	$1.5	0.00%
Seafood—Value-Added	Seafood Value-Added Crab	967	$0.5	0.01%	997	$3.2	0.01%
Service Case Meat	Stuffed/Mixed Pork	968	$0.5	0.01%	1,051	$2.7	0.01%
Herbs/Garlic	Sprouts	969	$0.5	0.01%	955	$3.9	0.01%
Pears	Pears Bosc	970	$0.5	0.01%	922	$4.3	0.01%
Meat—Shelf Stable	Corn Beef	971	$0.5	0.01%	1,169	$1.7	0.01%
Refrigerated Vegetarian	Non-Dairy Cheese	972	$0.5	0.01%	893	$4.6	0.01%
Isotonic Drinks	Sports Drink N/Supplmnt Milk	973	$0.5	0.01%	1,017	$3.0	0.01%
Soft Drinks	Seltzer Unflavored	974	$0.5	0.01%	757	$7.1	0.02%
Refrigerated Vegetarian	Tofu	975	$0.5	0.01%	809	$6.1	0.02%
Berries	Blueberries Organic	976	$0.5	0.01%	660	$9.6	0.03%
Trail Mix & Snacks	Candy W/Flour	977	$0.5	0.01%	1,027	$2.9	0.01%
Cakes	Cakes: Cheesecake Novelties	978	$0.5	0.01%	1,115	$2.1	0.01%
Water—(Sparkling & Still)	Sparkling Water—Flvrd Unsweetened	979	$0.5	0.01%	675	$9.3	0.03%
Powder & Crystal Drink Mix	Breakfast Crystals	980	$0.5	0.01%	1,209	$1.4	0.00%
Non-Dairy/Dairy Aseptic	Rice Beverage	981	$0.5	0.01%	891	$4.6	0.01%
Pies	Pies: Tarts/Minis/Crstdas	982	$0.5	0.01%	1,045	$2.7	0.01%
Specialty Cheese Pre Pack	Specialty Ppk Cheese Gouda & Eda	983	$0.5	0.01%	721	$8.0	0.03%

Exhibit A–2: Top 1,000 Subcommodities by Expenditures of SNAP Households—Continued

Commodity	Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures		
		Rank	$ in Millions	% of Expenditures	Rank	$ in Millions	% of Expenditures
Enhancements (Pickles/ Spreads)	Enhancements—Spices/ Sauces	984	$0.5	0.01%	1,082	$2.4	0.01%
Snacks	Snacks: Crackers/Cook- ies	985	$0.5	0.01%	705	$8.4	0.03%
Baking Needs	Corn Starch	986	$0.5	0.01%	1,062	$2.6	0.01%
Candy—Packaged	Bulk Candy	987	$0.5	0.01%	1,031	$2.9	0.01%
Prepared/Pdgd Foods	Pasta/Ramen	988	$0.5	0.01%	801	$6.2	0.02%
Specialty Cheese Pre Pack	Specialty Ppk Cheese Goat Milk	989	$0.5	0.01%	624	$10.4	0.03%
Herbs/Garlic	Herbs Basil Organic	990	$0.4	0.01%	692	$9.0	0.03%
Bakery Party Trays	Party Trays: Cakes	991	$0.4	0.01%	1,147	$1.9	0.01%
Mushrooms	Mushrooms White Bulk	992	$0.4	0.01%	830	$5.7	0.02%
Candy	Candy/Chocolate	993	$0.4	0.01%	786	$6.5	0.02%
Candy—Packaged	Seasonal Candy Bags- Chocolate	994	$0.4	0.01%	999	$3.2	0.01%
Tomatoes	Tomatoes Cocktail	995	$0.4	0.01%	714	$8.3	0.03%
Pears	Pears Asian	996	$0.4	0.01%	961	$3.8	0.01%
Authentic Caribbean Foods	Caribbean Foods	997	$0.4	0.01%	1,273	$1.1	0.00%
Dry Bean Veg & Rice	Misc Grain Mixes	998	$0.4	0.01%	735	$7.6	0.02%
Can Vegetables—Shelf Stable	Peas & Onions/Peas & Carrot	999	$0.4	0.01%	1,136	$1.9	0.01%
Seafood—Shellfish	Other Shellfish—Other	1,000	$0.4	0.01%	1,225	$1.3	0.00%
Top 1,000 Totals			**$6,580.5**	**100%**		**$31,513.8**	**100%**

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.
Note: Columns may not sum to total shown due to rounding.

EAppendix B. Crosswalk of Top 1,000 Subcommodities to Summary Categories

Commodity	Subcommodity	Summary Category
Baby Food	Baby Food	Baby food
Baby Foods	Baby Food—Beginner	Baby food
Baby Foods	Baby Food	Junior/All Brands Baby food
Baby Foods	Baby Food	Cereals Baby food
Baby Foods	Baby Juices	Baby food
Baby Foods	Baby Spring Waters	Baby food
Infant Formula	Infant Formula	Starter/Solutio Baby food
Infant Formula	Infant Formula	Specialty Baby food
Infant Formula	Infant Formula	Starter Large P Baby food
Infant Formula	Infant Formula	Toddler Baby food
Infant Formula	Infant Formula	Solutions Large Baby food
Infant Formula	Infant Formula	Concentrate Baby food
Infant Formula	Infant Formula	Ready To Use Baby food
Infant Formula	Baby Isotonic Drinks	Baby food
Infant Formula	Infant Formula Soy Base	Baby food
Infant Formula	Infant Formula Up Age	Baby food
Infant Formula	Infant Formula Milk Base	Baby food
Can Beans	Prepared Beans—Baked W/Pork	Beans
Can Beans	Variety Beans—Kidney/Pinto/E	Beans
Dry Bean Veg & Rice	Dry Beans/Peas/Barley: Bag & B	Beans
Frozen Meat Alternatives	Soy/Tofu	Beans
Salad & Dips	Sal: Hommus	Beans
Traditional Mexican Foods	Mexican Beans/Refried	Beans
Vegetables Cooking Bulk	Beans	Beans
Frozen Ice	Ice—Crushed/Cubed	Bottled water
Water	Fortified/Water	Bottled water
Water—(Sparkling & Still)	Still Water Drnking/Mnrl Water	Bottled water
Water—(Sparkling & Still)	Spring Water	Bottled water
Water—(Sparkling & Still)	Distilled Water	Bottled water
Water—(Sparkling & Still)	Sparkling Water—Unflavored	Bottled water
Water—(Sparkling & Still)	Sparkling Water—Flvrd Unswee	Bottled water
Bagels & Cream Cheese	Refrigerated Bagels	Bread and Crackers
Baked Breads	Mainstream White Bread	Bread and Crackers
Baked Breads	Mainstream Variety Breads	Bread and Crackers
Baked Breads	Hamburger Buns	Bread and Crackers
Baked Breads	Hot Dog Buns	Bread and Crackers
Baked Breads	Premium Bread	Bread and Crackers
Baked Breads	Bagels	Bread and Crackers
Baked Breads	Sandwich Buns	Bread and Crackers
Baked Breads	English Muffins/Waffles	Bread and Crackers
Baked Breads	Main Meal Bread	Bread and Crackers
Baked Breads	Dinner Rolls	Bread and Crackers
Baked Breads	Diet/Light Bread	Bread and Crackers
Baked Breads	Fruit/Breakfast Bread	Bread and Crackers

EAppendix B. Crosswalk of Top 1,000 Subcommodities to Summary Categories—Continued

Commodity	Subcommodity	Summary Category
Baked Breads	Rye Breads	Bread and Crackers
Baking Mixes	Biscuit Flour & Mixes	Bread and Crackers
Bread	Bread: Italian/French	Bread and Crackers
Bread	Bread: Specialty	Bread and Crackers
Bread	Bread: Artisan	Bread and Crackers
Bread	Bread: Pita/Pocket/Flatbrd	Bread and Crackers
Bread	Bread: Sweet/Breakfast	Bread and Crackers
Bread	Bread: Sourdough	Bread and Crackers
Bread	Bread: Tortillas/Wraps	Bread and Crackers
Bread	Bread: Rye/Cocktail	Bread and Crackers
Bread	Whole Grain Bread	Bread and Crackers
Bread	Bread: Wheat/Whl Grain	Bread and Crackers
Bread	Bread: Brand	Bread and Crackers
Cookie/Cracker Multi-Pks	Multi-Pack Crackers	Bread and Crackers
Crackers	Crackers	Bread and Crackers
Crackers & Misc Baked Food	Cheese Crackers	Bread and Crackers
Crackers & Misc Baked Food	Butter Spray Cracker	Bread and Crackers
Crackers & Misc Baked Food	Snack Crackers	Bread and Crackers
Crackers & Misc Baked Food	Saltine/Oyster	Bread and Crackers
Crackers & Misc Baked Food	Specialty Crackers	Bread and Crackers
Croutons/Bread Stick&Salad Top	Croutons	Bread and Crackers
Dry Sce/Gravy/Potatoes/Stuffng	Stuffing Mixes	Bread and Crackers
Frozen Bread/Dough	Frzn Garlic Toast	Bread and Crackers
Frozen Bread/Dough	Frzn Dinner Rolls	Bread and Crackers
Frozen Bread/Dough	Frzn Garlic Bread	Bread and Crackers
Frozen Bread/Dough	Frzn Biscuits	Bread and Crackers
Frozen Bread/Dough	Frzn Breadsticks	Bread and Crackers
Frozen Breakfast Foods	Frzn Bagels	Bread and Crackers
Refrgrated Dough Products	Refrigerated Biscuits	Bread and Crackers
Refrgrated Dough Products	Refrigerated Specialty Rolls	Bread and Crackers
Refrgrated Dough Products	Refrigerated Crescent Rolls	Bread and Crackers
Refrgrated Dough Products	Refrigerated Breads	Bread and Crackers
Refrgrated Dough Products	Misc Refrig Dough Products	Bread and Crackers
Refrigerated Hispanic Grocery	Refrigerated Tortillas	Bread and Crackers
Rice Cakes	Mini-Cakes	Bread and Crackers
Rice Cakes	Large Cakes	Bread and Crackers
Rolls	Rolls: Dinner	Bread and Crackers
Rolls	Rolls: Sandwich	Bread and Crackers
Rolls	Rolls: Croissants/Breadsticks	Bread and Crackers
Rolls	Rolls: Bagels	Bread and Crackers
Rolls	Rolls: Biscuits/Eng Muffins	Bread and Crackers
Ss/Vending—Cookie/Cracker	Vending Size/Sngl Serve Cracke	Bread and Crackers
Traditional Mexican Foods	Mexican Soft Tortillas And Wra	Bread and Crackers
Traditional Mexican Foods	Mexican Taco/Tostado/Shells	Bread and Crackers
Apples	Caramel/Candy Apples	Candy
Candy	Candy/Chocolate	Candy
Candy—Checklane	Candy Bars (Singles) (Including)	Candy
Candy—Checklane	Chewing Gum	Candy
Candy—Checklane	Candy Bars (Singles) (Including)	Candy
Candy—Checklane	Mints/Candy & Breath (Not Life)	Candy
Candy—Checklane	Misc Checklane Candy	Candy
Candy—Checklane	Mints/Candy & Breath (Not Life)	Candy
Candy—Packaged	Candy Bags-Chocolate	Candy
Candy—Packaged	Candy Bars (Multi Pack)	Candy
Candy—Packaged	Candy Bags-Non Chocolate	Candy
Candy—Packaged	Seasonal Miscellaneous [Candy]	Candy
Candy—Packaged	Seasonal Candy Bags-Chocolate	Candy
Candy—Packaged	Gum (Packaged)	Candy
Candy—Packaged	Miscellaneous Candy (Including)	Candy
Candy—Packaged	Seasonal Candy Box-Chocolate	Candy
Candy—Packaged	Seasonal Candy Bags Non-Chocol	Candy
Candy—Packaged	Candy Bars Multi Pack W/Flour	Candy
Candy—Packaged	Candy Bags-Chocolate W/Flour	Candy
Candy—Packaged	Miscellaneous Candy (Including)	Candy
Candy—Packaged	Novelty Candy	Candy
Candy—Packaged	Seasonal Miscellaneous W/Flour	Candy
Candy—Packaged	Candy Boxed Chocolates W/Flour	Candy
Candy—Packaged	Candy Boxed Chocolates	Candy
Candy—Packaged	Seasonal Candy Box Non-Chocola	Candy
Candy—Packaged	Candy Box Non-Chocolate	Candy
Candy—Packaged	Candy Bags-Non Chocolate W/Flo	Candy
Candy—Packaged	Bulk Candy	Candy
Candy—Packaged	Seasonal Candy Bags-Chocolate	Candy
Candy—Packaged	Seasonal Candy Bags Non-Chocol	Candy
Candy—Packaged	Seasonal Candy Box Non-Chocola	Candy
Sweet Goods & Snacks	Sweet Goods: Candy	Candy
Trail Mix & Snacks	Candy W/O Flour	Candy
Trail Mix & Snacks	Candy W/Flour	Candy
Cereal Bars	Breakfast Bars/Tarts/Scones	Cereal
Cereals	Cereal—Cold	Cereal
Cereals	Granola	Cereal
Cnv Breakfast & Wholesome Snks	Granola Bars	Cereal
Cnv Breakfast & Wholesome Snks	Cereal Bars	Cereal
Cold Cereal	Kids Cereal	Cereal

EAppendix B. Crosswalk of Top 1,000 Subcommodities to Summary Categories—Continued

Commodity	Subcommodity	Summary Category
Cold Cereal	All Family Cereal	Cereal
Cold Cereal	Adult Cereal	Cereal
Hot Cereal	Instant Oatmeal	Cereal
Hot Cereal	Standard Oatmeal	Cereal
Hot Cereal	Grits	Cereal
Hot Cereal	Other Hot Cereal	Cereal
Hot Cereal	Instant Breakfast	Cereal
Coffee & Creamers	Unflavored Can Coffee	Coffee and tea
Coffee & Creamers	Unflavored Bag Coffee	Coffee and tea
Coffee & Creamers	Unflavored Instant Coffee	Coffee and tea
Coffee & Creamers	Ready To Drink Coffee	Coffee and tea
Coffee & Creamers	Coffee Pods/Singles/Filter Pac	Coffee and tea
Coffee & Creamers	Flavored Bag Coffee	Coffee and tea
Coffee & Creamers	Specialty Instant Coffee W/Swe	Coffee and tea
Coffee & Creamers	Flavored Can Coffee	Coffee and tea
Coffee & Creamers	Bulk Coffee	Coffee and tea
Coffee & Creamers	Specialty Instant Coffee W/O S	Coffee and tea
Dry Tea/Coffee/Coco Mixes	Tea Bags (Supplement)	Coffee and tea
Refrgratd Juices/Drinks Dairy Case	Tea No Sugar Or Swe	Coffee and tea
Teas	Tea Bags & Bulk Tea	Coffee and tea
Teas	Tea Bags/Herbal	Coffee and tea
Teas	Tea Bags/Green	Coffee and tea
Teas	Instant Tea & Tea Mix	Coffee and tea
Authentic Hispanic Fds & Product	Authentic Sauces/Salsa/Picante	Condiments and seasoning
Bag Snacks	Salsa & Dips	Condiments and seasoning
Can Vegetables—Shelf Stable	Fried Onions	Condiments and seasoning
Condiments	Oils/Vinegar	Condiments and seasoning
Condiments & Sauces	Bbq Sauce	Condiments and seasoning
Condiments & Sauces	Catsup	Condiments and seasoning
Condiments & Sauces	Steak & Worchester Sauce	Condiments and seasoning
Condiments & Sauces	Hot Sauce	Condiments and seasoning
Condiments & Sauces	Marinades	Condiments and seasoning
Condiments & Sauces	Yellow Mustard	Condiments and seasoning
Condiments & Sauces	Mustard—All Other	Condiments and seasoning
Condiments & Sauces	Wing Sauce	Condiments and seasoning
Condiments & Sauces	Chili Sauce/Cocktail Sauce	Condiments and seasoning
Condiments & Sauces	Misc Meat Sauces	Condiments and seasoning
Croutons/Bread Stick & Salad Top	Salad Toppers	Condiments and seasoning
Dressings/Dips	Dips Guacamole/Salsa/Queso	Condiments and seasoning
Dressings/Dips	Dips Veggie	Condiments and seasoning
Dressings/Dips	Dips Fruit And Chocolate	Condiments and seasoning
Dry Sce/Gravy/Potatoes/Stuffng	Sauce Mixes/Gravy Mixes Dry	Condiments and seasoning
Dry Sce/Gravy/Potatoes/Stuffng	Gravy Can/Glass	Condiments and seasoning
Dry Sce/Gravy/Potatoes/Stuffng	Cooking Bags With Spices/Seaso	Condiments and seasoning
Enhancements	Enhancements—Pickles/Kraut	Condiments and seasoning
Enhancements	Enhancements—Salads/Spreads	Condiments and seasoning
Enhancements	Enhancements—Spices/Sauces	Condiments and seasoning
Herbs/Garlic	Herbs Cilanto	Condiments and seasoning
Herbs/Garlic	Herbs Fresh Other Organic	Condiments and seasoning
Herbs/Garlic	Herbs Basil Organic	Condiments and seasoning
Mediterranean Bar	Sal: Olives/Pickles—Bulk	Condiments and seasoning
Mediterranean Bar	Sal: Olives/Pickles—Bulk	Condiments and seasoning
Pickle/Relish/Pckld Veg & Olives	Ripe Olives	Condiments and seasoning
Pickle/Relish/Pckld Veg & Olives	Peppers	Condiments and seasoning
Pickle/Relish/Pckld Veg & Olives	Green Olives	Condiments and seasoning
Pickle/Relish/Pckld Veg & Olives	Relishes	Condiments and seasoning
Pickle/Relish/Pckld Veg & Olives	Pickld Veg/Peppers/*Etc.*	Condiments and seasoning
Pickle/Relish/Pckld Veg & Olives	Specialty Olives	Condiments and seasoning
Refrigerated Italian	Refrigerated Pasta Sauce	Condiments and seasoning
Salad & Dips	Sal: Salsa/Dips Bulk	Condiments and seasoning
Salad & Dips	Sal: Dip Prepack	Condiments and seasoning
Salad & Dips	Sal: Salsa Prepack	Condiments and seasoning
Salad Dresing & Sandwich Spreads	Dry Salad Dressing & Dip Mixes	Condiments and seasoning
Seafood—Salad/Dip/Sce/Cond	Dips/Spreads	Condiments and seasoning
Spices & Extracts	Traditional Spices	Condiments and seasoning
Spices & Extracts	Gourmet Spices	Condiments and seasoning
Spices & Extracts	Pure Extracts	Condiments and seasoning
Spices & Extracts	Table Salt/Popcorn Salt/Ice Cr	Condiments and seasoning
Spices & Extracts	Imitation Extracts	Condiments and seasoning
Spices/Jarred Garlic	Spices & Seasonings	Condiments and seasoning
Traditional Asian Foods	Asian Other Sauces/Marinad	Condiments and seasoning
Traditional Asian Foods	Asian Soy Sauce	Condiments and seasoning
Traditional Mexican Foods	Mexican Sauces And Picante Sau	Condiments and seasoning
Traditional Mexican Foods	Mexican Seasoning Mixes	Condiments and seasoning
Traditional Mexican Foods	Mexican Taco Sauce	Condiments and seasoning
Vinegar & Cooking Wines	Vinegar/White & Cider	Condiments and seasoning
Vinegar & Cooking Wines	Specialty Vinegar	Condiments and seasoning
Eggs/Muffins/Potatoes	Eggs—Large	Eggs
Eggs/Muffins/Potatoes	Eggs—Medium	Eggs
Eggs/Muffins/Potatoes	Eggs—X-Large	Eggs
Eggs/Muffins/Potatoes	Eggs—Jumbo	Eggs
Eggs/Muffins/Potatoes	Eggs Substitute	Eggs
Eggs/Muffins/Potatoes	Misc Dairy Refigerated	Eggs
Refrigerated Dairy Case	Eggs	Eggs

EAppendix B. Crosswalk of Top 1,000 Subcommodities to Summary Categories—Continued

Commodity	Subcommodity	Summary Category
Dressings/Dips Dressing	Creamy	Fats and oils
Dressings/Dips Dressing	Blue Cheese	Fats and oils
Margarines	Margarine: Tubs And Bowls	Fats and oils
Margarines	Butter	Fats and oils
Margarines	Margarine Stick	Fats and oils
Margarines	Margarine: Squeeze	Fats and oils
Salad Dresing & Sandwich Spreads	Pourable Salad Dressings	Fats and oils
Salad Dresing & Sandwich Spreads	Mayonnaise & Whipped Dressing	Fats and oils
Salad Dresing & Sandwich Spreads	Sand/Horseradish & Tartar Sauce	Fats and oils
Shortening & Oil	Vegetable Oil	Fats and oils
Shortening & Oil	Canola Oils	Fats and oils
Shortening & Oil	Olive Oil	Fats and oils
Shortening & Oil	Cooking Sprays	Fats and oils
Shortening & Oil	Solid Shortening	Fats and oils
Shortening & Oil	Corn Oil	Fats and oils
Shortening & Oil	Cooking Oil: Peanut/Safflower/	Fats and oils
Baking	Flours/Grains/Sugar	Flour and prepared flour mixes
Flour & Meals	Flour: White & Self Rising	Flour and prepared flour mixes
Flour & Meals	Breadings/Coatings/Crumbs	Flour and prepared flour mixes
Flour & Meals	Flour: Misc/Specialty/Blend Et	Flour and prepared flour mixes
Molasses/Syrups/Pancake Mixes	Pancake Mixes	Flour and prepared flour mixes
Frozen Breakfast Foods	Frzn Breakfast Sandwiches	Frozen prepared foods
Frozen Breakfast Foods	Waffles/Pancakes/French Toast	Frozen prepared foods
Frozen Breakfast Foods	Frzn Breakfast Entrees	Frozen prepared foods
Frozen Entrées	Meatless/Vegetarian	Frozen prepared foods
Frozen Ethnic	Frozen International [Ethnic Food]	Frozen prepared foods
Frozen Handhelds & Snacks	Snacks/Appetizers	Frozen prepared foods
Frozen Handhelds & Snacks	Sandwiches & Handhelds	Frozen prepared foods
Frozen Handhelds & Snacks	Corn Dogs	Frozen prepared foods
Frozen Handhelds & Snacks	Burritos	Frozen prepared foods
Frozen Meat Alternatives	Micro Protein [Meat]	Frozen prepared foods
Frozen Pizza	Pizza/Premium	Frozen prepared foods
Frozen Pizza	Pizza/Economy	Frozen prepared foods
Frozen Pizza	Pizza/Traditional	Frozen prepared foods
Frozen Pizza	Pizza/Single Serve/Microwave	Frozen prepared foods
Frzn Meatless	Meatless Burgers	Frozen prepared foods
Frzn Meatless	Meatless Breakfast	Frozen prepared foods
Frzn Meatless	Meatless Poultry	Frozen prepared foods
Frzn Meatless	Meatless Miscellaneous	Frozen prepared foods
Frzn Multi Serve	Fz Family Style Entrées	Frozen prepared foods
Frzn Multi Serve	Fz Skillet Meals	Frozen prepared foods
Frzn Multi Serve	Fz Meatballs	Frozen prepared foods
Frzn Pasta	Frozen Pasta	Frozen prepared foods
Frzn Prepared Chicken	Whole Muscle Breaded/18oz And	Frozen prepared foods
Frzn Prepared Chicken	Boneless Snack/18oz And Larger	Frozen prepared foods
Frzn Prepared Chicken	Bone-In Wings	Frozen prepared foods
Frzn Prepared Chicken	Fz Meal Kits/Stuffed/Other	Frozen prepared foods
Frzn Prepared Chicken	Whole Muscle Unbreaded	Frozen prepared foods
Frzn Prepared Chicken	Boneless Snack/Value/Small	Frozen prepared foods
Frzn Seafood	Frz Coated Fish Fillets	Frozen prepared foods
Frzn Seafood	Frz Fishsticks/Tenders/Nuggets	Frozen prepared foods
Frzn Seafood	Frz Non-Coated Fish Fillets	Frozen prepared foods
Frzn Ss Economy Meals	Fz Ss Economy Meals All	Frozen prepared foods
Frzn Ss Premium Meals	Fz Ss Prem Traditional Meals	Frozen prepared foods
Frzn Ss Premium Meals	Fz Ss Prem Nutritional Meals	Frozen prepared foods
Apples	Apples Gala (Bulk & Bag)	Fruits
Apples	Apples Red Delicious (Bulk & Bag)	Fruits
Apples	Apples Granny Smith (Bulk & Bag)	Fruits
Apples	Mixed Fruit Bags	Fruits
Apples	Apples Other (Bulk & Bag)	Fruits
Apples	Apples Fuji (Bulk & Bag)	Fruits
Apples	Apples Gold Delicious (Bulk & Bag)	Fruits
Apples	Apples Honeycrisp	Fruits
Apples	Apples Braeburn (Bulk & Bag)	Fruits
Apples	Apples Gala (Bulk & Bag) Organic	Fruits
Apples	Apples Red Delicious (Bulk & Bag)	Fruits
Apples	Apples Granny Smith (Bulk & Bag)	Fruits
Apples	Apples Gold Delicious (Bulk & Bag)	Fruits
Bananas	Bananas	Fruits
Bananas	Bananas Organic	Fruits
Berries	Strawberries	Fruits
Berries	Blueberries	Fruits
Berries	Raspberries	Fruits
Berries	Blackberries	Fruits
Berries	Strawberries Organic	Fruits
Berries	Raspberries Organic	Fruits
Berries	Blueberries Organic	Fruits
Can Fruit/Jar Applesauce	Pineapple	Fruits
Can Fruit/Jar Applesauce	Peaches	Fruits
Can Fruit/Jar Applesauce	Fruit Cocktail/Fruit Salad	Fruits
Can Fruit/Jar Applesauce	Mandarin Oranges/Citrus Sect	Fruits
Can Fruit/Jar Applesauce	Apple Sauce (Excludes Cup)	Fruits
Can Fruit/Jar Applesauce	Pears	Fruits
Can Fruit/Jar Applesauce	Cranberry Sauce	Fruits

EAppendix B. Crosswalk of Top 1,000 Subcommodities to Summary Categories—Continued

Commodity	Subcommodity	Summary Category
Citrus	Oranges Navels All	Fruits
Citrus	Clementines	Fruits
Citrus	Lemons	Fruits
Citrus	Limes	Fruits
Citrus	Grapefruit	Fruits
Citrus	Tangerines & Tangelos	Fruits
Citrus	Oranges Non Navel All	Fruits
Convenience/Snacking	Jarred Fruit Single Serve	Fruits
Convenience/Snacking	Convenience/Snacking Fruit Pro	Fruits
Convenience/Snacking	Jarred Fruit Multi Serve	Fruits
Dried Fruit	Raisins	Fruits
Dried Fruit	Dried Fruit—Other	Fruits
Dried Fruit	Dried Plums	Fruits
Frozen Fruits	Frozen Fruit	Fruits
Grapes	Grapes Red	Fruits
Grapes	Grapes White	Fruits
Grapes	Grapes Black/Blue	Fruits
Grapes	Grapes Red Globe	Fruits
Grapes	Grapes Other	Fruits
Melons	Watermelon Seedless Whole	Fruits
Melons	Cantaloupe Whole	Fruits
Melons	Watermelon Personal	Fruits
Melons	Watermelon W/Seeds Whole	Fruits
Melons	Honeydew Whole	Fruits
Pears	Pears Bartlett	Fruits
Pears	Pears Anjou	Fruits
Pears	Pears Bosc	Fruits
Single Serve Fruit/Applesauce	Fruit Cup	Fruits
Single Serve Fruit/Applesauce	Applesauce Cup	Fruits
Stone Fruit	Cherries Red	Fruits
Stone Fruit	Peaches Yellow Flesh	Fruits
Stone Fruit	Nectarines Yellow Flesh	Fruits
Stone Fruit	Plums	Fruits
Stone Fruit	Cherries Ranier	Fruits
Stone Fruit	Peaches White Flesh	Fruits
Tropical Fruit	Avocado	Fruits
Tropical Fruit	Pineapple Whole&Peel/Cored	Fruits
Tropical Fruit	Mango	Fruits
Tropical Fruit	Kiwi Fruit	Fruits
Tropical Fruit	Pomegranates	Fruits
Value-Added Fruit	Instore Cut Fruit	Fruits
Value-Added Fruit	Melons Instore Cut	Fruits
Value-Added Fruit	Cut Fruit All Other Prepack	Fruits
Value-Added Fruit	Fruit Party Tray Prepack	Fruits
Bagels & Cream Cheese	Cream Cheese	High fat dairy/cheese
Bulk Service Case Cheese	Bulk Semi-Hard [Cheese]	High fat dairy/cheese
Bulk Service Case Cheese	Bulk Processed [Cheese]	High fat dairy/cheese
Bulk Service Case Cheese	Bulk Semi-Soft [Cheese]	High fat dairy/cheese
Cheese	Shredded Cheese	High fat dairy/cheese
Cheese	American Single Cheese	High fat dairy/cheese
Cheese	Natural Cheese Chunks	High fat dairy/cheese
Cheese	String Cheese	High fat dairy/cheese
Cheese	Natural Cheese Slices	High fat dairy/cheese
Cheese	Miscellaneous Cheese	High fat dairy/cheese
Coffee & Creamers	Non Dairy Creamer	High fat dairy/cheese
Crackers & Misc Baked Food	Aerosol Cheese	High fat dairy/cheese
Dry Cheese	Loaf Cheese	High fat dairy/cheese
Dry Cheese	Grated Cheese	High fat dairy/cheese
Dry Cheese	Misc Dry Cheese	High fat dairy/cheese
Fluid Milk Products	Refrigerated Coffee Creamers	High fat dairy/cheese
Fluid Milk	Products Half & Half	High fat dairy/cheese
Fluid Milk Products	Whipping Cream	High fat dairy/cheese
Fluid Milk Products	Egg Nog/Boiled Custard	High fat dairy/cheese
Fluid Milk Products	Buttermilk	High fat dairy/cheese
Ice Cream Ice Milk & Sherbets	Premium [Ice Cream & Sherbert]	High fat dairy/cheese
Ice Cream Ice Milk & Sherbets	Traditional [Ice Cream & Sherbert]	High fat dairy/cheese
Ice Cream Ice Milk & Sherbets	Pails [Ice Cream & Sherbert]	High fat dairy/cheese
Ice Cream Ice Milk & Sherbets	Super Premium Pints [Ice Cream & Sherbert]	High fat dairy/cheese
Ice Cream Ice Milk & Sherbets	Premium Pints [Ice Cream & Sherbert]	High fat dairy/cheese
Ice Cream Ice Milk & Sherbets	Quarts [Ice Cream & Sherbert]	High fat dairy/cheese
Milk By-Products	Sour Creams	High fat dairy/cheese
Milk By-Products	Cottage Cheese	High fat dairy/cheese
Milk By-Products	Refrig Dips	High fat dairy/cheese
Milk By-Products	Aerosol Toppings [Milk By-Products]	High fat dairy/cheese
Milk By-Products	Ricotta Cheese	High fat dairy/cheese
Pre-Slice Service Case Cheese	Pre-Sliced Semi-Soft [Cheese]	High fat dairy/cheese
Pre-Slice Service Case Cheese	Pre-Sliced Semi-Hard [Cheese]	High fat dairy/cheese
Refrigerated Hispanic Grocery	Hispanic Cheese	High fat dairy/cheese
Specialty Cheese Pre Pack	Specialty Ppk Cheese Hard/Grat	High fat dairy/cheese
Specialty Cheese Pre Pack	Specialty Ppk Cheese Spreads	High fat dairy/cheese
Specialty Cheese Pre Pack	Specialty Ppk Cheese Feta	High fat dairy/cheese
Specialty Cheese Pre Pack	Specialty Ppk Cheese Mozzarell	High fat dairy/cheese
Specialty Cheese Pre Pack	Specialty Ppk Cheese Processed	High fat dairy/cheese

EAppendix B. Crosswalk of Top 1,000 Subcommodities to Summary Categories—Continued

Commodity	Subcommodity	Summary Category
Specialty Cheese Pre Pack	Specialty Ppk Cheese Cheddar & C	High fat dairy/cheese
Specialty Cheese Pre Pack	Specialty Ppk Cheese Semi Soft	High fat dairy/cheese
Specialty Cheese Pre Pack	Specialty Ppk Cheese Soft & Ripe	High fat dairy/cheese
Specialty Cheese Pre Pack	Specialty Ppk Cheese Blue/Gorg	High fat dairy/cheese
Specialty Cheese Pre Pack	Specialty Ppk Cheese Hispanic	High fat dairy/cheese
Specialty Cheese Pre Pack	Specialty Ppk Cheese Gouda & Eda	High fat dairy/cheese
Specialty Cheese Pre Pack	Specialty Ppk Cheese Goat Milk	High fat dairy/cheese
Traditional Mexican Foods	Mexican Con Queso	High fat dairy/cheese
Fruit Snacks	Fruit Snacks	Jams, jellies, preserves and other sweets
Peanut Butter/Jelly/Jams & Honey	Preserves/Jam/Marmalade	Jams, jellies, preserves and other sweets
Peanut Butter/Jelly/Jams & Honey	Jelly	Jams, jellies, preserves and other sweets
Aseptic Juice	Aseptic Pack Juice And Drinks	Juices
Frozen Juice And Smoothies	Frzn Conc Allieds Over 50% Jui	Juices
Frozen Juice And Smoothies	Frzn Oj & Oj Substitutes (Over 5	Juices
Juice	Non-Carb Jce(Over 50% Jce)	Juices
Juice	Drinks—Carb Juice (Over 50%)	Juices
Juices Super Premium	Juices Superfoods/Enhanced	Juices
Juices Super Premium	Juices Proteins	Juices
Juices Super Premium	Juice Single Blend	Juices
Processed	Squeeze Lemons/Limes	Juices
Refrgratd Juices/Drinks	Dairy Case 100% Pure Juice—O	Juices
Refrgratd Juices/Drinks	Dairy Case 100% Pure Juice Oth	Juices
Rtd Tea/New Age Juice	Juice (Over 50% Juice)	Juices
Shelf Stable Juice	Apple Juice & Cider (Over 50%)	Juices
Shelf Stable Juice	Blended Juice & Combinations (Ov)	Juices
Shelf Stable Juice	Grape Juice (Over 50% Juice)	Juices
Shelf Stable Juice	Veg Juice (Except Tomato) (Ove)	Juices
Shelf Stable Juice	Tomato Juice (Over 50% Jce)	Juices
Shelf Stable Juice	Pineapple Juice (Over 50% Juic)	Juices
Shelf Stable Juice	Cranberry Juice (Over 50% Jce)	Juices
Shelf Stable Juice	Lemon Juice & Lime Juice (Over)	Juices
Shelf Stable Juice	Prune Juice (Over 50% Juice)	Juices
Shelf Stable Juice	Cranapple/Cran Grape Juice (Ov)	Juices
Shelf Stable Juice	Grapefruit Juice (Over 50% Jui)	Juices
Shelf Stable Juice	Cranapple/Cran Grape Juice (Un)	Juices
Shelf Stable Juice	Grapefruit Juice (50% And Unde)	Juices
Bacon	Bacon—Trad 16oz Or Less	Meat/Poultry/Seafood
Bacon	Bacon—Trad Greater Than 16oz	Meat/Poultry/Seafood
Bacon	Bacon—Poultry	Meat/Poultry/Seafood
Bacon	Bacon—Pre-Cooked	Meat/Poultry/Seafood
Bacon	Bacon—Trad Center Cut	Meat/Poultry/Seafood
Bacon	Bacon—Other	Meat/Poultry/Seafood
Bacon	Bacon—Natural/Organic	Meat/Poultry/Seafood
Beef: Grinds	Lean [Beef]	Meat/Poultry/Seafood
Beef: Grinds	Primal [Beef]	Meat/Poultry/Seafood
Beef: Grinds	Angus [Beef]	Meat/Poultry/Seafood
Beef: Grinds	Patties [Beef]	Meat/Poultry/Seafood
Beef: Loins	Choice Beef	Meat/Poultry/Seafood
Beef: Loins Select	Beef	Meat/Poultry/Seafood
Beef: Rib	Angus [Beef]	Meat/Poultry/Seafood
Beef: Round	Choice Beef	Meat/Poultry/Seafood
Beef: Round	Angus Beef	Meat/Poultry/Seafood
Beef: Round	Select Beef	Meat/Poultry/Seafood
Beef: Thin Meats	Soup/Stew	Meat/Poultry/Seafood
Beef: Thin Meats	Cubed Meats [Beef]	Meat/Poultry/Seafood
Beef: Thin Meats	Corned Beef	Meat/Poultry/Seafood
Beef: Thin Meats	Brisket [Beef]	Meat/Poultry/Seafood
Beef: Thin Meats	Skirt [Beef]	Meat/Poultry/Seafood
Beef: Thin Meats	Flank [Beef]	Meat/Poultry/Seafood
Breakfast Sausage	Bkfst Sausage—Fresh Rolls	Meat/Poultry/Seafood
Breakfast Sausage	Bkfst Sausage—Fresh Links	Meat/Poultry/Seafood
Breakfast Sausage	Bkfst Sausage—Fresh Patties	Meat/Poultry/Seafood
Breakfast Sausage	Bkfst Sausage—Precooked	Meat/Poultry/Seafood
Breakfast Sausage	Bkfst Sausage—Bkfast Side Di	Meat/Poultry/Seafood
Breakfast Sausage	Bkfst Sausage—Other Forms	Meat/Poultry/Seafood
Buffalo	Grinds [Buffalo]	Meat/Poultry/Seafood
Can Seafood—Shelf Stable	Tuna	Meat/Poultry/Seafood
Can Seafood—Shelf Stable	Salmon	Meat/Poultry/Seafood
Can Seafood—Shelf Stable	Sardines	Meat/Poultry/Seafood
Can Seafood—Shelf Stable	Oysters	Meat/Poultry/Seafood
Chicken & Poultry	Chix: Value-Added (Cold)	Meat/Poultry/Seafood
Chicken & Poultry	Chix: Frd 8pc/Cut Up (Cold)	Meat/Poultry/Seafood
Chicken & Poultry	Chix: Baked 8pc Cut Up (Cold)	Meat/Poultry/Seafood
Chicken & Poultry	Chix: Rotisserie Cold	Meat/Poultry/Seafood
Chicken Fresh	Chicken Breast Boneless	Meat/Poultry/Seafood
Chicken Fresh	Chicken Wings	Meat/Poultry/Seafood
Chicken Fresh	Chicken Drums	Meat/Poultry/Seafood
Chicken Fresh	Whole Chicken (Roasters/Fryer)	Meat/Poultry/Seafood
Chicken Fresh	Chicken Thighs	Meat/Poultry/Seafood
Chicken Fresh	Chicken Legs/Quarters	Meat/Poultry/Seafood
Chicken Fresh	Mixed Packs [Chicken]	Meat/Poultry/Seafood
Chicken Frozen	Frzn Chicken—Wht Meat	Meat/Poultry/Seafood
Chicken Frozen	Frzn Chicken—Wings	Meat/Poultry/Seafood
Chicken Frozen	Frzn Chicken—Drk Meat	Meat/Poultry/Seafood

EAppendix B. Crosswalk of Top 1,000 Subcommodities to Summary Categories—Continued

Commodity	Subcommodity	Summary Category
Chicken Grinds	Ground Chicken	Meat/Poultry/Seafood
Chicken Offal	Internal Chicken Offal	Meat/Poultry/Seafood
Chicken Specialty/Natural	Chicken Breast Boneless	Meat/Poultry/Seafood
Chicken Specialty/Natural	Chicken Wings	Meat/Poultry/Seafood
Chicken Specialty/Natural	Whole Chicken (Roasters/Fryer)	Meat/Poultry/Seafood
Deli Meat: Bulk	Meat: Turkey Bulk	Meat/Poultry/Seafood
Deli Meat: Bulk	Meat: Ham Bulk	Meat/Poultry/Seafood
Deli Meat: Bulk	Meat: Beef Bulk	Meat/Poultry/Seafood
Deli Meat: Bulk	Meat Bulk: Specialty Dry Meats	Meat/Poultry/Seafood
Deli Meat: Bulk	Bologna/Loaves/Franks	Meat/Poultry/Seafood
Deli Meat: Bulk	Meat: Chicken Bulk	Meat/Poultry/Seafood
Deli Meat: Presliced	Deli Meat: Specialty Dry Meats	Meat/Poultry/Seafood
Deli Meat: Presliced	Deli Meat: Semi-Dry Sausage	Meat/Poultry/Seafood
Deli Meat: Presliced	Deli Meat: Turkey	Meat/Poultry/Seafood
Deli Meat: Presliced	Deli Meat: Ham	Meat/Poultry/Seafood
Deli Meat: Presliced	Deli Meat: Beef	Meat/Poultry/Seafood
Dinner Sausage	Dnr Sausage—Links Pork Ckd/S	Meat/Poultry/Seafood
Dinner Sausage	Dnr Sausage—Links Fresh	Meat/Poultry/Seafood
Dinner Sausage	Dnr Sausage—Pork Rope Ckd/Sm	Meat/Poultry/Seafood
Dinner Sausage	Dnr Sausage—Beef Rope Ckd/Sm	Meat/Poultry/Seafood
Dinner Sausage	Dnr Sausage—Other Forms	Meat/Poultry/Seafood
Dinner Sausage	Dnr Sausage—Links Beef Ckd/S	Meat/Poultry/Seafood
Dinner Sausage	Dnr Sausage—Poultry Rope Ckd	Meat/Poultry/Seafood
Dinner Sausage	Dnr Sausage—Links Poultry Ck	Meat/Poultry/Seafood
Dinner Sausage	Dnr Sausage—Natural/Organic	Meat/Poultry/Seafood
Dinner Sausage	Dnr Sausage—Fresh Poultry	Meat/Poultry/Seafood
Frozen Breakfast Foods	Frzn Breakfast Sausage	Meat/Poultry/Seafood
Frzn Multi Serve	Frzn Burgers	Meat/Poultry/Seafood
Frzn Prepared Chicken	Value Forms/18oz And Larger [Chicken]	Meat/Poultry/Seafood
Hot Dogs	Hot Dogs—Base Meat	Meat/Poultry/Seafood
Hot Dogs	Hot Dogs—Base Beef	Meat/Poultry/Seafood
Hot Dogs	Hot Dogs—Premium	Meat/Poultry/Seafood
Hot Dogs	Hot Dogs—Base Poultry	Meat/Poultry/Seafood
Lamb	Round/Leg [Lamb]	Meat/Poultry/Seafood
Lamb	Loin [Lamb]	Meat/Poultry/Seafood
Lamb	Chuck/Shoulder [Lamb]	Meat/Poultry/Seafood
Lunchmeat	Lunchment—Deli Fresh	Meat/Poultry/Seafood
Lunchmeat	Lunchment—Bologna/Sausage	Meat/Poultry/Seafood
Lunchmeat	Lunchment—Chop/Form Pltry & Ha	Meat/Poultry/Seafood
Lunchmeat	Lunchmeat—Whole Muscle Pltry	Meat/Poultry/Seafood
Lunchmeat	Lunchmeat—Chip Meat	Meat/Poultry/Seafood
Lunchmeat	Lunchmeat—Brauns/Liver/Loave	Meat/Poultry/Seafood
Lunchmeat	Lunchmeat—Variety Pack	Meat/Poultry/Seafood
Lunchmeat	Lunchment—Other	Meat/Poultry/Seafood
Lunchmeat	Lunchment—Natural/Organic	Meat/Poultry/Seafood
Lunchmeat	Lunchmeat—Peggable Deli Fres	Meat/Poultry/Seafood
Meat Frozen	Frzn Meat—Beef	Meat/Poultry/Seafood
Meat Frozen	Frzn Meat—Breakfast Sausage	Meat/Poultry/Seafood
Meat Frozen	Frzn Meat—Offals	Meat/Poultry/Seafood
Meat Frozen	Frzn Meat—Turkey	Meat/Poultry/Seafood
Meat Snacks	Jerky/Nuggets/Tenders	Meat/Poultry/Seafood
Meat Snacks	Meat Sticks/Bites	Meat/Poultry/Seafood
Party Tray Deli	Tray: Meat And Cheese	Meat/Poultry/Seafood
Pork Bone In Loin/Rib	Dry [Pork Bone In Loin/Rib]	Meat/Poultry/Seafood
Pork Boneless Loin/Rib	Enhanced [Pork Boneless Loin/Rib]	Meat/Poultry/Seafood
Pork Grinds	Ground Pork	Meat/Poultry/Seafood
Pork Offal	External Fresh [Pork Offal]	Meat/Poultry/Seafood
Pork Shoulder	Butts [Pork Shoulder]	Meat/Poultry/Seafood
Pork Shoulder	Fresh Hams	Meat/Poultry/Seafood
Pork Thin Meats	Ribs [Pork]	Meat/Poultry/Seafood
Poultry	Other Cornish Hen	Meat/Poultry/Seafood
Random Weight Meat Products	Lunch Meats	Meat/Poultry/Seafood
Seafood—Catfish	Catfish—Fillet	Meat/Poultry/Seafood
Seafood—Catfish	Catfish—Whole	Meat/Poultry/Seafood
Seafood—Catfish	Catfish—Nuggets	Meat/Poultry/Seafood
Seafood—Cod	Cod—Fillet	Meat/Poultry/Seafood
Seafood—Crab	Crab—Snow	Meat/Poultry/Seafood
Seafood—Crab	Crab—King	Meat/Poultry/Seafood
Seafood—Crab	Crab—Dungy	Meat/Poultry/Seafood
Seafood—Crab	Crab—Other	Meat/Poultry/Seafood
Seafood—Finfish	Other Finfish—Other	Meat/Poultry/Seafood
Seafood—Finfish	Other Finfish—Other	Meat/Poultry/Seafood
Seafood—Lobster	Lobster—Tails	Meat/Poultry/Seafood
Seafood—Party Trays	Party Tray—Shrimp	Meat/Poultry/Seafood
Seafood—Salmon-Farm Raised	Salmon Fr—Altantic	Meat/Poultry/Seafood
Seafood—Salmon-Wild Caught	Salmon Wc—Pink	Meat/Poultry/Seafood
Seafood—Salmon-Wild Caught	Salmon Wc—Sockeye	Meat/Poultry/Seafood
Seafood—Scallops	Scallops—Sea	Meat/Poultry/Seafood
Seafood—Shrimp	Shrimp—Raw	Meat/Poultry/Seafood
Seafood—Shrimp	Shrimp—Cooked	Meat/Poultry/Seafood
Seafood—Smoked Seafood	Smoked Salmon	Meat/Poultry/Seafood
Seafood—Tilapia	Tilapia—Fillet	Meat/Poultry/Seafood
Seafood—Trout	Steelhead Fr [Trout]	Meat/Poultry/Seafood
Seafood—Value-Added Seafood	Value-Added Breaded Shrimp	Meat/Poultry/Seafood

EAppendix B. Crosswalk of Top 1,000 Subcommodities to Summary Categories—Continued

Commodity	Subcommodity	Summary Category
Seafood—Value-Added Seafood	Value-Added Shrimp	Meat/Poultry/Seafood
Seafood—Value-Added Seafood	Value-Added Crab	Meat/Poultry/Seafood
Service Case Meat	Seasoned Poultry	Meat/Poultry/Seafood
Service Case Meat	Stuffed/Mixed Beef	Meat/Poultry/Seafood
Service Case Meat	Marinated Pork	Meat/Poultry/Seafood
Service Case Meat	Marinated Poultry	Meat/Poultry/Seafood
Service Case Meat	Seasoned Beef	Meat/Poultry/Seafood
Service Case Meat	Seasoned Pork	Meat/Poultry/Seafood
Service Case Meat	Stuffed/Mixed Poultry	Meat/Poultry/Seafood
Service Case Meat	Marinated Beef	Meat/Poultry/Seafood
Service Case Meat	Kabobs Beef	Meat/Poultry/Seafood
Service Case Meat	Kabobs Poultry	Meat/Poultry/Seafood
Service Case Meat	Stuffed/Mixed Pork	Meat/Poultry/Seafood
Smoked Hams	Hams—Half/Port Bone-In	Meat/Poultry/Seafood
Smoked Hams	Hams—Spiral	Meat/Poultry/Seafood
Smoked Hams	Hams—Whole Boneless	Meat/Poultry/Seafood
Smoked Hams	Hams—Half/Port Boneless	Meat/Poultry/Seafood
Smoked Hams	Hams—Dry Cured/Country	Meat/Poultry/Seafood
Smoked Hams	Hams—Whole Bone-In	Meat/Poultry/Seafood
Smoked Pork	Ham Steaks/Cubes/Slices	Meat/Poultry/Seafood
Smoked Pork	Smoked Offal [Pork]	Meat/Poultry/Seafood
Smoked Pork	Bacon—Belly/Jowl	Meat/Poultry/Seafood
Smoked Pork	Smoked Picnics [Pork]	Meat/Poultry/Seafood
Snack Meat	Snack Meat—Pepperoni	Meat/Poultry/Seafood
Snack Meat	Snack Meat—Salami/Smr Sausag	Meat/Poultry/Seafood
Turkey Fresh	Whole Hen (Under 16lbs) [Turkey]	Meat/Poultry/Seafood
Turkey Fresh	Whole Tom (Over 16lbs) [Turkey]	Meat/Poultry/Seafood
Turkey Frozen	Whole Toms (Over 16lbs) [Turkey]	Meat/Poultry/Seafood
Turkey Frozen	Whole Hens (Under 16lbs) [Turkey]	Meat/Poultry/Seafood
Turkey Frozen	Turkey Breast Bone In	Meat/Poultry/Seafood
Turkey Grinds	Ground Turkey	Meat/Poultry/Seafood
Turkey Offal	External [Turkey Offal]	Meat/Poultry/Seafood
Turkey Smoked	Turkey Wings	Meat/Poultry/Seafood
Turkey Smoked	Turkey Drums	Meat/Poultry/Seafood
Fluid Milk Products	Fluid Milk/White Only	Milk
Fluid Milk Products	Flavored Milk	Milk
Fluid Milk Products	Specialty/Lactose Free Milk	Milk
Fluid Milk Products	Organic Milk	Milk
Fluid Milk Products	Soy Milk	Milk
Non-Dairy/Dairy Aseptic	Aseptic Milk	Milk
Non-Dairy/Dairy Aseptic	Soy Beverage	Milk
Non-Dairy/Dairy Aseptic	Nut Milk	Milk
Non-Dairy/Dairy Aseptic	Rice Beverage	Milk
Refrigerated Dairy Case	Non-Dairy Milks	Milk
Refrigerated Dairy Case	Fluid Milk	Milk
Authentic Asian Foods	Authentic Japanese Foods	Miscellaneous
Authentic Asian Foods	Authentic Chinese Foods	Miscellaneous
Authentic Central American Fds	Central American Foods	Miscellaneous
Authentic Hispanic Fds & Product	Hispanic Baking Needs	Miscellaneous
Baking Needs	Baking Powder & Soda	Miscellaneous
Baking Needs	Yeast: Dry	Miscellaneous
Baking Needs	Corn Starch	Miscellaneous
Dietary Aid Prdct/Med Liq Nutr	Diet Cntrl Liqs Nutritional	Miscellaneous
Dietary Aid Prdct/Med Liq Nutr	Diet Energy Drinks	Miscellaneous
Dietary Aid Prdct/Med Liq Nutr	Diet Cntrl Bars Nutritional	Miscellaneous
Fitness & Diet	Fitness & Diet—Bars W/Flour	Miscellaneous
Fitness & Diet	Fitness & Diet—Bars W/O Flour	Miscellaneous
Fitness & Diet	Fitness & Diet—Powder Ntrtnl	Miscellaneous
Refrigerated Hispanic Grocery	Misc Hispanic Grocery	Miscellaneous
Baking Needs	Baking Nuts	Nuts and seeds
Bulk Food	Trail Mix/Nuts Bulk	Nuts and seeds
Condiments	Nut Butters/Peanut Butter	Nuts and seeds
Nuts	Pistachios	Nuts and seeds
Nuts	Mixed Nuts	Nuts and seeds
Nuts	Cashews	Nuts and seeds
Nuts	Sunflower/Other Seeds	Nuts and seeds
Nuts	Pecans Shelled	Nuts and seeds
Nuts	Peanuts All	Nuts and seeds
Nuts	Walnuts Shelled	Nuts and seeds
Nuts	Almonds Shelled	Nuts and seeds
Nuts	Trail Mix	Nuts and seeds
Nuts	Almonds	Nuts and seeds
Nuts	Dry Roast Peanuts	Nuts and seeds
Nuts	Oil Roast Peanuts	Nuts and seeds
Nuts	Nuts Other	Nuts and seeds
Nuts	Misc Snack Nuts	Nuts and seeds
Nuts	Nuts Inshell	Nuts and seeds
Peanut Butter/Jelly/Jams & Honey	Peanut Butter	Nuts and seeds
Trail Mix & Snacks	Trail Mixes/Snack	Nuts and seeds
Canned & Dry Milk	Canned Milk	Other dairy products
Canned & Dry Milk	Non Fat Dry Milk	Other dairy products
Refrigerated Dairy Case	Yogurt	Other dairy products
Refrigerated Dairy Case	Kefir	Other dairy products
Yogurt	Yogurt/Kids	Other dairy products

EAppendix B. Crosswalk of Top 1,000 Subcommodities to Summary Categories—Continued

Commodity	Subcommodity	Summary Category
Yogurt	Yogurt/Ss Regular	Other dairy products
Yogurt	Yogurt/Ss Light	Other dairy products
Yogurt	Yogurt/Pro Active Health	Other dairy products
Yogurt	Yogurt/Adult Multi-Packs	Other dairy products
Yogurt	Yogurt/Specialty Greek	Other dairy products
Yogurt	Yogurt/Large Size (16oz Or Lar)	Other dairy products
Yogurt	Yogurt/Adult Drinks	Other dairy products
Deli Specialties (Retail Pk)	Dl Spec: Dry/Refrig Pastas	Pasta, cornmeal, other cereal products
Dry Bean Veg & Rice	Noodle Side Dish Mixes	Pasta, cornmeal, other cereal products
Dry Noodles & Pasta	Long Cut Pasta	Pasta, cornmeal, other cereal products
Dry Noodles & Pasta	Short Cut Pasta	Pasta, cornmeal, other cereal products
Dry Noodles & Pasta	Noodles Dry	Pasta, cornmeal, other cereal products
Dry/Ramen Bouillon	Ramen Noodles/Ramen Cups	Pasta, cornmeal, other cereal products
Flour & Meals	Cornmeal	Pasta, cornmeal, other cereal products
Prepared/Pdgd Foods	Pasta/Ramen	Pasta, cornmeal, other cereal products
Refrigerated Italian	Refrigerated Pasta	Pasta, cornmeal, other cereal products
Salad & Dips	Pasta/Grain Salads—Prepack	Pasta, cornmeal, other cereal products
Salad & Dips	Pasta/Grain Salads—Bulk	Pasta, cornmeal, other cereal products
Seafood—Salad/Dip/Sce/Cond	Breading	Pasta, cornmeal, other cereal products
Traditional Asian Foods	Asian Noodles/Rice	Pasta, cornmeal, other cereal products
Authentic Hispanic Fds & Product	Hispanic Cookies/Crackers	Prepared Desserts
Baked Sweet Goods	Snack Cake—Multi Pack	Prepared Desserts
Baked Sweet Goods	Sweet Goods—Full Size	Prepared Desserts
Bakery Party Trays	Party Trays: Cakes	Prepared Desserts
Baking Mixes	Layer Cake Mix	Prepared Desserts
Baking Mixes	Frosting	Prepared Desserts
Baking Mixes	Muffin & Corn Bread Mix	Prepared Desserts
Baking Mixes	Brownie Mix	Prepared Desserts
Baking Mixes	Cookies Mix	Prepared Desserts
Baking Mixes	Miscellaneous Package Mixes	Prepared Desserts
Baking Needs	Bits & Morsels [Baking Needs]	Prepared Desserts
Baking Needs	Marshmallows	Prepared Desserts
Baking Needs	Pie Filling/Mincemeat/Glazes	Prepared Desserts
Baking Needs	Pie Crust Mixes & Shells	Prepared Desserts
Baking Needs	Cooking Chocolate (Ex: Smi-Swt)	Prepared Desserts
Baking Needs	Maraschino Cherries	Prepared Desserts
Baking Needs	Baking Cocoa	Prepared Desserts
Baking Needs	Marshmallow Crème	Prepared Desserts
Baking Needs	Coconut [Baking Needs]	Prepared Desserts
Cake Décor	Cake Décors & Icing	Prepared Desserts
Cake Décor	Cake Décors—Candies	Prepared Desserts
Cakes	Cakes: Birthday/Celebration Sh	Prepared Desserts
Cakes	Cakes: Cupcakes	Prepared Desserts
Cakes	Cakes: Layers	Prepared Desserts
Cakes	Cakes: Crème/Pudding	Prepared Desserts
Cakes	Cakes: Cheesecake	Prepared Desserts
Cakes	Cakes: Fancy/Service Case	Prepared Desserts
Cakes	Cakes: Layers/Sheets Novelties	Prepared Desserts
Cakes	Cakes: Angel Fds/Cke Rolls	Prepared Desserts
Cakes	Cakes: Ice Cream	Prepared Desserts
Cakes	Cakes: Birthday/Celebration Lay	Prepared Desserts
Cakes	Cakes: Sheet	Prepared Desserts
Cakes	Cakes: Crème/Pudding Novelties	Prepared Desserts
Cakes	Cakes: Cheesecake Novelties	Prepared Desserts
Cnv Breakfast & Wholesome Snks	Toaster Pastries	Prepared Desserts
Cnv Breakfast & Wholesome Snks	Treats	Prepared Desserts
Cookie/Cracker Multi-Pks	Multi-Pack Cookies	Prepared Desserts
Cookies	Sandwich Cookies	Prepared Desserts
Cookies	Tray Pack/Choc Chip Cookies	Prepared Desserts
Cookies	Cookies: Regular	Prepared Desserts
Cookies	Vanilla Wafer/Kids Cookies	Prepared Desserts
Cookies	Cookies: Holiday/Special Occas	Prepared Desserts
Cookies	Premium Cookies (Ex: Pepperidg)	Prepared Desserts
Cookies	Graham Crackers	Prepared Desserts
Cookies	Chocolate Covered Cookies	Prepared Desserts
Cookies	Wellness/Portion Control [Cookies]	Prepared Desserts
Cookies	Cookies: Gourmet	Prepared Desserts
Cookies	Fruit Filled Cookies	Prepared Desserts
Cookies	Cookies: Message	Prepared Desserts
Cookies	Cookies/Sweet Goods	Prepared Desserts
Cookies	Specialty Cookies	Prepared Desserts
Dry Mix Desserts	Pudding & Gelatin Cups/Cans	Prepared Desserts
Dry Mix Desserts	Puddings Dry	Prepared Desserts
Dry Mix Desserts	Gelatin	Prepared Desserts
Dry Mix Desserts	Misc: Cheesecake/Mousse Mixes	Prepared Desserts
Frozen Breakfast Foods	Frzn Breakfast Pastry	Prepared Desserts
Frozen Desserts	Frozen Fruit Pies & Cobblers	Prepared Desserts
Frozen Desserts	Frozen Cream Pies	Prepared Desserts
Frozen Desserts	Frzn Pie Shells/Pastry Shell/F	Prepared Desserts
Frozen Desserts	Frozen Cakes/Desserts	Prepared Desserts
Frozen Desserts	Frzn Pastry & Cookies	Prepared Desserts
Frozen Desserts	Single Serv/Portion Control	Prepared Desserts
Frozen Novelties—Water Ice	Sticks/Enrobed [Frozen Novelties]	Prepared Desserts
Frozen Novelties—Water Ice	Water Ice [Frozen Novelties]	Prepared Desserts

EAppendix B. Crosswalk of Top 1,000 Subcommodities to Summary Categories—Continued

Commodity	Subcommodity	Summary Category
Frozen Novelties—Water Ice	Cones [Frozen Novelties]	Prepared Desserts
Frozen Novelties—Water Ice	Ice Cream Sandwiches	Prepared Desserts
Frozen Novelties—Water Ice	Adult Premium [Frozen Novelties]	Prepared Desserts
Frozen Novelties—Water Ice	Cups/Push Ups/Other [Frozen Novelties]	Prepared Desserts
Frozen Whipped Topping	Frzn Whipped Topping	Prepared Desserts
Pies	Pies: Fruit/Nut	Prepared Desserts
Pies	Pies: Pumpkin/Custard	Prepared Desserts
Pies	Pies: Cream/Meringue	Prepared Desserts
Pies	Pies: Sugar Free	Prepared Desserts
Pies	Pies: Tarts/Minis/Crstdas	Prepared Desserts
Refrgrated Dough Products	Refrigerated Cookies—Break N B	Prepared Desserts
Refrgrated Dough Products	Refrigerated Cookie Dough	Prepared Desserts
Refrgrated Dough Products	Refrigerated Cookies—Seasonal	Prepared Desserts
Refrgrated Dough Products	Refrigerated Pie Crust	Prepared Desserts
Refrigerated Desserts	Refrigerated Pudding	Prepared Desserts
Salad & Dips	Sal: Desserts—Prepack	Prepared Desserts
Salad & Dips	Sal: Desserts—Bulk	Prepared Desserts
Single Serve Sweet Goods	Snack Cake—Single Serve	Prepared Desserts
Ss/Vending—Cookie/Cracker	Vendor Size/Single Serve Cooki	Prepared Desserts
Sweet Goods	Sw Gds: Donuts	Prepared Desserts
Sweet Goods	Sw Gds: Sw Rolls/Dan	Prepared Desserts
Sweet Goods	Sw Gds: Muffins	Prepared Desserts
Sweet Goods	Sw Gds: Coffee Cakes	Prepared Desserts
Sweet Goods & Snacks	Sw Gds: Swt/Flvrd Loaves	Prepared Desserts
Sweet Goods & Snacks	Sw Gds: Brownie/Bar Cookie	Prepared Desserts
Sweet Goods & Snacks	Sw Gds: Puff Pastry	Prepared Desserts
Sweet Goods & Snacks	Sw Gds: Specialty Desserts	Prepared Desserts
Syrups Toppings & Cones	Ice Cream Toppings	Prepared Desserts
Value-Added Fruit	Parfait Cups Instore	Prepared Desserts
Canned Pasta & Mwv Fd-Shlf Stbl	Can Pasta	Prepared Foods
Canned Pasta & Mwv Fd-Shlf Stbl	Microwavable Cups [Pasta]	Prepared Foods
Chilled Ready Meals	Store Brand	Prepared Foods
Convenient Meals	Convenient Meals—Kids Meal C	Prepared Foods
Convenient Meals	Convenient Meals—Adult Meal	Prepared Foods
Dinner Mixes—Dry	Macaroni & Cheese Dnrs	Prepared Foods
Dinner Mixes—Dry	Skillet Dinners	Prepared Foods
Dinner Mixes—Dry	Microwave Dinners	Prepared Foods
Dinner Mixes—Dry	Package Dinners/Pasta Salads	Prepared Foods
Dinner Mixes—Dry	Pizza Mix Dry	Prepared Foods
Dinner Sausage	Dnr Sausage—Cocktails	Prepared Foods
Meat—Shelf Stable	Chili: Canned	Prepared Foods
Meat—Shelf Stable	Chunk Meats—Chix/Ham/*Etc.*	Prepared Foods
Meat—Shelf Stable	Sandwich Sauce (Manwich)	Prepared Foods
Meat—Shelf Stable	Vienna Sausage	Prepared Foods
Meat—Shelf Stable	Luncheon Meat (Spam)	Prepared Foods
Meat—Shelf Stable	Hash: Canned	Prepared Foods
Meat—Shelf Stable	Beef Stew	Prepared Foods
Meat—Shelf Stable	Hot Dog Chili Sauce	Prepared Foods
Meat—Shelf Stable	Beef/Pork—Dried Sliced W/Gra	Prepared Foods
Meat—Shelf Stable	Potted Meats And Spreads	Prepared Foods
Meat—Shelf Stable	Corn Beef	Prepared Foods
Party Tray	Deli Tray: Sandwiches	Prepared Foods
Party Tray	Deli Tray: Appetizers&Hors D'oe	Prepared Foods
Prepared/Pdgd Foods	Boxed Prepared/Entrée/Dry Prep	Prepared Foods
Prepared/Pdgd Foods	Vegetables/Dry Beans	Prepared Foods
Refrigerated Vegetarian	Vegetarian Meats	Prepared Foods
Refrigerated Vegetarian	Vegetarian Misc	Prepared Foods
Refrigerated Vegetarian	Non-Dairy Cheese	Prepared Foods
Refrigerated Vegetarian	Tofu	Prepared Foods
Salad & Dips	Protein Salads—Bulk	Prepared Foods
Salad & Dips	Protein Salads—Prepack	Prepared Foods
Sandwiches	Sandwiches—(Cold)	Prepared Foods
Sushi	Sushi—In Store Prepared	Prepared Foods
Sushi	Sushi—Prepackaged	Prepared Foods
Traditional Asian Foods	Asian Foods And Meals	Prepared Foods
Traditional Asian Foods	Traditional Thai Foods	Prepared Foods
Traditional Mexican Foods	Mexican Dinners And Foods	Prepared Foods
Traditional Mexican Foods	Mexican Enchilada Sauce	Prepared Foods
Authentic Hispanic Fds & Product	Authentic Pasta/Rice/Beans	Rice
Dry Bean Veg & Rice	Rice Side Dish Mixes Dry	Rice
Dry Bean Veg & Rice	Rice—Dry Bag And Box	Rice
Dry Bean Veg & Rice	Rice—Instant & Microwave	Rice
Bag Snacks	Potato Chips	Salty snacks
Bag Snacks	Tortilla/Nacho Chips	Salty snacks
Bag Snacks	Mult Pk Bag Snacks	Salty snacks
Bag Snacks	Bagged Cheese Snacks	Salty snacks
Bag Snacks	Corn Chips	Salty snacks
Bag Snacks	Pretzels	Salty snacks
Bag Snacks	Store Brand	Salty snacks
Bag Snacks	Misc Bag Snacks	Salty snacks
Bag Snacks	Bagged Popped Popcorn	Salty snacks
Bag Snacks	Pork Skins/Cracklins	Salty snacks
Popcorn	Popcorn—Microwave	Salty snacks
Popcorn	Popcorn—Other	Salty snacks

EAppendix B. Crosswalk of Top 1,000 Subcommodities to Summary Categories—Continued

Commodity	Subcommodity	Summary Category
Popcorn	Caramel Coated Snacks	Salty snacks
Snack	Tortilla Chips	Salty snacks
Snack	Soy/Rice Snacks	Salty snacks
Snacks	Snacks: Pita Chips	Salty snacks
Snacks	Snacks: Salty	Salty snacks
Snacks	Snacks: Tortilla Chips	Salty snacks
Snacks	Snacks: Crackers/Cookies	Salty snacks
Ss/Vending—Salty Snacks	Salty Snacks Vending	Salty snacks
Warehouse Snacks	Canister Snacks	Salty snacks
Warehouse Snacks	Snack Mix	Salty snacks
Warehouse Snacks	Misc Snacks	Salty snacks
Authentic Hispanic Fds & Product	Authentic Soups/Bouillons	Soup
Canned Soups	Condensed Soup	Soup
Dry/Ramen Bouillon	Dry Soup	Soup
Dry/Ramen Bouillon	Bouillon	Soup
Rts/Micro Soup/Broth	Rts Soup: Chunky/Homestyle/Et	Soup
Rts/Micro Soup/Broth	Broth	Soup
Rts/Micro Soup/Broth	Microwavable Soups	Soup
Soup	Cans Soup/Chili	Soup
Soup	Broths	Soup
Condiments	Honey/Syrup	Sugars
Dressings/Dips	Dips Caramel/Fruit Glazes	Sugars
Molasses/Syrups/Pancake Mixes	Molasses & Syrups	Sugars
Peanut Butter/Jelly/Jams & Honey	Honey	Sugars
Sugars & Sweeteners	Sugar	Sugars
Sugars & Sweeteners	Sweeteners	Sugars
Aseptic Juice	Aseptic Pack Juice And Drinks	Sweetened Beverages
Aseptic Juice	Aseptic Pack Juice And Drinks	Sweetened Beverages
Authentic Hispanic Fds & Product	Hispanic Carbonated Beverages	Sweetened Beverages
Authentic Hispanic Fds & Product	Hispanic Juice Under 50% Juice	Sweetened Beverages
Beverages	Can/Btl Carb Beve 50% And Unde	Sweetened Beverages
Cocoa Mixes	Malted Mlk/Syrup/Pwdrs (Eggnog)	Sweetened Beverages
Cocoa Mixes	Hot Chocolate/Cocoa Mix	Sweetened Beverages
Energy Drinks	Energy Drink—Single Serve	Sweetened Beverages
Energy Drinks	Energy Drink—Single Serve (N)	Sweetened Beverages
Energy Drinks	Energy Drink—Multi-Pack	Sweetened Beverages
Energy Drinks	Energy Drink—Multi-Pack (Non)	Sweetened Beverages
Frozen Juice And Smoothies	Frzn Fruit Drinks (Under 10% J)	Sweetened Beverages
Frozen Juice And Smoothies	Frzn Conc Under 50% Juice	Sweetened Beverages
Frozen Juice And Smoothies	Smoothies-Frz	Sweetened Beverages
Frozen Juice And Smoothies	Cocktail Mixes-Frz	Sweetened Beverages
Isotonic Drinks	Isotonic Drinks Single Serve	Sweetened Beverages
Isotonic Drinks	Isotonic Drinks Multi-Pack	Sweetened Beverages
Isotonic Drinks	Isotonic Drinks Multi-Serve	Sweetened Beverages
Isotonic Drinks	Sports Drink N/Supplmnt Milk/M	Sweetened Beverages
Juice	Non-Carb Jce (Under 50% Jce)	Sweetened Beverages
Juices Super Premium	Juices Smoothies/Blended	Sweetened Beverages
Juices Super Premium	Juices Antioxidant/Wellness	Sweetened Beverages
Juices Super Premium	Juices (50% And Under Juice)	Sweetened Beverages
Mixers Cocktail	Mixes—Fluid: Add Liq	Sweetened Beverages
Powder & Crystal Drink Mix	Unsweetened Envelope [Powder Drink Mix]	Sweetened Beverages
Powder & Crystal Drink Mix	Sugar Free Canister [Powder Drink Mix]	Sweetened Beverages
Powder & Crystal Drink Mix	Sugar Free Sticks [Powder Drink Mix]	Sweetened Beverages
Powder & Crystal Drink Mix	Soft Drink Canisters	Sweetened Beverages
Powder & Crystal Drink Mix	Enhanced Stick [Powder Drink Mix]	Sweetened Beverages
Powder & Crystal Drink Mix	Sugar Sweetened Sticks	Sweetened Beverages
Powder & Crystal Drink Mix	Fluid Pouch [Powder Drink Mix]	Sweetened Beverages
Powder & Crystal Drink Mix	Breakfast Crystals	Sweetened Beverages
Processed	Packaged Dry Mixes	Sweetened Beverages
Refrgratd Juices/Drinks	Dairy Case Juice Drnk Under 10	Sweetened Beverages
Refrgratd Juices/Drinks	Dairy Case Citrus Pnch/Oj Subs	Sweetened Beverages
Refrgratd Juices/Drinks	Dairy Case Tea With Sugar Or S	Sweetened Beverages
Refrgratd Juices/Drinks	Dairy Case Fruit Drinks (No Ju)	Sweetened Beverages
Rtd Tea/New Age Juice	Tea Sweetened	Sweetened Beverages
Rtd Tea/New Age Juice	Juice (Under 10% Juice)	Sweetened Beverages
Shelf Stable Juice	Fruit Drinks: Canned & Glass	Sweetened Beverages
Shelf Stable Juice	Cranapple/Cran Grape Juice (50)	Sweetened Beverages
Shelf Stable Juice	Cranberry Juice (50% And Under)	Sweetened Beverages
Shelf Stable Juice	Blended Juice & Combinations (50)	Sweetened Beverages
Shelf Stable Juice	Fruit Drinks: Canned & Glass	Sweetened Beverages
Shelf Stable Juice	Apple Juice & Cider (50% And U)	Sweetened Beverages
Shelf Stable Juice	Tomato Juice (50% And Under)	Sweetened Beverages
Shelf Stable Juice	Blended Juice & Combinations (Un)	Sweetened Beverages
Shelf Stable Juice	Fruit Drinks: Canned & Glass	Sweetened Beverages
Soft Drinks	Soft Drinks 12/18 & 15pk Can Car	Sweetened Beverages
Soft Drinks	Sft Drnk 2 Liter Btl Carb Incl	Sweetened Beverages
Soft Drinks	Soft Drinks 20pk & 24pk Can Carb	Sweetened Beverages
Soft Drinks	Sft Drnk Mlt-Pk Btl Carb (Excp)	Sweetened Beverages
Soft Drinks	Sft Drnk Sngl Srv Btl Carb (Ex)	Sweetened Beverages
Soft Drinks	Soft Drinks Can Non-Carb (Exce)	Sweetened Beverages
Soft Drinks	Soft Drinks 6pk Can Carb (Exp)	Sweetened Beverages
Soft Drinks	Sft Drnk 1 Liter Btl Carb (Exc)	Sweetened Beverages
Soft Drinks	Tea Can With Sweetener/Sugar	Sweetened Beverages

EAppendix B. Crosswalk of Top 1,000 Subcommodities to Summary Categories—Continued

Commodity	Subcommodity	Summary Category
Soft Drinks	Soft Drink Bottle Non-Carb (Ex)	Sweetened Beverages
Soft Drinks	Tea Bottles With Sweetener/Sug	Sweetened Beverages
Soft Drinks	Mixers (Tonic Water/Gngr Ale)	Sweetened Beverages
Soft Drinks	Seltzer Unflavored	Sweetened Beverages
Teas	Instant Tea & Tea Mix (W/Sugar)	Sweetened Beverages
Water	Non-Carb Water Flvr—Drnk/Mnr	Sweetened Beverages
Water—(Sparkling & Still)	Still Water Flvrd Drnk/Mnrl Wt	Sweetened Beverages
Water—(Sparkling & Still)	Sparkling Water—Flvrd Sweet	Sweetened Beverages
Authentic Hispanic Fds & Product	Authentic Vegetables And Foods	Vegetables
Authentic Hispanic Fds & Product	Authentic Peppers	Vegetables
Authentic Italian Foods	Italian Vegetables	Vegetables
Broccoli/Cauliflower	Broccoli Whole & Crowns	Vegetables
Broccoli/Cauliflower	Cauliflower Whole	Vegetables
Can Vegetables—Shelf Stable	Green Beans: Fs/Whl/Cut	Vegetables
Can Vegetables—Shelf Stable	Corn	Vegetables
Can Vegetables—Shelf Stable	Peas/Green	Vegetables
Can Vegetables—Shelf Stable	Spinach & Greens	Vegetables
Can Vegetables—Shelf Stable	Mushrooms Cnd & Glass	Vegetables
Can Vegetables—Shelf Stable	Sweet Potatoes	Vegetables
Can Vegetables—Shelf Stable	Mixed Vegetables	Vegetables
Can Vegetables—Shelf Stable	Carrots	Vegetables
Can Vegetables—Shelf Stable	White Potatoes	Vegetables
Can Vegetables—Shelf Stable	Kraut & Cabbage	Vegetables
Can Vegetables—Shelf Stable	Beets	Vegetables
Can Vegetables—Shelf Stable	Peas Fresh Pack/Crowder	Vegetables
Can Vegetables—Shelf Stable	Artichokes	Vegetables
Carrots	Carrots Mini Peeled	Vegetables
Carrots	Carrots Bagged	Vegetables
Carrots	Carrots Bagged Organic	Vegetables
Corn	Corn Bulk	Vegetables
Corn	Corn Is Packaged	Vegetables
Dry Sce/Gravy/Potatoes/Stuffng	Potatoes: Dry	Vegetables
Frozen Potatoes	Frzn French Fries	Vegetables
Frozen Potatoes	Frzn Tater Tots/Other Extruded	Vegetables
Frozen Potatoes	Frzn Hashbrown Potatoes	Vegetables
Frozen Potatoes	Frzn Baked/Stuffed/Mashed & Spec	Vegetables
Frozen Potatoes	Frzn Onion Rings	Vegetables
Frozen Vegetable & Veg Dish	Fz Bag Vegetables—Plain	Vegetables
Frozen Vegetable & Veg Dish	Frzn Steamable Vegetables	Vegetables
Frozen Vegetable & Veg Dish	Fz Box Vegetables—Value-Added	Vegetables
Frozen Vegetable & Veg Dish	Frzn Corn On The Cob	Vegetables
Frozen Vegetable & Veg Dish	Fz Bag Vegetables—Value-Added	Vegetables
Frozen Vegetable & Veg Dish	Fz Box Vegetables—Plain	Vegetables
Herbs/Garlic	Garlic Whole Cloves	Vegetables
Herbs/Garlic	Sprouts	Vegetables
Mushrooms	Mushrooms White Sliced Pkg	Vegetables
Mushrooms	Mushrooms White Whole Pkg	Vegetables
Mushrooms	Mushrooms Portabella	Vegetables
Mushrooms	Mushrooms White Bulk	Vegetables
Onions	Onions Yellow (Bulk & Bag)	Vegetables
Onions	Onions Sweet (Bulk & Bag)	Vegetables
Onions	Onions Red (Bulk & Bag)	Vegetables
Onions	Onions White (Bulk & Bag)	Vegetables
Organics Fruit & Vegetables	Organic Salad Mix	Vegetables
Organics Fruit & Vegetables	Organic Value-Added Vegetables	Vegetables
Party Tray	Deli Tray: Fruit And Vegetable	Vegetables
Pasta & Pizza Sauce	Mainstream [Pasta & Pizza Sauce]	Vegetables
Pasta & Pizza Sauce	Value [Pasta & Pizza Sauce]	Vegetables
Pasta & Pizza Sauce	Pizza Sauce	Vegetables
Peppers	Peppers Green Bell	Vegetables
Peppers	Peppers Red Bell	Vegetables
Peppers	Peppers Other Bell	Vegetables
Peppers	Peppers Yellow Bell	Vegetables
Peppers	Peppers Jalapeño	Vegetables
Peppers	Peppers All Other	Vegetables
Potatoes	Potatoes Russet (Bulk & Bag)	Vegetables
Potatoes	Potatoes Sweet & Yams	Vegetables
Potatoes	Potatoes Red (Bulk & Bag)	Vegetables
Potatoes	Potatoes Gourmet	Vegetables
Potatoes	Potatoes Gold (Bulk & Bag)	Vegetables
Potatoes	Potatoes Other Organic	Vegetables
Salad & Dips	Vegetable Salads—Prepack	Vegetables
Salad & Dips	Vegetable Salads—Bulk	Vegetables
Salad & Dips	Salad: Lettuce	Vegetables
Salad & Dips	Salad Bar	Vegetables
Salad Bar	Salad Bar Other	Vegetables
Salad Mix	Blends [Salad Mix]	Vegetables
Salad Mix	Regular Garden	Vegetables
Salad Mix	Garden Plus [Salad Mix]	Vegetables
Salad Mix	Kits [Salad Mix]	Vegetables
Salad Mix	Shredded Lettuce	Vegetables
Salad Mix	Salad Bowls	Vegetables
Salad Mix	Salad Mix Blends Organic	Vegetables
Salad Mix	Salad Spinach	Vegetables

EAppendix B. Crosswalk of Top 1,000 Subcommodities to Summary Categories—Continued

Commodity	Subcommodity	Summary Category
Salad Mix	Coleslaw	Vegetables
Salad Mix	Salad Spinach Organic	Vegetables
Seasonal	Pumpkins	Vegetables
Spices/Jarred Garlic	Garlic Jar	Vegetables
Tomato Products—Shelf Stable	Tomatoes Diced	Vegetables
Tomato Products—Shelf Stable	Tomato Sauce	Vegetables
Tomato Products—Shelf Stable	Tomato Paste	Vegetables
Tomato Products—Shelf Stable	Tomato Stewed	Vegetables
Tomato Products—Shelf Stable	Tomatoes/Whole	Vegetables
Tomato Products—Shelf Stable	Tomato Crushed	Vegetables
Tomatoes	Tomatoes Hothouse On The Vine	Vegetables
Tomatoes	Roma Tomatoes (Bulk/Pkg)	Vegetables
Tomatoes	Tomatoes Vine Ripe Bulk	Vegetables
Tomatoes	Tomatoes Hot House Bulk	Vegetables
Tomatoes	Tomatoes Grape	Vegetables
Tomatoes	Tomatoes Vine Ripe Pkg	Vegetables
Tomatoes	Tomatoes Cherry	Vegetables
Tomatoes	Tomatoes—Other	Vegetables
Tomatoes	Tomatoes Others Organic	Vegetables
Tomatoes	Tomatoes Cocktail	Vegetables
Traditional Asian Foods	Asian Vegetables	Vegetables
Traditional Mexican Foods	Mexican Peppers Chilies	Vegetables
Value-Added Vegetables	Vegetable Party Tray	Vegetables
Value-Added Vegetables	Cut Vegetables All Other	Vegetables
Value-Added Vegetables	Instore Cut Vegetables	Vegetables
Vegetables Cooking Bulk	Celery	Vegetables
Vegetables Cooking Bulk	Cabbage	Vegetables
Vegetables Cooking Bulk	Asparagus	Vegetables
Vegetables Cooking Bulk	Celery Organic	Vegetables
Vegetables Cooking Packaged	Broccoli/Cauliflower Processed	Vegetables
Vegetables Cooking Packaged	Vegetables Cooking Packaged	Vegetables
Vegetables Salad	Head Lettuce	Vegetables
Vegetables Salad	Cucumbers	Vegetables
Vegetables Salad	Variety Lettuce	Vegetables
Vegetables Salad	Green Onions	Vegetables
Vegetables Salad	Radish	Vegetables
Vegetables Salad	Variety Lettuce Organic	Vegetables
Vegetables Salad	Spinach Bulk	Vegetables

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.

Appendix C. Crosswalk of Subcommodities to USDA Food Pattern Categories

Commodity	Subcommodity	USDA Food Pattern	SoFAS Subcategories	Composite Subcategories	Other Subcategories
Aseptic Juice	Kids Milk Drinks—Aseptic	Dairy			
Bag Snacks	Bagged Cheese Snacks	Dairy			
Bulk Service Case Cheese	Bulk Processed [Cheese]	Dairy			
Bulk Service Case Cheese	Bulk Semi-Hard [Cheese]	Dairy			
Bulk Service Case Cheese	Bulk Semi-Soft [Cheese]	Dairy			
Bulk Service Case Cheese	Cheese: Cheeseballs/Spreads	Dairy			
Bulk Service Case Cheese	Cheese: Specialty Bulk	Dairy			
Bulk Service Case Cheese	Cheese: Specialty Prepack	Dairy			
Bulk Service Case Cheese	Service Case Natural [Cheese]	Dairy			
Bulk Service Case Cheese	Service Case Natural Prepackage [Cheese]	Dairy			
Bulk Service Case Cheese	Service Case Processed Prepack [Cheese]	Dairy			
Canned & Dry Milk	Aseptic Milk & Milk Drinks	Dairy			
Canned & Dry Milk	Canned Milk	Dairy			
Canned & Dry Milk	Non Fat Dry Milk	Dairy			
Cheese	American Single Cheese	Dairy			
Cheese	Miscellaneous Cheese	Dairy			
Cheese	Natural Cheese Chunks	Dairy			
Cheese	Natural Cheese Random Wt	Dairy			
Cheese	Natural Cheese Slices	Dairy			
Cheese	Shredded Cheese	Dairy			
Cheese	String Cheese	Dairy			
Crackers & Misc Baked Food	Aerosol Cheese	Dairy			
Cubes/Prepackage Cheese	Cubes Cheese	Dairy			
Cubes/Prepackage Cheese	Prepackage Cheese	Dairy			
Dry Cheese	Grated Cheese	Dairy			
Dry Cheese	Loaf Cheese	Dairy			
Dry Cheese	Misc Dry Cheese	Dairy			
Fluid Milk Products	Buttermilk	Dairy			
Fluid Milk Products	Egg Nog/Boiled Custard	Dairy			
Fluid Milk Products	Flavored Milk	Dairy			
Fluid Milk Products	Fluid Milk/White Only	Dairy			
Fluid Milk Products	Half & Half	Dairy			
Fluid Milk Products	Organic Milk	Dairy			
Fluid Milk Products	Soy Milk	Dairy			
Fluid Milk Products	Specialty/Lactose Free Milk	Dairy			
Milk By-Products	Cottage Cheese	Dairy			
Milk By-Products	Ricotta Cheese	Dairy			
Non-Dairy/Dairy Aseptic	Aseptic Milk	Dairy			
Non-Dairy/Dairy Aseptic	Soy Beverage	Dairy			
Pre-Slice Service Case Cheese	Pre-Sliced Processed [Cheese]	Dairy			
Pre-Slice Service Case Cheese	Pre-Sliced Semi-Hard [Cheese]	Dairy			
Pre-Slice Service Case Cheese	Pre-Sliced Semi-Soft [Cheese]	Dairy			

Appendix C. Crosswalk of Subcommodities to USDA Food Pattern Categories—Continued

Commodity	Subcommodity	USDA Food Pattern	SoFAS Subcategories	Composite Subcategories	Other Subcategories
Refrigerated Dairy Case	Cheese Spreads	Dairy			
Refrigerated Dairy Case	Dairy Cheese	Dairy			
Refrigerated Dairy Case	Fluid Milk	Dairy			
Refrigerated Dairy Case	Kefir	Dairy			
Refrigerated Dairy Case	Yogurt	Dairy			
Refrigerated Hispanic Grocery	Hispanic Cheese	Dairy			
Service Beverage	Sv Bev: Milk/Milk Products	Dairy			
Specialty Bulk Cheese	Specialty Bulk Cheese Blue	Dairy			
Specialty Bulk Cheese	Specialty Bulk Cheese Cheddar	Dairy			
Specialty Bulk Cheese	Specialty Bulk Cheese Cheeseba	Dairy			
Specialty Bulk Cheese	Specialty Bulk Cheese Feta	Dairy			
Specialty Bulk Cheese	Specialty Bulk Cheese Fresh	Dairy			
Specialty Bulk Cheese	Specialty Bulk Cheese Gift Pac	Dairy			
Specialty Bulk Cheese	Specialty Bulk Cheese Goat	Dairy			
Specialty Bulk Cheese	Specialty Bulk Cheese Gouda &	Dairy			
Specialty Bulk Cheese	Specialty Bulk Cheese Hard	Dairy			
Specialty Bulk Cheese	Specialty Bulk Cheese Hispanic	Dairy			
Specialty Bulk Cheese	Specialty Bulk Cheese Mozzarel	Dairy			
Specialty Bulk Cheese	Specialty Bulk Cheese	Dairy			
Specialty Bulk Cheese	Specialty Bulk Cheese Semi-Sof	Dairy			
Specialty Bulk Cheese	Specialty Bulk Cheese Smallwar	Dairy			
Specialty Bulk Cheese	Specialty Bulk Cheese Soft Rip	Dairy			
Specialty Bulk Cheese	Specialty Bulk Cheese Spreads	Dairy			
Specialty Bulk Cheese	Specialty Bulk Cheese Swiss	Dairy			
Specialty Cheese Pre Pack	Ppk Cheese Shoppe	Dairy			
Specialty Cheese Pre Pack	Specialty Ppk Cheese Blue/Gorg	Dairy			
Specialty Cheese Pre Pack	Specialty Ppk Cheese Cheddar & C	Dairy			
Specialty Cheese Pre Pack	Specialty Ppk Cheese Feta	Dairy			
Specialty Cheese Pre Pack	Specialty Ppk Cheese Fresh	Dairy			
Specialty Cheese Pre Pack	Specialty Ppk Cheese Gift Pack	Dairy			
Specialty Cheese Pre Pack	Specialty Ppk Cheese Goat Milk	Dairy			
Specialty Cheese Pre Pack	Specialty Ppk Cheese Gouda & Eda	Dairy			
Specialty Cheese Pre Pack	Specialty Ppk Cheese Hard/Grat	Dairy			
Specialty Cheese Pre Pack	Specialty Ppk Cheese Hispanic	Dairy			
Specialty Cheese Pre Pack	Specialty Ppk Cheese Mozzarell	Dairy			
Specialty Cheese Pre Pack	Specialty Ppk Cheese Processed	Dairy			
Specialty Cheese Pre Pack	Specialty Ppk Cheese Semi Soft	Dairy			
Specialty Cheese Pre Pack	Specialty Ppk Cheese Soft & Ripe	Dairy			
Specialty Cheese Pre Pack	Specialty Ppk Cheese Spreads	Dairy			
Specialty Cheese Pre Pack	Specialty Ppk Cheese Swiss	Dairy			
Specialty Cheese Pre Pack	Specialty Ppk Cheese: Smallwar	Dairy			
Traditional Mexican Foods	Mexican Con Queso	Dairy			
Yogurt	Yogurt/Adult Drinks	Dairy			
Yogurt	Yogurt/Adult Multi-Packs	Dairy			
Yogurt	Yogurt/Kids	Dairy			
Yogurt	Yogurt/Large Size (16oz Or Lar)	Dairy			
Yogurt	Yogurt/Pro Active Health	Dairy			
Yogurt	Yogurt/Specialty Greek	Dairy			
Yogurt	Yogurt/Ss Light	Dairy			
Yogurt	Yogurt/Ss Regular	Dairy			
Apples	Apples Braeburn (Bulk & Bag)	Fruit			
Apples	Apples Braeburn (Bulk & Bag) Org	Fruit			
Apples	Apples Fuji (Bulk & Bag)	Fruit			
Apples	Apples Fuji (Bulk & Bag) Organic	Fruit			
Apples	Apples Gala (Bulk & Bag)	Fruit			
Apples	Apples Gala (Bulk & Bag) Organic	Fruit			
Apples	Apples Gold Delicious (Bulk & Bag)	Fruit			
Apples	Apples Gold Delicious (Bulk & Bag)	Fruit			
Apples	Apples Granny Smith (Bulk & Bag)	Fruit			
Apples	Apples Granny Smith (Bulk & Bag)	Fruit			
Apples	Apples Honeycrisp	Fruit			
Apples	Apples Honeycrisp Organic	Fruit			
Apples	Apples Other (Bulk & Bag)	Fruit			
Apples	Apples Other (Bulk & Bag) Organic	Fruit			
Apples	Apples Red Delicious (Bulk & Bag)	Fruit			
Apples	Apples Red Delicious (Bulk & Bag)	Fruit			
Apples	Caramel/Candy Apples	Fruit			
Apples	Mixed Fruit Bags	Fruit			
Authentic Hispanic Foods & Products	Hispanic Juices Over 50% Juice	Fruit			
Baking Needs	Maraschino Cherries	Fruit			
Bananas	Bananas	Fruit			
Bananas	Bananas Organic	Fruit			
Bananas	Bananas: Variety	Fruit			
Berries	Berries Other	Fruit			
Berries	Berries Other Organic	Fruit			
Berries	Blackberries	Fruit			
Berries	Blackberries Organic	Fruit			
Berries	Blueberries	Fruit			
Berries	Blueberries Organic	Fruit			
Berries	Cranberries	Fruit			
Berries	Cranberries Organic	Fruit			
Berries	Raspberries	Fruit			
Berries	Raspberries Organic	Fruit			
Berries	Strawberries	Fruit			
Berries	Strawberries Organic	Fruit			
Beverages	Can/Btl Beverage Over 50% Juice	Fruit			
Bulk Food	Fruit Bulk	Fruit			
Bulk Food	Fruit W/Sweetener	Fruit			
Can Fruit/Jar Applesauce	Apple Sauce (Excludes Cup)	Fruit			
Can Fruit/Jar Applesauce	Apples/Crabapples	Fruit			
Can Fruit/Jar Applesauce	Berries/Cnd (Blu/Blk/Rasp)	Fruit			
Can Fruit/Jar Applesauce	Cherries (Except Maraschino)	Fruit			
Can Fruit/Jar Applesauce	Cranberry Sauce	Fruit			

Appendix C. Crosswalk of Subcommodities to USDA Food Pattern Categories—Continued

Commodity	Subcommodity	USDA Food Pattern	SoFAS Subcategories	Composite Subcategories	Other Subcategories
Can Fruit/Jar Applesauce	Fruit Cocktail/Fruit Salad	Fruit			
Can Fruit/Jar Applesauce	Mandarin Oranges/Citrus Sect	Fruit			
Can Fruit/Jar Applesauce	Misc. Cnd Fruit (Grapes/Figs)	Fruit			
Can Fruit/Jar Applesauce	Peaches	Fruit			
Can Fruit/Jar Applesauce	Pears	Fruit			
Can Fruit/Jar Applesauce	Pineapple	Fruit			
Citrus	Citrus—Other	Fruit			
Citrus	Citrus Other Organic	Fruit			
Citrus	Clementines	Fruit			
Citrus	Clementines Organic	Fruit			
Citrus	Grapefruit	Fruit			
Citrus	Grapefruit Organic	Fruit			
Citrus	Lemons	Fruit			
Citrus	Lemons Organic	Fruit			
Citrus	Limes	Fruit			
Citrus	Limes Organic	Fruit			
Citrus	Oranges Navels All	Fruit			
Citrus	Oranges Navels All Organic	Fruit			
Citrus	Oranges Non Navel All	Fruit			
Citrus	Oranges Non Navel All Organic	Fruit			
Citrus	Tangerines & Tangelos	Fruit			
Citrus	Tangerines & Tangelos Organic	Fruit			
Coffee Shop	Sv Bev: Bev/Juice 50–100% Jce	Fruit			
Coffee Shop	Sv Bev: Bev/Juice 50–100% Jce	Fruit			
Convenience/Snacking	Convenience/Snacking Fruit Pro	Fruit			
Convenience/Snacking	Jarred Fruit Multi Serve	Fruit			
Convenience/Snacking	Jarred Fruit Single Serve	Fruit			
Convenience/Snacking	Squeeze Fruits	Fruit			
Dried Fruit	Dates Fruit				
Dried Fruit	Dried Fruit—Other	Fruit			
Dried Fruit	Dried Fruit Cranberries	Fruit			
Dried Fruit	Dried Fruit Other Organic	Fruit			
Dried Fruit	Dried Fruit W/Sweetener	Fruit			
Dried Fruit	Dried Plums	Fruit			
Dried Fruit	Glace Fruit	Fruit			
Dried Fruit	Raisins	Fruit			
Frozen Breakfast	Juice Over 50% Juice	Fruit			
Frozen Fruits	Frozen Fruit	Fruit			
Frozen Juice And Smoothies	Frzn Conc Allieds Over 50% Juice	Fruit			
Frozen Juice And Smoothies	Frozen Oj & Oj Substitutes	Fruit			
Fruit Snacks	Fruit Snacks	Fruit			
Gift & Fruit Baskets	Fruit Baskets	Fruit			
Gift & Fruit Baskets	In Store Made Fruit Baskets	Fruit			
Gift & Fruit Baskets	Ready To Sell Fruit Baskets	Fruit			
Grapes	Grapes Black/Blue	Fruit			
Grapes	Grapes Black/Blue Organic	Fruit			
Grapes	Grapes Other	Fruit			
Grapes	Grapes Other Organic	Fruit			
Grapes	Grapes Red	Fruit			
Grapes	Grapes Red Globe	Fruit			
Grapes	Grapes Red Globe Organic	Fruit			
Grapes	Grapes Red Organic	Fruit			
Grapes	Grapes White	Fruit			
Grapes	Grapes White Organic	Fruit			
Grapes	Grapes Wine	Fruit			
Juice	Drinks—Carb Juice (Over 50% Juice)	Fruit			
Juice	Non-Carb Jce(Over 50% Juice)	Fruit			
Juices Super Premium	Cider	Fruit			
Juices Super Premium	Juice Single Blend	Fruit			
Juices Super Premium	Juices Organic (Over 50% Juice)	Fruit			
Melons	Cantaloupe Whole	Fruit			
Melons	Cantaloupe Whole Organic	Fruit			
Melons	Honeydew Whole	Fruit			
Melons	Honeydew Whole Organic	Fruit			
Melons	Melons Whole Other	Fruit			
Melons	Melons Whole Other Organic	Fruit			
Melons	Watermelon Personal	Fruit			
Melons	Watermelon Personal Organic	Fruit			
Melons	Watermelon Seedless Whole	Fruit			
Melons	Watermelon Seedless Whole Organic	Fruit			
Melons	Watermelon W/Seeds Whole	Fruit			
Packaged Natural Snacks	Dried Fruit	Fruit			
Packaged Natural Snacks	Dried Fruit W/Sweetener	Fruit			
Peanut Butter/Jelly/Jams & Honey	Apple Butter/Fruit Butter	Fruit			
Pears	Pears Anjou	Fruit			
Pears	Pears Anjou Organic	Fruit			
Pears	Pears Asian	Fruit			
Pears	Pears Asian Organic	Fruit			
Pears	Pears Bartlett	Fruit			
Pears	Pears Bartlett Organic	Fruit			
Pears	Pears Bosc	Fruit			
Pears	Pears Bosc Organic	Fruit			
Pears	Pears Other	Fruit			
Pears	Pears Other Organic	Fruit			
Pears	Pears Red	Fruit			
Prepared/Pdgd Foods	Apple Sauce/Pudding	Fruit			
Prepared/Pdgd Foods	Canned Fruit	Fruit			
Processed	Jarred Fruit	Fruit			
Processed	Juice	Fruit			
Processed	Squeeze Lemons/Limes	Fruit			
Refrgratd Juices/Drinks	Dairy Case 100% Pure Juice—Orange	Fruit			
Refrgratd Juices/Drinks	Dairy Case 100% Pure Juice Other	Fruit			
Refrigerated Dairy Case	Nut Refrig Juice Over 50%	Fruit			
Rtd Tea/New Age Juice	Juice (100% Juice)	Fruit			
Rtd Tea/New Age Juice	Juice (Over 50% Juice)	Fruit			
Salad Bar	Salad Bar Fresh Fruit	Fruit			
Seasonal Fruit	Baskets	Fruit			
Service Beverage	Sv Bev: Bev/Juice 50–100% Juice	Fruit			

Appendix C. Crosswalk of Subcommodities to USDA Food Pattern Categories—Continued

Commodity	Subcommodity	USDA Food Pattern	SoFAS Subcategories	Composite Subcategories	Other Subcategories
Shelf Stable Juice	Apple Juice & Cider (Over 50% Juice)	Fruit			
Shelf Stable Juice	Blended Juice & Combinations	Fruit			
Shelf Stable Juice	Cranapple/Cran Grape Juice	Fruit			
Shelf Stable Juice	Cranapple/Cran Grape Juice	Fruit			
Shelf Stable Juice	Cranberry Juice (Over 50% Juice)	Fruit			
Shelf Stable Juice	Grape Juice (Over 50% Juice)	Fruit			
Shelf Stable Juice	Grapefruit Juice (Over 50% Juice)	Fruit			
Shelf Stable Juice	Lemon Juice & Lime Juice (Over 50% Juice)	Fruit			
Shelf Stable Juice	Nectars (Over 50% Juice)	Fruit			
Shelf Stable Juice	Orange Juice (Over 50% Juice)	Fruit			
Shelf Stable Juice	Other Citrus Juices (50% And Under Juice)	Fruit			
Shelf Stable Juice	Other Citrus Juices (Over 50% Juice)	Fruit			
Shelf Stable Juice	Pineapple Juice (Over 50% Juice)	Fruit			
Shelf Stable Juice	Prune Juice (Over 50% Juice)	Fruit			
Single Serve Fruit/Applesauce	Applesauce Cup	Fruit			
Single Serve Fruit/Applesauce	Applesauce Pouch	Fruit			
Single Serve Fruit/Applesauce	Fruit Cup	Fruit			
Stone Fruit	Apricots	Fruit			
Stone Fruit	Cherries Ranier	Fruit			
Stone Fruit	Cherries Red	Fruit			
Stone Fruit	Cherries Red Organic	Fruit			
Stone Fruit	Nectarines White Flesh	Fruit			
Stone Fruit	Nectarines Yellow Flesh	Fruit			
Stone Fruit	Nectarines Yellow Flesh Organic	Fruit			
Stone Fruit	Peaches White Flesh	Fruit			
Stone Fruit	Peaches White Flesh Organic	Fruit			
Stone Fruit	Peaches Yellow Flesh	Fruit			
Stone Fruit	Peaches Yellow Flesh Organic	Fruit			
Stone Fruit	Plums	Fruit			
Stone Fruit	Plums Organic	Fruit			
Stone Fruit	Pluots	Fruit			
Stone Fruit	Stone Fruit Other Organic	Fruit			
Tropical Fruit	Kiwi Fruit	Fruit			
Tropical Fruit	Kiwi Fruit Organic	Fruit			
Tropical Fruit	Mango	Fruit			
Tropical Fruit	Mango Organic	Fruit			
Tropical Fruit	Papaya	Fruit			
Tropical Fruit	Pineapple Whole & Peel/Cored	Fruit			
Tropical Fruit	Pineapple Whole & Peel/Cored Organic	Fruit			
Tropical Fruit	Pomegranates	Fruit			
Tropical Fruit	Pomegranates Organic	Fruit			
Tropical Fruit	Tropical Fruit—Other	Fruit			
Tropical Fruit	Tropical Fruit Other Organic	Fruit			
Unknown	Frozen Fruit	Fruit			
Value-Added Fruit	Cut Fruit All Other Prepack	Fruit			
Value-Added Fruit	Fruit Party Tray Prepack	Fruit			
Value-Added Fruit	Instore Cut Fruit	Fruit			
Value-Added Fruit	Melon Halves/Quarters Prepack	Fruit			
Value-Added Fruit	Melons Instore Cut	Fruit			
Value-Added Fruit	Pineapple Wedge/Sliced/Chunks	Fruit			
Value-Added Fruit	Value-Added Fruit Organic	Fruit			
Authentic Hispanic Fds & Product	Hispanic Tostados & Tortillas	Grains			
Bag Snacks	Bagged Popped Popcorn	Grains			
Bag Snacks	Bagged Popped Popcorn W/Sweetener	Grains			
Bag Snacks	Corn Chips	Grains			
Bag Snacks	Pretzel W/Sweetner	Grains			
Bag Snacks	Pretzels	Grains			
Bag Snacks	Tortilla/Nacho Chips	Grains			
Bagels & Cream Cheese	Refrigerated Bagels	Grains			
Baked Breads	Bagels	Grains			
Baked Breads	Diet/Light Bread	Grains			
Baked Breads	Dinner Rolls	Grains			
Baked Breads	English Muffins/Waffles	Grains			
Baked Breads	Fruit/Breakfast Bread	Grains			
Baked Breads	Hamburger Buns	Grains			
Baked Breads	Hot Dog Buns	Grains			
Baked Breads	Main Meal Bread	Grains			
Baked Breads	Mainstream Variety Breads	Grains			
Baked Breads	Mainstream White Bread	Grains			
Baked Breads	Pita/Tortillas	Grains			
Baked Breads	Premium Bread	Grains			
Baked Breads	Rye Breads	Grains			
Baked Breads	Sandwich Buns	Grains			
Bakery Party	Trays Party Trays: Rolls	Grains			
Baking Mixes	Biscuit Flour & Mixes	Grains			
Baking Mixes	Muffin & Corn Bread Mix	Grains			
Baking Needs	Corn Starch	Grains			
Bread	All Other Bread	Grains			
Bread	Bread—Ingredients	Grains			
Bread	Bread Snacks	Grains			
Bread	Bread: Diet/Organic	Grains			
Bread	Bread: Kosher	Grains			
Bread	Bread: Artisan	Grains			
Bread	Bread: Italian/French	Grains			
Bread	Bread: Pita/Pocket/Flatbrd	Grains			
Bread	Bread: Retail Seasonings	Grains			
Bread	Bread: Rye/Cocktail	Grains			
Bread	Bread: Sourdough	Grains			
Bread	Bread: Specialty	Grains			
Bread	Bread: Sweet/Breakfast	Grains			
Bread	Bread: Brand	Grains			
Bread	Bread: Tortillas/Wraps	Grains			
Bread	Bread: Wheat/Whl Grain	Grains			
Bread	Bread: White Loaf	Grains			
Bread	Gluten Free	Grains			

Appendix C. Crosswalk of Subcommodities to USDA Food Pattern Categories—Continued

Commodity	Subcommodity	USDA Food Pattern	SoFAS Subcategories	Composite Subcategories	Other Subcategories
Bread	Whole Grain Bread	Grains			
Bulk Food	Cereal Bulk	Grains			
Cereal Bars	Breakfast Bars/Tarts/Scones	Grains			
Cereals	Cereal—Cold	Grains			
Cereals	Cereal—Hot	Grains			
Cereals	Grains	Grains			
Cereals	Granola	Grains			
Cnv Breakfast & Wholesome Snks	Cereal Bars	Grains			
Cnv Breakfast & Wholesome Snks	Granola Bars	Grains			
Cnv Breakfast & Wholesome Snks	Toaster Pastries	Grains			
Coffee Shop Sweet Goods & Rtl	Coffee Shop: Bagged Snacks	Grains			
Cold Cereal	Adult Cereal	Grains			
Cold Cereal	All Family Cereal	Grains			
Cold Cereal	Kids Cereal	Grains			
Cold Cereal	Misc. Cereal	Grains			
Cookie/Cracker Multi-Pks	Multi-Pack Crackers	Grains			
Cookies	Graham Crackers	Grains			
Crackers	Crackers	Grains			
Crackers & Misc Baked Food	Butter Spray Cracker	Grains			
Crackers & Misc Baked Food	Cheese Crackers	Grains			
Crackers & Misc Baked Food	Saltine/Oyster	Grains			
Crackers & Misc Baked Food	Snack Crackers	Grains			
Crackers & Misc Baked Food	Specialty Crackers	Grains			
Croutons/Bread Stick & Salad Toppings	Bread Sticks	Grains			
Croutons/Bread Stick & Salad Toppings	Croutons	Grains			
Croutons/Bread Stick & Salad Toppings	Salad Toppers	Grains			
Dl Specialties (Retail Pk)	Dl Spec: Dry/Refrig Pastas	Grains			
Dietary Aid Prdct/Med Liq Nutr	Diabetic Dry Cereal	Grains			
Dinner Mixes—Dry	Pizza Mix Dry	Grains			
Dry Bean Veg & Rice	Misc Grain Mixes	Grains			
Dry Bean Veg & Rice	Noodle Side Dish Mixes	Grains			
Dry Bean Veg & Rice	Rice—Dry Bag And Box	Grains			
Dry Bean Veg & Rice	Rice—Instant & Microwave	Grains			
Dry Bean Veg & Rice	Rice Side Dish Mixes Dry	Grains			
Dry Noodles & Pasta	Long Cut Pasta	Grains			
Dry Noodles & Pasta	Noodles Dry	Grains			
Dry Noodles & Pasta	Short Cut Pasta	Grains			
Dry Noodles & Pasta	Specialty Pasta	Grains			
Dry Sauce/Gravy/Potatoes/Stuffing	Stuffing Mixes	Grains			
Dry/Ramen Bouillon	Ramen Noodles/Ramen Cups	Grains			
Eggs/Muffins/Potatoes	Refrigerated English Muffins	Grains			
Flour & Meals	Breadings/Coatings/Crumbs	Grains			
Flour & Meals	Cornmeal	Grains			
Flour & Meals	Flour: Misc/Specialty/Blend Et	Grains			
Flour & Meals	Flour: White & Self Rising	Grains			
Frozen Bread And Desserts	Allergen Free [Frozen Bread]	Grains			
Frozen Bread And Desserts	Breads	Grains			
Frozen Bread And Desserts	Muffins/Bagels	Grains			
Frozen Bread And Desserts	Rolls	Grains			
Frozen Bread And Desserts	Sprouted Breads	Grains			
Frozen Bread/Dough	Frzn Biscuits	Grains			
Frozen Bread/Dough	Frzn Bread Dough	Grains			
Frozen Bread/Dough	Frzn Breadsticks	Grains			
Frozen Bread/Dough	Frzn Dinner Rolls	Grains			
Frozen Bread/Dough	Frzn Garlic Bread	Grains			
Frozen Bread/Dough	Frzn Garlic Toast	Grains			
Frozen Bread/Dough	Frzn Sweet Rolls & Muffins	Grains			
Frozen Breakfast	Pancakes/French Toast	Grains			
Frozen Breakfast	Waffles	Grains			
Frozen Breakfast Foods	Frzn Bagels	Grains			
Frozen Breakfast Foods	Frzn Breakfast Pastry	Grains			
Frozen Breakfast Foods	Waffles/Pancakes/French Toast	Grains			
Frzn Pasta	Frozen Pasta	Grains			
Hot Cereal	Grits	Grains			
Hot Cereal	Instant Breakfast	Grains			
Hot Cereal	Instant Oatmeal	Grains			
Hot Cereal	Other Hot Cereal	Grains			
Hot Cereal	Standard Oatmeal	Grains			
Kosher Foods And Products	Kosher Matzas	Grains			
Kosher Foods And Products	Kosher Noodles And Rice	Grains			
Meat—Shelf Stable	Tamales	Grains			
Molasses/Syrups/Pancake Mixes	Pancake Mixes	Grains			
Multicultural Products	Rice Bulk/Bag	Grains			
Non-Dairy/Dairy Aseptic	Rice Beverage	Grains			
Pies	Pies: Sugar Free	Grains			
Popcorn	Caramel Coated Snacks	Grains			
Popcorn	Popcorn—Microwave	Grains			
Popcorn	Popcorn—Other	Grains			
Prepared/Pdgd Foods	Grains	Grains			
Prepared/Pdgd Foods	Pasta/Ramen	Grains			
Refrgrated Dough Products	Misc Refrig Dough Products	Grains			
Refrgrated Dough Products	Refrigerated Biscuits	Grains			
Refrgrated Dough Products	Refrigerated Breads	Grains			
Refrgrated Dough Products	Refrigerated Crescent Rolls	Grains			
Refrgrated Dough Products	Refrigerated Specialty Rolls	Grains			
Refrigerated Hispanic Grocery	Refrigerated Tortillas	Grains			
Refrigerated Italian	Refrigerated Pasta	Grains			
Rice Cakes	Large—Rice Cakes	Grains			
Rice Cakes	Large Cakes	Grains			
Rice Cakes	Mini—Rice Cakes	Grains			
Rice Cakes	Mini-Cakes	Grains			
Rice Cakes	Other—Rice Cakes	Grains			
Rolls	Rolls: Bagels	Grains			
Rolls	Rolls: Bagels—Less Than 6	Grains			
Rolls	Rolls: Biscuits/Eng Muffins	Grains			
Rolls	Rolls: Croissants/Breadsticks	Grains			
Rolls	Rolls: Diet/Organic	Grains			
Rolls	Rolls: Dinner	Grains			

Appendix C. Crosswalk of Subcommodities to USDA Food Pattern Categories—Continued

Commodity	Subcommodity	USDA Food Pattern	SoFAS Subcategories	Composite Subcategories	Other Subcategories
Rolls	Rolls: Kosher	Grains			
Rolls	Rolls: Sandwich	Grains			
Salad & Dips Pasta/Grain	Salads—Bulk	Grains			
Salad & Dips Pasta/Grain	Salads—Prepack	Grains			
Salad Toppings	Croutons Organic	Grains			
Seafood—Salad/Dip/Sce/Cond	Breading	Grains			
Snack	Popcorn	Grains			
Snack	Popcorn W/Sweetener	Grains			
Snack	Tortilla Chips	Grains			
Snacks	Snacks: Crackers/Cookies	Grains			
Snacks	Snacks: Bagel Chips	Grains			
Snacks	Snacks: Pita Chips	Grains			
Snacks	Snacks: Tortilla Chips	Grains			
Specialty Cheese Pre Pack	Gourmet Crackers	Grains			
Ss/Vending—Cookie/Cracker	Vending Size/Sngl Serve Cracke	Grains			
Syrups Toppings & Cones	Cones [Frozen Novelties]	Grains			
Traditional Asian Foods	Asian Noodles/Rice	Grains			
Traditional Mexican Foods	Mexican Soft Tortillas And Wra	Grains			
Traditional Mexican Foods	Mexican Taco/Tostado/Shells	Grains			
Unknown	Frozen Bread	Grains			
Unknown	Frozen Convenience/Pockets	Grains			
Bacon	Bacon—Natural/Organic	Protein Foods			
Bacon	Bacon—Other	Protein Foods			
Bacon	Bacon—Poultry	Protein Foods			
Bacon	Bacon—Pre-Cooked	Protein Foods			
Bacon	Bacon—Trad 16oz Or Less	Protein Foods			
Bacon	Bacon—Trad Center Cut	Protein Foods			
Bacon	Bacon—Trad Greater Than 16oz	Protein Foods			
Baking Needs	Baking Nuts	Protein Foods			
Beef: Chuck/Shoulder	Choice Beef	Protein Foods			
Beef: Chuck/Shoulder	Natural Beef	Protein Foods			
Beef: Chuck/Shoulder	Organic Beef	Protein Foods			
Beef: Grinds	Angus [Beef]	Protein Foods			
Beef: Grinds	Lean [Beef]	Protein Foods			
Beef: Grinds	Natural [Beef]	Protein Foods			
Beef: Grinds	Organic [Beef]	Protein Foods			
Beef: Grinds	Patties [Beef]	Protein Foods			
Beef: Grinds	Primal [Beef]	Protein Foods			
Beef: Grinds	Sausage [Beef]	Protein Foods			
Beef: Loins	Choice Beef	Protein Foods			
Beef: Loins	Select Beef	Protein Foods			
Beef: Offal	External [Beef Offal]	Protein Foods			
Beef: Rib	Angus Beef	Protein Foods			
Beef: Rib	Prime Beef	Protein Foods			
Beef: Round	Angus Beef	Protein Foods			
Beef: Round	Choice Beef	Protein Foods			
Beef: Round	Natural Beef	Protein Foods			
Beef: Round	Organic Beef	Protein Foods			
Beef: Round	Prime Beef	Protein Foods			
Beef: Round	Select Beef	Protein Foods			
Beef: Thin Meats	Brisket	Protein Foods			
Beef: Thin Meats	Corned Beef	Protein Foods			
Beef: Thin Meats	Cubed Meats [Beef]	Protein Foods			
Beef: Thin Meats	Flank [Beef]	Protein Foods			
Beef: Thin Meats	Lifter Meat [Beef]	Protein Foods			
Beef: Thin Meats	Skirt [Beef]	Protein Foods			
Beef: Thin Meats	Soup/Stew	Protein Foods			
Breakfast Sausage	Bkfst Sausage—Bkfast Side Di	Protein Foods			
Breakfast Sausage	Bkfst Sausage—Fresh Links	Protein Foods			
Breakfast Sausage	Bkfst Sausage—Fresh Patties	Protein Foods			
Breakfast Sausage	Bkfst Sausage—Fresh Rolls	Protein Foods			
Breakfast Sausage	Bkfst Sausage—Other Forms	Protein Foods			
Breakfast Sausage	Bkfst Sausage—Precooked	Protein Foods			
Buffalo	Chuck/Shoulder [Buffalo]	Protein Foods			
Buffalo	Grinds [Buffalo]	Protein Foods			
Buffalo	Loin [Buffalo]	Protein Foods			
Buffalo	Natural [Buffalo]	Protein Foods			
Buffalo	Rib [Buffalo]	Protein Foods			
Buffalo	Round/Leg [Buffalo]	Protein Foods			
Buffalo	Thin Meats [Buffalo]	Protein Foods			
Bulk Food	Nuts Bulk W/Sweetener	Protein Foods			
Bulk Food	Trail Mix/Nuts Bulk	Protein Foods			
Can Beans	Prepared Beans—Baked W/Pork	Protein Foods			
Can Beans	Variety Beans—Kidney/Pinto/E	Protein Foods			
Can Seafood—Shelf Stable	Anchovies	Protein Foods			
Can Seafood—Shelf Stable	Caviar	Protein Foods			
Can Seafood—Shelf Stable	Clam Juice	Protein Foods			
Can Seafood—Shelf Stable	Clams	Protein Foods			
Can Seafood—Shelf Stable	Crabmeat	Protein Foods			
Can Seafood—Shelf Stable	Kipper Snack	Protein Foods			
Can Seafood—Shelf Stable	Mackerel	Protein Foods			
Can Seafood—Shelf Stable	Misc. Cnd Seafoods (Crab/*Etc.*)	Protein Foods			
Can Seafood—Shelf Stable	Oysters	Protein Foods			
Can Seafood—Shelf Stable	Salmon	Protein Foods			
Can Seafood—Shelf Stable	Sardines	Protein Foods			
Can Seafood—Shelf Stable	Shrimp	Protein Foods			
Can Seafood—Shelf Stable	Tuna	Protein Foods			
Chicken & Poultry	Chix/Poultry Ingredients	Protein Foods			
Chicken & Poultry	Chix: Baked 8pc Cut Up (Cold)	Protein Foods			
Chicken & Poultry	Chix: Chicken Dinners/Snacks C	Protein Foods			
Chicken & Poultry	Chix: Chicken Dinners/Snacks H	Protein Foods			
Chicken & Poultry	Chix: Kosher (Cold)	Protein Foods			
Chicken & Poultry	Chix: Rotisserie Cold	Protein Foods			
Chicken & Poultry	Chix: Frd 8pc/Cut Up (Cold)	Protein Foods			
Chicken & Poultry	Chix: Value-Added (Cold)	Protein Foods			
Chicken Fresh	Chicken Breast Boneless	Protein Foods			
Chicken Fresh	Chicken Drums	Protein Foods			
Chicken Fresh	Chicken Legs/Quarters	Protein Foods			
Chicken Fresh	Chicken Thighs	Protein Foods			
Chicken Fresh	Chicken Wings	Protein Foods			
Chicken Fresh	Mixed Packs	Protein Foods			

Appendix C. Crosswalk of Subcommodities to USDA Food Pattern Categories—Continued

Commodity	Subcommodity	USDA Food Pattern	SoFAS Subcategories	Composite Subcategories	Other Subcategories
Chicken Fresh	Whole Chicken (Roasters/Fryer)	Protein Foods			
Chicken Frozen	Chicken—Frz Iqf—Raw	Protein Foods			
Chicken Frozen	Frzn Chicken—Drk Meat	Protein Foods			
Chicken Frozen	Frzn Chicken—Wht Meat	Protein Foods			
Chicken Frozen	Frzn Chicken—Wings	Protein Foods			
Chicken Frozen	Whole/Cutup [Chicken]	Protein Foods			
Chicken Frozen (Rw)	Chicken Breast Bone In	Protein Foods			
Chicken Frozen (Rw)	Chicken Breast Boneless	Protein Foods			
Chicken Frozen (Rw)	Chicken Drums	Protein Foods			
Chicken Frozen (Rw)	Chicken Legs/Quarters	Protein Foods			
Chicken Frozen (Rw)	Chicken Thighs	Protein Foods			
Chicken Frozen (Rw)	Chicken Wings	Protein Foods			
Chicken Frozen (Rw)	Whole Chicken (Roasters/Fryer)	Protein Foods			
Chicken Grinds	Ground Chicken	Protein Foods			
Chicken Offal	External [Chicken Offal]	Protein Foods			
Chicken Offal	Internal [Chicken Offal]	Protein Foods			
Chicken Organic	Chicken Breast Bone In	Protein Foods			
Chicken Smoked	Chicken Breast Bone In	Protein Foods			
Chicken Specialty/Natural	Chicken Breast Bone In	Protein Foods			
Chicken Specialty/Natural	Chicken Breast Boneless	Protein Foods			
Chicken Specialty/Natural	Chicken Drums	Protein Foods			
Chicken Specialty/Natural	Chicken Legs/Quarters	Protein Foods			
Chicken Specialty/Natural	Chicken Thighs	Protein Foods			
Chicken Specialty/Natural	Chicken Wings	Protein Foods			
Chicken Specialty/Natural	Mixed Packs [Chicken]	Protein Foods			
Chicken Specialty/Natural	Whole Chicken (Roasters/Fryer)	Protein Foods			
Condiments	Nut Butters/Peanut Butter	Protein Foods			
Deli Meat: Bulk	Bologna/Loaves/Franks	Protein Foods			
Deli Meat: Bulk	Meat Bulk: Specialty Dry Meats	Protein Foods			
Deli Meat: Bulk	Meat: Bacon	Protein Foods			
Deli Meat: Bulk	Meat: Beef Bulk	Protein Foods			
Deli Meat: Bulk	Meat: Chicken Bulk	Protein Foods			
Deli Meat: Bulk	Meat: Gift Pack	Protein Foods			
Deli Meat: Bulk	Meat: Ham Ppk/Prslc	Protein Foods			
Deli Meat: Bulk	Meat: Pates/Mousse	Protein Foods			
Deli Meat: Bulk	Meat: Saus Dry Ppk/Prslc	Protein Foods			
Deli Meat: Bulk	Meat: Turkey Bulk	Protein Foods			
Deli Meat: Bulk	Meat:Ham Bulk	Protein Foods			
Deli Meat: Bulk	Meat: Lnchmt Ppk/Prslc	Protein Foods			
Deli Meat: Other	Deli Meat: Bacon	Protein Foods			
Deli Meat: Other	Deli Meat: Kosher	Protein Foods			
Deli Meat: Other	Deli Meat: Pates/Mousse	Protein Foods			
Deli Meat: Other	Deli Meat: Shippers/Gift Packs	Protein Foods			
Deli Meat: Presliced	Deli Meat: Beef	Protein Foods			
Deli Meat: Presliced	Deli Meat: Bologna/Loaves/Fran	Protein Foods			
Deli Meat: Presliced	Deli Meat: Chicken	Protein Foods			
Deli Meat: Presliced	Deli Meat: Ham	Protein Foods			
Deli Meat: Presliced	Deli Meat: Semi-Dry Sausage	Protein Foods			
Deli Meat: Presliced	Deli Meat: Specialty Dry Meats	Protein Foods			
Deli Meat: Presliced	Deli Meat: Turkey	Protein Foods			
Dinner Sausage	Dnr Sausage—Beef Rope Ckd/Sm	Protein Foods			
Dinner Sausage	Dnr Sausage—Cocktails	Protein Foods			
Dinner Sausage	Dnr Sausage—Fresh Poultry	Protein Foods			
Dinner Sausage	Dnr Sausage—Links Beef Ckd	Protein Foods			
Dinner Sausage	Dnr Sausage—Links Fresh	Protein Foods			
Dinner Sausage	Dnr Sausage—Links Pork Ckd	Protein Foods			
Dinner Sausage	Dnr Sausage—Links Poultry Ck	Protein Foods			
Dinner Sausage	Dnr Sausage—Natural/Organic	Protein Foods			
Dinner Sausage	Dnr Sausage—Other Forms	Protein Foods			
Dinner Sausage	Dnr Sausage—Pork Rope Ckd/Sm	Protein Foods			
Dinner Sausage	Dnr Sausage—Poultry Rope Ckd	Protein Foods			
Dinner Sausage	Dnr Saus-Rope/Link-Smkd/Preckd	Protein Foods			
Eggs/Muffins/Potatoes	Eggs—Jumbo	Protein Foods			
Eggs/Muffins/Potatoes	Eggs—Large	Protein Foods			
Eggs/Muffins/Potatoes	Eggs—Medium	Protein Foods			
Eggs/Muffins/Potatoes	Eggs—Small	Protein Foods			
Eggs/Muffins/Potatoes	Eggs—X-Large	Protein Foods			
Eggs/Muffins/Potatoes	Eggs Substitute	Protein Foods			
Eggs/Muffins/Potatoes	Specialty Eggs	Protein Foods			
Exotic	Goat	Protein Food			
Exotic	Rabbit	Protein Foods			
Frozen Breakfast Foods	Frzn Breakfast Sausage	Protein Foods			
Frozen Breakfast Foods	Frzn Egg Substitutes	Protein Foods			
Frozen Entrées	Meat Protein	Protein Foods			
Frozen Meat	Frozen Meat	Protein Foods			
Frozen Meat	Alternatives Meat	Protein Foods			
Frozen Meat	Alternatives Soy/Tofu	Protein Foods			
Frzn Multi Serve	Frzn Burgers	Protein Foods			
Frzn Multi Serve	Fz Bbq	Protein Foods			
Frzn Multi Serve	Fz Meatballs	Protein Foods			
Frzn Prepared Chicken	Bone-In Wings	Protein Foods			
Frzn Prepared Chicken	Boneless Snack/18oz And Larger	Protein Foods			
Frzn Prepared Chicken	Boneless Snack/Value/Small	Protein Foods			
Frzn Prepared Chicken	Value Forms/18oz And Larger [Chicken]	Protein Foods			
Frzn Prepared Chicken	Whole Muscle Breaded/18oz And	Protein Foods			
Frzn Prepared Chicken	Whole Muscle Unbreaded	Protein Foods			
Frzn Seafood	Frz Coated Fish Fillets	Protein Foods			
Frzn Seafood	Frz Fishsticks/Tenders/Nuggets	Protein Foods			
Frzn Seafood	Frz Non-Coated Fish Fillets	Protein Foods			
Frzn Seafood	Frz Seafood Entrées	Protein Foods			
Frzn Seafood	Frzn Misc Seafood	Protein Foods			
Hot Dogs	Hot Dogs—Base Beef	Protein Foods			
Hot Dogs	Hot Dogs—Base Meat	Protein Foods			
Hot Dogs	Hot Dogs—Base Poultry	Protein Foods			
Hot Dogs	Hot Dogs—Premium	Protein Foods			
Hot Dogs	Hot Dogs-Rw-All	Protein Foods			
Kosher	Beef	Protein Foods			
Kosher	Chicken	Protein Foods			
Kosher	Lamb	Protein Foods			
Kosher	Turkey	Protein Foods			

Appendix C. Crosswalk of Subcommodities to USDA Food Pattern Categories—Continued

Commodity	Subcommodity	USDA Food Pattern	SoFAS Subcategories	Composite Subcategories	Other Subcategories
Kosher	Veal	Protein Foods			
Kosher Foods And Products	Kosher Seafood	Protein Foods			
Lamb	Chuck/Shoulder [Lamb]	Protein Foods			
Lamb	Grinds [Lamb]	Protein Foods			
Lamb	Loin [Lamb]	Protein Foods			
Lamb	Offals [Lamb]	Protein Foods			
Lamb	Rib [Lamb]	Protein Foods			
Lamb	Round/Leg [Lamb]	Protein Foods			
Lamb	Thin Meats [Lamb]	Protein Foods			
Lunchmeat	Lunchmeat—Brauns/Liver/Loave	Protein Foods			
Lunchmeat	Lunchmeat—Chip Meat	Protein Foods			
Lunchmeat	Lunchmeat—Chop/Form Pltry & Ha	Protein Foods			
Lunchmeat	Lunchmeat—Other	Protein Foods			
Lunchmeat	Lunchmeat—Peggable Deli Fres	Protein Foods			
Lunchmeat	Lunchmeat—Variety Pack	Protein Foods			
Lunchmeat	Lunchmeat—Whole Muscle Pltry	Protein Foods			
Lunchmeat	Lunchmeat—Rw-All	Protein Foods			
Lunchmeat	Lunchmeat—Bologna/Sausage	Protein Foods			
Lunchmeat	Lunchmeat—Deli Fresh	Protein Foods			
Lunchmeat	Lunchmeat—Natural/Organic	Protein Foods			
Meat—Shelf Stable	Beef Stew	Protein Foods			
Meat—Shelf Stable	Beef/Pork—Dried Sliced W/Gra	Protein Foods			
Meat—Shelf Stable	Chicken & Dumplings	Protein Foods			
Meat—Shelf Stable	Chili: Canned	Protein Foods			
Meat—Shelf Stable	Chunk Meats—Chix/Ham/*Etc.*	Protein Foods			
Meat—Shelf Stable	Corn Beef	Protein Foods			
Meat—Shelf Stable	Hash: Canned	Protein Foods			
Meat—Shelf Stable	Hot Dog Chili Sauce	Protein Foods			
Meat—Shelf Stable	Luncheon Meat (Spam)	Protein Foods			
Meat—Shelf Stable	Misc Cnd Meats	Protein Foods			
Meat—Shelf Stable	Potted Meats And Spreads	Protein Foods			
Meat—Shelf Stable	Sandwich Sauce (Manwich)	Protein Foods			
Meat—Shelf Stable	Vienna Sausage	Protein Foods			
Meat Frozen	Frzn Meat—Beef	Protein Foods			
Meat Frozen	Frzn Meat—Breakfast Sausage	Protein Foods			
Meat Frozen	Frzn Meat—Exotic	Protein Foods			
Meat Frozen	Frzn Meat—Natural/Organic	Protein Foods			
Meat Frozen	Frzn Meat—Offals	Protein Foods			
Meat Frozen	Frzn Meat—Pork	Protein Foods			
Meat Frozen	Frzn Meat—Turkey	Protein Foods			
Meat Frozen	Meat—Misc-Misc	Protein Foods			
Meat Snacks	Jerky/Nuggets/Tenders	Protein Foods			
Meat Snacks	Meat Sticks/Bites	Protein Foods			
Nat Foods—Refrigerated Meat	Ntrn Refrig Meat: Breakfast Me	Protein Foods			
Nat Foods—Refrigerated Meat	Ntrn Refrig Meat: Hot Dogs/Sau	Protein Foods			
Nat Foods—Refrigerated Meat	Ntrn Refrig Meat: Lunchmeat	Protein Foods			
Non-Dairy/Dairy Aseptic	Nut Milk	Protein Foods			
Nuts	Almonds	Protein Foods			
Nuts	Almonds Shelled	Protein Foods			
Nuts	Almonds W/Sweetener	Protein Foods			
Nuts	Cashews	Protein Foods			
Nuts	Cashews W/Sweetener	Protein Foods			
Nuts	Dry Roast Peanuts	Protein Foods			
Nuts	Dry Roast Peanuts W/Sweetener	Protein Foods			
Nuts	Misc Snack Nuts	Protein Foods			
Nuts	Misc Snacks Nuts W/Sweetener	Protein Foods			
Nuts	Mixed Nuts	Protein Foods			
Nuts	Mixed Nuts W/Sweetener	Protein Foods			
Nuts	Nuts Inshell	Protein Foods			
Nuts	Nuts Other	Protein Foods			
Nuts	Nuts Other Organic	Protein Foods			
Nuts	Nuts Sugar Coated All	Protein Foods			
Nuts	Oil Roast Peanuts	Protein Foods			
Nuts	Oil Roast Peanuts W/Sweetener	Protein Foods			
Nuts	Peanuts All	Protein Foods			
Nuts	Pecans Shelled	Protein Foods			
Nuts	Pecans W/Sweetener	Protein Foods			
Nuts	Pistachios	Protein Foods			
Nuts	Sunflower/Other Seeds	Protein Foods			
Nuts	Sunflower/Other Seeds W/Sweete	Protein Foods			
Nuts	Trail Mix	Protein Foods			
Nuts	Walnuts Shelled	Protein Foods			
Packaged Natural Snacks	Nuts	Protein Foods			
Packaged Natural Snacks	Nuts W/Sweetener	Protein Foods			
Peanut Butter/Jelly/Jams & Honey	Peanut Butter	Protein Foods			
Pkgd Meat Corp Use	Only Pkgd Meat Corp Use Only	Protein Foods			
Pork Bone In Loin/Rib	Dry [Pork Bone In Loin/Rib]	Protein Foods			
Pork Boneless Loin/Rib	Enhanced [Pork Boneless Loin/Rib]	Protein Foods			
Pork Boneless Loin/Rib	Natural [Pork Boneless Loin/Rib]	Protein Foods			
Pork Grinds	Ground Pork	Protein Foods			
Pork Offal	External Fresh [Pork Offal]	Protein Foods			
Pork Offal	Internal Fresh [Pork Offal]	Protein Foods			
Pork Shoulder	Butts [Pork Shoulder]	Protein Foods			
Pork Shoulder	Fresh Hams	Protein Foods			
Pork Thin Meats	Kabobs [Pork]	Protein Foods			
Pork Thin Meats	Organics [Pork]	Protein Foods			
Pork Thin Meats	Ribs [Pork]	Protein Foods			
Pork Thin Meats	Stir Fry/Strips/Fajitas [Pork]	Protein Foods			
Poultry Other	Capons	Protein Foods			
Poultry Other	Cornish Hen	Protein Foods			
Poultry Other	Ducks	Protein Foods			
Poultry Other	Geese	Protein Foods			
Poultry Other	Poultry/Other	Protein Foods			
Prepared/Pdgd Foods	Meat—Can/Pouch	Protein Foods			
Processed	Beans Dried	Protein Foods			
Random Weight Meat Products	Lunch Meats	Protein Foods			
Refrigerated Dairy Case	Eggs	Protein Foods			
Refrigerated Vegetarian	Non-Dairy Cheese	Protein Foods			
Refrigerated Vegetarian	Tofu	Protein Foods			
Refrigerated Vegetarian	Vegetarian Meats	Protein Foods			

Appendix C. Crosswalk of Subcommodities to USDA Food Pattern Categories—Continued

Commodity	Subcommodity	USDA Food Pattern	SoFAS Subcategories	Composite Subcategories	Other Subcategories
Restricted Diet	Pnut Btr/Jelly	Protein Foods			
Salad & Dips	Protein Salads—Bulk	Protein Foods			
Salad & Dips	Protein Salads—Prepack	Protein Foods			
Seafood—Catfish	Catfish—Fillet	Protein Foods			
Seafood—Catfish	Catfish—Nuggets	Protein Foods			
Seafood—Catfish	Catfish—Other Form	Protein Foods			
Seafood—Catfish	Catfish—Whole	Protein Foods			
Seafood—Cod	Cod—Fillet	Protein Foods			
Seafood—Cod	Cod—Other Form	Protein Foods			
Seafood—Cod	Cod—Whole	Protein Foods			
Seafood—Crab	Crab—Dungy	Protein Foods			
Seafood—Crab	Crab—King	Protein Foods			
Seafood—Crab	Crab—Other	Protein Foods			
Seafood—Crab	Crab—Snow	Protein Foods			
Seafood—Exotic	Exotic—Mahi Mahi	Protein Foods			
Seafood—Exotic	Exotic—Other	Protein Foods			
Seafood—Exotic	Exotic—Red Snapper	Protein Foods			
Seafood—Exotic	Exotic—Shark	Protein Foods			
Seafood—Exotic	Exotic—Swordfish	Protein Foods			
Seafood—Exotic	Exotic—Tuna	Protein Foods			
Seafood—Finfish Other	Finfish—Halibut	Protein Foods			
Seafood—Finfish Other	Finfish—Other	Protein Foods			
Seafood—Finfish Other	Finfish—Other	Protein Foods			
Seafood—Finfish Other	Finfish—Rockfish	Protein Foods			
Seafood—Finfish Other	Finfish—Sole/Flounder	Protein Foods			
Seafood—Finfish Other	Finfish—Sole/Flounder	Protein Foods			
Seafood—Imitation Seafood	Imitation Crab	Protein Foods			
Seafood—Imitation Seafood	Imitation Other	Protein Foods			
Seafood—Imitation Seafood	Imitation Shrimp	Protein Foods			
Seafood—Lobster	Lobster—Live	Protein Foods			
Seafood—Lobster	Lobster—Meat	Protein Foods			
Seafood—Lobster	Lobster—Other Form	Protein Foods			
Seafood—Lobster	Lobster—Tails	Protein Foods			
Seafood—Oyster	Oyster—Bulk	Protein Foods			
Seafood—Oyster	Oyster—Cup (Packaged)	Protein Foods			
Seafood—Oyster	Oyster—Cup (Packaged)	Protein Foods			
Seafood—Party Trays	Party Tray—Shrimp	Protein Foods			
Seafood—Salmon-Farm Raised	Salmon Fr—Altantic	Protein Foods			
Seafood—Salmon-Farm Raised	Salmon Fr—Other Form	Protein Foods			
Seafood—Salmon-Farm Raised	Salmon Fr—Atlantic	Protein Foods			
Seafood—Salmon-Farm Raised	Salmon Fr—Coho	Protein Foods			
Seafood—Salmon-Farm Raised	Salmon Fr—King	Protein Foods			
Seafood—Salmon-Farm Raised	Seafood—Fre-Catfish	Protein Foods			
Seafood—Salmon-Farm Raised	Seafood—Fre-Misc	Protein Foods			
Seafood—Salmon-Farm Raised	Seafood—Fre-Raw Finfish—Other	Protein Foods			
Seafood—Salmon-Wild Caught	Salmon Wc—Other Form	Protein Foods			
Seafood—Salmon-Wild Caught	Salmon Wc—Coho	Protein Foods			
Seafood—Salmon-Wild Caught	Salmon Wc—King	Protein Foods			
Seafood—Salmon-Wild Caught	Salmon Wc—Pink	Protein Foods			
Seafood—Salmon-Wild Caught	Salmon Wc—Silverbrite	Protein Foods			
Seafood—Salmon-Wild Caught	Salmon Wc—Silverbrite	Protein Foods			
Seafood—Salmon-Wild Caught	Salmon Wc—Sockeye	Protein Foods			
Seafood—Scallops	Scallops—Bay	Protein Foods			
Seafood—Scallops	Scallops—Sea	Protein Foods			
Seafood—Shellfish Other	Shellfish—Clams	Protein Foods			
Seafood—Shellfish Other	Shellfish—Clams	Protein Foods			
Seafood—Shellfish Other	Shellfish—Mussels	Protein Foods			
Seafood—Shellfish Other	Shellfish—Other	Protein Foods			
Seafood—Shrimp	Shrimp—Cooked	Protein Foods			
Seafood—Shrimp	Shrimp—Natural/Organic	Protein Foods			
Seafood—Shrimp	Shrimp—Raw	Protein Foods			
Seafood—Smoked Seafood	Smoked Other	Protein Foods			
Seafood—Smoked Seafood	Smoked Salmon	Protein Foods			
Seafood—Tilapia	Tilapia—Fillet	Protein Foods			
Seafood—Tilapia	Tilapia—Other Form	Protein Foods			
Seafood—Tilapia	Tilapia—Whole	Protein Foods			
Seafood—Trout	Steelhead Fr	Protein Foods			
Seafood—Trout	Trout—Fillet	Protein Foods			
Seafood—Trout	Trout—Whole	Protein Foods			
Seafood—Value-Added Seafood	Value-Added Catfish	Protein Foods			
Seafood—Value-Added Seafood	Value-Added In-Store Cooked Ho	Protein Foods			
Seafood—Value-Added Seafood	Value-Added Breaded Shrimp	Protein Foods			
Seafood—Value-Added Seafood	Value-Added Crab	Protein Foods			
Seafood—Value-Added Seafood	Value-Added Finfish	Protein Foods			
Seafood—Value-Added Seafood	Value-Added In-Store Cooked Co	Protein Foods			
Seafood—Value-Added Seafood	Value-Added Kabobs	Protein Foods			
Seafood—Value-Added Seafood	Value-Added Other	Protein Foods			
Seafood—Value-Added Seafood	Value-Added Salmon	Protein Foods			
Seafood—Value-Added Seafood	Value-Added Shrimp	Protein Foods			
Seafood—Value-Added Seafood	Value-Added Tilapia	Protein Foods			
Seafood—Salad/Dips/Sce/Cond	Herring	Protein Foods			
Service Case Meat	Cooked	Protein Foods			
Service Case Meat	Ingredients	Protein Foods			
Service Case Meat	Kabobs Beef	Protein Foods			
Service Case Meat	Kabobs Pork	Protein Foods			
Service Case Meat	Kabobs Poultry	Protein Foods			
Service Case Meat	Marinated Beef	Protein Foods			
Service Case Meat	Marinated Pork	Protein Foods			
Service Case Meat	Marinated Poultry	Protein Foods			
Service Case Meat	Seasoned	Protein Foods			
Service Case Meat	Seasoned Beef	Protein Foods			
Service Case Meat	Seasoned Pork	Protein Foods			
Service Case Meat	Seasoned Poultry	Protein Foods			
Service Case Meat	Stuffed/Mixed Beef	Protein Foods			
Service Case Meat	Stuffed/Mixed Pork	Protein Foods			
Service Case Meat	Stuffed/Mixed Poultry	Protein Foods			
Smoked Hams	Hams—Canned	Protein Foods			
Smoked Hams	Hams—Dry Cured/Country	Protein Foods			
Smoked Hams	Hams—Half/Port Bone-In	Protein Foods			
Smoked Hams	Hams—Half/Port Boneless	Protein Foods			
Smoked Hams	Hams—Spiral	Protein Foods			

Appendix C. Crosswalk of Subcommodities to USDA Food Pattern Categories—Continued

Commodity	Subcommodity	USDA Food Pattern	SoFAS Subcategories	Composite Subcategories	Other Subcategories
Smoked Hams	Hams—Whole Bone-In	Protein Foods			
Smoked Hams	Hams—Whole Boneless	Protein Foods			
Smoked Pork	Bacon—Belly/Jowl	Protein Foods			
Smoked Pork	Ham Steaks/Cubes/Slices	Protein Foods			
Smoked Pork	Smoked Chops Bone-In [Pork]	Protein Foods			
Smoked Pork	Smoked Chops Boneless [Pork]	Protein Foods			
Smoked Pork	Smoked Offal [Pork]	Protein Foods			
Smoked Pork	Smoked Picnics [Pork]	Protein Foods			
Snack Meat	Grnd/Patty—Chuck	Protein Foods			
Snack Meat	Snack Meat—Other	Protein Foods			
Snack Meat	Snack Meat—Pepperoni	Protein Foods			
Snack Meat	Snack Meat—Salami/Smr Sausag	Protein Foods			
Snacks	Snacks: Deli Nuts	Protein Foods			
Ss/Vending—Salty Snacks	Tube Nuts	Protein Foods			
Ss/Vending—Salty Snacks	Tube Nuts W/Sweetener	Protein Foods			
Turkey Fresh	Turkey Legs	Protein Foods			
Turkey Fresh	Whole Hen (Under 16lbs) [Turkey]	Protein Foods			
Turkey Fresh	Whole Tom (Over 16lbs) [Turkey]	Protein Foods			
Turkey Frozen	Turkey Breast Bone In	Protein Foods			
Turkey Frozen	Turkey Breast Boneless	Protein Foods			
Turkey Frozen	Turkey Halves/Quarters	Protein Foods			
Turkey Frozen	Turkey Thighs	Protein Foods			
Turkey Frozen	Whole Hens (Under 16lbs) [Turkey]	Protein Foods			
Turkey Frozen	Whole Toms (Over 16lbs) [Turkey]	Protein Foods			
Turkey Grinds	Ground Turkey	Protein Foods			
Turkey Offal	External [Turkey Offal]	Protein Foods			
Turkey Offal	Internal [Turkey Offal]	Protein Foods			
Turkey Organic	Whole Hens (Under 15lbs) [Turkey]	Protein Foods			
Turkey Organic	Whole Toms (Over 15lbs) [Turkey]	Protein Foods			
Turkey Smoked	Turkey Drums	Protein Foods			
Turkey Smoked	Turkey Wings	Protein Foods			
Turkey Specialty Natural	Whole Hens (Under 15lbs) [Turkey]	Protein Foods			
Turkey Specialty Natural	Whole Toms (Over 15lbs) [Turkey]	Protein Foods			
Unknown	Beef—Boneless-Choice	Protein Foods			
Unknown	Beef—Grinds	Protein Foods			
Unknown	Breast—Bone-In (Frz)	Protein Foods			
Unknown	Frozen Burgers	Protein Foods			
Unknown	Frozen Meat	Protein Foods			
Unknown	Frozen Meat (Vegetarian)	Protein Foods			
Unknown	Ham—Bone-In Whole	Protein Foods			
Unknown	Ham—Boneless Half/Port	Protein Foods			
Unknown	Marinated	Protein Foods			
Unknown	Meal Sol—Precooked Meats	Protein Foods			
Unknown	Meal Sol—Raw Frthr Preprd Mt	Protein Foods			
Unknown	Meat Frz—Misc	Protein Foods			
Unknown	Seafood—Frz—Rw—All	Protein Foods			
Unknown	Smkd Ham Country—All	Protein Foods			
Unknown	Turkey—Grinds	Protein Foods			
Unknown	Turkey—Other Parts/Pieces—Fre	Protein Foods			
Unknown	Whole—Tom (16 Lbs & Over Frz	Protein Foods			
Veal	Whole/Half [Veal]	Protein Foods			
Nuts	Pecans	Protein Foods			
Authentic Hispanic Fds & Product	Authentic Peppers	Vegetables			
Authentic Hispanic Fds & Product	Authentic Sauces/Salsa/Picante	Vegetables			
Authentic Hispanic Fds & Product	Authentic Vegetables And Foods	Vegetables			
Authentic Italian Foods	Italian Vegetables	Vegetables			
Broccoli/Cauliflower	Brocco—Flower	Vegetables			
Broccoli/Cauliflower	Broccoli Whole & Crowns Organi	Vegetables			
Broccoli/Cauliflower	Broccoli Whole&Crowns	Vegetables			
Broccoli/Cauliflower	Cauliflower Whole	Vegetables			
Broccoli/Cauliflower	Cauliflower Whole Organic	Vegetables			
Can Vegetables—Shelf Stable	Artichokes	Vegetables			
Can Vegetables—Shelf Stable	Beans/Wax/Shellies	Vegetables			
Can Vegetables—Shelf Stable	Beets	Vegetables			
Can Vegetables—Shelf Stable	Carrots	Vegetables			
Can Vegetables—Shelf Stable	Corn	Vegetables			
Can Vegetables—Shelf Stable	Fried Onions	Vegetables			
Can Vegetables—Shelf Stable	Green Beans: Fs/Whl/Cut	Vegetables			
Can Vegetables—Shelf Stable	Hominy	Vegetables			
Can Vegetables—Shelf Stable	Kraut & Cabbage	Vegetables			
Can Vegetables—Shelf Stable	Lima Beans	Vegetables			
Can Vegetables—Shelf Stable	Miscellaneous Vegetables	Vegetables			
Can Vegetables—Shelf Stable	Mixed Vegetables	Vegetables			
Can Vegetables—Shelf Stable	Mushrooms Cnd & Glass	Vegetables			
Can Vegetables—Shelf Stable	Peas & Onions/Peas & Carrot	Vegetables			
Can Vegetables—Shelf Stable	Peas Fresh Pack/Crowder	Vegetables			
Can Vegetables—Shelf Stable	Peas/Green	Vegetables			
Can Vegetables—Shelf Stable	Pimentos	Vegetables			
Can Vegetables—Shelf Stable	Salads Cnd (Bean/Potato)	Vegetables			
Can Vegetables—Shelf Stable	Spinach & Greens	Vegetables			
Can Vegetables—Shelf Stable	Squash	Vegetables			
Can Vegetables—Shelf Stable	Sweet Potatoes	Vegetables			
Can Vegetables—Shelf Stable	White Potatoes	Vegetables			
Carrots	Carrots—Bulk	Vegetables			
Carrots	Carrots Bagged	Vegetables			
Carrots	Carrots Bagged Organic	Vegetables			
Carrots	Carrots Bulk Organic	Vegetables			
Carrots	Carrots Mini Peeled	Vegetables			
Carrots	Carrots Mini Peeled Organic	Vegetables			
Condiments	Salsa/Dips	Vegetables			
Convenience/Snacking	Convenience/Snacking Organic	Vegetables			
Convenience/Snacking	Convenience/Snacking Vegetable	Vegetables			
Corn	Corn Bulk	Vegetables			
Corn	Corn Is Packaged	Vegetables			
Corn	Corn Organic	Vegetables			
Corn	Corn Packaged	Vegetables			
Corn	Corn White	Vegetables			
Dry Sauce/Gravy/Potatoes/Stuffing	Potatoes: Dry	Vegetables			

Appendix C. Crosswalk of Subcommodities to USDA Food Pattern Categories—Continued

Commodity	Subcommodity	USDA Food Pattern	SoFAS Subcategories	Composite Subcategories	Other Subcategories
Frozen Potatoes	Frzn Baked/Stuffed/Mashed & Spec	Vegetables			
Frozen Potatoes	Frzn French Fries	Vegetables			
Frozen Potatoes	Frzn Hashbrown Potatoes	Vegetables			
Frozen Potatoes	Frzn Onion Rings	Vegetables			
Frozen Potatoes	Frzn Tater Tots/Other Extruded	Vegetables			
Frozen Vegetable & Veg Dish	Frzn Breaded Vegetables	Vegetables			
Frozen Vegetable & Veg Dish	Frzn Corn On The Cob	Vegetables			
Frozen Vegetable & Veg Dish	Frzn Organic Vegetables	Vegetables			
Frozen Vegetable & Veg Dish	Frzn Steamable Vegetables	Vegetables			
Frozen Vegetable & Veg Dish	Fz Bag Vegetables—Plain	Vegetables			
Frozen Vegetable & Veg Dish	Fz Bag Vegetables—Value-Added	Vegetables			
Frozen Vegetable & Veg Dish	Fz Box Vegetables—Plain	Vegetables			
Frozen Vegetable & Veg Dish	Fz Box Vegetables—Value-Added	Vegetables			
Frozen Vegetables And Potatoes	Bag Vegetables	Vegetables			
Frozen Vegetables And Potatoes	Box Vegetables	Vegetables			
Frozen Vegetables And Potatoes	Edamame	Vegetables			
Frozen Vegetables And Potatoes	Potatoes	Vegetables			
Fruit & Veg Plants (Outdoor)	Herbs (Outdoor)	Vegetables			
Fruit & Veg Plants (Outdoor)	Vegetable	Vegetables			
Herbs/Garlic	Garlic Whole Cloves	Vegetables			
Herbs/Garlic	Garlic Whole Cloves Organic	Vegetables			
Herbs/Garlic	Herbs Basil	Vegetables			
Herbs/Garlic	Herbs Basil Organic	Vegetables			
Herbs/Garlic	Herbs Cilanto	Vegetables			
Herbs/Garlic	Herbs Cilantro Organic	Vegetables			
Herbs/Garlic	Herbs Fresh Other	Vegetables			
Herbs/Garlic	Herbs Fresh Other Organic	Vegetables			
Herbs/Garlic	Herbs Parsley	Vegetables			
Herbs/Garlic	Herbs Parsley Organic	Vegetables			
Herbs/Garlic	Sprouts	Vegetables			
Kosher Foods And Products	Kosher Potato Vegetable	Vegetables			
Mushrooms	Mushrooms Dried	Vegetables			
Mushrooms	Mushrooms Other	Vegetables			
Mushrooms	Mushrooms Others Organic	Vegetables			
Mushrooms	Mushrooms Portabella	Vegetables			
Mushrooms	Mushrooms White Bulk	Vegetables			
Mushrooms	Mushrooms White Sliced Pkg	Vegetables			
Mushrooms	Mushrooms White Whole Pkg	Vegetables			
Mushrooms	Mushrooms White Whole Pkg Organic	Vegetables			
Onions	Onions Gourmet	Vegetables			
Onions	Onions Other	Vegetables			
Onions	Onions Other Organic	Vegetables			
Onions	Onions Red (Bulk & Bag)	Vegetables			
Onions	Onions Sweet (Bulk & Bag)	Vegetables			
Onions	Onions White (Bulk & Bag)	Vegetables			
Onions	Onions Yellow (Bulk & Bag)	Vegetables			
Organics Fruit & Vegetables	Organic Broccoli/Cauliflower	Vegetables			
Organics Fruit & Vegetables	Organic Fruit/Veg Instore Proc	Vegetables			
Organics Fruit & Vegetables	Organic Other	Vegetables			
Organics Fruit & Vegetables	Organic Processed	Vegetables			
Organics Fruit & Vegetables	Organic Salad Mix	Vegetables			
Organics Fruit & Vegetables	Organic Value-Added Vegetables	Vegetables			
Organics Fruit & Vegetables	Organic Vegetables Salad	Vegetables			
Pasta & Pizza Sauce	Mainstream [Pasta & Pizza Sauce]	Vegetables			
Pasta & Pizza Sauce	Pizza Sauce	Vegetables			
Pasta & Pizza Sauce	Specialty Italian Sauce	Vegetables			
Pasta & Pizza Sauce	Value [Pasta & Pizza Sauce]	Vegetables			
Peppers	Peppers All Other	Vegetables			
Peppers	Peppers All Others Organic	Vegetables			
Peppers	Peppers Green Bell	Vegetables			
Peppers	Peppers Green Bell Organic	Vegetables			
Peppers	Peppers Jalapeño	Vegetables			
Peppers	Peppers Mini Sweet Packaged	Vegetables			
Peppers	Peppers Other Bell	Vegetables			
Peppers	Peppers Other Bell Organic	Vegetables			
Peppers	Peppers Red Bell	Vegetables			
Peppers	Peppers Red Bell Organic	Vegetables			
Peppers	Peppers Serrano	Vegetables			
Peppers	Peppers Yellow Bell	Vegetables			
Peppers	Peppers Yellow Bell Organic	Vegetables			
Potatoes	Potatoes Gold (Bulk & Bag)	Vegetables			
Potatoes	Potatoes Gourmet	Vegetables			
Potatoes	Potatoes Other	Vegetables			
Potatoes	Potatoes Other Organic	Vegetables			
Potatoes	Potatoes Red (Bulk & Bag)	Vegetables			
Potatoes	Potatoes Russet (Bulk & Bag)	Vegetables			
Potatoes	Potatoes Sweet&Yams	Vegetables			
Potatoes	Potatoes White (Bulk & Bag)	Vegetables			
Prepared/Pdgd Foods	Vegetables/Dry Beans	Vegetables			
Processed	Jarred Vegetables	Vegetables			
Refrigerated Italian	Refrigerated Pasta Sauce	Vegetables			
Salad & Dips	Sal: Hommus	Vegetables			
Salad & Dips	Sal: Salsa/Dips Bulk	Vegetables			
Salad & Dips	Sal: Salsa Prepack	Vegetables			
Salad & Dips	Salad Bar	Vegetables			
Salad & Dips	Salad: Ingredients	Vegetables			
Salad & Dips	Salad: Lettuce	Vegetables			
Salad & Dips	Vegetable Salads—Bulk	Vegetables			
Salad & Dips	Vegetable Salads—Prepack	Vegetables			
Salad Bar	Processed Salad	Vegetables			
Salad Mix	Blends [Salad Mix]	Vegetables			
Salad Mix	Coleslaw	Vegetables			
Salad Mix	Garden Plus [Salad Mix]	Vegetables			
Salad Mix	Kits [Salad Mix]	Vegetables			
Salad Mix	Regular Garden [Salad Mix]	Vegetables			
Salad Mix	Salad Bowls	Vegetables			
Salad Mix	Salad Mix Blends Organic	Vegetables			
Salad Mix	Salad Mix Kits Organic	Vegetables			
Salad Mix	Salad Mix Other	Vegetables			

Appendix C. Crosswalk of Subcommodities to USDA Food Pattern Categories—Continued

Commodity	Subcommodity	USDA Food Pattern	SoFAS Subcategories	Composite Subcategories	Other Subcategories
Salad Mix	Salad Spinach	Vegetables			
Salad Mix	Salad Spinach Organic	Vegetables			
Salad Mix	Shredded Lettuce	Vegetables			
Seasonal	Pumpkins	Vegetables			
Shelf Stable Juice	Tomato Juice (50% And Under)	Vegetables			
Shelf Stable Juice	Tomato Juice (Over 50% Juice)	Vegetables			
Shelf Stable Juice	Veg Juice (Except Tomato) (50% And Under)	Vegetables			
Shelf Stable Juice	Veg Juice (Except Tomato) (Over 50% Juice)	Vegetables			
Snack	Salsa	Vegetables			
Spices/Jarred Garlic	Garlic Jar	Vegetables			
Spices/Jarred Garlic	Garlic Jar Organic	Vegetables			
Spices/Jarred Garlic	Herbs Dried	Vegetables			
Spices/Jarred Garlic	Herbs Squeeze Tube Organic	Vegetables			
Spices/Jarred Garlic	Peppers Dried	Vegetables			
Tomato Products—Shelf	Tomato Stewed	Vegetables			
Tomato Products—Shelf Stable	Tomato Paste	Vegetables			
Tomato Products—Shelf Stable	Tomatoes Diced	Vegetables			
Tomato Products—Shelf Stable	Tomato Crushed	Vegetables			
Tomato Products—Shelf Stable	Tomato Puree	Vegetables			
Tomato Products—Shelf Stable	Tomato Sauce	Vegetables			
Tomato Products—Shelf Stable	Tomato Sun Dried	Vegetables			
Tomato Products—Shelf Stable	Tomatoes/Whole	Vegetables			
Tomatoes	Roma Tomatoes (Bulk/Pkg)	Vegetables			
Tomatoes	Tomatoes Cherry	Vegetables			
Tomatoes	Tomatoes Cherry Organic	Vegetables			
Tomatoes	Tomatoes Cocktail	Vegetables			
Tomatoes	Tomatoes Grape	Vegetables			
Tomatoes	Tomatoes Grape Organic	Vegetables			
Tomatoes	Tomatoes Hot House Bulk	Vegetables			
Tomatoes	Tomatoes Hothouse On The Vine	Vegetables			
Tomatoes	Tomatoes Hothouse Pkg	Vegetables			
Tomatoes	Tomatoes Others Organic	Vegetables			
Tomatoes	Tomatoes Snacking Colored	Vegetables			
Tomatoes	Tomatoes Vine Ripe Bulk	Vegetables			
Tomatoes	Tomatoes Vine Ripe Pkg	Vegetables			
Tomatoes	Tomatoes—Other	Vegetables			
Traditional Asian Foods	Asian Vegetables	Vegetables			
Traditional Mexican Foods	Mexican Beans/Refried	Vegetables			
Traditional Mexican Foods	Mexican Enchilada Sauce	Vegetables			
Traditional Mexican Foods	Mexican Peppers Chilies	Vegetables			
Traditional Mexican Foods	Mexican Sauces And Picante Sau	Vegetables			
Tropical Fruit	Avocado	Vegetables			
Tropical Fruit	Avocado Organic	Vegetables			
Unknown	Frozen Vegetables	Vegetables			
Value-Added Vegetables	Celery Chopped/Sticks	Vegetables			
Value-Added Vegetables	Cut Vegetables All Other	Vegetables			
Value-Added Vegetables	Instore Cut Vegetables	Vegetables			
Value-Added Vegetables	Onions Processed	Vegetables			
Value-Added Vegetables	Vegetable Party Tray	Vegetables			
Vegetables Cooking Bulk	Asparagus	Vegetables			
Vegetables Cooking Bulk	Beans	Vegetables			
Vegetables Cooking Bulk	Beans Organic	Vegetables			
Vegetables Cooking Bulk	Cabbage	Vegetables			
Vegetables Cooking Bulk	Cabbage Organic	Vegetables			
Vegetables Cooking Bulk	Celery	Vegetables			
Vegetables Cooking Bulk	Celery Organic	Vegetables			
Vegetables Cooking Bulk	Greens Bulk	Vegetables			
Vegetables Cooking Bulk	Greens Bulk Organic	Vegetables			
Vegetables Cooking Bulk	Hard Squash	Vegetables			
Vegetables Cooking Bulk	Organic Vegetables All Others	Vegetables			
Vegetables Cooking Bulk	Squash Other	Vegetables			
Vegetables Cooking Bulk	Squash Other Organic	Vegetables			
Vegetables Cooking Bulk	Vegetables All Other	Vegetables			
Vegetables Cooking Packaged	Vegetables Cooking Packaged Organic				
Vegetables Cooking Packaged	Broccoli/Cauliflower Processed	Vegetables			
Vegetables Cooking Packaged	Potatoes/Onions Processed	Vegetables			
Vegetables Cooking Packaged	Vegetables Cooking Packaged	Vegetables			
Vegetables Salad	Cucumbers	Vegetables			
Vegetables Salad	Cucumbers Organic	Vegetables			
Vegetables Salad	Green Onions	Vegetables			
Vegetables Salad	Green Onions Organic	Vegetables			
Vegetables Salad	Head Lettuce	Vegetables			
Vegetables Salad	Head Lettuce Organic	Vegetables			
Vegetables Salad	Radish	Vegetables			
Vegetables Salad	Radishes Organic	Vegetables			
Vegetables Salad	Spinach Bulk	Vegetables			
Vegetables Salad	Spring Mix Bulk	Vegetables			
Vegetables Salad	Variety Lettuce	Vegetables			
Vegetables Salad	Variety Lettuce Organic	Vegetables			
Authentic Italian Foods	Italian Oils And Dressings	Oils			
Deli Specialties (Retail Pk)	Dl Spec: Sauces/Sld Dressings	Oils			
Dressings/Dips	Dressing Blue Cheese	Oils			
Dressings/Dips	Dressing Cole Slaw	Oils			
Dressings/Dips	Dressing Creamy	Oils			
Dressings/Dips	Dressing Ginger	Oils			
Dressings/Dips	Dressing Organics	Oils			
Dressings/Dips	Dressing Vinegarette	Oils			
Dressings/Dips	Dressing Yogurt Based	Oils			
Margarines	Margarine: Squeeze	Oils			
Margarines	Margarine: Tubs And Bowls	Oils			
Processed	Dressings	Oils			
Salad Dresing & Sandwich Spreads	Mayonnaise & Whipped Dressing	Oils			
Salad Dresing & Sandwich Spreads	Pourable Salad Dressings	Oils			
Salad Dresing & Sandwich Spreads	Sand/Horseradish & Tartar Sauce	Oils			
Shortening & Oil	Canola Oils	Oils			

Appendix C. Crosswalk of Subcommodities to USDA Food Pattern Categories—Continued

Commodity	Subcommodity	USDA Food Pattern	SoFAS Subcategories	Composite Subcategories	Other Subcategories
Shortening & Oil	Cooking Oil: Peanut/Safflower	Oils			
Shortening & Oil	Cooking Sprays	Oils			
Shortening & Oil	Corn Oil	Oils			
Shortening & Oil	Misc Oils	Oils			
Shortening & Oil	Olive Oil	Oils			
Shortening & Oil	Vegetable Oil	Oils			
Aseptic Juice	Aseptic Pack Juice And Drinks	Solid Fats & Added Sugar	sweetened beverage		
Aseptic Juice	Aseptic Pack Juice And Drinks	Solid Fats & Added Sugar	sweetened beverage		
Aseptic Juice	Aseptic Pack Juice And Drinks	Solid Fats & Added Sugar	sweetened beverage		
Authentic Central American Fds	Central American Candy W/O Flour	Solid Fats & Added Sugar	candy/sweet		
Authentic Central American Fds	Central American Carbonated Bev	Solid Fats & Added Sugar	sweetened beverage		
Authentic Hispanic Fds & Product	Hispanic Carbonated Beverages	Solid Fats & Added Sugar	sweetened beverage		
Authentic Hispanic Fds & Product	Authentic Dry Beverages W/Sweetener	Solid Fats & Added Sugar	sweetened beverage		
Authentic Hispanic Fds & Product	Hispanic Juice Under 50% Juice	Solid Fats & Added Sugar	sweetened beverage		
Authentic South American Fds	South American Candy W/O Flour	Solid Fats & Added Sugar	candy/sweet		
Bag Snacks	Pork Skins/Cracklins	Solid Fats & Added Sugar	butter/cream/solid fat		
Bagels & Cream Cheese	Cream Cheese	Solid Fats & Added Sugar	butter/cream/solid fat		
Baking	Chocolate Chips & Bars (Sweete)	Solid Fats & Added Sugar	candy/sweet		
Baking Mixes	Frosting	Solid Fats & Added Sugar	candy/sweet		
Baking Needs	Coconut [Baking Needs]	Solid Fats & Added Sugar	butter/cream/solid fat		
Baking Needs	Marshmallow Crème	Solid Fats & Added Sugar	candy/sweet		
Baking Needs	Marshmallows	Solid Fats & Added Sugar	candy/sweet		
Beverages	Can/Btl Carb Beve 50% And Under	Solid Fats & Added Sugar	sweetened beverage		
Beverages	Can/Btl N/Carb Beve 50% And Under	Solid Fats & Added Sugar	sweetened beverage		
Beverages	Tea (Canned/Bottled) W/Sweetener	Solid Fats & Added Sugar	sweetened beverage		
Bulk Food	Candy Bulk	Solid Fats & Added Sugar	candy/sweet		
Bulk Food	Candy Bulk W/Flour	Solid Fats & Added Sugar	candy/sweet		
Cake Décor	Cake Décors—Candies	Solid Fats & Added Sugar	candy/sweet		
Cake Décor	Cake Décors & Icing	Solid Fats & Added Sugar	candy/sweet		
Candy	Candy W/Flour	Solid Fats & Added Sugar	candy/sweet		
Candy	Candy/Chocolate	Solid Fats & Added Sugar	candy/sweet		
Candy—Checklane	Candy Bars (Singles) (Including)	Solid Fats & Added Sugar	candy/sweet		
Candy—Checklane	Candy Bars (Singles) (Including)	Solid Fats & Added Sugar	candy/sweet		
Candy—Checklane	Chewing Gum	Solid Fats & Added Sugar	candy/sweet		
Candy—Checklane	Mints/Candy & Breath (Not Life-savers)	Solid Fats & Added Sugar	candy/sweet		
Candy—Checklane	Mints/Candy & Breath (Not Life-savers)	Solid Fats & Added Sugar	candy/sweet		
Candy—Checklane	Misc Checklane Candy	Solid Fats & Added Sugar	candy/sweet		
Candy—Packaged	Bulk Candy	Solid Fats & Added Sugar	candy/sweet		
Candy—Packaged	Bulk Candy W/Flour	Solid Fats & Added Sugar	candy/sweet		
Candy—Packaged	Candy & Breath Mints (Pkgd)	Solid Fats & Added Sugar	candy/sweet		
Candy—Packaged	Candy & Breath Mints (Pkgd)	Solid Fats & Added Sugar	candy/sweet		
Candy—Packaged	Candy Bags—Chocolate	Solid Fats & Added Sugar	candy/sweet		
Candy—Packaged	Candy Bags—Chocolate W/Flour	Solid Fats & Added Sugar	candy/sweet		
Candy—Packaged	Candy Bags—Non Chocolate	Solid Fats & Added Sugar	candy/sweet		
Candy—Packaged	Candy Bags—Non Chocolate W/Flour	Solid Fats & Added Sugar	candy/sweet		
Candy—Packaged	Candy Bars (Multi Pack)	Solid Fats & Added Sugar	candy/sweet		
Candy—Packaged	Candy Bars Multi Pack W/Flour	Solid Fats & Added Sugar	candy/sweet		
Candy—Packaged	Candy Box Non-Chocolate	Solid Fats & Added Sugar	candy/sweet		
Candy—Packaged	Candy Box Non-Chocolate W/Flour	Solid Fats & Added Sugar	candy/sweet		
Candy—Packaged	Candy Boxed Chocolates	Solid Fats & Added Sugar	candy/sweet		
Candy—Packaged	Candy Boxed Chocolates W/Flour	Solid Fats & Added Sugar	candy/sweet		
Candy—Packaged	Candy Refrigerated	Solid Fats & Added Sugar	candy/sweet		
Candy—Packaged	Gum (Packaged)	Solid Fats & Added Sugar	candy/sweet		
Candy—Packaged	Hispanic Candy	Solid Fats & Added Sugar	candy/sweet		

Appendix C. Crosswalk of Subcommodities to USDA Food Pattern Categories—Continued

Commodity	Subcommodity	USDA Food Pattern	SoFAS Subcategories	Composite Subcategories	Other Subcategories
Candy—Packaged	Miscellaneous Candy	Solid Fats & Added Sugar	candy/sweet		
Candy—Packaged	Miscellaneous Candy	Solid Fats & Added Sugar	candy/sweet		
Candy—Packaged	Novelty Candy	Solid Fats & Added Sugar	candy/sweet		
Candy—Packaged	Novelty Candy W/Flour	Solid Fats & Added Sugar	candy/sweet		
Candy—Packaged	Novelty Candy—Taxable	Solid Fats & Added Sugar	candy/sweet		
Candy—Packaged	Seasonal Candy Bags Non-Chocolate	Solid Fats & Added Sugar	candy/sweet		
Candy—Packaged	Seasonal Candy Bags Non-Chocolate	Solid Fats & Added Sugar	candy/sweet		
Candy—Packaged	Seasonal Candy Bags—Chocolate	Solid Fats & Added Sugar	candy/sweet		
Candy—Packaged	Seasonal Candy Bags—Chocolate	Solid Fats & Added Sugar	candy/sweet		
Candy—Packaged	Seasonal Candy Box Non-Chocolate	Solid Fats & Added Sugar	candy/sweet		
Candy—Packaged	Seasonal Candy Box Non-Chocolate	Solid Fats & Added Sugar	candy/sweet		
Candy—Packaged	Seasonal Candy Box—Chocolate	Solid Fats & Added Sugar	candy/sweet		
Candy—Packaged	Seasonal Candy Box—Chocolate W/Flour	Solid Fats & Added Sugar	candy/sweet		
Candy—Packaged	Seasonal Miscellaneous [Candy]	Solid Fats & Added Sugar	candy/sweet		
Candy—Packaged	Seasonal Miscellaneous W/Flour	Solid Fats & Added Sugar	candy/sweet		
Cocoa Mixes	Hot Chocolate/Cocoa Mix	Solid Fats & Added Sugar	sweetened beverage		
Cocoa Mixes	Malted Mlk/Syrup/Pwdrs (Eggnog)	Solid Fats & Added Sugar	sweetened beverage		
Coffee & Creamers	Coffee Sweeteners	Solid Fats & Added Sugar	sweetened beverage		
Coffee & Creamers	Non Dairy Creamer	Solid Fats & Added Sugar	sweetened beverage		
Coffee Shop Sweet Goods & Rtl	Coffee Shop: Candy	Solid Fats & Added Sugar	candy/sweet		
Condiments	Honey/Syrup	Solid Fats & Added Sugar	candy/sweet		
Condiments	Jellies/Preserves/Apple Butter	Solid Fats & Added Sugar	candy/sweet		
Deli Specialties (Retail Pk)	Dl Spec: Jellies/Toppings	Solid Fats & Added Sugar	Sugar candy/sweet		
Dressings/Dips	Dips Caramel/Fruit Glazes	Solid Fats & Added Sugar	candy/sweet		
Dressings/Dips	Dips Fruit And Chocolate	Solid Fats & Added Sugar	candy/sweet		
Dry Mix	Desserts Topping Mixes/Whip Topping	Solid Fats & Added Sugar	butter/cream/solid fat		
Dry Tea/Coffee/Coco Mixes	Coco Mix	Solid Fats & Added Sugar	sweetened beverage		
Dry Tea/Coffee/Coco Mixes	Tea Concentrate W/Sweetener/Su	Solid Fats & Added Sugar	sweetened beverage		
Dry Tea/Coffee/Coco Mixes	Tea Rtd With Sweetener/Sugar	Solid Fats & Added Sugar	sweetened beverage		
Energy Drinks	Energy Drink—Multi-Pack	Solid Fats & Added Sugar	sweetened beverage		
Energy Drinks	Energy Drink—Multi-Pack (Non)	Solid Fats & Added Sugar	sweetened beverage		
Energy Drinks	Energy Drink—Single Serve	Solid Fats & Added Sugar	sweetened beverage		
Energy Drinks	Energy Drink—Single Serve	Solid Fats & Added Sugar	sweetened beverage		
European Foods	British Carbonated Beverages	Solid Fats & Added Sugar	sweetened beverage		
European Foods	European Carbonated Beverages	Solid Fats & Added Sugar	sweetened beverage		
Fluid Milk Products	Refrigerated Coffee Creamers	Solid Fats & Added Sugar	butter/cream/solid fat		
Fluid Milk Products	Whipping Cream	Solid Fats & Added Sugar	butter/cream/solid fat		
Frozen Breakfast Foods	Frzn Non-Dairy Creamers	Solid Fats & Added Sugar	butter/cream/solid fat		
Frozen Juice And Smoothies	Cocktail Mixes-Frz	Solid Fats & Added Sugar	sweetened beverage		
Frozen Juice And Smoothies	Frzn Conc Under 50% Juice	Solid Fats & Added Sugar	sweetened beverage		
Frozen Juice And Smoothies	Frzn Fruit Drinks (Under 10% J)	Solid Fats & Added Sugar	sweetened beverage		
Frozen Whipped Topping	Frzn Whipped Topping	Solid Fats & Added Sugar	butter/cream/solid fat		
Gift & Fruit Baskets	Candy Arrangements Food Only	Solid Fats & Added Sugar	candy/sweet		
Juice	Drinks—Carb Juice (Under 50%)	Solid Fats & Added Sugar	sweetened beverage		
Juice	Non-Carb Jce (Under 50% Juice)	Solid Fats & Added Sugar	sweetened beverage		
Juices Super Premium	Juices (50% And Under Juice)	Solid Fats & Added Sugar	sweetened beverage		
Juices Super Premium	Juices Organic (50% And Under)	Solid Fats & Added Sugar	sweetened beverage		
Juices Super Premium	Juices Smoothies/Blended	Solid Fats & Added Sugar	sweetened beverages		
Juices Super Premium	Juices Superfoods/Enhanced	Solid Fats & Added Sugar	sweetened beverages		
Juices Super Premium	Juices/Smoothies Instore Produ	Solid Fats & Added Sugar	sweetened beverages		
Kosher Foods And Products	Kosher Beverage	Solid Fats & Added Sugar	sweetened beverages		

Appendix C. Crosswalk of Subcommodities to USDA Food Pattern Categories—Continued

Commodity	Subcommodity	USDA Food Pattern	SoFAS Subcategories	Composite Subcategories	Other Subcategories
Kosher Foods And Products	Kosher Candy	Solid Fats & Added Sugar	candy/sweet		
Kosher Foods And Products	Kosher Carbonated Soft Drinks	Solid Fats & Added Sugar	sweetened beverage		
Margarines	Butter	Solid Fats & Added Sugar	butter/cream/solid fat		
Margarines	Margarine Stick	Solid Fats & Added Sugar	butter/cream/solid fat		
Milk By-Products	Aerosol Toppings [Milk By-Products]	Solid Fats & Added Sugar	butter/cream/solid fat		
Milk By-Products	Refrig Dips	Solid Fats & Added Sugar	butter/cream/solid fat		
Milk By-Products	Sour Creams	Solid Fats & Added Sugar	butter/cream/solid fat		
Mixers	Cocktail Mixes—Dry	Solid Fats & Added Sugar	sweetened beverage		
Mixers	Cocktail Mixes—Fluid: Add Liq	Solid Fats & Added Sugar	sweetened beverage		
Molasses/Syrups/Pancake Mixes	Molasses & Syrups	Solid Fats & Added Sugar	candy/sweet		
Packaged Natural Snacks	Candy	Solid Fats & Added Sugar	candy/sweet		
Peanut Butter/Jelly/Jams & Honey	Preserves/Jam/Marmalade	Solid Fats & Added Sugar	candy/sweet		
Peanut Butter/Jelly/Jams & Honey	Honey	Solid Fats & Added Sugar	candy/sweet		
Peanut Butter/Jelly/Jams & Honey	Jelly	Solid Fats & Added Sugar	candy/sweet		
Powder & Crystal Drink Mix	Breakfast Crystals	Solid Fats & Added Sugar	sweetened beverage		
Powder & Crystal Drink Mix	Enhanced Stick [Powder Drink Mix]	Solid Fats & Added Sugar	sweetened beverage		
Powder & Crystal Drink Mix	Fluid Pouch [Powder Drink Mix]	Solid Fats & Added Sugar	sweetened beverage		
Powder & Crystal Drink Mix	Soft Drink Canisters [Powder Drink Mix]	Solid Fats & Added Sugar	sweetened beverage		
Powder & Crystal Drink Mix	Sugar Sweetened Envelopes	Solid Fats & Added Sugar	candy/sweet		
Powder & Crystal Drink Mix	Sugar Sweetened Sticks	Solid Fats & Added Sugar	candy/sweet		
Processed	Dips	Solid Fats & Added Sugar	butter/cream/solid fat		
Processed	Packaged Dry Smoothie Mix	Solid Fats & Added Sugar	sweetened beverages		
Refrgratd Juices/Drinks	Dairy Case Citrus Pnch/Oj Subs	Solid Fats & Added Sugar	sweetened beverage		
Refrgratd Juices/Drinks	Dairy Case Fruit Drinks (No Ju)	Solid Fats & Added Sugar	sweetened beverage		
Refrgratd Juices/Drinks	Dairy Case Juice Drnk Under 10	Solid Fats & Added Sugar	sweetened beverage		
Refrgratd Juices/Drinks	Dairy Case Tea With Sugar Or S	Solid Fats & Added Sugar	sweetened beverage		
Refrigerated Dairy Case	Ntrn Refrig Juice Under 50%	Solid Fats & Added Sugar	sweetened beverage		
Refrigerated Dairy Case	Sour Cream/Cottage Cheese	Solid Fats & Added Sugar	butter/cream/solid fat		
Refrigerated Dairy Case	Tea With Sweetener/Sugar	Solid Fats & Added Sugar	sweetened beverage		
Rtd Tea/New Age Juice	Juice (Under 10% Juice)	Solid Fats & Added Sugar	sweetened beverage		
Rtd Tea/New Age Juice	Juice (Under 50% Juice)	Solid Fats & Added Sugar	sweetened beverage		
Rtd Tea/New Age Juice	Tea Sweetened	Solid Fats & Added Sugar	sweetened beverage		
Service Beverage	Sv Bev: Bev/Juic 10–50% Juice	Solid Fats & Added Sugar	sweetened beverage		
Shelf Stable Juice	Apple Juice & Cider (50% And Under Juice)	Solid Fats & Added Sugar	sweetened beverage		
Shelf Stable Juice	Apple Juice & Cider (Under 10% Juice)	Solid Fats & Added Sugar	sweetened beverage		
Shelf Stable Juice	Blended Juice & Combinations	Solid Fats & Added Sugar	sweetened beverage		
Shelf Stable Juice	Blended Juice & Combinations	Solid Fats & Added Sugar	sweetened beverage		
Shelf Stable Juice	Cranapple/Cran Grape Juice	Solid Fats & Added Sugar	sweetened beverage		
Shelf Stable Juice	Cranberry Juice (50% And Under Juice)	Solid Fats & Added Sugar	sweetened beverage		
Shelf Stable Juice	Fruit Drinks: Canned & Glass	Solid Fats & Added Sugar	sweetened beverage		
Shelf Stable Juice	Fruit Drinks: Canned & Glass	Solid Fats & Added Sugar	sweetened beverage		
Shelf Stable Juice	Fruit Drinks: Canned & Glass	Solid Fats & Added Sugar	sweetened beverage		
Shelf Stable Juice	Fruit Drinks: Canned & Glass	Solid Fats & Added Sugar	sweetened beverage		
Shelf Stable Juice	Grape Juice (50% And Under Juice)	Solid Fats & Added Sugar	sweetened beverage		
Shelf Stable Juice	Grapefruit Juice (50% And Under Juice)	Solid Fats & Added Sugar	sweetened beverage		
Shelf Stable Juice	Lemon Juice & Lime Juice (50% And Under Juice)	Solid Fats & Added Sugar	sweetened beverage		
Shelf Stable Juice	Lemon Juice & Lime Juice	Solid Fats & Added Sugar	sweetened beverage		
Shelf Stable Juice	Nectars (50% And Under Juice)	Solid Fats & Added Sugar	sweetened beverage		
Shelf Stable Juice	Prune Juice (50% And Under Juice)	Solid Fats & Added Sugar	sweetened beverage		
Shortening & Oil	Solid Shortening	Solid Fats & Added Sugar	butter/cream/solid fat		
Soft Drinks	Mixers (Tonic Water/Gngr Ale)	Solid Fats & Added Sugar	sweetened beverage		

Appendix C. Crosswalk of Subcommodities to USDA Food Pattern Categories—Continued

Commodity	Subcommodity	USDA Food Pattern	SoFAS Subcategories	Composite Subcategories	Other Subcategories
Soft Drinks	Mixers (Tonic Wtr/Gngr Ale)	Solid Fats & Added Sugar	sweetened beverage		
Soft Drinks	Sft Drnk 1 Liter Btl Carb	Solid Fats & Added Sugar	sweetened beverage		
Soft Drinks	Sft Drnk 2 Liter Btl Carb Incl	Solid Fats & Added Sugar	sweetened beverage		
Soft Drinks	Sft Drnk 3 Liter Btl Carb	Solid Fats & Added Sugar	sweetened beverage		
Soft Drinks	Sft Drnk Misc Btl (Any Btl)	Solid Fats & Added Sugar	sweetened beverage		
Soft Drinks	Sft Drnk Misc Can (Ex: 4/8/18pk)	Solid Fats & Added Sugar	sweetened beverage		
Soft Drinks	Sft Drnk Mlt-Pk Btl Carb	Solid Fats & Added Sugar	sweetened beverage		
Soft Drinks	Sft Drnk Sngl Srv Btl Carb	Solid Fats & Added Sugar	sweetened beverage		
Soft Drinks	Soft Drink Bottle Non-Carb	Solid Fats & Added Sugar	sweetened beverage		
Soft Drinks	Soft Drinks 12/18 & 15pk Can Car	Solid Fats & Added Sugar	sweetened beverage		
Soft Drinks	Soft Drinks 20pk & 24pk Can Carb	Solid Fats & Added Sugar	sweetened beverage		
Soft Drinks	Soft Drinks 6pk Can Carb	Solid Fats & Added Sugar	sweetened beverage		
Soft Drinks	Soft Drinks Bottle Returnable	Solid Fats & Added Sugar	sweetened beverage		
Soft Drinks	Soft Drinks Can Non-Carb	Solid Fats & Added Sugar	sweetened beverage		
Soft Drinks	Soft Drinks Single Cans Carb	Solid Fats & Added Sugar	sweetened beverage		
Soft Drinks	Tea Bottles With Sweetener/Sugar	Solid Fats & Added Sugar	sweetened beverage		
Soft Drinks	Tea Can With Sweetener/Sugar	Solid Fats & Added Sugar	sweetened beverage		
Sugars & Sweeteners	Sugar	Solid Fats & Added Sugar	candy/sweet		
Sugars & Sweeteners	Sweeteners	Solid Fats & Added Sugar	candy/sweet		
Sweet Goods & Snacks	Sweet Goods: Candy	Solid Fats & Added Sugar	candy/sweet		
Sweet Goods & Snacks	Sweet Goods: Candy W/Flour	Solid Fats & Added Sugar	candy/sweet		
Syrups Toppings & Cones	Ice Cream Toppings	Solid Fats & Added Sugar	candy/sweet		
Teas	Instant Tea & Tea Mix (W/Sugar)	Solid Fats & Added Sugar	sweetened beverage		
Traditional Mexican Foods	Mexican Candy	Solid Fats & Added Sugar	candy/sweet		
Trail Mix & Snacks	Candy W/Flour	Solid Fats & Added Sugar	candy/sweet		
Trail Mix & Snacks	Candy W/O Flour	Solid Fats & Added Sugar	candy/sweet		
Trail Mix & Snacks	Candy W/O Flour Organic	Solid Fats & Added Sugar	candy/sweet		
Water	Carb Water—Flvrd Sweetened	Solid Fats & Added Sugar	sweetened beverage		
Water	Energy Drinks	Solid Fats & Added Sugar	sweetened beverage		
Authentic Hispanic Fds & Product	Authentic Pasta/Rice/Beans	Composite		entrée/meal	
Authentic Hispanic Fds & Product	Authentic Soups/Bouillons	Composite		soup	
Authentic Hispanic Fds & Product	Hispanic Cookies/Crackers	Composite		desserts	
Authentic Italian Foods	Italian Pasta And Pasta Sauce	Composite		entrée/meal	
Bag Snacks	Store Brand	Composite		snacks	
Bag Snacks	Misc Bag Snacks	Composite		snacks	
Bag Snacks	Mult Pk Bag Snacks	Composite		snacks	
Bag Snacks	Potato Chips	Composite		snacks	
Bag Snacks	Salsa & Dips	Composite		snacks	
Baked Sweet Goods	Snack Cake—Multi Pack	Composite		desserts	
Baked Sweet Goods	Sweet Goods—Full Size	Composite		desserts	
Bakery Party Trays		Composite		desserts	
Bakery Party Trays	Party Trays: Breakfast Sweets	Composite		desserts	
Bakery Party Trays	Party Trays: Cakes	Composite		desserts	
Bakery Party Trays	Party Trays: Cookies—Rolls	Composite		desserts	
Baking Mixes	Brownie Mix	Composite		desserts	
Baking Mixes	Cookies Mix	Composite		desserts	
Baking Mixes	Layer Cake Mix	Composite		desserts	
Baking Mixes	Microwavable Cake Mix	Composite		desserts	
Baking Needs	Pie Crust Mixes & Shells	Composite		desserts	
Baking Needs	Pie Filling/Mincemeat/Glazes	Composite		desserts	
Bulk Food	Grain/Beans Bulk	Composite		entree/meal	
Bulk Food	Misc Bulk Snacks Sweetened	Composite		snacks	
Bulk Food	Snacks Bulk	Composite		snacks	
Cakes	Cakes Ingredients	Composite		desserts	
Cakes	Cakes: Angel Fds/Cke Rolls	Composite		desserts	
Cakes	Cakes: Angl Fd/Roll Novelties	Composite		desserts	
Cakes	Cakes: Birthday/Celebration Sheet	Composite		desserts	
Cakes	Cakes: Cheesecake	Composite		desserts	
Cakes	Cakes: Cheesecake Novelties	Composite		desserts	
Cakes	Cakes: Cndles/Retl Accss	Composite		desserts	
Cakes	Cakes: Crème/Pudding	Composite		desserts	
Cakes	Cakes: Crème/Pudding Novelties	Composite		desserts	
Cakes	Cakes: Cupcakes	Composite		desserts	
Cakes	Cakes: Fancy/Service Case	Composite		desserts	
Cakes	Cakes: Ice Cream	Composite		desserts	
Cakes	Cakes: Kosher	Composite		desserts	
Cakes	Cakes: Layers	Composite		desserts	
Cakes	Cakes: Layers/Sheets Novelties	Composite		desserts	
Cakes	Cakes: Novelties	Composite		desserts	
Cakes	Cakes: Pound	Composite		desserts	
Cakes	Cakes: Pound Cake Novelties	Composite		desserts	
Cakes	Cakes: Sheet	Composite		desserts	

Appendix C. Crosswalk of Subcommodities to USDA Food Pattern Categories—Continued

Commodity	Subcommodity	USDA Food Pattern	SoFAS Subcategories	Composite Subcategories	Other Subcategories
Cakes	Cakes: Birthday/Celebration Layer	Composite		desserts	
Cakes	Cakes: Wedding/Designer Series	Composite		desserts	
Canned Pasta & Mwv Fd—Shlf Stbl	Can Pasta	Composite		entrée/meal	
Canned Pasta & Mwv Fd—Shlf Stbl	Microwavable Cups [Canned Pasta]	Composite		entrée/meal	
Canned Pasta & Mwv Fd—Shlf Stbl	Microwavable Trays [Canned Pasta]	Composite		entrée/meal	
Canned Soups	Condensed Soup	Composite		soup	
Chilled Ready Meals	Store Brand	Composite		entrée/meal	
Chilled Ready Meals	Fresh Meals	Composite		entrée/meal	
Chilled Ready Meals	Fresh Side Dishes	Composite		entrée/meal	
Cnv Breakfast & Wholesome Snks	Treats	Composite		snacks	
Convenient Meals	Convenient Meals—Adult Meal	Composite		entrée/meal	
Convenient Meals	Convenient Meals—Kids Meal	Composite		entrée/meal	
Cookie/Cracker Multi-Pks	Multi-Pack Cookies	Composite		desserts	
Cookies	Chocolate Covered Cookies	Composite		desserts	
Cookies	Cookies/Sweet Goods	Composite		desserts	
Cookies	Cookies: Gourmet	Composite		desserts	
Cookies	Cookies: Holiday/Special Occas	Composite		desserts	
Cookies	Cookies: Kosher	Composite		desserts	
Cookies	Cookies: Less Than 6	Composite		desserts	
Cookies	Cookies: Message	Composite		desserts	
Cookies	Cookies: Party	Composite		desserts	
Cookies	Cookies: Regular	Composite		desserts	
Cookies	Fruit Filled Cookies	Composite		desserts	
Cookies	Premium Cookies (Ex: Pepperidge)	Composite		desserts	
Cookies	Sandwich Cookies	Composite		desserts	
Cookies	Specialty Cookies	Composite		desserts	
Cookies	Tray Pack/Choc Chip Cookies	Composite		desserts	
Cookies	Vanilla Wafer/Kids Cookies	Composite		desserts	
Cookies	Wellness/Portion Control [Cookies]	Composite		desserts	
Dinner Mixes—Dry	Macaroni & Cheese Dnrs	Composite		entrée/meal	
Dinner Mixes—Dry	Microwave Dinners	Composite		entrée/meal	
Dinner Mixes—Dry	Package Dinners Meat Included	Composite		entrée/meal	
Dinner Mixes—Dry	Package Dinners W/O Meat	Composite		entrée/meal	
Dinner Mixes—Dry	Package Dinners/Pasta Salads	Composite		entrée/meal	
Dinner Mixes—Dry	Skillet Dinners	Composite		entrée/meal	
Dressings/Dips	Dips Guacamole/Salsa/Queso	Composite		snacks	
Dressings/Dips	Dips Organic	Composite		snacks	
Dressings/Dips	Dips Veggie	Composite		snacks	
Dry Bean Veg & Rice	Dry Beans/Peas/Barley: Bag & B	Composite		entrée/meal	
Dry Mix Desserts	Freeze Mixes/Pwdrs/Liquids	Composite		desserts	
Dry Mix Desserts	Misc: Cheesecake/Mousse Mixes	Composite		desserts	
Dry Mix Desserts	Pudding & Gelatin Cups/Cans	Composite		desserts	
Dry Mix Desserts	Puddings Dry	Composite		desserts	
Dry/Ramen Bouillon	12 Pack Soup/Case Soup/*Etc.*	Composite		soup	
Dry/Ramen Bouillon	Bouillon	Composite		soup	
Dry/Ramen Bouillon	Dry Soup	Composite		soup	
Fitness & Diet	Fitness & Diet—Bars (Supplement)	Composite		snacks	
Fitness & Diet	Fitness & Diet—Bars W/Flour	Composite		snacks	
Fitness & Diet	Fitness & Diet—Bars W/O Flour	Composite		snacks	
Frozen Bread And Desserts	Desserts	Composite		desserts	
Frozen Breakfast	Donuts	Composite		desserts	
Frozen Breakfast	Meals/Sandwichs	Composite		entrée/meal	
Frozen Breakfast	Foods Frzn Breakfast Entrées	Composite		entrée/meal	
Frozen Breakfast	Foods Frzn Breakfast Sandwiches	Composite		entrée/meal	
Frozen Desserts	Frozen Cakes/Desserts	Composite		desserts	
Frozen Desserts	Frozen Cream Pies	Composite		desserts	
Frozen Desserts	Frozen Fruit Pies & Cobblers	Composite		desserts	
Frozen Desserts	Frzn Pastry&Cookies	Composite		desserts	
Frozen Desserts	Frzn Pie Shells/Pastry Shell/F	Composite		desserts	
Frozen Desserts	Single Serv/Portion Control	Composite		desserts	
Frozen Entrées	Bowls	Composite		entrée/meal	
Frozen Entrées	Meatless/Vegetarian	Composite		entrée/meal	
Frozen Entrées	Pasta/Skillet Meals	Composite		entrée/meal	
Frozen Entrées	Soup	Composite		soup	
Frozen Handhelds & Snacks	Burritos	Composite		entrée/meal	
Frozen Handhelds & Snacks	Corn Dogs	Composite		snacks	
Frozen Handhelds & Snacks	Sandwiches & Handhelds	Composite		entrée/meal	
Frozen Handhelds & Snacks	Snacks/Appetizers	Composite		snacks	
Frozen Ice Cream & Novelties	Almond	Composite		desserts	
Frozen Ice Cream & Novelties	Ice Cream	Composite		desserts	
Frozen Ice Cream & Novelties	Novelties—Dairy	Composite		desserts	
Frozen Ice Cream & Novelties	Novelties—Non Dairy	Composite		desserts	
Frozen Ice Cream & Novelties	Novelties—Water Base	Composite		desserts	
Frozen Ice Cream & Novelties	Rice	Composite		desserts	
Frozen Ice Cream & Novelties	Soy	Composite		desserts	
Frozen Ice Cream & Novelties	Yogurt/Sorbet And Kefir	Composite		desserts	
Frozen Juice And Smoothies	Smoothies—Frz	Composite		desserts	
Frozen Novelties—Water Ice	Adult Premium [Frozen Novelties]	Composite		desserts	
Frozen Novelties—Water Ice	Cones [Frozen Novelties]	Composite		desserts	
Frozen Novelties—Water Ice	Cups/Push Ups/Other [Frozen Novelties]	Composite		desserts	
Frozen Novelties—Water Ice	Ice Cream Sandwiches	Composite		desserts	
Frozen Novelties—Water Ice	Sticks/Enrobed [Frozen Novelties]	Composite		desserts	
Frozen Novelties—Water Ice	Water Ice [Frozen Novelties]	Composite		desserts	
Frozen Pizza	Meatless/Vegetarian	Composite		entrée/meal	
Frozen Pizza	Pizza/Economy	Composite		entrée/meal	
Frozen Pizza	Pizza/Premium	Composite		entrée/meal	
Frozen Pizza	Pizza/Single Serve/Microwave	Composite		entrée/meal	
Frozen Pizza	Pizza/Traditional	Composite		entrée/meal	
Frozen Pizza	Pizza/Value	Composite		entrée/meal	
Frozen Pizza	Single Serve	Composite		entrée/meal	
Frozen Snacks And	Burritos—Meatless/Vegetarian	Composite		entrée/meal	
Frozen Snacks And Handhelds	Appetizers	Composite		snacks	
Frozen Snacks And Handhelds	Burritos—Meat Protein	Composite		entrée/meal	
Frozen Snacks And Handhelds	Wraps/Handhelds—Meat	Composite		entrée/meal	
Frozen Snacks And Handhelds	Wraps/Handhelds—Meatless	Composite		entrée/meal	
Frozen Vegetables And Potatoes	Meals	Composite		entrée/meal	

Appendix C. Crosswalk of Subcommodities to USDA Food Pattern Categories—Continued

Commodity	Subcommodity	USDA Food Pattern	SoFAS Subcategories	Composite Subcategories	Other Subcategories
Frzn Meatless	Meatless Breakfast	Composite		entrée/meal	
Frzn Meatless	Meatless Burgers	Composite		entrée/meal	
Frzn Meatless	Meatless Entrees	Composite		entrée/meal	
Frzn Meatless	Meatless Meal Starters	Composite		entrée/meal	
Frzn Meatless	Meatless Miscellaneous	Composite		entrée/meal	
Frzn Meatless	Meatless Poultry	Composite		entrée/meal	
Frzn Meatless	Meatless Snacks	Composite		snacks	
Frzn Multi Serve	Fz Crockpots/Soups	Composite		soup	
Frzn Multi Serve	Fz Family Style Entrees	Composite		entree/meal	
Frzn Multi Serve	Fz Skillet Meals	Composite		entree/meal	
Frzn Prepared Chicken	Fz Meal Kits/Stuffed/Other	Composite		entree/meal	
Frzn Ss Economy Meals	Fz Economy Meals All	Composite		entree/meal	
Frzn Ss Premium Meals	Fz Regional/Other	Composite		entree/meal	
Frzn Ss Premium Meals	Fz Ss Prem Nutritional Meals	Composite		entree/meal	
Frzn Ss Premium Meals	Fz Ss Prem Traditional Meals	Composite		entree/meal	
Gift & Fruit Baskets	Snack Packs W/Soda	Composite		snacks	
Ice Cream Ice Milk & Sherbets	Pails [Ice Cream & Sherbert]	Composite		desserts	
Ice Cream Ice Milk & Sherbets	Premium [Ice Cream & Sherbert]	Composite		desserts	
Ice Cream Ice Milk & Sherbets	Premium Pints [Ice Cream & Sherbert]	Composite		desserts	
Ice Cream Ice Milk & Sherbets	Quarts [Ice Cream & Sherbert]	Composite		desserts	
Ice Cream Ice Milk & Sherbets	Super Premium Pints [Ice Cream & Sherbert]	Composite		desserts	
Ice Cream Ice Milk & Sherbets	Traditional [Ice Cream & Sherbert]	Composite		desserts	
Kosher Foods And Products	Kosher Snacks	Composite		snacks	
Kosher Foods And Products	Kosher Soups	Composite		soup	
Packaged Natural Snacks	Trail Mixes	Composite		snacks	
Party Tray	Deli Tray—Includes Non-Foods	Composite		entrée/meal	
Party Tray	Deli Tray: Appetizers & Hors D'oe	Composite		entrée/meal	
Party Tray	Deli Tray: Chicken	Composite		entrée/meal	
Party Tray	Deli Tray: Fruit And Vegetable	Composite		entrée/meal	
Party Tray	Deli Tray: Meat And Cheese	Composite		entrée/meal	
Party Tray	Deli Tray: Sandwiches	Composite		entrée/meal	
Party Tray	Deli Trays: Hot	Composite		entrée/meal	
Pies	Pie Ingredients	Composite		desserts	
Pies	Pies: Cream/Meringue	Composite		desserts	
Pies	Pies: Fruit/Nut	Composite		desserts	
Pies	Pies: Kosher	Composite		desserts	
Pies	Pies: Pumpkin/Custard	Composite		desserts	
Pies	Pies: Tarts/Minis/Crstdas	Composite		desserts	
Prepared/Pdgd Foods	Boxed Prepared/Entrée/Dry Prep	Composite		entrée/meal	
Refrgrated Dough Products	Refrigerated Cookie Dough	Composite		desserts	
Refrgrated Dough Products	Refrigerated Cookies—Brand	Composite		desserts	
Refrgrated Dough Products	Refrigerated Cookies—Seasonal	Composite		desserts	
Refrgrated Dough Products	Refrigerated Pie Crust	Composite		desserts	
Refrigerated Desserts	Refrigerated Pudding	Composite		desserts	
Restricted Diet	Cookies	Composite		desserts	
Rts/Micro Soup/Broth	Broth	Composite		soup	
Rts/Micro Soup/Broth	Microwavable Soups	Composite		soup	
Rts/Micro Soup/Broth	Rts Soup: Chunky/Homestyle/Et	Composite		soup	
Salad & Dips	Sal: Desserts—Bulk	Composite		desserts	
Salad & Dips	Sal: Desserts—Prepack	Composite		desserts	
Salad Bar	Soups	Composite		soup	
Sandwiches	Sandwich Ingredients	Composite		entree/meals	
Sandwiches	Sandwiches—(Cold)	Composite		entree/meals	
Sandwiches	Sandwiches: Kosher (Cold)	Composite		entree/meals	
Seafood—Party Trays	Party Tray Other	Composite		entree/meal	
Seafood—Party Trays	Party Tray Other	Composite		entree/meal	
Seafood—Salad/Dips/Sce/Cond	Salads	Composite		entree/meal	
Service Case Meat	Side Dishes	Composite		entree/meal	
Service Case Meat	Stuffed/Mixed	Composite		entree/meal	
Single Serve Items	Single Serve Desserts	Composite		desserts	
Single Serve Items	Single Serve Snacks	Composite		snacks	
Single Serve Sweet Goods	Snack Cake—Single Serve	Composite		desserts	
Snack	Nuts/Trail Mix/Dried Fruit	Composite		snacks	
Snack	Soy/Rice Snacks	Composite		snacks	
Snack	Specialty Chips	Composite		snacks	
Snacks	Snacks: Dry	Composite		snacks	
Snacks	Snacks: Gift Packs	Composite		snacks	
Snacks	Snacks: Salty	Composite		snacks	
Snacks	Snacks:Chippery	Composite		snacks	
Soup	Asceptic	Composite		soup	
Soup	Broths	Composite		soup	
Soup	Cans Soup/Chili	Composite		soup	
Soup	Cups	Composite		soup	
Ss/Vending—Cookie/Cracker	Vendor Size/Single Serve Cookie	Composite		desserts	
Ss/Vending—Salty Snacks	Salty Snacks Vending	Composite		snacks	
Ss/Vending—Salty Snacks	Salty Snacks W/Sweetener Vending	Composite		snacks	
Sushi	Sushi—In Store Prepared	Composite		entrée/meal	
Sushi	Sushi—Kosher	Composite		entrée/meal	
Sushi	Sushi—Prepackaged	Composite		entrée/meal	
Sushi	Sushi: In Store Prepared (Hot)	Composite		entrée/meal	
Sushi	Sushi: Ingredients	Composite		entrée/meal	
Sushi	Sushi: In-Store Prepared (Dine)	Composite		entrée/meal	
Sushi	Sushi: Smallwares	Composite		entrée/meal	
Sweet Goods	Sw Gds: Kosher Breakfast	Composite		desserts	
Sweet Goods	Sw Gds: Muffins	Composite		desserts	
Sweet Goods	Sw Gds: Sw Rolls/Dan	Composite		desserts	
Sweet Goods	Sw Gds: Coffee Cakes	Composite		desserts	
Sweet Goods	Sw Gds: Donuts	Composite		desserts	
Sweet Goods	Sw Gds: Donuts—Less Than 6	Composite		desserts	
Sweet Goods	Sw Gds: Muffins—Lss Thn 6	Composite		desserts	
Sweet Goods	Swt Gds Ingredients	Composite		desserts	
Sweet Goods & Snacks	Sw Gds: Brownie/Bar Cookie	Composite		desserts	
Sweet Goods & Snacks	Sw Gds: Kosher	Composite		desserts	
Sweet Goods & Snacks	Sw Gds: Puff Pastry	Composite		desserts	
Sweet Goods & Snacks	Sw Gds: Specialty Desserts	Composite		desserts	
Sweet Goods & Snacks	Sw Gds: Swt/Flvrd Loaves	Composite		desserts	
Traditional Asian Foods	Asian Foods And Meals	Composite		entree/meal	

Appendix C. Crosswalk of Subcommodities to USDA Food Pattern Categories—Continued

Commodity	Subcommodity	USDA Food Pattern	SoFAS Subcategories	Composite Subcategories	Other Subcategories
Traditional Mexican Foods	Mexican Dinners And Foods	Composite		entrée/meal	
Trail Mix & Snacks	Trail Mixes/Snack	Composite		snacks	
Trail Mix & Snacks	Trail Mixes/Snacks Organic	Composite		snacks	
Unknown	Frozen Breakfast	Composite		entrée/meal	
Unknown	Frozen Dessert (Ice Cream Cake)	Composite		desserts	
Unknown	Frozen Entrees	Composite		entrée/meal	
Unknown	Frozen Ice Cream	Composite		desserts	
Unknown	Frozen Side Dish	Composite		entrée/meal	
Value-Added Fruit	Parfait Cups Instore	Composite		desserts	
Warehouse Snacks	Canister Snacks	Composite		snacks	
Warehouse Snacks	Misc Snacks	Composite		snacks	
Warehouse Snacks	Misc Snacks W/Sweetener	Composite		snacks	
Warehouse Snacks	Snack Mix	Composite		snacks	
Authentic Asian Foods	Authentic Chinese Foods	Other			misc
Authentic Asian Foods	Authentic Japanese Foods	Other			misc
Authentic Asian Foods	Authentic Thai Foods	Other			misc
Authentic Asian Foods	Other Authentic Asian Foods	Other			misc
Authentic Caribbean Foods	Caribbean Foods	Other			misc
Authentic Central American Fds	Central American Foods	Other			misc
Authentic Hispanic Fds & Product	Hispanic Baking Needs	Other			seasoning/baking need
Authentic Hispanic Fds & Product	Authentic Dry Beverages W/O Sweetener	Other			unsweetened beverage
Authentic Hispanic Fds & Product	Hispanic Condiments	Other			condiments
Authentic Hispanic Fds & Product	Hispanic Spices And Seasonings	Other			seasoning/baking need
Authentic Italian Foods	Other Italian Foods	Other			misc
Authentic South American Fds	South American Foods	Other			misc
Baby Food	Baby Cereal	Other			infant formula/baby food
Baby Food	Baby Crackers	Other			infant formula/baby food
Baby Food	Baby Food	Other			infant formula/baby food
Baby Food	Baby Formula	Other			infant formula/baby food
Baby Food	Baby Misc	Other			infant formula/baby food
Baby Foods	Baby Food—Beginner	Other			infant formula/baby food
Baby Foods	Baby Food Cereals	Other			infant formula/baby food
Baby Foods	Baby Food Junior/All Brands	Other			infant formula/baby food
Baby Foods	Baby Juices	Other			infant formula/baby food
Baby Foods	Baby Spring Waters	Other			infant formula/baby food
Baking	Flours/Grains/Sugar	Other			seasoning/baking need
Baking	Mixes	Other			seasoning/baking need
Baking	Spices	Other			seasoning/baking need
Baking Mixes	Microwave Mixes: All Other	Other			seasoning/baking need
Baking Mixes	Miscellaneous Package Mixes	Other			seasoning/baking need
Baking Needs	Baking Cocoa	Other			seasoning/baking need
Baking Needs	Baking Powder & Soda	Other			seasoning/baking need
Baking Needs	Bits & Morsels [Baking Needs]	Other			seasoning/baking need
Baking Needs	Cooking Chocolate (Ex.: Smi-Swt)	Other			seasoning/baking need
Baking Needs	Cooking Chocolate Unsweetened	Other			seasoning/baking need
Baking Needs	Yeast: Dry	Other			seasoning/baking need
Beverages	Tea Unsweetened (Can/Bottle)	Other			unsweetened beverage
Bulk Food	Bulk Spices	Other			seasoning/baking need
Bulk Food	Coffee & Tea Bulk	Other			unsweetened beverage
Bulk Food	Misc Bulk	Other			misc
Coffee & Creamers	Bulk Coffee	Other			unsweetened beverage
Coffee & Creamers	Coffee Pods/Singles/Filter Pac	Other			unsweetened beverage
Coffee & Creamers	Flavored Bag Coffee	Other			unsweetened beverage
Coffee & Creamers	Flavored Can Coffee	Other			unsweetened beverage
Coffee & Creamers	Flavored Instant Coffee	Other			unsweetened beverage
Coffee & Creamers	Ready To Drink Coffee	Other			unsweetened beverage
Coffee & Creamers	Ready To Drink Coffee Suppleme	Other			unsweetened beverage
Coffee & Creamers	Specialty Instant Coffee W/O S	Other			unsweetened beverage
Coffee & Creamers	Specialty Instant Coffee W/Swe	Other			unsweetened beverage
Coffee & Creamers	Unflavored Bag Coffee	Other			unsweetened beverage
Coffee & Creamers	Unflavored Can Coffee	Other			unsweetened beverage
Coffee & Creamers	Unflavored Instant Coffee	Other			unsweetened beverage
Coffee Shop	Sv Bev: Inged/Portion Pk	Other			unsweetened beverage
Coffee Shop	Sv Bev: Carb Wat-Flv/Unflv	Other			unsweetened beverage
Coffee Shop Sweet Goods & Rtl	Coff Shop: Instant Retail Pack	Other			unsweetened beverage
Coffee Shop Sweet Goods & Rtl	Coff Shop: Retail Pack Beverag	Other			unsweetened beverage
Coffee Shop Sweet Goods & Rtl	Coff Shop: Whole Bean Retail P	Other			unsweetened beverage
Condiments	Ketchup/Mustard/Bbq Sce/Marina	Other			condiments
Condiments	Oils/Vinegar	Other			condiments
Condiments	Pickles/Olives/Kraut	Other			condiments
Condiments & Sauces	Bbq Sauce	Other			condiments
Condiments & Sauces	Catsup	Other			condiments
Condiments & Sauces	Chili Sauce/Cocktail Sauce	Other			condiments
Condiments & Sauces	Hot Sauce	Other			condiments
Condiments & Sauces	Marinades	Other			condiments
Condiments & Sauces	Misc Meat Sauces	Other			condiments
Condiments & Sauces	Mustard—All Other	Other			condiments
Condiments & Sauces	Steak & Worchester Sauce	Other			condiments
Condiments & Sauces	Wing Sauce	Other			condiments
Condiments & Sauces	Yellow Mustard	Other			condiments
Deli Specialties (Retail Pk)	Dl Spec: Beverages	Other			unsweetened beverage
Deli Specialties (Retail Pk)	Dl Spec: Must/Oils/Vinegars	Other			condiments
Deli/Bakery Discontnued Items	Deli/Bakery Discontinued Items	Other			misc
Dietary Aid Prdct/Med Liq Nutr	Diet Cntrl Liqs Supplement	Other			supplements/meal replacements/energy drinks
Dietary Aid Prdct/Med Liq Nutr	Diet Cntrl Powders Nutritional	Other			supplements/meal replacements/energy drinks
Dietary Aid Prdct/Med Liq Nutr	Diet Control Water	Other			supplements/meal replacements/energy drinks
Dietary Aid Prdct/Med Liq Nutr	Diet Cntrl Bars (Supplement)	Other			supplements/meal replacements/energy drinks
Dietary Aid Prdct/Med Liq Nutr	Diet Cntrl Bars Nutritional	Other			supplements/meal replacements/energy drinks
Dietary Aid Prdct/Med Liq Nutr	Diet Cntrl Bars Nutritional W/	Other			supplements/meal replacements/energy drinks
Dietary Aid Prdct/Med Liq Nutr	Diet Cntrl Liqs Nutritional	Other			supplements/meal replacements/energy drinks
Dietary Aid Prdct/Med Liq Nutr	Diet Energy Drinks	Other			supplements/meal replacements/energy drinks
Dietary Aid Prdct/Med Liq Nutr	Powder Nutrition Products	Other			supplements/meal replacements/energy drinks

Appendix C. Crosswalk of Subcommodities to USDA Food Pattern Categories—Continued

Commodity	Subcommodity	USDA Food Pattern	SoFAS Subcategories	Composite Subcategories	Other Subcategories
Dry Mix	Desserts Gelatin	Other			seasoning/baking need
Dry Tea/Coffee/Coco Mixes	Coffee Ground	Other			unsweetened beverage
Dry Tea/Coffee/Coco Mixes	Coffee Whole Bean	Other			unsweetened beverage
Dry Tea/Coffee/Coco Mixes	Tea Bags (Supplement)	Other			unsweetened beverage
Dry Tea/Coffee/Coco Mixes	Tea Dry	Other			unsweetened beverage
Dry Sauce/Gravy/Potatoes/Stuffing	Cooking Bags With Spices/Seaso	Other			seasoning/baking need
Dry Sauce/Gravy/Potatoes/Stuffing	Gravy Can/Glass	Other			seasoning/baking need
Dry Sauce/Gravy/Potatoes/Stuffing	Sauce Mixes/Gravy Mixes Dry	Other			seasoning/baking need
Eggs/Muffins/Potatoes	Misc Dairy Refigerated	Other			misc
Enhancements	Enhancements—Other	Other			supplements/meal replacements/energy drinks
Enhancements	Enhancements—Pickled Items	Other			condiments
Enhancements	Enhancements—Pickles/Kraut	Other			condiments
Enhancements	Enhancements—Salads/Spreads	Other			condiments
Enhancements	Enhancements—Spices/Sauces	Other			seasoning/baking need
European Foods	British Foods	Other			misc
European Foods	French Foods	Other			misc
European Foods	German Foods	Other			misc
European Foods	Mediterranean/Greek Foods	Other			misc
European Foods	Other Ethnic Foods	Other			misc
European Foods	Polish Foods	Other			misc
European Foods	Scandinavian Foods	Other			misc
Fitness & Diet	Fitness & Diet Energy Drinks F/S	Other			supplements/meal replacements/energy drinks
Fitness & Diet	Fitness & Diet Energy Drinks Non	Other			supplements/meal replacements/energy drinks
Fitness & Diet	Fitness & Diet Isotonic Drinks	Other			supplements/meal replacements/energy drinks
Fitness & Diet	Fitness & Diet Isotonic Drinks	Other			supplements/meal replacements/energy drinks
Fitness & Diet	Fitness & Diet—Liq (Supplement)	Other			supplements/meal replacements/energy drinks
Fitness & Diet	Fitness & Diet—Liq Ntrtnl	Other			supplements/meal replacements/energy drinks
Fitness & Diet	Fitness & Diet—Powder (Supplement)	Other			supplements/meal replacements/energy drinks
Fitness & Diet	Fitness & Diet—Powder Ntrtnl	Other			supplements/meal replacements/energy drinks
Fitness & Diet	Fitness/Diet—Meal Replacement	Other			supplements/meal replacements/energy drinks
Frozen Ethnic	Frozen Internaional	Other			misc
Frozen Ethnic	Frozen Kosher	Other			misc
Frozen Meat	Alternatives Micro Protein	Other			supplements/meal replacements/energy drinks
Frzn Multi Serve	Frozen Other	Other			misc
Gift & Fruit Baskets	Gift Baskets W/Food	Other			misc
Gift & Fruit Baskets	Snack Packs W/Food	Other			misc
Indian Foods	Authentic Indian Foods	Other			misc
Infant Formula	Baby Isotonic Drinks	Other			infant formula/baby food
Infant Formula	Infant Formula Concentrate	Other			infant formula/baby food
Infant Formula	Infant Formula Milk Base	Other			infant formula/baby food
Infant Formula	Infant Formula Ready To Use	Other			infant formula/baby food
Infant Formula	Infant Formula Solutions Large	Other			infant formula/baby food
Infant Formula	Infant Formula Soy Base	Other			infant formula/baby food
Infant Formula	Infant Formula Specialty	Other			infant formula/baby food
Infant Formula	Infant Formula Starter Large Pk	Other			infant formula/baby food
Infant Formula	Infant Formula Starter/Solution	Other			infant formula/baby food
Infant Formula	Infant Formula Toddler	Other			infant formula/baby food
Infant Formula	Infant Formula Up Age	Other			infant formula/baby food
Isotonic Drinks	Isotonic Drinks Multi-Pack	Other			supplements/meal replacements/energy drinks
Isotonic Drinks	Isotonic Drinks Multi-Serve	Other			supplements/meal replacements/energy drinks
Isotonic Drinks	Isotonic Drinks Powdered	Other			supplements/meal replacements/energy drinks
Isotonic Drinks	Isotonic Drinks Single Serve	Other			supplements/meal replacements/energy drinks
Isotonic Drinks	Sports Bars	Other			supplements/meal replacements/energy drinks
Isotonic Drinks	Sports Drink N/Supplmnt Milk	Other			supplements/meal replacements/energy drinks
Isotonic Drinks	Sports Drink Supplement	Other			supplements/meal replacements/energy drinks
Juices Super Premium	Juices Antioxidant/Wellness	Other			supplements/meal replacements/energy drinks
Juices Super Premium	Juices Proteins	Other			supplements/meal replacements/energy drinks
Kosher	Exotic [Kosher Foods]	Other			misc
Kosher	Further Prepared	Other			misc
Kosher Foods And Products	Kosher Baking Needs	Other			seasoning/baking need
Kosher Foods And Products	Kosher Condiments	Other			condiments
Kosher Foods And Products	Passover Products	Other			misc
Mediterranean Bar	Sal: Olives/Pickles—Bulk	Other			condiments
Mediterranean Bar	Sal: Olives/Pickles—Bulk	Other			condiments
Mediterranean Bar	Sal: Olives/Pickls—Prpck	Other			condiments
Mediterranean Bar	Sal: Olives/Pickls—Prpck	Other			condiments
Mixers	Margarita Salt/Sugar/Misc	Other			condiments
Multicultural Products	Asian Processed	Other			misc
Multicultural Products	Hispanic Processed Produce	Other			misc
Non-Dairy/Dairy	Aseptic Soy/Rice Powder	Other			misc
Pickle/Relish/Pckld Veg & Olives	Green Olives	Other			condiments
Pickle/Relish/Pckld Veg & Olives	Peppers	Other			condiments
Pickle/Relish/Pckld Veg & Olives	Pickld Veg/Peppers/Etc.	Other			condiments
Pickle/Relish/Pckld Veg & Olives	Relishes	Other			condiments
Pickle/Relish/Pckld Veg & Olives	Ripe Olives	Other			condiments
Pickle/Relish/Pckld Veg & Olives	Specialty Olives	Other			condiments
Powder & Crystal Drink Mix	Sugar Free Canister [Powder Drink Mix]	Other			unsweetened beverage
Powder & Crystal Drink Mix	Sugar Free Sticks [Powder Drink Mix]	Other			unsweetened beverage
Powder & Crystal Drink Mix	Tea	Other			unsweetened beverage

Appendix C. Crosswalk of Subcommodities to USDA Food Pattern Categories—Continued

Commodity	Subcommodity	USDA Food Pattern	SoFAS Subcategories	Composite Subcategories	Other Subcategories
Powder & Crystal Drink Mix	Unsweetened Envelope [Powder Drink Mix]	Other			unsweetened beverage
Prepared/Pdgd Foods	Prepared/Pkgd Food Misc	Other			misc
Processed	Packaged Dry Mixes	Other			misc
Processed	Processed Other	Other			misc
Refrgratd Juices/Drinks	Dairy Case Tea No Sugar Or Swe	Other			unsweetened beverage
Refrigerated Dairy Case	Non-Dairy Milks	Other			misc
Refrigerated Dairy Case	Tea W/O Sweetener/Sugar	Other			unsweetened beverage
Refrigerated Grocery	Misc: Herring/Pickles/Horserad	Other			condiments
Refrigerated Grocery	Refrigerated Kosher Products	Other			misc
Refrigerated Hispanic Grocery	Hispanic Cultured Products	Other			misc
Refrigerated Hispanic Grocery	Misc Hispanic Grocery	Other			misc
Refrigerated Hispanic Grocery	Refrigerated Hispanic Drinks	Other			misc
Refrigerated Vegetarian	Vegetarian Misc	Other			misc
Restricted Diet	Baking	Other			seasoning/baking need
Restricted Diet	Beverage	Other			supplements/meal replacements/energy drinks
Restricted Diet	Breakfast Foods	Other			supplements/meal replacements/energy drinks
Restricted Diet	Diet Bars/Diet Liquid Meals	Other			supplements/meal replacements/energy drinks
Restricted Diet	Misc Diet	Other			supplements/meal replacements/energy drinks
Rtd Tea/New Age Juice	Sparkling Tea	Other			unsweetened beverage
Rtd Tea/New Age Juice	Tea Unsweetened	Other			unsweetened beverage
Salad & Dips	Sal: Kosher	Other			misc
Salad & Dips	Sal:Dip Prepack	Other			condiments
Salad Bar	Condiments/Supplies	Other			condiments
Salad Bar	Salad Bar Other	Other			misc
Salad Dresing & Sandwich Spreads	Dry Salad Dressing & Dip Mixes	Other			condiments
Seafood—Salad/Dip/Sce/Cond	Dips/Spreads	Other			condiments
Seafood—Salad/Dip/Sce/Cond	Sauces	Other			condiments
Seafood—Salad/Dips/Sce/Cond	Other Pkgd Dip/Sauce/Condiment	Other			condiments
Seafood—Salad/Dips/Sce/Cond	Sauces	Other			condiments
Seafood—Salad/Dips/Sce/Cond	Spices/Marinades	Other			condiments
Service Beverage	Sv Bev: Coffee	Other			unsweetened beverage
Service Beverage	Sv Bev: Flav Tea Products	Other			unsweetened beverage
Service Beverage	Sv Bev: N/Carb Flv Frk/Minwtr	Other			unsweetened beverage
Service Beverage	Sv Bev: Spring Water	Other			unsweetened beverage
Shelf Stable Juice	Tea Bottles	Other			unsweetened beverage
Soft Drinks	Club Soda	Other			unsweetened beverage
Soft Drinks	Misc Items For Soft Drinks	Other			unsweetened beverage
Soft Drinks	Seltzer Unflavored	Other			unsweetened beverage
Soft Drinks	Unswntd Flavored Seltzer Water	Other			unsweetened beverage
Spices & Extracts	Food Colorings	Other			seasoning/baking need
Spices & Extracts	Gourmet Spices	Other			seasoning/baking need
Spices & Extracts	Imitation Extracts	Other			seasoning/baking need
Spices & Extracts	Pure Extracts	Other			seasoning/baking need
Spices & Extracts	Salt Substitutes	Other			seasoning/baking need
Spices & Extracts	Spices & Seasonings	Other			seasoning/baking need
Spices & Extracts	Table Salt/Popcorn Salt/Ice Cr	Other			seasoning/baking need
Spices & Extracts	Traditional Spices	Other			seasoning/baking need
Spices/Jarred Garlic	Spices & Seasonings	Other			seasoning/baking need
Spices/Jarred Garlic	Spices & Seasonings Organic	Other			seasoning/baking need
Teas	Bulk Tea	Other			unsweetened beverage
Teas	Instant Tea & Tea Mix	Other			unsweetened beverage
Teas	Supplemental Tea	Other			unsweetened beverage
Teas	Tea Bags & Bulk Tea	Other			unsweetened beverage
Teas	Tea Bags/Chai	Other			unsweetened beverage
Teas	Tea Bags/Green	Other			unsweetened beverage
Teas	Tea Bags/Herbal	Other			unsweetened beverage
Traditional Asian Foods	Asian Other Sauces/Marinad	Other			seasoning/baking need
Traditional Asian Foods	Asian Soy Sauce	Other			seasoning/baking need
Traditional Asian Foods	Traditional Thai Foods	Other			misc
Traditional Mexican Foods	Mexican Seasoning Mixes	Other			seasoning/baking need
Traditional Mexican Foods	Mexican Taco Sauce	Other			condiments
Unknown	Frozen Misc	Other			misc
Vinegar & Cooking Wines	Cooking Wines	Other			seasoning/baking need
Vinegar & Cooking Wines	Specialty Vinegar	Other			seasoning/baking need
Vinegar & Cooking Wines	Vinegar/White & Cider	Other			seasoning/baking need
Water	Carb Water Unflvrd	Other			unsweetened beverage
Water	Carb Water—Flvrd Unsweetened	Other			unsweetened beverage
Water	Fortified/Water	Other			unsweetened beverage
Water	Non-Carb Water Flvr—Drnk/Mnr	Other			unsweetened beverage
Water	Non-Carb Water Flvr—Unsweetened	Other			unsweetened beverage
Water—(Sparkling & Still)	Distilled Water	Other			unsweetened beverage
Water—(Sparkling & Still)	Sparkling Water—Flvrd Sweet	Other			unsweetened beverage
Water—(Sparkling & Still)	Sparkling Water—Flvrd Unsweetened	Other			unsweetened beverage
Water—(Sparkling & Still)	Sparkling Water—Unflavored	Other			unsweetened beverage
Water—(Sparkling & Still)	Spring Water	Other			unsweetened beverage
Water—(Sparkling & Still)	Still Water Drnking/Mnrl Water	Other			unsweetened beverage
Water—(Sparkling & Still)	Still Water Flvrd Drnk/Mnrl Wt	Other			unsweetened beverage
Water—(Sparkling & Still)	Still Water Flvrd Unsweetened	Other			unsweetened beverage
Water—(Sparkling & Still)	Water—Supplies	Other			unsweetened beverage

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.

Appendix D. Top 100 Subcommodities for SNAP Households By Expenditure for Each USDA Food Pattern Category

Exhibit D–1: Dairy

Dairy Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Fluid Milk/White Only	1	$191.1	33.25%	1	$853.8	25.69%	1	$1,044.9	26.80%
Shredded Cheese	2	$74.7	13.00%	2	$342.0	10.29%	2	$416.7	10.69%
American Single Cheese	3	$44.1	7.67%	4	$136.6	4.11%	4	$180.7	4.63%
Natural Cheese Chunks	4	$35.3	6.14%	3	$216.1	6.50%	3	$251.4	6.45%
Bagged Cheese Snacks	5	$17.1	2.98%	16	$52.0	1.56%	15	$69.1	1.77%
Flavored Milk	6	$16.0	2.78%	14	$59.4	1.79%	12	$75.4	1.93%
String Cheese	7	$15.1	2.63%	9	$99.0	2.98%	8	$114.1	2.93%
Yogurt/Kids	8	$14.0	2.44%	20	$42.4	1.28%	17	$56.5	1.45%
Cottage Cheese	9	$13.9	2.42%	7	$108.8	3.27%	6	$122.7	3.15%
Natural Cheese Slices	10	$13.4	2.33%	6	$113.2	3.41%	5	$126.6	3.25%
Yogurt/Ss Regular	11	$11.0	1.91%	11	$69.0	2.07%	11	$79.9	2.05%
Loaf Cheese	12	$10.9	1.90%	23	$38.1	1.15%	21	$49.1	1.26%
Yogurt/Ss Light	13	$10.2	1.78%	8	$103.1	3.10%	9	$113.3	2.91%
Yogurt/Pro Active Health	14	$7.4	1.29%	13	$63.5	1.91%	13	$70.9	1.82%
Yogurt/Adult Multi-Packs	15	$7.2	1.25%	19	$42.5	1.28%	20	$49.7	1.28%
Specialty/Lactose Free Milk	16	$6.7	1.17%	17	$48.4	1.46%	18	$55.1	1.41%
Grated Cheese	17	$6.2	1.08%	25	$33.6	1.01%	24	$39.9	1.02%
Bulk Semi-Hard [Cheese]	18	$6.1	1.05%	18	$44.0	1.32%	18	$50.1	1.28%
Fluid Milk	19	$5.9	1.02%	5	$113.3	3.41%	7	$119.2	3.06%
Canned Milk	20	$5.5	0.96%	27	$27.9	0.84%	26	$33.4	0.86%
Yogurt/Specialty Greek	21	$5.0	0.86%	10	$77.4	2.33%	10	$82.4	2.11%
Half & Half	22	$4.4	0.77%	15	$54.6	1.64%	16	$59.1	1.52%
Yogurt/Large Size (16oz Or Lar)	23	$4.4	0.76%	22	$40.4	1.22%	23	$44.8	1.15%
Miscellaneous Cheese	24	$3.8	0.67%	21	$42.1	1.27%	22	$45.9	1.18%
Bulk Processed [Cheese]	25	$3.4	0.59%	29	$19.8	0.60%	29	$23.2	0.59%
Yogurt	26	$3.2	0.56%	12	$67.0	2.02%	14	$70.2	1.80%
Bulk Semi-Soft [Cheese]	27	$3.0	0.53%	28	$23.3	0.70%	28	$26.3	0.68%
Egg Nog/Boiled Custard	28	$2.7	0.47%	39	$13.3	0.40%	35	$16.0	0.41%
Buttermilk	29	$2.4	0.42%	33	$15.9	0.48%	31	$18.3	0.47%
Organic Milk	30	$2.0	0.34%	24	$35.4	1.06%	25	$37.3	0.96%
Ricotta Cheese	31	$1.9	0.33%	34	$15.6	0.47%	32	$17.5	0.45%
Aerosol Cheese	32	$1.8	0.31%	54	$5.2	0.16%	51	$7.0	0.18%
Hispanic Cheese	33	$1.7	0.29%	50	$6.9	0.21%	45	$8.6	0.22%
Specialty Ppk Cheese Hard/Grat	34	$1.5	0.27%	26	$28.7	0.86%	27	$30.2	0.78%
Aseptic Milk	35	$1.4	0.24%	38	$13.6	0.41%	38	$15.0	0.38%
Misc Dry Cheese	36	$1.4	0.24%	46	$7.3	0.22%	44	$8.7	0.22%
Soy Milk	37	$1.3	0.22%	49	$7.1	0.22%	47	$8.4	0.22%
Specialty Ppk Cheese Spreads	38	$1.2	0.21%	31	$16.2	0.49%	33	$17.5	0.45%
Mexican Con Queso	39	$1.2	0.21%	63	$3.1	0.09%	61	$4.3	0.11%
Specialty Ppk Cheese Feta	40	$1.2	0.20%	30	$18.5	0.56%	30	$19.6	0.50%
Pre-Sliced Semi-Soft [Cheese]	41	$1.1	0.20%	35	$14.4	0.43%	36	$15.5	0.40%
Pre-Sliced Semi-Hard [Cheese]	42	$1.0	0.18%	36	$14.3	0.43%	37	$15.3	0.39%
Specialty Ppk Cheese Mozzarell	43	$0.9	0.15%	32	$16.2	0.49%	34	$17.1	0.44%
Specialty Ppk Cheese Processed	44	$0.8	0.15%	52	$6.0	0.18%	52	$6.8	0.17%
Yogurt/Adult Drinks	45	$0.8	0.14%	60	$3.8	0.12%	60	$4.7	0.12%
Specialty Ppk Cheese Cheddar & C	46	$0.8	0.14%	37	$13.9	0.42%	39	$14.7	0.38%
Soy Beverage	47	$0.7	0.12%	53	$5.3	0.16%	54	$6.0	0.15%
Specialty Ppk Cheese Semi Soft	48	$0.6	0.10%	40	$11.4	0.34%	40	$12.0	0.31%
Specialty Ppk Cheese Soft & Ripe	49	$0.6	0.10%	42	$10.8	0.32%	41	$11.4	0.29%
Specialty Ppk Cheese Blue/Gorg	50	$0.6	0.10%	41	$10.8	0.33%	42	$11.4	0.29%
Non Fat Dry Milk	51	$0.6	0.10%	55	$5.2	0.16%	55	$5.7	0.15%
Kefir	52	$0.6	0.10%	48	$7.2	0.22%	48	$7.8	0.20%
Specialty Ppk Cheese Hispanic	53	$0.5	0.09%	68	$1.5	0.05%	68	$2.0	0.05%
Specialty Ppk Cheese Gouda & Eda	54	$0.5	0.08%	44	$8.0	0.24%	46	$8.5	0.22%
Specialty Ppk Cheese Goat Milk	55	$0.5	0.08%	43	$10.4	0.31%	43	$10.9	0.28%
Total Dairy Expenditures* Among Top 1,000 Subcommodities		**$571.2**	**99.37%**		**$3,989.3**	**98.04%**		**$4,767.6**	**98.22%**

Exhibit D–1: Dairy—Continued

Dairy Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Total Dairy Expenditures Among 1,792 Subcommodities		**$574.9**	**100%**		**$3,323.6**	**100%**		**$3,898.5**	**100%**

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.
Note: Columns may not sum to total shown due to rounding.
*Only 55 dairy subcommodities among the top 1,000 subcommodities.

Exhibit D–2: Fruit

Fruit Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Dairy Case 100% Pure Juice—O	1	$43.5	10.18%	1	$269.0	9.35%	1	$312.6	9.46%
Bananas	2	$34.2	8.00%	2	$242.7	8.43%	2	$276.9	8.38%
Strawberries	3	$23.5	5.48%	3	$178.4	6.20%	3	$201.9	6.11%
Fruit Snacks	4	$17.6	4.13%	17	$43.2	1.50%	12	$60.8	1.84%
Grapes Red	5	$15.8	3.70%	4	$121.7	4.23%	4	$137.5	4.16%
Grapes White	6	$15.5	3.61%	6	$84.9	2.95%	5	$100.4	3.04%
Apple Juice & Cider (Over 50%)	7	$13.3	3.11%	14	$45.8	1.59%	13	$59.0	1.79%
Instore Cut Fruit	8	$13.2	3.09%	5	$85.8	2.98%	6	$99.0	3.00%
Oranges Navels All	9	$12.6	2.94%	8	$79.3	2.75%	7	$91.8	2.78%
Fruit Cup	10	$10.6	2.47%	19	$42.7	1.49%	14	$53.3	1.61%
Blended Juice & Combinations (Ov)	11	$9.3	2.17%	29	$29.6	1.03%	24	$38.9	1.18%
Clementines	12	$8.8	2.06%	9	$78.6	2.73%	8	$87.5	2.65%
Melons Instore Cut	13	$8.2	1.93%	18	$42.8	1.49%	17	$51.1	1.55%
Watermelon Seedless Whole	14	$7.9	1.84%	16	$43.9	1.53%	16	$51.8	1.57%
Cherries Red	15	$6.9	1.61%	11	$56.7	1.97%	11	$63.6	1.93%
Apples Gala (Bulk & Bag)	16	$6.6	1.54%	10	$69.3	2.41%	10	$75.9	2.30%
Cranapple/Cran Grape Juice (50)	17	$6.1	1.43%	31	$27.3	0.95%	29	$33.4	1.01%
Apples Red Delicious (Bulk & Bag)	18	$5.8	1.35%	23	$35.2	1.22%	20	$41.0	1.24%
Dairy Case 100% Pure Juice Oth	19	$5.4	1.26%	25	$32.3	1.12%	26	$37.7	1.14%
Cantaloupe Whole	20	$5.3	1.24%	15	$44.4	1.54%	18	$49.7	1.50%
Blueberries	21	$5.1	1.19%	7	$79.4	2.76%	9	$84.5	2.56%
Pineapple	22	$4.9	1.15%	33	$24.0	0.83%	33	$28.9	0.87%
Peaches Yellow Flesh	23	$4.8	1.13%	22	$35.6	1.24%	21	$40.5	1.22%
Grape Juice (Over 50% Juice)	24	$4.8	1.12%	44	$17.1	0.60%	41	$21.9	0.66%
Lemons	25	$4.6	1.08%	24	$33.6	1.17%	25	$38.2	1.16%
Peaches	26	$4.6	1.07%	39	$21.3	0.74%	35	$25.9	0.78%
Apples Granny Smith (Bulk & Bag)	27	$4.4	1.03%	27	$30.9	1.07%	28	$35.3	1.07%
Frozen Fruit	28	$4.3	1.01%	12	$48.6	1.69%	15	$52.9	1.60%
Applesauce Cup	29	$4.1	0.95%	35	$22.6	0.79%	34	$26.7	0.81%
Non-Carb Jce (Over 50% Jce)	30	$3.8	0.88%	26	$31.7	1.10%	27	$35.4	1.07%
Raspberries	31	$3.5	0.83%	13	$45.8	1.59%	19	$49.3	1.49%
Grapes Black/Blue	32	$3.4	0.80%	37	$21.8	0.76%	37	$25.2	0.76%
Fruit Cocktail/Fruit Salad	33	$3.4	0.79%	54	$12.5	0.43%	52	$15.8	0.48%
Mixed Fruit Bags	34	$3.2	0.75%	79	$5.7	0.20%	73	$8.9	0.27%
Jarred Fruit Single Serve	35	$3.1	0.73%	49	$14.6	0.51%	47	$17.7	0.54%
Raisins	36	$2.9	0.69%	32	$26.0	0.90%	32	$28.9	0.87%
Apples Other (Bulk & Bag)	37	$2.8	0.66%	30	$27.4	0.95%	31	$30.2	0.91%
Apples Fuji (Bulk & Bag)	38	$2.8	0.65%	21	$36.2	1.26%	23	$39.0	1.18%
Apples Gold Delicious (Bulk & Bag)	39	$2.8	0.65%	43	$17.9	0.62%	43	$20.7	0.62%
Blackberries	40	$2.7	0.63%	28	$29.9	1.04%	30	$32.6	0.99%
Limes	41	$2.7	0.62%	34	$22.7	0.79%	36	$25.3	0.77%
Nectarines Yellow Flesh	42	$2.5	0.60%	42	$18.6	0.64%	42	$21.1	0.64%
Pineapple Whole & Peel/Cored	43	$2.5	0.59%	36	$22.1	0.77%	38	$24.6	0.75%
Apples Honeycrisp	44	$2.4	0.57%	20	$36.9	1.28%	22	$39.4	1.19%
Grapefruit	45	$2.4	0.56%	40	$21.2	0.74%	39	$23.6	0.71%
Plums	46	$2.4	0.56%	52	$13.1	0.46%	53	$15.5	0.47%
Mandarin Oranges/Citrus Sect	47	$2.3	0.53%	53	$12.6	0.44%	54	$14.8	0.45%
Frzn Conc Allieds Over 50% Jui	48	$2.2	0.52%	57	$10.1	0.35%	56	$12.3	0.37%
Mango	49	$2.2	0.52%	50	$14.1	0.49%	50	$16.3	0.49%
Apple Sauce (Excludes Cup)	50	$2.2	0.51%	51	$13.8	0.48%	51	$16.0	0.48%
Tangerines & Tangelos	51	$2.1	0.49%	55	$11.3	0.39%	55	$13.4	0.41%

Exhibit D–2: Fruit—Continued

Fruit Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Frzn Oj & Oj Substitutes (Over 5)	52	$1.9	0.44%	45	$16.2	0.56%	45	$18.1	0.55%
Watermelon Personal	53	$1.9	0.44%	46	$15.9	0.55%	46	$17.8	0.54%
Bananas Organic	54	$1.9	0.44%	41	$18.7	0.65%	44	$20.6	0.62%
Pears	55	$1.9	0.43%	59	$10.0	0.35%	58	$11.8	0.36%
Convenience/Snacking Fruit Pro	56	$1.8	0.41%	64	$9.4	0.33%	60	$11.2	0.34%
Cranberry Sauce	57	$1.7	0.39%	58	$10.0	0.35%	59	$11.6	0.35%
Strawberries Organic	58	$1.6	0.38%	38	$21.4	0.74%	40	$23.0	0.70%
Cut Fruit All Other Prepack	59	$1.6	0.38%	69	$8.5	0.29%	65	$10.1	0.31%
Caramel/Candy Apples	60	$1.6	0.36%	94	$3.4	0.12%	84	$4.9	0.15%
Pears Bartlett	61	$1.5	0.35%	47	$15.7	0.55%	48	$17.2	0.52%
Fruit Party Tray Prepack	62	$1.4	0.33%	74	$6.5	0.23%	75	$7.9	0.24%
Dried Fruit—Other	63	$1.4	0.33%	48	$15.6	0.54%	49	$17.0	0.51%
Pineapple Juice (Over 50% Juic)	64	$1.4	0.33%	75	$6.4	0.22%	76	$7.8	0.24%
Cranberry Juice (Over 50% Jce)	65	$1.4	0.32%	70	$8.4	0.29%	69	$9.8	0.30%
Lemon Juice & Lime Juice (Over)	66	$1.2	0.29%	72	$7.8	0.27%	72	$9.0	0.27%
Oranges Non Navel All	67	$1.2	0.28%	81	$5.0	0.18%	80	$6.2	0.19%
Prune Juice (Over 50% Juice)	68	$1.2	0.27%	71	$8.3	0.29%	71	$9.5	0.29%
Drinks—Carb Juice (Over 50%)	69	$1.1	0.26%	61	$9.7	0.34%	62	$10.8	0.33%
Juice Single Blend	70	$1.1	0.26%	66	$9.4	0.33%	63	$10.5	0.32%
Pears Anjou	71	$1.1	0.26%	60	$9.8	0.34%	61	$10.9	0.33%
Kiwi Fruit	72	$1.0	0.24%	73	$7.0	0.24%	74	$8.0	0.24%
Dried Plums	73	$1.0	0.24%	56	$11.0	0.38%	57	$12.0	0.36%
Cherries Ranier	74	$1.0	0.23%	68	$9.0	0.31%	68	$10.0	0.30%
Cranapple/Cran Grape Juice (Ov)	75	$0.9	0.21%	77	$6.3	0.22%	77	$7.2	0.22%
Juice (Over 50% Juice)	76	$0.9	0.21%	100	$2.7	0.09%	98	$3.6	0.11%
Watermelon W/Seeds Whole	77	$0.9	0.20%	98	$3.0	0.11%	93	$3.9	0.12%
Honeydew Whole	78	$0.8	0.18%	78	$5.9	0.21%	79	$6.7	0.20%
Grapes Red Globe	79	$0.8	0.18%	92	$3.5	0.12%	91	$4.2	0.13%
Pomegranates	80	$0.7	0.17%	85	$4.3	0.15%	83	$5.0	0.15%
Grapes Other	81	$0.7	0.17%	89	$3.8	0.13%	89	$4.6	0.14%
Maraschino Cherries	82	$0.7	0.17%	88	$4.1	0.14%	87	$4.8	0.14%
Apples Braeburn (Bulk & Bag)	83	$0.7	0.17%	63	$9.4	0.33%	64	$10.1	0.31%
Grapefruit Juice (Over 50% Jui)	84	$0.7	0.17%	86	$4.1	0.14%	85	$4.8	0.15%
Apples Gala (Bulk & Bag) Organic	85	$0.6	0.15%	65	$9.4	0.33%	67	$10.0	0.30%
Peaches White Flesh	86	$0.6	0.15%	80	$5.5	0.19%	81	$6.2	0.19%
Jarred Fruit Multi Serve	87	$0.6	0.14%	82	$4.5	0.16%	82	$5.1	0.16%
Squeeze Lemons/Limes	88	$0.5	0.12%	95	$3.3	0.12%	94	$3.9	0.12%
Raspberries Organic	89	$0.5	0.12%	67	$9.1	0.32%	70	$9.6	0.29%
Pears Bosc	90	$0.5	0.11%	84	$4.3	0.15%	86	$4.8	0.14%
Blueberries Organic	91	$0.5	0.11%	62	$9.6	0.33%	66	$10.1	0.30%
Pears Asian	92	$0.4	0.10%	90	$3.8	0.13%	92	$4.2	0.13%
Total Fruit Expenditures* Among Top 1,000 subcommodities		**$416.8**	**97.49%**		**$2,772.4**	**96.36%**		**$3,189.2**	**96.54%**
Total Fruit Expenditures Among 1,792 Subcommodities		**$427.6**	**100%**		**$2,877.2**	**100%**		**$3,304.8**	**100%**

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.
Note: Columns may not sum to total shown due to rounding.
*Only 92 fruit subcommodities among top 1,000 subcommodities.

Exhibit D–3: Grains

Grain Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Kids Cereal	1	$78.1	9.88%	3	$186.4	4.51%	1	$264.5	5.37%
Mainstream White Bread	2	$48.0	6.07%	7	$136.8	3.31%	6	$184.7	3.75%
Tortilla/Nacho Chips	3	$47.4	5.99%	2	$209.0	5.05%	2	$256.4	5.21%
Mainstream Variety Breads	4	$38.4	4.86%	5	$173.2	4.19%	4	$211.7	4.30%
All Family Cereal	5	$36.2	4.58%	1	$214.9	5.20%	3	$251.1	5.10%
Adult Cereal	6	$24.9	3.15%	4	$182.6	4.42%	5	$207.5	4.21%

Exhibit D–3: Grains—Continued

Grain Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Mexican Soft Tortillas And Wra	7	$23.7	3.00%	8	$113.1	2.74%	8	$136.8	2.78%
Waffles/Pancakes/French Toast	8	$17.3	2.19%	13	$77.4	1.87%	12	$94.7	1.92%
Ramen Noodles/Ramen Cups	9	$16.7	2.12%	43	$28.1	0.68%	34	$44.8	0.91%
Cheese Crackers	10	$16.5	2.08%	10	$90.2	2.18%	10	$106.7	2.17%
Hamburger Buns	11	$16.2	2.05%	14	$70.2	1.70%	14	$86.4	1.75%
Hot Dog Buns	12	$16.2	2.05%	18	$62.2	1.50%	16	$78.4	1.59%
Refrigerated Biscuits	13	$14.7	1.86%	30	$45.2	1.09%	26	$59.9	1.22%
Butter Spray Cracker	14	$14.6	1.85%	15	$68.7	1.66%	15	$83.3	1.69%
Toaster Pastries	15	$14.0	1.77%	27	$47.6	1.15%	23	$61.6	1.25%
Rice Side Dish Mixes Dry	16	$14.0	1.76%	28	$46.7	1.13%	24	$60.6	1.23%
Popcorn—Microwave	17	$13.1	1.65%	17	$63.4	1.53%	17	$76.5	1.55%
Long Cut Pasta	18	$13.0	1.64%	19	$60.4	1.46%	19	$73.4	1.49%
Granola Bars	19	$12.8	1.61%	11	$88.9	2.15%	11	$101.7	2.06%
Premium Bread	20	$12.3	1.55%	6	$144.7	3.50%	7	$157.0	3.19%
Cereal Bars	21	$10.9	1.38%	12	$78.4	1.90%	13	$89.3	1.81%
Short Cut Pasta	22	$9.9	1.25%	21	$56.2	1.36%	20	$66.1	1.34%
Rolls: Dinner	23	$9.5	1.21%	23	$50.5	1.22%	25	$60.1	1.22%
Frzn Garlic Toast	24	$9.1	1.16%	44	$27.8	0.67%	39	$36.9	0.75%
Corn Chips	25	$9.1	1.15%	29	$45.6	1.10%	28	$54.7	1.11%
Instant Oatmeal	26	$8.9	1.13%	33	$41.1	0.99%	32	$50.0	1.02%
Snack Crackers	27	$8.9	1.13%	9	$98.6	2.39%	9	$107.6	2.18%
Saltine/Oyster	28	$8.2	1.03%	31	$43.1	1.04%	30	$51.3	1.04%
Multi-Pack Crackers	29	$8.0	1.01%	32	$41.3	1.00%	33	$49.3	1.00%
Bagels	30	$7.8	0.99%	16	$66.9	1.62%	18	$74.7	1.52%
Noodle Side Dish Mixes	31	$7.3	0.92%	53	$21.1	0.51%	49	$28.4	0.58%
Rice—Dry Bag And Box	32	$7.1	0.90%	37	$33.9	0.82%	36	$41.1	0.83%
Sandwich Buns	33	$7.1	0.90%	20	$56.8	1.37%	21	$63.9	1.30%
Rice—Instant & Microwave	34	$6.8	0.86%	34	$38.0	0.92%	34	$44.8	0.91%
Frzn Breakfast Pastry	35	$6.5	0.82%	57	$19.0	0.46%	52	$25.4	0.52%
Flour: White & Self Rising	36	$6.4	0.81%	42	$28.8	0.70%	41	$35.2	0.71%
Pretzels	37	$6.2	0.79%	22	$55.4	1.34%	22	$61.6	1.25%
Bread: Italian/French	38	$6.1	0.77%	25	$49.0	1.19%	27	$55.1	1.12%
Muffin & Corn Bread Mix	39	$6.0	0.76%	41	$28.9	0.70%	42	$34.9	0.71%
Refrigerated Specialty Rolls	40	$5.5	0.70%	45	$27.5	0.66%	44	$33.0	0.67%
Refrigerated Crescent Rolls	41	$5.4	0.68%	38	$31.2	0.76%	40	$36.6	0.74%
Mexican Taco/Tostado/Shells	42	$5.2	0.66%	56	$19.1	0.46%	55	$24.3	0.49%
Noodles Dry	43	$4.5	0.58%	48	$24.9	0.60%	47	$29.4	0.60%
Rolls: Sandwich	44	$4.1	0.52%	46	$26.7	0.65%	46	$30.9	0.63%
Salad Toppers	45	$4.1	0.52%	68	$15.1	0.37%	64	$19.2	0.39%
Graham Crackers	46	$4.0	0.51%	47	$24.9	0.60%	48	$29.0	0.59%
Standard Oatmeal	47	$3.9	0.49%	39	$29.9	0.72%	43	$33.8	0.69%
English Muffins/Waffles	48	$3.8	0.48%	24	$49.5	1.20%	29	$53.3	1.08%
Main Meal Bread	49	$3.8	0.48%	36	$34.9	0.84%	37	$38.7	0.79%
Dinner Rolls	50	$3.5	0.44%	71	$14.5	0.35%	67	$18.0	0.36%
Breadings/Coatings/Crumbs	51	$3.2	0.41%	65	$16.0	0.39%	62	$19.3	0.39%
Bread: Specialty	52	$3.2	0.40%	51	$22.9	0.55%	51	$26.0	0.53%
Bagged Popped Popcorn	53	$3.0	0.38%	77	$12.5	0.30%	75	$15.5	0.32%
Frzn Dinner Rolls	54	$3.0	0.38%	54	$20.9	0.50%	56	$23.9	0.48%
Rolls: Croissants/Breadsticks	55	$2.9	0.37%	64	$16.5	0.40%	61	$19.4	0.39%
Grits	56	$2.8	0.36%	96	$6.7	0.16%	92	$9.6	0.19%
Cereal—Cold	57	$2.8	0.36%	26	$47.8	1.16%	31	$50.7	1.03%
Refrigerated Tortillas	58	$2.8	0.36%	86	$9.4	0.23%	80	$12.3	0.25%
Croutons	59	$2.8	0.36%	73	$14.0	0.34%	69	$16.8	0.34%
Frzn Garlic Bread	60	$2.7	0.34%	78	$11.1	0.27%	78	$13.8	0.28%
Frzn Biscuits	61	$2.6	0.33%	76	$12.9	0.31%	74	$15.6	0.32%
Frozen Pasta	62	$2.6	0.33%	62	$16.9	0.41%	59	$19.6	0.40%
Pasta/Grain Salads—Prepack	63	$2.6	0.33%	82	$10.3	0.25%	79	$12.9	0.26%
Cornmeal	64	$2.5	0.32%	95	$7.3	0.18%	90	$9.8	0.20%
Refrigerated Bagels	65	$2.5	0.32%	93	$7.7	0.19%	87	$10.2	0.21%
Refrigerated Pasta	66	$2.4	0.30%	40	$29.3	0.71%	45	$31.7	0.64%
Diet/Light Bread	67	$2.4	0.30%	49	$24.0	0.58%	50	$26.3	0.53%
Pasta/Grain Salads—Bulk	68	$2.3	0.30%	63	$16.9	0.41%	63	$19.3	0.39%
Mini-Cakes	69	$2.3	0.30%	60	$17.2	0.42%	60	$19.5	0.40%
Fruit/Breakfast Bread	70	$2.2	0.28%	58	$18.7	0.45%	58	$21.0	0.43%
Breading	71	$2.2	0.28%	114	$3.7	0.09%	104	$5.9	0.12%
Frzn Breadsticks	72	$2.2	0.28%	106	$5.0	0.12%	97	$7.2	0.15%
Rye Breads	73	$2.0	0.25%	52	$22.3	0.54%	54	$24.3	0.49%
Other Hot Cereal	74	$1.9	0.24%	80	$10.3	0.25%	81	$12.2	0.25%
Rolls: Bagels	75	$1.9	0.24%	67	$15.4	0.37%	68	$17.3	0.35%
Biscuit Flour & Mixes	76	$1.9	0.23%	74	$13.8	0.33%	72	$15.7	0.32%
Bread: Artisan	77	$1.7	0.22%	35	$36.7	0.89%	38	$38.4	0.78%
Flour: Misc/Specialty/Blend Et	78	$1.6	0.20%	75	$13.6	0.33%	77	$15.2	0.31%
Bread: Pita/Pocket/Flatbrd	79	$1.5	0.19%	72	$14.1	0.34%	73	$15.6	0.32%
Pizza Mix Dry	80	$1.4	0.18%	102	$5.4	0.13%	98	$6.8	0.14%
Breakfast Bars/Tarts/Scones	81	$1.4	0.18%	50	$23.6	0.57%	53	$25.0	0.51%
Popcorn—Other	82	$1.4	0.17%	84	$10.0	0.24%	84	$11.4	0.23%
Asian Noodles/Rice	83	$1.3	0.17%	79	$10.5	0.25%	82	$11.8	0.24%

Exhibit D–3: Grains—Continued

Grain Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Instant Breakfast	84	$1.3	0.16%	91	$8.1	0.20%	93	$9.4	0.19%
Tortilla Chips	85	$1.3	0.16%	55	$19.9	0.48%	57	$21.2	0.43%
Bread: Sweet/Breakfast	86	$1.3	0.16%	90	$8.4	0.20%	91	$9.7	0.20%
Refrigerated Breads	87	$1.2	0.16%	83	$10.2	0.25%	83	$11.5	0.23%
Bread: Sourdough	88	$1.2	0.15%	61	$17.1	0.41%	66	$18.3	0.37%
Bread: Tortillas/Wraps	89	$1.0	0.13%	85	$9.8	0.24%	86	$10.8	0.22%
Vending Size/Sngl Serve Cracke	90	$1.0	0.12%	124	$2.3	0.06%	120	$3.3	0.07%
Snacks: Pita Chips	91	$0.9	0.12%	66	$15.7	0.38%	70	$16.7	0.34%
Granola	92	$0.9	0.12%	69	$15.1	0.37%	71	$16.0	0.33%
Caramel Coated Snacks	93	$0.9	0.11%	118	$3.1	0.08%	115	$4.0	0.08%
Specialty Crackers	94	$0.9	0.11%	59	$17.8	0.43%	65	$18.7	0.38%
Crackers	95	$0.8	0.10%	70	$14.6	0.35%	76	$15.4	0.31%
Bread: Rye/Cocktail	96	$0.7	0.09%	92	$8.1	0.20%	95	$8.8	0.18%
Whole Grain Bread	97	$0.7	0.09%	88	$9.2	0.22%	88	$9.9	0.20%
Frzn Bagels	98	$0.7	0.09%	120	$2.9	0.07%	119	$3.6	0.07%
Bread: Wheat/Whl Grain	99	$0.7	0.09%	81	$10.3	0.25%	85	$11.0	0.22%
Pies: Sugar Free	100	$0.7	0.09%	111	$4.5	0.11%	111	$5.2	0.11%
Top 100 Grain Expenditures *		**$778.3**	**98.43%**		**$3,989.3**	**96.47%**		**$4,767.6**	**96.79%**
Total Grain Expenditures Among Top 1,000 Subcommodities		**$783.8**	**99.13%**		**$4,049.9**	**96.28%**		**$4,833.8**	**98.63%**
Total Grain Expenditures Among 1,792 Subcommodities		**$790.7**	**100%**		**$4,135.0**	**100%**		**$4,925.7**	**100%**

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.
Note: Columns may not sum to total shown due to rounding.
*Top 100 subcommodities based on SNAP household expenditures.

Exhibit D–4: Oils

Oil Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Pourable Salad Dressings	1	$29.0	22.71%	1	$139.4	24.28%	1	$168.4	23.99%
Mayonnaise & Whipped Dressing	2	$27.3	21.34%	2	$119.1	20.73%	2	$146.3	20.84%
Margarine: Tubs And Bowls	3	$23.4	18.37%	3	$100.9	17.56%	3	$124.3	17.71%
Vegetable Oil	4	$20.5	16.07%	5	$35.4	6.16%	5	$55.9	7.96%
Canola Oils	5	$8.3	6.49%	6	$29.3	5.10%	6	$37.6	5.35%
Olive Oil	6	$7.3	5.69%	4	$63.8	11.11%	4	$71.1	10.12%
Cooking Sprays	7	$3.2	2.49%	7	$21.0	3.65%	7	$24.1	3.44%
Dressing Creamy	8	$1.6	1.23%	8	$14.5	2.53%	8	$16.1	2.30%
Sand/Horseradish & Tartar Sauce	9	$1.4	1.14%	10	$7.2	1.26%	10	$8.7	1.23%
Corn Oil	10	$1.3	1.01%	14	$4.1	0.71%	12	$5.4	0.77%
Cooking Oil: Peanut/ Safflower/	11	$1.1	0.89%	11	$6.7	1.17%	11	$7.8	1.12%
Dressing Blue Cheese	12	$0.9	0.71%	9	$9.5	1.65%	9	$10.4	1.48%
Margarine: Squeeze	13	$0.6	0.44%	13	$4.2	0.74%	14	$4.8	0.68%
Total Oil Expenditures * **Among Top 1,000 Subcommodities**		**$125.9**	**98.58%**		**$555.0**	**96.65%**		**$680.9**	**96.99%**
Total Oil Expenditures Among 1,792 Subcommodities		**$127.0**	**100%**		**$574.4**	**100%**		**$702.1**	**100%**

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.
Note: Columns may not sum to total shown due to rounding.
*Only 13 oil subcommodities among the top 1,000 subcommodities.

Exhibit D–5: Protein Foods

Protein Foods Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Lean [Beef]	1	$112.4	7.38%	2	$257.9	4.03%	1	$370.3	4.67%
Primal [Beef]	2	$62.4	4.10%	5	$219.8	3.43%	5	$282.2	3.56%
Lunchment—Deli Fresh	3	$55.8	3.67%	4	$242.6	3.79%	4	$298.4	3.76%
Eggs—Large	4	$52.1	3.43%	3	$251.6	3.93%	3	$303.7	3.83%
Chicken Breast Boneless	5	$49.6	3.26%	1	$292.9	4.57%	2	$342.5	4.32%
Enhanced [Pork Boneless Loin/Rib]	6	$41.5	2.73%	6	$168.0	2.62%	6	$209.5	2.64%
Bacon—Trad 16oz Or Less	7	$40.7	2.68%	8	$157.6	2.46%	7	$198.3	2.50%
Ribs [Pork]	8	$35.0	2.30%	15	$106.8	1.67%	13	$141.8	1.79%
Frzn Chicken—Wht Meat	9	$30.0	1.97%	17	$99.8	1.56%	16	$129.8	1.64%
Choice Beef (Loins)	10	$28.4	1.87%	11	$136.6	2.13%	10	$165.1	2.08%
Select Beef	11	$27.9	1.83%	9	$143.7	2.24%	9	$171.5	2.16%
Hot Dogs—Base Meat	12	$25.1	1.65%	27	$56.8	0.89%	23	$81.9	1.03%
Choice Beef (Rounds)	13	$24.0	1.58%	20	$72.5	1.13%	19	$96.5	1.22%
Chicken Wings	14	$22.2	1.46%	58	$28.6	0.45%	40	$50.9	0.64%
Frzn Chicken—Wings	15	$22.2	1.46%	97	$17.4	0.27%	52	$39.5	0.50%
Lunchment—Bologna/Sausage	16	$21.8	1.43%	24	$60.9	0.95%	22	$82.7	1.04%
Tuna	17	$21.1	1.39%	14	$109.9	1.72%	15	$131.0	1.65%
Peanut Butter	18	$20.4	1.34%	12	$127.8	1.99%	12	$148.2	1.87%
Meat: Turkey Bulk	19	$19.3	1.27%	7	$159.6	2.49%	8	$178.9	2.26%
Frzn Meat—Beef	20	$19.0	1.25%	34	$46.3	0.72%	30	$65.2	0.82%
Value Forms/18oz And Larger [Chicken]	21	$18.6	1.22%	41	$42.6	0.67%	33	$61.2	0.77%
Chicken Drums	22	$17.3	1.14%	49	$31.5	0.49%	44	$48.8	0.62%
Angus [Beef]	23	$17.1	1.13%	16	$103.8	1.62%	17	$120.9	1.53%
Dnr Sausage—Links Pork Ckd/S	24	$16.4	1.08%	45	$37.6	0.59%	38	$54.1	0.68%
Meat: Ham Bulk	25	$15.3	1.00%	13	$115.9	1.81%	14	$131.2	1.65%
Bkfst Sausage—Fresh Rolls	26	$15.1	0.99%	23	$61.4	0.96%	25	$76.5	0.96%
Shrimp—Raw	27	$15.0	0.99%	21	$69.0	1.08%	21	$84.1	1.06%
Shrimp—Cooked	28	$14.8	0.97%	29	$54.0	0.84%	28	$68.8	0.87%
Prepared Beans—Baked W/ Pork	29	$13.4	0.88%	28	$55.3	0.86%	29	$68.7	0.87%
Chili: Canned	30	$13.3	0.88%	39	$42.8	0.67%	36	$56.1	0.71%
Ground Turkey	31	$13.1	0.86%	19	$78.0	1.22%	20	$91.1	1.15%
Dnr Sausage—Links Fresh	32	$13.0	0.86%	25	$58.0	0.91%	26	$71.1	0.90%
Whole Chicken (Roasters/ Fryer)	33	$12.9	0.85%	26	$56.9	0.89%	27	$69.8	0.88%
Chicken Thighs	34	$12.2	0.80%	31	$50.0	0.78%	31	$62.2	0.78%
Dnr Sausage—Pork Rope Ckd/Sm	35	$12.1	0.80%	43	$38.2	0.60%	42	$50.4	0.64%
Bacon—Trad Greater Than 16oz	36	$12.0	0.79%	35	$44.6	0.70%	35	$56.6	0.71%
Soup/Stew	37	$11.2	0.74%	36	$44.1	0.69%	37	$55.3	0.70%
Whole Muscle Breaded/18oz And	38	$11.1	0.73%	53	$29.9	0.47%	49	$41.0	0.52%
Variety Beans—Kidney/ Pinto/E	39	$10.5	0.69%	22	$68.0	1.06%	24	$78.5	0.99%
Cubed Meats [Beef]	40	$10.5	0.69%	54	$29.8	0.46%	51	$40.3	0.51%
Hot Dogs—Base Beef	41	$10.3	0.68%	32	$49.4	0.77%	34	$59.8	0.75%
Eggs—Medium	42	$10.1	0.66%	81	$21.0	0.33%	64	$31.1	0.39%
Butts [Pork Shoulder]	43	$9.7	0.63%	56	$29.2	0.46%	54	$38.8	0.49%
Boneless Snack/18oz And Larger	44	$9.6	0.63%	77	$21.5	0.33%	65	$31.1	0.39%
Chix: Value-Added (Cold)	45	$9.5	0.63%	62	$26.7	0.42%	58	$36.2	0.46%
Angus [Beef]	46	$9.3	0.61%	50	$31.4	0.49%	50	$40.6	0.51%
Patties [Beef]	47	$9.1	0.60%	42	$39.7	0.62%	45	$48.8	0.61%
Bkfst Sausage—Fresh Links	48	$8.9	0.59%	64	$26.3	0.41%	59	$35.3	0.44%
Bone-In Wings	49	$8.8	0.58%	123	$12.0	0.19%	94	$20.8	0.26%
Hams—Half/Port Bone-In	50	$8.2	0.54%	52	$30.0	0.47%	56	$38.2	0.48%
Meat: Beef Bulk	51	$7.9	0.52%	30	$53.4	0.83%	32	$61.3	0.77%
Hams—Spiral	52	$7.6	0.50%	46	$36.5	0.57%	47	$44.1	0.56%
Hot Dogs—Premium	53	$7.4	0.49%	40	$42.7	0.67%	43	$50.1	0.63%
Snack Meat—Pepperoni	54	$7.4	0.48%	48	$32.1	0.50%	53	$39.5	0.50%
Frzn Meat—Breakfast Sausage	55	$7.3	0.48%	128	$11.3	0.18%	109	$18.6	0.23%
Angus [Beef]	56	$7.3	0.48%	37	$43.3	0.68%	41	$50.7	0.64%
Select Beef	57	$7.1	0.46%	51	$30.4	0.47%	57	$37.5	0.47%
Frz Coated Fish Fillets	58	$6.9	0.45%	79	$21.1	0.33%	74	$28.0	0.35%
Jerky/Nuggets/Tenders	59	$6.8	0.45%	67	$25.8	0.40%	62	$32.6	0.41%
Catfish—Fillet	60	$6.8	0.45%	110	$13.1	0.20%	102	$19.9	0.25%
Chicken Legs/Quarters	61	$6.6	0.43%	109	$13.5	0.21%	101	$20.1	0.25%
Value-Added Breaded Shrimp	62	$6.4	0.42%	98	$16.9	0.26%	86	$23.3	0.29%
Pancake Mixes	63	$6.3	0.41%	65	$21.9	0.34%	68	$28.1	0.35%
Frz Fishsticks/Tenders/Nuggets	64	$6.1	0.40%	104	$14.7	0.23%	95	$20.8	0.26%
Crab—Snow	65	$6.1	0.40%	127	$11.4	0.18%	110	$17.5	0.22%
Chix: Frd 8pc/Cut Up (Cold)	66	$6.0	0.39%	117	$12.7	0.20%	107	$18.7	0.24%
Lunchmeat—Chop/Form Pltry & Ha	67	$5.1	0.34%	121	$12.1	0.19%	111	$17.2	0.22%

Exhibit D–5: Protein Foods—Continued

Protein Foods Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Salmon Fr—Altantic	68	$5.0	0.33%	33	$48.8	0.76%	39	$53.8	0.68%
Party Tray—Shrimp	69	$4.8	0.32%	73	$24.8	0.39%	71	$29.6	0.37%
Ham Steaks/Cubes/Slices	70	$4.7	0.31%	63	$26.3	0.41%	66	$31.0	0.39%
Eggs—X-Large	71	$4.5	0.29%	44	$37.9	0.59%	48	$42.4	0.54%
Bacon—Poultry	72	$4.5	0.29%	91	$18.4	0.29%	88	$22.9	0.29%
Hams—Whole Boneless	73	$4.5	0.29%	105	$14.6	0.23%	106	$19.1	0.24%
Meat Bulk: Specialty Dry Meats	74	$4.4	0.29%	59	$28.3	0.44%	61	$32.8	0.41%
Chunk Meats—Chix/Ham/ Etc.	75	$4.4	0.29%	70	$25.3	0.40%	70	$29.7	0.37%
Whole Toms (Over 16lbs) [Turkey]	76	$4.3	0.28%	84	$20.0	0.31%	83	$24.2	0.31%
Lunchmeat—Whole Muscle Pltry	77	$4.2	0.28%	86	$19.7	0.31%	84	$24.0	0.30%
Bacon—Pre-Cooked	78	$4.1	0.27%	72	$24.8	0.39%	72	$28.9	0.36%
Baking Nuts	79	$4.1	0.27%	38	$43.2	0.67%	46	$47.3	0.60%
Bologna/Loaves/Franks	80	$4.0	0.26%	87	$19.2	0.30%	87	$23.1	0.29%
Pistachios	81	$3.9	0.26%	57	$29.1	0.45%	60	$33.0	0.42%
Seasoned Poultry	82	$3.9	0.26%	100	$16.5	0.26%	99	$20.4	0.26%
Protein Salads—Bulk	83	$3.9	0.26%	65	$26.3	0.41%	69	$30.2	0.38%
Bkfst Sausage—Fresh Patties	84	$3.8	0.25%	136	$9.8	0.15%	126	$13.6	0.17%
Meat: Chicken Bulk	85	$3.7	0.25%	47	$34.6	0.54%	55	$38.4	0.48%
Bkfst Sausage—Precooked	86	$3.7	0.25%	78	$21.4	0.33%	80	$25.2	0.32%
Dnr Sausage—Beef Rope Ckd/Sm	87	$3.7	0.24%	120	$12.2	0.19%	115	$15.9	0.20%
Whole Hens (Under 16lbs) [Turkey]	88	$3.6	0.24%	89	$19.0	0.30%	89	$22.6	0.29%
Dnr Sausage—Other Forms	89	$3.6	0.24%	76	$21.6	0.34%	81	$25.2	0.32%
External Fresh [Pork Offal]	90	$3.5	0.23%	204	$4.2	0.06%	169	$7.7	0.10%
Corned Beef	91	$3.5	0.23%	99	$16.9	0.26%	98	$20.4	0.26%
Fz Meatballs	92	$3.5	0.23%	95	$17.7	0.28%	93	$21.1	0.27%
Hams—Half/Port Boneless	93	$3.4	0.23%	80	$21.0	0.33%	82	$24.5	0.31%
Lunchmeat—Chip Meat	94	$3.3	0.22%	138	$9.7	0.15%	130	$13.1	0.16%
Salmon	95	$3.2	0.21%	108	$13.6	0.21%	113	$16.8	0.21%
Sandwich Sauce	96	$3.2	0.21%	156	$7.7	0.12%	146	$10.8	0.14%
Tilapia—Fillet	97	$3.2	0.21%	101	$16.4	0.26%	103	$19.6	0.25%
Frozen Burgers	98	$3.2	0.21%	217	$3.1	0.05%	185	$6.3	0.08%
Frozen Breakfast Sausage	99	$3.1	0.20%	135	$9.8	0.15%	132	$12.9	0.16%
Stuffed/Mixed Beef	100	$3.1	0.20%	88	$19.2	0.30%	90	$22.3	0.28%
Top 100 Protein Foods Expenditures*		**$1,342.3**	**87.82%**		**$5,249.5**	**81.66%**		**$6,591.7**	**82.84%**
Total Protein Foods Expenditures Among Top 1,000 Subcommodities		**$1,512.2**	**98.95%**		**$6,288.8**	**97.83%**		**$7,801.0**	**98.04%**
Total Protein Foods Expenditures Among 1,792 Subcommodities		**$1,528.3**	**100%**		**$6,428.5**	**100%**		**$7,956.9**	**100%**

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.
Note: Columns may not sum to total shown due to rounding.
*Top 100 subcommodities based on SNAP household expenditures.

Exhibit D–6: Saturated Fats and Added Sugars (SoFAS)

(SoFAS) Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Soft Drinks 12/18 & 15pk Can Car	1	$164.6	18.86%	1	$601.2	16.11%	1	$765.8	16.63%
Sft Drnk 2 Liter Btl Carb Incl	2	$70.9	8.12%	2	$230.1	6.17%	2	$301.0	6.54%
Soft Drinks 20pk & 24pk Can Carb	3	$39.7	4.55%	9	$106.4	2.85%	8	$146.1	3.17%
Sugar	4	$36.9	4.23%	8	$112.7	3.02%	7	$149.6	3.25%
Sft Drnk Mlt-Pk Btl Carb (Excp)	5	$34.0	3.90%	4	$173.6	4.65%	3	$207.6	4.51%
Sft Drnk Sngl Srv Btl Carb (Ex)	6	$27.8	3.18%	11	$71.4	1.91%	11	$99.2	2.15%
Aseptic Pack Juice And Drinks	7	$24.2	2.78%	16	$57.1	1.53%	15	$81.4	1.77%

Exhibit D–6: Saturated Fats and Added Sugars (SoFAS)—Continued

(SoFAS) Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Refrigerated Coffee Creamers	8	$24.1	2.76%	6	$147.2	3.95%	5	$171.3	3.72%
Candy Bags—Chocolate	9	$21.5	2.46%	5	$147.5	3.95%	6	$169.1	3.67%
Butter	10	$19.6	2.24%	3	$175.6	4.71%	4	$195.2	4.24%
Sour Creams	11	$17.5	2.00%	10	$95.2	2.55%	10	$112.7	2.45%
Cream Cheese	12	$17.2	1.97%	7	$115.5	3.10%	9	$132.7	2.88%
Candy Bars (Singles) (Including)	13	$16.3	1.87%	18	$54.9	1.47%	16	$71.3	1.55%
Dairy Case Juice Drnk Under 10	14	$16.0	1.83%	22	$48.0	1.29%	19	$64.0	1.39%
Candy Bars (Multi Pack)	15	$15.6	1.79%	12	$69.6	1.86%	12	$85.2	1.85%
Tea Sweetened	16	$13.9	1.59%	13	$68.7	1.84%	13	$82.6	1.79%
Chewing Gum	17	$13.2	1.51%	14	$68.3	1.83%	14	$81.5	1.77%
Candy Bags—Non Chocolate	18	$12.6	1.44%	19	$54.9	1.47%	18	$67.5	1.46%
Molasses & Syrups	19	$11.7	1.34%	15	$58.7	1.57%	17	$70.4	1.53%
Dairy Case Citrus Pnch/Oj Subs	20	$11.0	1.26%	27	$34.4	0.92%	26	$45.4	0.99%
Fruit Drinks: Canned & Glass	21	$10.6	1.21%	60	$10.9	0.29%	46	$21.5	0.47%
Non Dairy Creamer	22	$10.5	1.20%	25	$35.4	0.95%	25	$45.9	1.00%
Seasonal Miscellaneous [Candy]	23	$9.2	1.05%	23	$46.9	1.26%	23	$56.0	1.22%
Dairy Case Tea With Sugar Or S	24	$8.4	0.96%	36	$23.1	0.62%	33	$31.5	0.68%
Seasonal Candy Bags—Chocolate	25	$7.9	0.90%	20	$54.8	1.47%	21	$62.7	1.36%
Energy Drink—Single Serve	26	$7.7	0.88%	32	$26.3	0.70%	29	$33.9	0.74%
Energy Drink—Single Serve (N)	27	$7.1	0.82%	24	$39.5	1.06%	24	$46.7	1.01%
Preserves/Jam/Marmalade	28	$6.7	0.77%	17	$56.2	1.51%	20	$63.0	1.37%
Margarine Stick	29	$6.7	0.77%	41	$22.3	0.60%	37	$29.0	0.63%
Juice (Under 10% Juice)	30	$6.7	0.76%	40	$22.4	0.60%	36	$29.1	0.63%
Sweeteners	31	$6.4	0.73%	21	$49.8	1.33%	22	$56.2	1.22%
Frosting	32	$6.3	0.72%	31	$27.0	0.72%	30	$33.4	0.72%
Soft Drinks Can Non-Carb (Exce)	33	$5.9	0.67%	57	$11.5	0.31%	54	$17.4	0.38%
Refrig Dips	34	$5.7	0.66%	34	$24.7	0.66%	34	$30.4	0.66%
Aseptic Pack Juice And Drinks	35	$5.3	0.61%	46	$17.5	0.47%	44	$22.9	0.50%
Candy Bars (Singles) (Including)	36	$5.1	0.59%	50	$15.9	0.43%	48	$21.1	0.46%
Cranberry Juice (50% And Under)	37	$5.0	0.58%	39	$22.6	0.61%	40	$27.6	0.60%
Frzn Whipped Topping	38	$5.0	0.57%	28	$30.9	0.83%	28	$35.9	0.78%
Blended Juice & Combinations (50)	39	$4.8	0.55%	37	$22.9	0.61%	39	$27.7	0.60%
Jelly	40	$4.7	0.54%	44	$18.1	0.48%	45	$22.8	0.50%
Energy Drink—Multi-Pack	41	$4.3	0.49%	43	$19.0	0.51%	42	$23.3	0.51%
Honey	42	$4.1	0.48%	29	$28.9	0.78%	31	$33.1	0.72%
Gum (Packaged)	43	$4.1	0.47%	33	$25.9	0.69%	35	$30.0	0.65%
Soft Drinks 6pk Can Carb (Exp)	44	$4.1	0.47%	30	$27.8	0.74%	32	$31.9	0.69%
Miscellaneous Candy (Including)	45	$4.0	0.46%	42	$19.0	0.51%	43	$23.0	0.50%
Juices Superfoods/Enhanced	46	$3.8	0.44%	38	$22.8	0.61%	41	$26.6	0.58%
Dairy Case Fruit Drinks (No Ju)	47	$3.7	0.42%	102	$2.8	0.08%	80	$6.5	0.14%
Aseptic Pack Juice And Drinks	48	$3.5	0.41%	87	$4.2	0.11%	72	$7.7	0.17%
Aerosol Toppings [Milk By-Products]	49	$3.5	0.40%	35	$24.5	0.66%	38	$28.0	0.61%
Hot Chocolate/Cocoa Mix	50	$3.5	0.40%	45	$17.8	0.48%	47	$21.2	0.46%
Seasonal Candy Box—Chocolate	51	$3.4	0.39%	47	$16.6	0.45%	49	$20.0	0.43%
Sft Drnk 1 Liter Btl Carb (Exc)	52	$3.3	0.38%	65	$8.2	0.22%	63	$11.5	0.25%
Fruit Drinks: Canned & Glass	53	$3.2	0.37%	80	$5.0	0.13%	71	$8.2	0.18%
Soft Drink Canisters	54	$3.1	0.36%	66	$7.9	0.21%	65	$11.1	0.24%
Marshmallows	55	$3.0	0.34%	48	$16.4	0.44%	50	$19.4	0.42%
Whipping Cream	56	$3.0	0.34%	26	$35.2	0.94%	27	$38.1	0.83%
Solid Shortening	57	$2.9	0.33%	54	$14.0	0.38%	55	$16.9	0.37%
Tea Can With Sweetener/Sugar	58	$2.7	0.31%	74	$6.1	0.16%	67	$8.8	0.19%
Soft Drink Bottle Non-Carb (Ex)	59	$2.6	0.30%	83	$4.7	0.13%	76	$7.4	0.16%
Ice Cream Toppings	60	$2.6	0.30%	53	$14.1	0.38%	56	$16.7	0.36%
Seasonal Candy Bags Non-Chocol	61	$2.6	0.30%	52	$14.9	0.40%	53	$17.5	0.38%
Candy Bars Multi Pack W/ Flour	62	$2.6	0.29%	64	$8.8	0.23%	64	$11.3	0.25%

Exhibit D–6: Saturated Fats and Added Sugars (SoFAS)—Continued

(SoFAS) Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Candy Bags—Chocolate W/ Flour	63	$2.5	0.29%	51	$15.2	0.41%	52	$17.7	0.38%
Pork Skins/Cracklins	64	$2.2	0.26%	73	$6.2	0.17%	68	$8.4	0.18%
Mints/Candy & Breath (Not Life)	65	$2.1	0.25%	56	$12.1	0.32%	57	$14.3	0.31%
Juices Smoothies/Blended	66	$2.1	0.24%	59	$11.0	0.29%	60	$13.1	0.28%
Miscellaneous Candy (Including)	67	$1.9	0.22%	58	$11.2	0.30%	59	$13.1	0.28%
Cocktail Mixes—Fluid: Add Liq	68	$1.9	0.22%	49	$16.4	0.44%	51	$18.3	0.40%
Cake Décors & Icing	69	$1.8	0.20%	62	$10.0	0.27%	62	$11.7	0.25%
Enhanced Stick [Powder Drink Mix]	70	$1.7	0.20%	61	$10.7	0.29%	61	$12.5	0.27%
Novelty Candy	71	$1.6	0.19%	76	$5.7	0.15%	77	$7.4	0.16%
Sugar Sweetened Sticks	72	$1.4	0.16%	104	$2.5	0.07%	96	$3.9	0.08%
Dips Caramel/Fruit Glazes	73	$1.3	0.15%	75	$5.9	0.16%	78	$7.2	0.16%
Seasonal Miscellaneous W/ Flour	74	$1.2	0.14%	68	$7.1	0.19%	69	$8.4	0.18%
Instant Tea & Tea Mix (W/ Sugar)	75	$1.1	0.13%	84	$4.4	0.12%	85	$5.6	0.12%
Misc Checklane Candy	76	$1.1	0.13%	103	$2.6	0.07%	97	$3.7	0.08%
Fluid Pouch [Powder Drink Mix]	77	$1.1	0.13%	71	$6.6	0.18%	73	$7.7	0.17%
Sweet Goods: Candy	78	$1.1	0.12%	85	$4.4	0.12%	87	$5.4	0.12%
Tea Bottles With Sweetener/ Sug	79	$1.1	0.12%	114	$1.9	0.05%	105	$3.0	0.06%
Hispanic Carbonated Beverages	80	$1.1	0.12%	93	$3.5	0.09%	92	$4.6	0.10%
Candy W/O Flour	81	$1.0	0.12%	78	$5.4	0.15%	81	$6.5	0.14%
Candy Boxed Chocolates W/ Flour	82	$1.0	0.12%	79	$5.3	0.14%	83	$6.3	0.14%
Apple Juice & Cider (50% And U)	83	$1.0	0.12%	98	$3.0	0.08%	95	$4.0	0.09%
Energy Drink—Multi-Pack (Non)	84	$1.0	0.11%	63	$9.4	0.25%	66	$10.4	0.22%
Candy Boxed Chocolates	85	$0.9	0.11%	70	$6.7	0.18%	74	$7.7	0.17%
Seasonal Candy Box Non-Chocola	86	$0.9	0.11%	89	$4.0	0.11%	88	$4.9	0.11%
Candy Box Non—Chocolate	87	$0.9	0.11%	90	$3.9	0.10%	89	$4.8	0.10%
Cake Décors—Candies	88	$0.9	0.10%	77	$5.4	0.15%	82	$6.3	0.14%
Non-Carb Jce (Under 50% Jce)	89	$0.9	0.10%	82	$4.8	0.13%	84	$5.7	0.12%
Candy Bags—Non Chocolate W/Flo	90	$0.8	0.09%	91	$3.7	0.10%	93	$4.5	0.10%
Hispanic Juice Under 50% Juice	91	$0.7	0.08%	113	$2.0	0.07%	109	$2.7	0.05%
Can/Btl Carb Beve 50% And Unde	92	$0.7	0.08%	67	$7.6	0.20%	70	$8.3	0.18%
Cranapple/Cran Grape Juice (Un)	93	$0.6	0.07%	69	$7.0	0.19%	75	$7.6	0.17%
Grapefruit Juice (50% And Unde)	94	$0.6	0.07%	96	$3.1	0.08%	98	$3.7	0.08%
Blended Juice & Combinations (Un)	95	$0.6	0.07%	97	$3.0	0.08%	100	$3.6	0.08%
Mixers (Tonic Water/Gngr Ale) Un	96	$0.5	0.06%	55	$13.2	0.35%	58	$13.7	0.30%
Marshmallow Crème	97	$0.5	0.06%	92	$3.5	0.09%	94	$4.1	0.09%
Coconut [Baking Needs]	98	$0.5	0.06%	81	$4.9	0.13%	86	$5.5	0.12%
Honey/Syrup	99	$0.5	0.06%	86	$4.3	0.11%	90	$4.8	0.10%
Dips Fruit And Chocolate	100	$0.5	0.06%	106	$1.9	0.05%	112	$2.4	0.04%
Top 100 SoFAS Expenditures *		**$862.5**	**98.70%**		**$3,660.7**	**97.93%**		**$4,523.2**	**98.05%**
Total SoFAS Expenditures Among Top 1,000 Subcommodities		**$864.1**	**98.96%**		**$3,673.1**	**98.42%**		**$4,537.3**	**98.53%**
Total SoFAS Expenditures Among 1,792 Subcommodities		**$873.2**	**100%**		**$3,731.9**	**100%**		**$4,605.0**	**100%**

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.
Note: Columns may not sum to total shown due to rounding.
* Top 100 subcommodities based on SNAP household expenditures.

Exhibit D–7: Vegetables

Vegetable Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Potatoes Russet (Bulk & Bag)	1	$35.8	6.74%	1	$154.5	4.60%	1	$190.2	4.89%
Fz Bag Vegetables—Plain	2	$25.7	4.85%	2	$131.9	3.93%	2	$157.7	4.05%
Mainstream [Pasta & Pizza Sauce]	3	$23.0	4.33%	6	$81.0	2.41%	5	$103.9	2.67%
Frzn French Fries	4	$20.5	3.86%	19	$50.3	1.50%	9	$70.8	1.82%
Avocado	5	$13.4	2.52%	4	$112.6	3.35%	4	$126.0	3.24%
Blends [Salad Mix]	6	$13.1	2.47%	3	$124.0	3.69%	3	$137.1	3.52%
Green Beans: Fs/Whl/Cut	7	$12.8	2.41%	15	$53.1	1.58%	15	$65.9	1.69%
Potatoes: Dry	8	$12.3	2.31%	33	$32.3	0.96%	28	$44.6	1.15%
Corn	9	$12.1	2.28%	22	$44.0	1.31%	19	$56.0	1.44%
Head Lettuce	10	$11.6	2.18%	13	$55.5	1.65%	14	$67.1	1.72%
Frzn Steamable Vegetables	11	$10.5	1.98%	5	$81.4	2.42%	6	$91.9	2.36%
Mexican Sauces And Picante Sau	12	$10.2	1.93%	9	$62.3	1.85%	8	$72.5	1.86%
Tomatoes Diced	13	$9.5	1.79%	11	$59.9	1.78%	11	$69.4	1.79%
Tomatoes Hothouse On The Vine	14	$9.2	1.74%	7	$77.7	2.31%	7	$86.9	2.23%
Onions Yellow (Bulk & Bag)	15	$8.7	1.65%	27	$39.3	1.17%	24	$48.1	1.24%
Cucumbers	16	$8.2	1.55%	12	$58.9	1.75%	13	$67.1	1.73%
Vegetable Salads—Prepack	17	$7.8	1.48%	29	$36.6	1.09%	29	$44.4	1.14%
Peppers Green Bell	18	$7.8	1.47%	25	$41.5	1.24%	22	$49.3	1.27%
Regular Garden	19	$7.8	1.46%	35	$31.9	0.95%	31	$39.6	1.02%
Roma Tomatoes (Bulk/Pkg)	20	$7.5	1.41%	26	$39.6	1.18%	25	$47.1	1.21%
Carrots Mini Peeled	21	$7.0	1.32%	10	$61.4	1.83%	12	$68.5	1.76%
Onions Sweet (Bulk & Bag)	22	$6.2	1.16%	20	$47.4	1.41%	21	$53.6	1.38%
Celery	23	$5.9	1.11%	17	$51.2	1.52%	18	$57.1	1.47%
Tomatoes Vine Ripe Bulk	24	$5.7	1.07%	51	$22.5	0.67%	48	$28.2	0.72%
Garden Plus [Salad Mix]	25	$5.5	1.03%	36	$31.8	0.95%	34	$37.2	0.96%
Cabbage	26	$5.3	1.00%	43	$25.1	0.75%	43	$30.5	0.78%
Frzn Tater Tots/Other Extruded	27	$5.2	0.99%	55	$18.8	0.56%	53	$24.1	0.62%
Broccoli Whole & Crowns	28	$5.2	0.97%	16	$52.0	1.55%	17	$57.1	1.47%
Tomato Sauce	29	$5.1	0.96%	48	$24.2	0.72%	45	$29.3	0.75%
Variety Lettuce	30	$5.1	0.96%	8	$65.2	1.94%	10	$70.3	1.81%
Tomatoes Hot House Bulk	31	$5.0	0.94%	39	$30.3	0.90%	37	$35.3	0.91%
Potatoes Sweet & Yams	32	$4.8	0.91%	28	$37.1	1.11%	30	$41.9	1.08%
Tomatoes Grape	33	$4.7	0.88%	14	$54.6	1.63%	16	$59.3	1.52%
Mexican Beans/Refried	34	$4.7	0.88%	52	$21.0	0.63%	51	$25.6	0.66%
Frzn Hashbrown Potatoes	35	$4.6	0.86%	45	$24.8	0.74%	44	$29.3	0.75%
Corn Bulk	36	$4.5	0.85%	32	$32.5	0.97%	35	$37.1	0.95%
Fz Box Vegetables—Value-Added	37	$4.4	0.83%	46	$24.7	0.73%	47	$29.1	0.75%
Kits [Salad Mix]	38	$4.2	0.79%	31	$33.5	1.00%	33	$37.6	0.97%
Potatoes Red (Bulk & Bag)	39	$4.1	0.78%	34	$32.0	0.95%	36	$36.1	0.93%
Frzn Corn On The Cob	40	$4.0	0.75%	94	$8.4	0.25%	83	$12.4	0.32%
Vegetable Party Tray	41	$4.0	0.75%	44	$25.1	0.75%	46	$29.1	0.75%
Cut Vegetables All Other	42	$4.0	0.75%	24	$42.2	1.26%	26	$46.2	1.19%
Vegetable Salads—Bulk	43	$3.8	0.72%	37	$31.0	0.92%	38	$34.8	0.89%
Veg Juice (Except Tomato) (Ove)	44	$3.8	0.72%	38	$30.4	0.91%	39	$34.2	0.88%
Asparagus	45	$3.8	0.72%	18	$50.7	1.51%	20	$54.5	1.40%
Tomatoes Vine Ripe Pkg	46	$3.6	0.68%	101	$7.3	0.22%	89	$10.9	0.28%
Peppers Red Bell	47	$3.6	0.68%	23	$42.5	1.27%	27	$46.1	1.19%
Value (Pasta Tomato Sauce)	48	$3.5	0.67%	87	$9.7	0.29%	78	$13.2	0.34%
Peas/Green	49	$3.5	0.66%	64	$14.7	0.44%	61	$18.2	0.47%
Spinach & Greens	50	$3.5	0.66%	103	$7.0	0.21%	92	$10.5	0.27%
Peppers Other Bell	51	$3.4	0.63%	41	$28.4	0.85%	41	$31.8	0.82%
Mushrooms White Sliced Pkg	52	$3.3	0.63%	42	$27.8	0.83%	42	$31.2	0.80%
Shredded Lettuce	53	$3.3	0.62%	81	$10.9	0.32%	75	$14.2	0.36%
Mushrooms White Whole Pkg	54	$3.1	0.58%	40	$29.6	0.88%	40	$32.7	0.84%
Green Onions	55	$3.0	0.57%	49	$23.5	0.70%	50	$26.5	0.68%
Salad Bowls	56	$2.9	0.54%	74	$12.3	0.37%	69	$15.2	0.39%
Fz Bag Vegetables—Value-Added	57	$2.8	0.54%	65	$14.7	0.44%	63	$17.6	0.45%
Sal: Hommus	58	$2.8	0.52%	21	$45.4	1.35%	23	$48.2	1.24%
Mushrooms Cnd & Glass	59	$2.7	0.52%	67	$14.3	0.42%	64	$17.0	0.44%
Mexican Enchilada Sauce	60	$2.7	0.51%	69	$13.7	0.41%	66	$16.4	0.42%
Onions Red (Bulk & Bag)	61	$2.5	0.48%	53	$20.9	0.62%	54	$23.5	0.60%
Onions White (Bulk & Bag)	62	$2.5	0.47%	60	$15.8	0.47%	60	$18.3	0.47%
Authentic Sauces/Salsa/Picante	63	$2.3	0.43%	89	$9.2	0.27%	87	$11.5	0.30%
Salad Mix Blends Organic	64	$2.3	0.43%	30	$36.5	1.09%	32	$38.8	1.00%
Salad: Lettuce	65	$2.2	0.42%	77	$12.2	0.36%	72	$14.5	0.37%
Cauliflower Whole	66	$2.2	0.42%	47	$24.5	0.73%	49	$26.8	0.69%
Mushrooms Portabella	67	$2.2	0.42%	50	$22.6	0.67%	52	$24.8	0.64%
Mexican Peppers Chilies	68	$2.2	0.41%	61	$15.7	0.47%	62	$17.9	0.46%
Fried Onions	69	$2.1	0.39%	75	$12.3	0.37%	73	$14.3	0.37%
Carrots Bagged	70	$2.0	0.39%	58	$17.2	0.51%	58	$19.2	0.49%

Exhibit D–7: Vegetables—Continued

Vegetable Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Potatoes Gourmet	71	$2.0	0.38%	54	$20.3	0.60%	55	$22.3	0.57%
Sweet Potatoes	72	$2.0	0.38%	104	$6.7	0.20%	101	$8.7	0.22%
Corn Is Packaged	73	$1.9	0.36%	70	$12.8	0.38%	71	$14.7	0.38%
Salad Spinach	74	$1.8	0.34%	57	$17.9	0.53%	57	$19.7	0.51%
Tomato Paste	75	$1.8	0.34%	83	$10.2	0.30%	84	$12.0	0.31%
Sal: Salsa/Dips Bulk	76	$1.8	0.33%	98	$7.7	0.23%	95	$9.5	0.24%
Beans	77	$1.7	0.32%	59	$16.9	0.50%	59	$18.6	0.48%
Tomato Juice (Over 50% Jce)	78	$1.7	0.32%	88	$9.6	0.28%	88	$11.2	0.29%
Authentic Vegetables And Foods	79	$1.7	0.32%	136	$3.2	0.10%	128	$4.9	0.13%
Potatoes Gold (Bulk & Bag)	80	$1.6	0.29%	63	$14.8	0.44%	65	$16.4	0.42%
Garlic Whole Cloves	81	$1.6	0.29%	71	$12.7	0.38%	74	$14.3	0.37%
Coleslaw	82	$1.6	0.29%	79	$11.9	0.35%	77	$13.5	0.35%
Carrots Bagged Organic	83	$1.5	0.29%	56	$18.6	0.55%	56	$20.2	0.52%
Pumpkins	84	$1.5	0.29%	82	$10.3	0.31%	85	$11.9	0.31%
Herbs Cilanto	85	$1.4	0.26%	84	$10.1	0.30%	86	$11.5	0.30%
Frzn Baked/Stuffed/Mashed & Spec	86	$1.3	0.25%	91	$9.0	0.27%	93	$10.4	0.27%
Broccoli/Cauliflower Processed	87	$1.3	0.25%	72	$12.5	0.37%	76	$13.8	0.36%
Mixed Vegetables	88	$1.3	0.24%	124	$4.5	0.13%	119	$5.8	0.15%
Authentic Peppers	89	$1.3	0.24%	125	$4.5	0.13%	120	$5.7	0.15%
Sal: Salsa Prepack	90	$1.3	0.24%	68	$13.7	0.41%	70	$15.0	0.38%
Carrots	91	$1.1	0.21%	123	$4.5	0.14%	121	$5.7	0.15%
Peppers Yellow Bell	92	$1.1	0.21%	80	$11.4	0.34%	82	$12.5	0.32%
Pizza Sauce	93	$1.1	0.21%	110	$6.1	0.18%	107	$7.2	0.18%
Garlic Jar	94	$1.1	0.21%	97	$7.7	0.23%	99	$8.8	0.23%
Peppers Jalapeño	95	$1.0	0.19%	126	$4.4	0.13%	125	$5.5	0.14%
Tomatoes Cherry	96	$1.0	0.19%	78	$12.1	0.36%	80	$13.1	0.34%
Instore Cut Vegetables	97	$1.0	0.19%	86	$9.7	0.29%	91	$10.7	0.28%
Tomato Stewed	98	$1.0	0.19%	108	$6.4	0.19%	105	$7.4	0.19%
White Potatoes	99	$1.0	0.18%	128	$4.3	0.13%	127	$5.2	0.13%
Sauerkraut and Cabbage	100	$0.9	0.17%	111	$6.0	0.18%	109	$6.9	0.18%
Top 100 Vegetable Expenditures *		**$500.7**	**94.36%**		**$3,035.6**	**90.37%**		**$3,536.4**	**90.91%**
Total Vegetable Expenditures Among Top 1,000 Subcommodities		**$520.5**	**98.08%**		**$3,251.8**	**96.80%**		**$3,772.3**	**96.97%**
Total Vegetable Expenditures Among 1,792 Subcommodities		**$530.7**	**100%**		**$3,359.3**	**100%**		**$3,890.0**	**100%**

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.
Note: Columns may not sum to total shown due to rounding.
*Top 100 subcommodities based on SNAP household expenditures.

Exhibit D–8: Composite Foods

Composite Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Potato Chips	1	$64.4	5.19%	2	$253.2	4.88%	1	$317.6	4.94%
Snacks/Appetizers	2	$44.6	3.59%	10	$100.5	1.94%	7	$145.0	2.26%
Fz Ss Prem Traditional Meals	3	$43.8	3.53%	4	$175.4	3.38%	4	$219.3	3.41%
Snack Cake—Multi Pack	4	$41.6	3.36%	9	$101.7	1.96%	9	$143.3	2.23%
Fz Ss Economy Meals All	5	$40.9	3.30%	15	$80.7	1.56%	11	$121.6	1.89%
Pizza/Premium	6	$39.7	3.20%	6	$153.3	2.95%	5	$193.0	3.00%
Sandwiches & Handhelds	7	$35.9	2.89%	17	$73.6	1.42%	13	$109.4	1.70%
Convenient Meals—Kids Meal C	8	$34.2	2.76%	19	$69.7	1.34%	14	$104.0	1.62%
Premium [Ice Cream & Sherbert]	9	$31.2	2.52%	3	$226.0	4.35%	3	$257.2	4.00%
Condensed Soup	10	$29.7	2.39%	5	$153.6	2.96%	6	$183.2	2.85%
Fz Family Style Entrées	11	$27.6	2.23%	13	$83.5	1.61%	12	$111.1	1.73%
Traditional [Ice Cream & Sherbert]	12	$25.6	2.07%	8	$118.7	2.29%	8	$144.4	2.25%
Fz Ss Prem Nutritional Meals	13	$24.7	1.99%	1	$271.6	5.23%	2	$296.3	4.61%
Macaroni & Cheese Dnrs	14	$24.3	1.96%	24	$59.7	1.15%	21	$84.0	1.31%
Can Pasta	15	$22.2	1.79%	36	$47.7	0.92%	29	$69.9	1.09%

Exhibit D–8: Composite Foods—Continued

Composite Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Mult Pk Bag Snacks	16	$21.6	1.74%	38	$43.4	0.84%	32	$65.0	1.01%
Sw Gds: Donuts	17	$21.3	1.72%	14	$82.3	1.58%	15	$103.6	1.61%
Pizza/Economy	18	$19.8	1.60%	37	$45.1	0.87%	33	$65.0	1.01%
Frzn Breakfast Sandwiches	19	$19.1	1.54%	29	$55.7	1.07%	23	$74.8	1.16%
Fz Skillet Meals	20	$18.8	1.51%	16	$79.3	1.53%	17	$98.1	1.53%
Cakes: Birthday/Celebration Sh	21	$18.6	1.50%	33	$50.3	0.97%	31	$68.9	1.07%
Sandwich Cookies	22	$18.0	1.45%	18	$71.8	1.38%	19	$89.8	1.40%
Pizza/Traditional	23	$17.9	1.44%	22	$64.1	1.24%	22	$82.0	1.27%
Rts Soup: Chunky/ Homestyle/Et	24	$17.6	1.42%	7	$119.9	2.31%	10	$137.5	2.14%
Salsa & Dips	25	$17.1	1.38%	28	$57.0	1.10%	24	$74.1	1.15%
Sandwiches—(Cold)	26	$16.9	1.36%	20	$67.7	1.30%	20	$84.6	1.32%
Sweet Goods—Full Size	27	$15.8	1.28%	27	$57.9	1.12%	26	$73.8	1.15%
Tray Pack/Choc Chip Cookies	28	$15.3	1.23%	31	$53.9	1.04%	30	$69.2	1.08%
Sticks/Enrobed [Frozen Novelties]	29	$14.2	1.14%	25	$59.7	1.15%	25	$73.9	1.15%
Water Ice [Frozen Novelties]	30	$14.0	1.13%	32	$50.6	0.97%	34	$64.6	1.00%
Pails [Ice Cream & Sherbert]	31	$13.9	1.12%	46	$35.1	0.68%	41	$49.1	0.76%
Skillet Dinners	32	$13.0	1.05%	57	$25.8	0.50%	49	$38.9	0.60%
Pizza/Single Serve/Microwave	33	$12.8	1.03%	39	$43.2	0.83%	38	$56.0	0.87%
Super Premium Pints [Ice Cream & Sherbert]	34	$11.8	0.95%	11	$91.1	1.76%	16	$103.0	1.60%
Cakes: Cupcakes	35	$11.1	0.89%	45	$35.3	0.68%	43	$46.3	0.72%
Corn Dogs	36	$10.9	0.88%	68	$20.6	0.40%	59	$31.5	0.49%
Cookies: Regular	37	$10.8	0.87%	26	$59.6	1.15%	28	$70.4	1.09%
Burritos	38	$10.2	0.82%	69	$20.0	0.39%	61	$30.1	0.47%
Microwave Dinners	39	$9.8	0.79%	40	$39.9	0.77%	40	$49.8	0.77%
Cakes: Layers	40	$9.8	0.79%	42	$38.2	0.74%	42	$48.1	0.75%
Sushi—In Store Prepared	41	$9.2	0.74%	12	$85.4	1.64%	18	$94.6	1.47%
Canister Snacks	42	$9.1	0.73%	44	$36.4	0.70%	45	$45.5	0.71%
Pudding & Gelatin Cups/ Cans	43	$8.7	0.70%	53	$27.6	0.53%	51	$36.3	0.56%
Salty Snacks Vending	44	$8.4	0.67%	80	$15.8	0.31%	67	$24.2	0.38%
Cones [Frozen Novelties]	45	$7.9	0.64%	50	$31.2	0.60%	48	$39.2	0.61%
Vanilla Wafer/Kids Cookies	46	$7.5	0.60%	43	$36.7	0.71%	46	$44.2	0.69%
Ice Cream Sandwiches	47	$7.4	0.60%	60	$24.2	0.47%	58	$31.6	0.49%
Cakes: Crème/Pudding	48	$7.4	0.59%	58	$25.8	0.50%	54	$33.2	0.52%
Refrigerated Pudding	49	$7.0	0.57%	34	$49.5	0.95%	37	$56.5	0.88%
Layer Cake Mix	50	$7.0	0.56%	47	$35.1	0.68%	47	$42.1	0.65%
Refrigerated Cookies—Brand	51	$6.8	0.55%	51	$28.8	0.56%	53	$35.6	0.55%
Broth	52	$6.7	0.54%	21	$65.6	1.26%	27	$72.3	1.12%
Pies: Fruit/Nut	53	$6.3	0.51%	41	$39.6	0.76%	44	$45.9	0.71%
Snack Cake—Single Serve	54	$5.7	0.46%	77	$16.2	0.31%	74	$22.0	0.34%
Better For You Snacks	55	$5.6	0.45%	35	$48.1	0.93%	39	$53.7	0.84%
Cookies: Holiday/Special Occas	56	$5.5	0.44%	56	$26.8	0.52%	56	$32.2	0.50%
Misc Bag Snacks	57	$5.5	0.44%	98	$11.5	0.22%	83	$17.0	0.26%
Frozen Fruit Pies & Cobblers	58	$5.3	0.43%	62	$23.7	0.46%	62	$28.9	0.45%
Frozen Cream Pies	59	$4.9	0.39%	71	$18.9	0.36%	69	$23.8	0.37%
Sw Gds: Sw Rolls/Dan	60	$4.8	0.39%	55	$26.9	0.52%	57	$31.7	0.49%
Brownie Mix	61	$4.8	0.39%	54	$27.5	0.53%	55	$32.3	0.50%
Fz Meal Kits/Stuffed/Other	62	$4.8	0.38%	96	$12.2	0.23%	84	$16.9	0.26%
Sw Gds: Muffins	63	$4.5	0.36%	48	$31.8	0.61%	50	$36.3	0.57%
Frzn Breakfast Entrées	64	$4.5	0.36%	78	$16.2	0.31%	78	$20.7	0.32%
Convenient Meals—Adult Meal	65	$4.5	0.36%	102	$11.2	0.22%	92	$15.7	0.24%
Dry Beans/Peas/Barley: Bag & B	66	$4.2	0.34%	72	$18.8	0.36%	71	$23.1	0.36%
Adult Premium [Frozen Novelties]	67	$4.2	0.34%	30	$54.5	1.05%	36	$58.7	0.91%
Mexican Dinners And Foods	68	$4.2	0.34%	100	$11.4	0.22%	93	$15.6	0.24%
Premium Cookies (Ex: Pepperidg)	69	$4.2	0.33%	49	$31.5	0.61%	52	$35.7	0.55%
Chocolate Covered Cookies	70	$4.0	0.32%	73	$18.5	0.36%	73	$22.5	0.35%
Microwavable Cups	71	$3.7	0.29%	116	$9.0	0.17%	106	$12.7	0.20%
Cakes: Cheesecake	72	$3.6	0.29%	84	$14.7	0.28%	81	$18.3	0.28%
Deli Tray: Meat And Cheese	73	$3.5	0.28%	65	$21.5	0.41%	66	$25.0	0.39%
Dry Soup	74	$3.5	0.28%	63	$23.3	0.45%	64	$26.8	0.42%
Treats	75	$3.5	0.28%	103	$11.2	0.22%	95	$14.6	0.23%
Fitness & Diet—Bars W/ Flour	76	$3.4	0.28%	23	$59.8	1.15%	35	$63.2	0.98%
Refrigerated Cookie Dough	77	$3.4	0.28%	90	$12.9	0.25%	89	$16.3	0.25%
Cakes: Fancy/Service Case	78	$3.3	0.27%	76	$17.4	0.34%	77	$20.7	0.32%
Package Dinners/Pasta Salads	79	$3.3	0.26%	112	$9.5	0.18%	105	$12.7	0.20%
Cakes: Layers/Sheets Novelties	80	$3.3	0.26%	94	$12.5	0.24%	91	$15.8	0.25%

Exhibit D–8: Composite Foods—Continued

Composite Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Pies: Pumpkin/Custard	81	$3.2	0.26%	89	$13.1	0.25%	87	$16.3	0.25%
Puddings Dry	82	$3.2	0.26%	67	$20.8	0.40%	68	$23.9	0.37%
Vendor Size/Single Serve Cooki	83	$3.1	0.25%	126	$6.8	0.13%	120	$9.9	0.15%
Snack Mix	84	$3.0	0.24%	75	$17.5	0.34%	79	$20.5	0.32%
Multi-Pack Cookies	85	$2.9	0.23%	99	$11.4	0.22%	96	$14.3	0.22%
Cups/Push Ups/Other	86	$2.8	0.23%	110	$9.6	0.18%	108	$12.4	0.19%
Frzn Pie Shells/Pastry Shell/ F	87	$2.7	0.22%	79	$16.0	0.31%	80	$18.7	0.29%
Frozen Cakes/Desserts	88	$2.7	0.22%	105	$11.0	0.21%	101	$13.7	0.21%
Cakes: Angel Fds/Cke Rolls	89	$2.7	0.22%	74	$18.1	0.35%	76	$20.8	0.32%
Wellness/Portion Control	90	$2.7	0.22%	61	$23.8	0.46%	65	$26.5	0.41%
Pie Filling/Mincemeat/Glazes	91	$2.7	0.22%	59	$24.8	0.48%	63	$27.5	0.43%
Misc Snacks	92	$2.6	0.21%	87	$13.2	0.25%	90	$15.8	0.25%
Cakes: Ice Cream	93	$2.6	0.21%	120	$8.6	0.17%	113	$11.2	0.17%
Sushi—Prepackaged	94	$2.6	0.21%	70	$19.2	0.37%	75	$21.8	0.34%
Cakes: Birthday/Celebration Lay	95	$2.5	0.20%	114	$9.1	0.18%	110	$11.6	0.18%
Sw Gds: Swt/Flvrd Loaves	96	$2.4	0.20%	85	$13.9	0.27%	88	$16.3	0.25%
Cakes: Sheet	97	$2.4	0.19%	124	$7.2	0.14%	121	$9.6	0.15%
Cookies: Gourmet	98	$2.4	0.19%	66	$20.8	0.40%	70	$23.2	0.36%
Premium Pints [Ice Cream & Sherbert]	99	$2.3	0.18%	128	$6.5	0.13%	125	$8.8	0.14%
Sw Gds: Brownie/Bar Cookie	100	$1.9	0.15%	104	$11.2	0.22%	104	$13.1	0.20%
Top 100 Composite Expenditures *		**$1,179.3**	**95.05%**		**$4,717.8**	**90.90%**		**$5,897.1**	**91.70%**
Total Composite Expenditures Among Top 1,000 Subcommodities		**$1,235.4**	**99.57%**		**$5,132.0**	**98.88%**		**$6,367.4**	**99.01%**
Total Composite Expenditures Among 1,792 Subcommodities		**$1,240.7**	**100%**		**$5,190.0**	**100%**		**$6,430.7**	**100%**

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.
Note: Columns may not sum to total shown due to rounding.
*Top 100 subcommodities based on SNAP household expenditures.

Exhibit D–9: Other Subcommodities

Other Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Infant Formula Starter/Solution	1	$54.2	9.60%	14	$45.3	1.70%	6	$99.5	3.07%
Still Water Drnking/Mnrl Water	2	$48.8	8.64%	2	$187.7	7.03%	2	$236.5	7.31%
Unflavored Can Coffee	3	$41.3	7.32%	1	$198.0	7.41%	1	$239.3	7.39%
Isotonic Drinks Single Serve	4	$30.5	5.40%	4	$119.5	4.47%	3	$150.0	4.63%
Spring Water	5	$16.2	2.87%	5	$95.6	3.58%	5	$111.8	3.45%
Traditional Spices	6	$14.1	2.49%	8	$61.2	2.29%	7	$75.2	2.32%
Bbq Sauce	7	$12.3	2.17%	16	$38.6	1.45%	16	$50.9	1.57%
Baby Food—Beginner	8	$11.7	2.07%	21	$28.1	1.05%	18	$39.8	1.23%
Non-Carb Water Flvr—Drnk/ Mnr	9	$11.6	2.05%	7	$63.4	2.37%	8	$74.9	2.32%
Catsup	10	$11.5	2.03%	15	$41.5	1.55%	15	$53.0	1.64%
Sauce Mixes/Gravy Mixes Dry	11	$11.5	2.03%	13	$46.7	1.75%	12	$58.2	1.80%
Baby Food Junior/All Brands	12	$11.2	1.98%	22	$27.5	1.03%	19	$38.7	1.20%
Isotonic Drinks Multi-Pack	13	$10.8	1.92%	9	$58.1	2.17%	10	$68.9	2.13%
Ice—Crushed/Cubed	14	$9.3	1.65%	11	$49.9	1.87%	11	$59.2	1.83%
Unflavored Bag Coffee	15	$8.5	1.50%	3	$137.3	5.14%	4	$145.8	4.50%
Infant Formula Specialty	16	$8.4	1.49%	71	$9.1	0.34%	47	$17.5	0.54%
Infant Formula Starter Large P	17	$8.3	1.46%	30	$22.8	0.85%	27	$31.0	0.96%
Steak & Worchester Sauce	18	$8.2	1.44%	25	$26.7	1.00%	21	$34.9	1.08%
Unflavored Instant Coffee	19	$7.6	1.34%	23	$27.3	1.02%	22	$34.8	1.08%
Non-Dairy Milks	20	$7.1	1.25%	6	$67.7	2.53%	9	$74.8	2.31%
Unsweetened Envelope [Powder Drink Mix]	21	$7.0	1.25%	88	$6.2	0.23%	61	$13.3	0.41%
Malted Mlk/Syrup/Pwdrs (Eggnog)	22	$6.9	1.23%	28	$25.3	0.95%	26	$32.2	1.00%

Exhibit D–9: Other Subcommodities—Continued

Other Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Still Water Flvrd Drnk/Mnrl Wt	23	$6.3	1.11%	17	$38.1	1.43%	17	$44.4	1.37%
Infant Formula Toddler	24	$6.0	1.06%	55	$12.4	0.46%	45	$18.4	0.57%
Mexican Seasoning Mixes	25	$5.9	1.05%	33	$20.6	0.77%	32	$26.5	0.82%
Hot Sauce	26	$5.8	1.03%	42	$16.4	0.61%	38	$22.2	0.69%
Ready To Drink Coffee	27	$5.5	0.98%	34	$20.5	0.77%	33	$26.0	0.80%
Tea Bags & Bulk Tea	28	$5.4	0.95%	24	$27.2	1.02%	25	$32.5	1.01%
Infant Formula Solutions Large	29	$5.3	0.95%	47	$15.2	0.57%	42	$20.5	0.63%
Stuffing Mixes	30	$5.3	0.94%	31	$22.1	0.83%	30	$27.4	0.85%
Infant Formula Concentrate	31	$4.9	0.86%	111	$3.9	0.15%	82	$8.8	0.27%
Salad Bar Other	32	$4.5	0.81%	41	$18.2	0.68%	36	$22.8	0.70%
Bits & Morsels [Baking Needs]	33	$4.4	0.77%	10	$50.3	1.88%	13	$54.7	1.69%
Ripe Olives	34	$4.1	0.73%	27	$25.3	0.95%	28	$29.5	0.91%
Gravy Can/Glass	35	$4.0	0.72%	44	$15.7	0.59%	44	$19.8	0.61%
Marinades	36	$3.9	0.70%	39	$18.4	0.69%	37	$22.4	0.69%
Baby Food Cereals	37	$3.8	0.67%	82	$7.1	0.27%	70	$10.9	0.34%
Diet Cntrl Liqs Nutritional	38	$3.7	0.66%	20	$30.3	1.13%	24	$34.0	1.05%
Enhancements—Pickles/Kraut	39	$3.6	0.64%	36	$19.8	0.74%	35	$23.4	0.72%
Infant Formula Ready To Use	40	$3.5	0.61%	85	$6.9	0.26%	72	$10.4	0.32%
Sugar Free Canister [Powder Drink Mix]	41	$3.5	0.61%	32	$21.1	0.79%	34	$24.5	0.76%
Coffee Pods/Singles/Filter Pac	42	$3.4	0.60%	12	$49.8	1.87%	14	$53.2	1.65%
Sugar Free Sticks [Powder Drink Mix]	43	$3.3	0.58%	38	$18.8	0.70%	39	$22.1	0.68%
Sparkling Water—Flvrd Sweet	44	$3.1	0.55%	29	$24.1	0.90%	31	$27.2	0.84%
Tea Bags/Herbal	45	$3.1	0.54%	19	$31.2	1.17%	23	$34.3	1.06%
Yellow Mustard	46	$3.0	0.53%	56	$12.4	0.46%	55	$15.4	0.48%
Asian Other Sauces/Marinad	47	$2.8	0.50%	37	$18.9	0.71%	40	$21.8	0.67%
Peppers	48	$2.7	0.48%	52	$13.5	0.50%	53	$16.2	0.50%
Mexican Taco Sauce	49	$2.6	0.47%	84	$7.0	0.26%	76	$9.7	0.30%
Green Olives	50	$2.6	0.46%	43	$15.8	0.59%	46	$18.3	0.57%
Relishes	51	$2.5	0.44%	60	$11.6	0.43%	57	$14.1	0.44%
Flavored Bag Coffee	52	$2.4	0.42%	26	$26.2	0.98%	29	$28.6	0.88%
Gourmet Spices	53	$2.4	0.42%	18	$33.2	1.24%	20	$35.6	1.10%
Baby Juices	54	$2.3	0.40%	118	$3.1	0.11%	105	$5.3	0.16%
Dry Salad Dressing & Dip Mixes	55	$2.0	0.35%	48	$15.1	0.57%	49	$17.1	0.53%
Mustard—All Other	56	$2.0	0.35%	40	$18.3	0.69%	43	$20.3	0.63%
Gelatin	57	$2.0	0.35%	51	$14.3	0.54%	52	$16.3	0.50%
Vinegar/White & Cider	58	$1.9	0.34%	50	$14.4	0.54%	51	$16.3	0.50%
Baby Isotonic Drinks	59	$1.9	0.33%	101	$4.9	0.18%	92	$6.8	0.21%
Wing Sauce	60	$1.8	0.33%	100	$5.0	0.19%	91	$6.8	0.21%
Pure Extracts	61	$1.7	0.31%	46	$15.4	0.58%	48	$17.2	0.53%
Infant Formula Soy Base	62	$1.7	0.31%	161	$1.1	0.04%	135	$2.8	0.09%
Juices Proteins	63	$1.7	0.30%	66	$10.1	0.38%	64	$11.8	0.36%
Sal: Dip Prepack	64	$1.7	0.30%	59	$12.1	0.45%	58	$13.8	0.43%
Diet Energy Drinks	65	$1.7	0.30%	54	$12.8	0.48%	56	$14.5	0.45%
Baby Spring Waters	66	$1.7	0.30%	138	$2.0	0.07%	119	$3.7	0.11%
Frozen Internaional	67	$1.6	0.28%	86	$6.7	0.25%	83	$8.3	0.26%
Table Salt/Popcorn Salt/Ice Cr	68	$1.6	0.28%	72	$8.6	0.32%	73	$10.2	0.31%
Distilled Water	69	$1.6	0.28%	57	$12.2	0.46%	59	$13.7	0.42%
Enhancements—Salads/Spreads	70	$1.5	0.26%	99	$5.2	0.19%	95	$6.6	0.21%
Asian Soy Sauce	71	$1.5	0.26%	64	$10.3	0.39%	66	$11.7	0.36%
Central American Foods	72	$1.4	0.25%	94	$5.5	0.21%	90	$6.9	0.21%
Misc Dairy Refigerated	73	$1.4	0.25%	70	$9.1	0.34%	71	$10.5	0.32%
Diet Cntrl Bars Nutritional	74	$1.4	0.24%	35	$19.9	0.74%	41	$21.3	0.66%
Tea Bags/Green	75	$1.2	0.22%	61	$11.2	0.42%	63	$12.5	0.38%
Flours/Grains/Sugar	76	$1.2	0.22%	49	$14.6	0.55%	54	$15.9	0.49%
Specialty Instant Coffee W/Swe	77	$1.2	0.22%	77	$7.7	0.29%	81	$8.9	0.27%
Misc Hispanic Grocery	78	$1.2	0.21%	65	$10.2	0.38%	67	$11.4	0.35%
Baking Powder & Soda	79	$1.1	0.20%	75	$8.2	0.31%	77	$9.4	0.29%
Isotonic Drinks Multi-Serve	80	$1.1	0.19%	103	$4.7	0.18%	103	$5.7	0.18%
Juices Antioxidant/Wellness	81	$1.0	0.19%	76	$8.1	0.30%	78	$9.2	0.28%
Spices & Seasonings	82	$1.0	0.19%	104	$4.6	0.17%	104	$5.7	0.17%
Infant Formula Up Age	83	$1.0	0.18%	119	$3.0	0.11%	117	$4.1	0.13%
Oils/Vinegar	84	$1.0	0.18%	67	$10.0	0.37%	69	$11.0	0.34%
Miscellaneous Package Mixes	85	$1.0	0.18%	80	$7.2	0.27%	84	$8.2	0.25%
Sal: Olives/Pickles—Bulk	86	$1.0	0.18%	45	$15.5	0.58%	50	$16.5	0.51%
Cooking Bags With Spices/Seaso	87	$1.0	0.17%	132	$2.4	0.09%	124	$3.4	0.10%
Cooking Chocolate (Ex: Smi-Swt)	88	$0.9	0.16%	63	$10.3	0.39%	68	$11.2	0.35%

Exhibit D–9: Other Subcommodities—Continued

Other Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Tea Bags (Supplement)	89	$0.9	0.15%	69	$9.2	0.34%	74	$10.0	0.31%
Specialty Vinegar	90	$0.8	0.15%	53	$12.9	0.48%	60	$13.7	0.42%
Traditional Thai Foods	91	$0.8	0.14%	74	$8.3	0.31%	80	$9.1	0.28%
Pickld Veg/Peppers/*Etc.*	92	$0.8	0.14%	91	$5.9	0.22%	94	$6.7	0.21%
Specialty Olives	93	$0.8	0.14%	62	$11.0	0.41%	65	$11.7	0.36%
Authentic Japanese Foods	94	$0.8	0.14%	81	$7.1	0.27%	86	$7.9	0.24%
Chili Sauce/Cocktail Sauce	95	$0.7	0.13%	89	$6.0	0.22%	93	$6.7	0.21%
Flavored Can Coffee	96	$0.7	0.13%	92	$5.8	0.22%	96	$6.5	0.20%
Fortified/Water	97	$0.7	0.13%	108	$4.4	0.17%	107	$5.1	0.16%
Sparkling Water—Unflavored	98	$0.7	0.12%	58	$12.1	0.45%	62	$12.8	0.40%
Fitness & Diet—Powder Ntrtnl	99	$0.7	0.12%	78	$7.3	0.27%	85	$8.0	0.25%
Imitation Extracts	100	$0.7	0.12%	115	$3.5	0.13%	116	$4.2	0.13%
Top 100 Other Expenditures*		**$540.1**	**95.68%**		**$2,453.1**	**91.80%**		**$2,993.1**	**92.48%**
Total Other Expenditures Among Top 1,000 Subcommodities		**$550.7**	**97.56%**		**$2,533.2**	**94.80%**		**$3,083.9**	**95.28%**
Total Other Expenditures Among 1,792 Subcommodities		**$564.5**	**100%**		**$2,672.1**	**100%**		**$3,236.6**	**100%**

Source: *Foods Typically Purchased by SNAP Households*, IMPAQ International, LLC, 2016.
Note: Columns may not sum to total shown due to rounding.
*Top 100 subcommodities based on SNAP household expenditures.

Appendix E. Top 100 Subcommodities for SNAP Households by Expenditure by Demographic and Store Characteristics

Exhibit E–1: Top 100 Subcommodities for SNAP Households by Expenditure: Household Head Age 19–44 Year Olds

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Fluid Milk/White Only	1	$30.7	0.47%	1	$143.7	0.46%	1	$174.3	0.46%
Soft Drinks 12/18 & 15pk Can Car	2	$25.1	0.38%	2	$95.9	0.30%	2	$121.0	0.32%
Lean [Beef]	3	$17.2	0.26%	8	$42.7	0.14%	5	$59.9	0.16%
Kids Cereal	4	$13.8	0.21%	5	$44.6	0.14%	6	$58.4	0.15%
Shredded Cheese	5	$13.0	0.20%	3	$67.1	0.21%	3	$80.1	0.21%
Sft Drnk 2 Liter Btl Carb Incl	6	$11.3	0.17%	13	$39.1	0.12%	8	$50.5	0.13%
Potato Chips	7	$10.1	0.15%	11	$39.4	0.13%	9	$49.5	0.13%
Primal [Beef]	8	$10.0	0.15%	16	$35.6	0.11%	14	$45.5	0.12%
Infant Formula Starter/Solutio	9	$9.8	0.15%	150	$9.2	0.03%	73	$19.0	0.05%
Lunchment—Deli Fresh	10	$8.9	0.14%	6	$43.0	0.14%	7	$51.9	0.14%
Chicken Breast Boneless	11	$8.4	0.13%	4	$54.2	0.17%	4	$62.5	0.16%
Tortilla/Nacho Chips	12	$8.2	0.13%	10	$41.1	0.13%	10	$49.3	0.13%
Eggs—Large	13	$7.8	0.12%	12	$39.4	0.13%	12	$47.2	0.12%
Snacks/Appetizers	14	$7.7	0.12%	45	$20.6	0.07%	32	$28.3	0.07%
Still Water Drnking/Mnrl Water	15	$7.6	0.12%	20	$30.5	0.10%	18	$38.1	0.10%
Mainstream White Bread	16	$7.4	0.11%	31	$23.4	0.07%	25	$30.8	0.08%
American Single Cheese	17	$7.0	0.11%	34	$22.8	0.07%	26	$29.8	0.08%
Dairy Case 100% Pure Juice—O	18	$6.8	0.10%	9	$41.4	0.13%	11	$48.2	0.13%
Enhanced [Pork Boneless Loin/Rib]	19	$6.6	0.10%	24	$27.1	0.09%	23	$33.6	0.09%
Pizza/Premium	20	$6.5	0.10%	22	$28.2	0.09%	20	$34.8	0.09%
Snack Cake—Multi Pack	21	$6.5	0.10%	57	$18.9	0.06%	40	$25.5	0.07%
Fz Ss Economy Meals All	22	$6.3	0.10%	90	$13.6	0.04%	72	$19.9	0.05%
Convenient Meals—Kids Meal C	23	$6.2	0.09%	48	$20.3	0.06%	38	$26.6	0.07%
All Family Cereal	24	$6.2	0.09%	14	$37.6	0.12%	15	$43.8	0.11%
Fz Ss Prem Traditional Meals	25	$6.1	0.09%	52	$19.7	0.06%	39	$25.8	0.07%
Sandwiches & Handhelds	26	$6.0	0.09%	77	$14.9	0.05%	64	$20.9	0.05%
Soft Drinks 20pk & 24pk Can Carb	27	$6.0	0.09%	61	$17.9	0.06%	48	$23.9	0.06%

Exhibit E–1: Top 100 Subcommodities for SNAP Households by Expenditure: Household Head Age 19–44 Year Olds—Continued

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Bacon—Trad 16oz Or Less	28	$6.0	0.09%	30	$23.5	0.07%	29	$29.4	0.08%
Mainstream Variety Breads	29	$5.8	0.09%	23	$28.0	0.09%	22	$33.8	0.09%
Sugar	30	$5.6	0.09%	62	$17.9	0.06%	50	$23.5	0.06%
Natural Cheese Chunks	31	$5.6	0.08%	17	$34.5	0.11%	17	$40.1	0.11%
Unflavored Can Coffee	32	$5.5	0.08%	32	$23.3	0.07%	30	$28.8	0.08%
Frzn Chicken—Wht Meat	33	$5.4	0.08%	51	$19.9	0.06%	42	$25.2	0.07%
Potatoes Russet (Bulk & Bag)	34	$5.3	0.08%	37	$22.4	0.07%	35	$27.7	0.07%
Bananas	35	$5.2	0.08%	15	$37.0	0.12%	16	$42.2	0.11%
Isotonic Drinks Single Serve	36	$5.1	0.08%	33	$22.9	0.07%	34	$28.0	0.07%
Ribs [Pork]	37	$5.1	0.08%	78	$14.8	0.05%	71	$19.9	0.05%
Sft Drnk Mlt-Pk Btl Carb (Excp)	38	$5.0	0.08%	35	$22.6	0.07%	36	$27.6	0.07%
Premium [Ice Cream & Sherbert]	39	$4.7	0.07%	18	$32.9	0.10%	19	$37.6	0.10%
Sft Drnk Sngl Srv Btl Carb (Ex)	40	$4.7	0.07%	89	$13.7	0.04%	77	$18.4	0.05%
Pourable Salad Dressings	41	$4.7	0.07%	36	$22.4	0.07%	37	$27.1	0.07%
Condensed Soup	42	$4.6	0.07%	29	$24.0	0.08%	31	$28.6	0.08%
Choice Beef	43	$4.5	0.07%	86	$14.0	0.04%	76	$18.5	0.05%
Fz Family Style Entrées	44	$4.5	0.07%	82	$14.3	0.05%	74	$18.8	0.05%
Aseptic Pack Juice And Drinks	45	$4.4	0.07%	66	$16.9	0.05%	61	$21.3	0.06%
Select Beef	46	$4.3	0.06%	46	$20.5	0.07%	45	$24.8	0.07%
Macaroni & Cheese Dnrs	47	$4.2	0.06%	92	$13.5	0.04%	82	$17.7	0.05%
Choice Beef	48	$4.1	0.06%	63	$17.8	0.06%	56	$21.9	0.06%
Mainstream [Pasta & Pizza Sauce]	49	$4.0	0.06%	70	$16.1	0.05%	67	$20.1	0.05%
Mayonnaise & Whipped Dressing	50	$4.0	0.06%	67	$16.8	0.05%	65	$20.8	0.05%
Fz Ss Prem Nutritional Meals	51	$4.0	0.06%	7	$42.9	0.14%	13	$46.9	0.12%
Refrigerated Coffee Creamers	52	$4.0	0.06%	26	$25.8	0.08%	27	$29.7	0.08%
Fz Bag Vegetables—Plain	53	$3.9	0.06%	54	$19.4	0.06%	51	$23.3	0.06%
Hot Dogs—Base Meat	54	$3.9	0.06%	137	$9.8	0.03%	113	$13.6	0.04%
Strawberries	55	$3.8	0.06%	19	$30.7	0.10%	21	$34.5	0.09%
Adult Cereal	56	$3.8	0.06%	25	$25.8	0.08%	28	$29.6	0.08%
Can Pasta	57	$3.8	0.06%	119	$10.8	0.03%	102	$14.6	0.04%
Mexican Soft Tortillas And Wra	58	$3.8	0.06%	39	$21.7	0.07%	41	$25.4	0.07%
Traditional [Ice Cream & Sherbert]	59	$3.8	0.06%	69	$16.2	0.05%	70	$19.9	0.05%
Choice Beef	60	$3.7	0.06%	124	$10.6	0.03%	104	$14.3	0.04%
Mult Pk Bag Snacks	61	$3.6	0.05%	132	$10.0	0.03%	114	$13.6	0.04%
Pizza/Economy	62	$3.5	0.05%	128	$10.3	0.03%	111	$13.7	0.04%
Margarine: Tubs And Bowls	63	$3.5	0.05%	88	$13.8	0.04%	84	$17.3	0.05%
Frzn Chicken—Wings	64	$3.4	0.05%	441	$3.0	0.01%	269	$6.4	0.02%
Frzn French Fries	65	$3.4	0.05%	143	$9.6	0.03%	119	$13.0	0.03%
Peanut Butter	66	$3.4	0.05%	40	$21.4	0.07%	44	$24.8	0.07%
Candy Bags—Chocolate	67	$3.4	0.05%	42	$20.8	0.07%	47	$24.2	0.06%
Value Forms/18oz And Larger [Chicken]	68	$3.3	0.05%	120	$10.7	0.03%	108	$13.9	0.04%
Fruit Snacks	69	$3.3	0.05%	104	$12.1	0.04%	94	$15.4	0.04%
Sw Gds: Donuts	70	$3.2	0.05%	98	$12.5	0.04%	92	$15.7	0.04%
Meat: Turkey Bulk	71	$3.2	0.05%	21	$28.5	0.09%	24	$31.8	0.08%
Frzn Meat—Beef	72	$3.2	0.05%	161	$8.8	0.03%	139	$12.0	0.03%
Chicken Wings	73	$3.1	0.05%	350	$4.0	0.01%	247	$7.2	0.02%
Frzn Breakfast Sandwiches	74	$3.1	0.05%	125	$10.5	0.03%	115	$13.6	0.04%
Tuna	75	$3.1	0.05%	74	$15.6	0.05%	75	$18.8	0.05%
Waffles/Pancakes/French Toast	76	$3.1	0.05%	59	$18.2	0.06%	62	$21.3	0.06%
Cakes: Birthday/Celebration Sh	77	$3.1	0.05%	152	$9.2	0.03%	136	$12.2	0.03%
Sour Creams	78	$3.0	0.05%	64	$17.5	0.06%	66	$20.5	0.05%
Cheese Crackers	79	$3.0	0.05%	44	$20.7	0.07%	49	$23.7	0.06%
Fz Skillet Meals	80	$3.0	0.05%	97	$12.6	0.04%	93	$15.6	0.04%
Vegetable Oil	81	$3.0	0.05%	253	$5.7	0.02%	196	$8.7	0.02%
Lunchment—Bologna/Sausage	82	$3.0	0.05%	177	$8.1	0.03%	149	$11.1	0.03%
Pizza/Traditional	83	$3.0	0.05%	101	$12.3	0.04%	97	$15.3	0.04%
Cream Cheese	84	$3.0	0.04%	49	$20.3	0.06%	53	$23.2	0.06%
Sandwich Cookies	85	$2.9	0.04%	100	$12.4	0.04%	95	$15.4	0.04%
Butter	86	$2.9	0.04%	27	$25.1	0.08%	33	$28.0	0.07%
Ramen Noodles/Ramen Cups	87	$2.9	0.04%	258	$5.6	0.02%	208	$8.5	0.02%

Exhibit E–1: Top 100 Subcommodities for SNAP Households by Expenditure: Household Head Age 19–44 Year Olds—Continued

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
String Cheese	88	$2.8	0.04%	38	$22.0	0.07%	46	$24.7	0.06%
Bagged Cheese Snacks	89	$2.7	0.04%	153	$9.0	0.03%	142	$11.7	0.03%
Salsa & Dips	90	$2.7	0.04%	136	$9.8	0.03%	129	$12.5	0.03%
Toaster Pastries	91	$2.7	0.04%	107	$11.8	0.04%	103	$14.5	0.04%
Hot Dog Buns	92	$2.7	0.04%	110	$11.2	0.04%	109	$13.9	0.04%
Hamburger Buns	93	$2.7	0.04%	103	$12.2	0.04%	100	$14.9	0.04%
Rts Soup: Chunky/ Homestyle/Et	94	$2.7	0.04%	65	$17.4	0.06%	68	$20.0	0.05%
Flavored Milk	95	$2.6	0.04%	118	$10.8	0.03%	116	$13.4	0.04%
Candy Bars (Singles) (Including)	96	$2.6	0.04%	158	$8.9	0.03%	146	$11.5	0.03%
Yogurt/Kids	97	$2.6	0.04%	80	$14.4	0.05%	85	$17.0	0.04%
Angus [Beef]	98	$2.6	0.04%	75	$15.3	0.05%	80	$17.9	0.05%
Chicken Drums	99	$2.5	0.04%	297	$4.8	0.02%	241	$7.3	0.02%
Sweet Goods—Full Size	100	$2.5	0.04%	145	$9.5	0.03%	137	$12.0	0.03%
Top 100 Subcommodities		**$537.8**	**8.17%**		**$2,251.0**	**7.14%**		**$2,788.8**	**7.32%**
Total Expenditures		**$6,580.5**	**100%**		**$31,513.8**	**100%**		**$38,094.2**	**100%**

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.
Note: Columns may not sum to total shown due to rounding.
*Top 100 subcommodities based on SNAP household expenditures.

Exhibit E–2: Top 100 Subcommodities for SNAP Households by Expenditure: Household Head Age 45–64 Year Olds

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Fluid Milk/White Only	1	$41.3	0.63%	1	$258.9	0.82%	1	$300.1	0.79%
Soft Drinks 12/18 & 15pk Can Car	2	$36.6	0.56%	2	$197.3	0.63%	2	$233.9	0.61%
Lean [Beef]	3	$22.4	0.34%	8	$77.3	0.25%	5	$99.7	0.26%
Shredded Cheese	4	$16.7	0.25%	3	$112.7	0.36%	6	$129.4	0.34%
Sft Drnk 2 Liter Btl Carb Incl	5	$15.6	0.24%	14	$70.8	0.22%	3	$86.4	0.23%
Kids Cereal	6	$15.0	0.23%	27	$52.7	0.17%	8	$67.7	0.18%
Primal [Beef]	7	$14.6	0.22%	11	$74.6	0.24%	9	$89.2	0.23%
Potato Chips	8	$14.6	0.22%	6	$85.6	0.27%	14	$100.2	0.26%
Lunchment—Deli Fresh	9	$12.2	0.19%	9	$76.8	0.24%	73	$89.1	0.23%
Eggs—Large	10	$11.3	0.17%	10	$75.4	0.24%	7	$86.7	0.23%
Chicken Breast Boneless	11	$11.1	0.17%	4	$95.0	0.30%	4	$106.1	0.28%
Unflavored Can Coffee	12	$10.2	0.16%	18	$64.2	0.20%	10	$74.4	0.20%
Mainstream White Bread	13	$10.2	0.15%	44	$40.6	0.13%	12	$50.8	0.13%
Fz Ss Prem Traditional Meals	14	$10.1	0.15%	26	$53.5	0.17%	32	$63.7	0.17%
Tortilla/Nacho Chips	15	$10.0	0.15%	17	$67.1	0.21%	18	$77.1	0.20%
Still Water Drnking/Mnrl Water	16	$9.9	0.15%	22	$56.0	0.18%	25	$65.9	0.17%
Infant Formula Starter/ Solutio	17	$9.8	0.15%	363	$7.7	0.02%	26	$17.4	0.05%
Dairy Case 100% Pure Juice—O	18	$9.7	0.15%	7	$80.7	0.26%	11	$90.4	0.24%
American Single Cheese	19	$9.4	0.14%	42	$41.5	0.13%	23	$50.9	0.13%
Bacon—Trad 16oz Or Less	20	$9.1	0.14%	30	$50.1	0.16%	20	$59.2	0.16%
Enhanced [Pork Boneless Loin/Rib]	21	$9.0	0.14%	24	$54.8	0.17%	40	$63.9	0.17%
Snacks/Appetizers	22	$8.9	0.14%	64	$32.2	0.10%	72	$41.1	0.11%
Snack Cake—Multi Pack	23	$8.8	0.13%	66	$31.8	0.10%	38	$40.5	0.11%
Sft Drnk Mlt-Pk Btl Carb (Excp)	24	$8.6	0.13%	19	$61.3	0.19%	15	$69.9	0.18%
Mainstream Variety Breads	25	$8.4	0.13%	29	$50.8	0.16%	39	$59.2	0.16%
Fz Ss Economy Meals All	26	$8.3	0.13%	104	$22.2	0.07%	64	$30.6	0.08%
Pizza/Premium	27	$8.3	0.13%	34	$48.7	0.15%	48	$57.0	0.15%
Natural Cheese Chunks	28	$8.3	0.13%	15	$69.9	0.22%	29	$78.2	0.21%
All Family Cereal	29	$8.1	0.12%	16	$68.0	0.22%	22	$76.1	0.20%
Soft Drinks 20pk & 24pk Can Carb	30	$8.1	0.12%	62	$33.3	0.11%	50	$41.5	0.11%
Potatoes Russet (Bulk & Bag)	31	$8.1	0.12%	31	$49.4	0.16%	17	$57.5	0.15%
Bananas	32	$7.9	0.12%	12	$74.3	0.24%	30	$82.3	0.22%

Exhibit E–2: Top 100 Subcommodities for SNAP Households by Expenditure: Household Head Age 45–64 Year Olds—Continued

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Sugar	33	$7.7	0.12%	57	$35.2	0.11%	42	$42.9	0.11%
Ribs [Pork]	34	$7.7	0.12%	59	$34.9	0.11%	35	$42.6	0.11%
Premium [Ice Cream & Sherbert]	35	$7.4	0.11%	13	$73.2	0.23%	16	$80.6	0.21%
Condensed Soup	36	$7.2	0.11%	33	$49.0	0.16%	34	$56.2	0.15%
Sandwiches & Handhelds	37	$7.1	0.11%	100	$22.5	0.07%	71	$29.5	0.08%
Fz Ss Prem Nutritional Meals	38	$6.7	0.10%	5	$91.3	0.29%	36	$98.0	0.26%
Convenient Meals—Kids Meal C	39	$6.6	0.10%	143	$18.0	0.06%	19	$24.6	0.06%
Isotonic Drinks Single Serve	40	$6.6	0.10%	54	$36.0	0.11%	77	$42.6	0.11%
Select Beef	41	$6.6	0.10%	32	$49.3	0.16%	37	$55.9	0.15%
Frzn Chicken—Wht Meat	42	$6.5	0.10%	65	$32.0	0.10%	31	$38.5	0.10%
Choice Beef	43	$6.5	0.10%	70	$30.7	0.10%	76	$37.2	0.10%
Choice Beef	44	$6.5	0.10%	39	$45.3	0.14%	74	$51.8	0.14%
Pourable Salad Dressings	45	$6.5	0.10%	37	$46.3	0.15%	61	$52.7	0.14%
Traditional [Ice Cream & Sherbert]	46	$6.2	0.09%	52	$37.1	0.12%	45	$43.3	0.11%
Fz Bag Vegetables—Plain	47	$6.2	0.09%	40	$42.0	0.13%	82	$48.2	0.13%
Mayonnaise & Whipped Dressing	48	$6.0	0.09%	49	$38.0	0.12%	56	$44.0	0.12%
Refrigerated Coffee Creamers	49	$5.9	0.09%	35	$48.1	0.15%	67	$54.0	0.14%
Fz Family Style Entrées	50	$5.8	0.09%	80	$26.5	0.08%	65	$32.3	0.08%
Sft Drnk Sngl Srv Btl Carb (Ex)	51	$5.7	0.09%	111	$21.2	0.07%	13	$26.9	0.07%
Adult Cereal	52	$5.6	0.08%	21	$57.0	0.18%	27	$62.6	0.16%
Butter	53	$5.4	0.08%	20	$60.1	0.19%	51	$65.5	0.17%
Strawberries	54	$5.4	0.08%	25	$54.8	0.17%	113	$60.1	0.16%
Candy Bags—Chocolate	55	$5.2	0.08%	28	$50.9	0.16%	21	$56.1	0.15%
Hot Dogs—Base Meat	56	$5.1	0.08%	161	$16.6	0.05%	28	$21.7	0.06%
Margarine: Tubs And Bowls	57	$5.1	0.08%	71	$30.5	0.10%	102	$35.6	0.09%
Choice Beef	58	$5.1	0.08%	99	$22.6	0.07%	41	$27.7	0.07%
Mainstream [Pasta & Pizza Sauce]	59	$4.9	0.07%	87	$25.0	0.08%	70	$29.9	0.08%
Tuna	60	$4.8	0.07%	58	$35.1	0.11%	104	$39.9	0.10%
Lunchment—Bologna/Sausage	61	$4.7	0.07%	138	$18.5	0.06%	114	$23.2	0.06%
Meat: Turkey Bulk	62	$4.7	0.07%	23	$55.8	0.18%	111	$60.5	0.16%
Macaroni & Cheese Dnrs	63	$4.7	0.07%	154	$17.1	0.05%	84	$21.8	0.06%
Peanut Butter	64	$4.7	0.07%	45	$40.5	0.13%	269	$45.1	0.12%
Aseptic Pack Juice And Drinks	65	$4.5	0.07%	194	$14.2	0.04%	119	$18.7	0.05%
Chicken Wings	66	$4.5	0.07%	346	$8.1	0.03%	44	$12.6	0.03%
Mexican Soft Tortillas And Wra	67	$4.5	0.07%	63	$33.0	0.10%	47	$37.5	0.10%
Can Pasta	68	$4.4	0.07%	206	$13.4	0.04%	108	$17.9	0.05%
Sw Gds: Donuts	69	$4.4	0.07%	91	$23.6	0.07%	94	$27.9	0.07%
Frzn French Fries	70	$4.3	0.07%	166	$16.2	0.05%	92	$20.5	0.05%
Angus [Beef]	71	$4.3	0.07%	53	$36.2	0.11%	24	$40.5	0.11%
Rts Soup: Chunky/Homestyle/Et	72	$4.2	0.06%	48	$38.2	0.12%	139	$42.4	0.11%
Fz Skillet Meals	73	$4.1	0.06%	85	$25.2	0.08%	247	$29.4	0.08%
Cream Cheese	74	$4.1	0.06%	51	$37.6	0.12%	115	$41.7	0.11%
Frzn Chicken—Wings	75	$4.1	0.06%	514	$4.8	0.02%	75	$8.9	0.02%
Mult Pk Bag Snacks	76	$4.1	0.06%	208	$13.4	0.04%	62	$17.5	0.05%
Frzn Breakfast Sandwiches	77	$4.0	0.06%	147	$17.7	0.06%	136	$21.6	0.06%
Sandwich Cookies	78	$3.9	0.06%	94	$23.3	0.07%	66	$27.2	0.07%
Vegetable Oil	79	$3.9	0.06%	279	$9.8	0.03%	49	$13.7	0.04%
Sour Creams	80	$3.9	0.06%	67	$31.0	0.10%	93	$34.9	0.09%
Frzn Meat—Beef	81	$3.9	0.06%	180	$15.2	0.05%	196	$19.1	0.05%
Meat: Ham Bulk	82	$3.9	0.06%	46	$40.3	0.13%	149	$44.1	0.12%
Pizza/Traditional	83	$3.8	0.06%	125	$19.6	0.06%	97	$23.4	0.06%
Hamburger Buns	84	$3.8	0.06%	93	$23.5	0.07%	53	$27.2	0.07%
Pizza/Economy	85	$3.8	0.06%	238	$11.7	0.04%	95	$15.5	0.04%
Flavored Milk	86	$3.7	0.06%	116	$20.3	0.06%	33	$24.0	0.06%
Cheese Crackers	87	$3.7	0.06%	74	$29.0	0.09%	46	$32.7	0.09%
Candy Bars (Multi Pack)	88	$3.6	0.05%	96	$22.9	0.07%	142	$26.5	0.07%
Value Forms/18oz And Larger [Chicken]	89	$3.6	0.05%	240	$11.6	0.04%	129	$15.2	0.04%
Grapes Red	90	$3.6	0.05%	50	$37.6	0.12%	103	$41.2	0.11%
Hot Dog Buns	91	$3.6	0.05%	122	$19.7	0.06%	109	$23.3	0.06%
Waffles/Pancakes/French Toast	92	$3.6	0.05%	105	$22.1	0.07%	100	$25.6	0.07%
Spring Water	93	$3.6	0.05%	73	$29.4	0.09%	68	$32.9	0.09%
Sweet Goods—Full Size	94	$3.6	0.05%	144	$18.0	0.06%	116	$21.5	0.06%

Exhibit E–2: Top 100 Subcommodities for SNAP Households by Expenditure: Household Head Age 45–64 Year Olds—Continued

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Cottage Cheese	95	$3.5	0.05%	56	$35.4	0.11%	146	$38.9	0.10%
Cakes: Birthday/Celebration Sh	96	$3.5	0.05%	190	$14.6	0.05%	85	$18.2	0.05%
Bkfst Sausage—Fresh Rolls	97	$3.5	0.05%	117	$20.2	0.06%	80	$23.7	0.06%
Dnr Sausage—Links Pork Ckd/S	98	$3.5	0.05%	242	$11.5	0.04%	241	$15.0	0.04%
Candy Bars (Singles) (Including)	99	$3.5	0.05%	155	$17.1	0.05%	137	$20.5	0.05%
Fruit Snacks	100	$3.5	0.05%	224	$12.2	0.04%	203	$15.6	0.04%
Top 100 Subcommodities		**$731.2**	**11.09%**		**$4,237.7**	**13.52%**		**$5,004.7**	**13.17%**
Total Expenditures		**$6,580.5**	**100%**		**$31,513.8**	**100%**		**$38,094.2**	**100%**

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.
Note: Columns may not sum to total shown due to rounding.
*Top 100 subcommodities based on SNAP household expenditures.

Exhibit E–3: Top 100 Subcommodities for SNAP Households by Expenditure: Household Head Age 65 Years or Older

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Fluid Milk/White Only	1	$12.6	0.19%	1	$109.6	0.35%	1	$122.2	0.32%
Soft Drinks 12/18 & 15pk Can Car	2	$10.9	0.17%	2	$69.4	0.22%	2	$80.3	0.21%
Lean [Beef]	3	$6.3	0.10%	18	$26.1	0.08%	12	$32.4	0.09%
Sft Drnk 2 Liter Btl Carb Incl	4	$4.2	0.06%	29	$21.4	0.07%	24	$25.6	0.07%
Primal [Beef]	5	$4.2	0.06%	15	$27.5	0.09%	13	$31.7	0.08%
Shredded Cheese	6	$4.2	0.06%	10	$29.8	0.09%	10	$34.0	0.09%
Potato Chips	7	$4.0	0.06%	13	$28.8	0.09%	11	$32.7	0.09%
Kids Cereal	8	$3.8	0.06%	72	$10.7	0.03%	59	$14.5	0.04%
Eggs—Large	9	$3.6	0.06%	8	$32.7	0.10%	8	$36.4	0.10%
Unflavored Can Coffee	10	$3.5	0.05%	6	$35.6	0.11%	5	$39.1	0.10%
Fz Ss Prem Traditional Meals	11	$3.4	0.05%	9	$31.9	0.10%	9	$35.3	0.09%
Lunchment—Deli Fresh	12	$3.4	0.05%	19	$24.6	0.08%	19	$28.0	0.07%
Mainstream White Bread	13	$3.2	0.05%	40	$16.9	0.05%	36	$20.1	0.05%
Dairy Case 100% Pure Juice—O	14	$3.1	0.05%	3	$38.6	0.12%	3	$41.7	0.11%
Bacon—Trad 16oz Or Less	15	$2.9	0.04%	24	$23.1	0.07%	23	$26.0	0.07%
Chicken Breast Boneless	16	$2.8	0.04%	17	$26.2	0.08%	18	$29.0	0.08%
Bananas	17	$2.7	0.04%	4	$37.1	0.12%	4	$39.8	0.10%
American Single Cheese	18	$2.7	0.04%	38	$17.4	0.06%	35	$20.1	0.05%
Enhanced [Pork Boneless Loin/Rib]	19	$2.7	0.04%	26	$22.9	0.07%	25	$25.6	0.07%
Mainstream Variety Breads	20	$2.7	0.04%	27	$22.6	0.07%	28	$25.3	0.07%
Sft Drnk Mlt-Pk Btl Carb (Excp)	21	$2.6	0.04%	20	$24.5	0.08%	20	$27.1	0.07%
Still Water Drnking/Mnrl Water	22	$2.6	0.04%	49	$15.2	0.05%	43	$17.8	0.05%
Potatoes Russet (Bulk & Bag)	23	$2.6	0.04%	25	$22.9	0.07%	27	$25.5	0.07%
Snack Cake—Multi Pack	24	$2.6	0.04%	68	$11.4	0.04%	62	$14.0	0.04%
Natural Cheese Chunks	25	$2.5	0.04%	14	$28.3	0.09%	16	$30.8	0.08%
All Family Cereal	26	$2.5	0.04%	12	$29.0	0.09%	14	$31.5	0.08%
Fz Ss Economy Meals All	27	$2.5	0.04%	87	$9.3	0.03%	73	$11.8	0.03%
Premium [Ice Cream & Sherbert]	28	$2.5	0.04%	7	$35.5	0.11%	6	$38.0	0.10%
Tortilla/Nacho Chips	29	$2.5	0.04%	48	$15.6	0.05%	41	$18.0	0.05%
Condensed Soup	30	$2.4	0.04%	22	$24.5	0.08%	21	$26.8	0.07%
Soft Drinks 20pk & 24pk Can Carb	31	$2.3	0.04%	82	$9.7	0.03%	70	$12.1	0.03%
Sugar	32	$2.3	0.04%	51	$15.1	0.05%	47	$17.5	0.05%
Traditional [Ice Cream & Sherbert]	33	$2.3	0.03%	23	$23.2	0.07%	26	$25.5	0.07%
Ribs [Pork]	34	$2.3	0.03%	57	$13.4	0.04%	53	$15.6	0.04%
Snacks/Appetizers	35	$2.2	0.03%	144	$6.6	0.02%	112	$8.9	0.02%
Infant Formula Starter/Solutio	36	$2.2	0.03%	583	$1.4	0.00%	336	$3.6	0.01%

Exhibit E–3: Top 100 Subcommodities for SNAP Households by Expenditure: Household Head Age 65 Years or Older—Continued

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Pizza/Premium	37	$2.2	0.03%	59	$12.7	0.04%	57	$14.9	0.04%
Select Beef	38	$2.1	0.03%	35	$17.9	0.06%	37	$19.9	0.05%
Fz Ss Prem Nutritional Meals	39	$2.0	0.03%	5	$35.8	0.11%	7	$37.8	0.10%
Fz Bag Vegetables—Plain	40	$2.0	0.03%	32	$19.9	0.06%	31	$21.9	0.06%
Choice Beef	41	$1.9	0.03%	60	$12.7	0.04%	58	$14.6	0.04%
Mayonnaise & Whipped Dressing	42	$1.9	0.03%	34	$18.2	0.06%	34	$20.1	0.05%
Choice Beef	43	$1.9	0.03%	36	$17.7	0.06%	38	$19.6	0.05%
Adult Cereal	44	$1.9	0.03%	11	$29.4	0.09%	15	$31.2	0.08%
Butter	45	$1.9	0.03%	16	$27.4	0.09%	17	$29.3	0.08%
Margarine: Tubs And Bowls	46	$1.8	0.03%	33	$18.5	0.06%	33	$20.4	0.05%
Pourable Salad Dressings	47	$1.8	0.03%	39	$16.9	0.05%	39	$18.7	0.05%
Sandwiches & Handhelds	48	$1.8	0.03%	219	$4.9	0.02%	165	$6.7	0.02%
Strawberries	49	$1.7	0.03%	21	$24.5	0.08%	22	$26.1	0.07%
Candy Bags—Chocolate	50	$1.6	0.02%	28	$22.4	0.07%	29	$24.1	0.06%
Convenient Meals—Kids Meal C	51	$1.6	0.02%	324	$3.4	0.01%	240	$5.0	0.01%
Refrigerated Coffee Creamers	52	$1.6	0.02%	45	$16.1	0.05%	44	$17.7	0.05%
Frzn Chicken—Wht Meat	53	$1.6	0.02%	96	$8.8	0.03%	86	$10.4	0.03%
Lunchment—Bologna/Sausage	54	$1.6	0.02%	84	$9.5	0.03%	78	$11.1	0.03%
Fz Family Style Entrées	55	$1.6	0.02%	90	$9.0	0.03%	85	$10.6	0.03%
Isotonic Drinks Single Serve	56	$1.6	0.02%	123	$7.4	0.02%	108	$9.0	0.02%
Choice Beef	57	$1.5	0.02%	80	$9.8	0.03%	76	$11.3	0.03%
Sw Gds: Donuts	58	$1.5	0.02%	62	$12.5	0.04%	61	$14.1	0.04%
Hot Dogs—Base Meat	59	$1.5	0.02%	146	$6.6	0.02%	125	$8.1	0.02%
Peanut Butter	60	$1.4	0.02%	44	$16.1	0.05%	45	$17.6	0.05%
Sft Drnk Sngl Srv Btl Carb (Ex)	61	$1.4	0.02%	237	$4.5	0.01%	195	$6.0	0.02%
Tuna	62	$1.4	0.02%	54	$13.9	0.04%	55	$15.3	0.04%
Angus [Beef]	63	$1.4	0.02%	50	$15.2	0.05%	51	$16.6	0.04%
Cottage Cheese	64	$1.3	0.02%	31	$20.3	0.06%	32	$21.6	0.06%
Rts Soup: Chunky/Homestyle/Et	65	$1.3	0.02%	41	$16.6	0.05%	42	$17.9	0.05%
Chicken Wings	66	$1.3	0.02%	405	$2.6	0.01%	310	$3.9	0.01%
Meat: Turkey Bulk	67	$1.2	0.02%	47	$15.9	0.05%	48	$17.1	0.04%
Mainstream [Pasta & Pizza Sauce]	68	$1.2	0.02%	142	$6.9	0.02%	126	$8.1	0.02%
Grapes Red	69	$1.2	0.02%	37	$17.4	0.06%	40	$18.6	0.05%
Macaroni & Cheese Dnrs	70	$1.2	0.02%	277	$4.0	0.01%	231	$5.2	0.01%
Mexican Soft Tortillas And Wra	71	$1.2	0.02%	115	$7.9	0.03%	106	$9.1	0.02%
Frzn Breakfast Sandwiches	72	$1.2	0.02%	165	$6.1	0.02%	150	$7.2	0.02%
Cream Cheese	73	$1.1	0.02%	55	$13.9	0.04%	56	$15.0	0.04%
Can Pasta	74	$1.1	0.02%	321	$3.4	0.01%	268	$4.6	0.01%
Sweet Goods—Full Size	75	$1.1	0.02%	93	$8.9	0.03%	90	$10.1	0.03%
Meat: Ham Bulk	76	$1.1	0.02%	46	$15.9	0.05%	49	$17.0	0.04%
Bkfst Sausage—Fresh Rolls	77	$1.1	0.02%	105	$8.3	0.03%	97	$9.5	0.02%
Fz Skillet Meals	78	$1.1	0.02%	83	$9.6	0.03%	82	$10.8	0.03%
Vegetable Oil	79	$1.1	0.02%	305	$3.6	0.01%	258	$4.7	0.01%
Frzn French Fries	80	$1.1	0.02%	234	$4.6	0.01%	212	$5.7	0.01%
Sandwich Cookies	81	$1.1	0.02%	102	$8.4	0.03%	96	$9.5	0.03%
Candy Bars (Multi Pack)	82	$1.1	0.02%	78	$9.9	0.03%	79	$11.0	0.03%
Butter Spray Cracker	83	$1.1	0.02%	69	$10.9	0.03%	71	$12.0	0.03%
Premium Bread	84	$1.1	0.02%	30	$21.2	0.07%	30	$22.3	0.06%
Aseptic Pack Juice And Drinks	85	$1.1	0.02%	420	$2.5	0.01%	343	$3.6	0.01%
Sticks/Enrobed [Frozen Novelties]	86	$1.1	0.02%	76	$10.2	0.03%	77	$11.3	0.03%
Sour Creams	87	$1.1	0.02%	71	$10.7	0.03%	72	$11.8	0.03%
Waffles/Pancakes/French Toast	88	$1.1	0.02%	111	$8.1	0.03%	102	$9.2	0.02%
Spring Water	89	$1.1	0.02%	73	$10.3	0.03%	75	$11.3	0.03%
Hamburger Buns	90	$1.1	0.02%	116	$7.9	0.02%	110	$8.9	0.02%
Mult Pk Bag Snacks	91	$1.0	0.02%	408	$2.6	0.01%	341	$3.6	0.01%
Frzn Chicken—Wings	92	$1.0	0.02%	654	$1.2	0.00%	479	$2.2	0.01%
Flavored Milk	93	$1.0	0.02%	178	$5.8	0.02%	161	$6.8	0.02%
Refrigerated Biscuits	94	$1.0	0.02%	164	$6.2	0.02%	151	$7.2	0.02%
Grapes White	95	$1.0	0.02%	70	$10.8	0.03%	74	$11.8	0.03%
Dnr Sausage—Links Pork Ckd/S	96	$1.0	0.02%	284	$3.9	0.01%	249	$4.9	0.01%
Pizza/Economy	97	$1.0	0.02%	357	$3.0	0.01%	305	$4.0	0.01%
Frzn Meat—Beef	98	$1.0	0.01%	279	$3.9	0.01%	248	$4.9	0.01%

Exhibit E–3: Top 100 Subcommodities for SNAP Households by Expenditure: Household Head Age 65 Years or Older—Continued

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Pizza/Traditional	99	$1.0	0.01%	211	$5.1	0.02%	184	$6.1	0.02%
Candy Bars (Singles)	100	$1.0	0.01%	167	$6.0	0.02%	154	$7.0	0.02%
Top 100 Subcommodities		**$213.1**	**3.29%**		**$1,664.6**	**5.23%**		**$1,877.6**	**4.94%**
Total Expenditures		**$6,580.5**	**100%**		**$31,513.8**	**100%**		**$38,094.2**	**100%**

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.
Note: Columns may not sum to total shown due to rounding.
* Top 100 subcommodities based on SNAP household expenditures.

Exhibit E–4: Top 100 Subcommodities for SNAP Households by Expenditure: Households with Children Present

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Fluid Milk/White Only	1	$33.9	0.52%	1	$190.0	0.60%	1	$223.9	0.59%
Soft Drinks 12/18 & 15pk Can Car	2	$28.4	0.43%	2	$128.5	0.41%	2	$156.9	0.41%
Lean [Beef]	3	$17.5	0.27%	10	$51.4	0.16%	5	$68.9	0.18%
Kids Cereal	4	$14.0	0.21%	7	$53.4	0.17%	6	$67.4	0.18%
Shredded Cheese	5	$13.9	0.21%	3	$82.7	0.26%	3	$96.7	0.25%
Sft Drnk 2 Liter Btl Carb Incl	6	$12.4	0.19%	12	$49.7	0.16%	9	$62.2	0.16%
Primal [Beef]	7	$11.4	0.17%	13	$49.7	0.16%	10	$61.0	0.16%
Potato Chips	8	$11.3	0.17%	5	$55.3	0.18%	7	$66.6	0.17%
Lunchment—Deli Fresh	9	$9.6	0.15%	8	$53.4	0.17%	8	$63.0	0.17%
Chicken Breast Boneless	10	$8.9	0.14%	4	$65.2	0.21%	4	$74.1	0.19%
Infant Formula Starter/Solutio	11	$8.7	0.13%	258	$7.1	0.02%	127	$15.8	0.04%
Tortilla/Nacho Chips	12	$8.5	0.13%	11	$50.4	0.16%	12	$58.9	0.15%
Eggs—Large	13	$8.5	0.13%	14	$49.1	0.16%	13	$57.6	0.15%
Mainstream White Bread	14	$8.3	0.13%	32	$31.1	0.10%	28	$39.4	0.10%
Snacks/Appetizers	15	$8.2	0.12%	41	$27.4	0.09%	34	$35.6	0.09%
Still Water Drnking/Mnrl Water	16	$7.8	0.12%	21	$37.7	0.12%	19	$45.5	0.12%
American Single Cheese	17	$7.5	0.11%	36	$28.9	0.09%	33	$36.4	0.10%
Dairy Case 100% Pure Juice—O	18	$7.5	0.11%	6	$53.5	0.17%	11	$61.0	0.16%
Snack Cake—Multi Pack	19	$7.2	0.11%	47	$25.7	0.08%	41	$32.9	0.09%
Enhanced [Pork Boneless Loin/Rib]	20	$7.2	0.11%	22	$36.4	0.12%	21	$43.6	0.11%
Fz Ss Prem Traditional Meals	21	$7.1	0.11%	39	$27.9	0.09%	36	$35.0	0.09%
Pizza/Premium	22	$6.9	0.11%	27	$34.2	0.11%	24	$41.1	0.11%
Fz Ss Economy Meals All	23	$6.9	0.10%	90	$16.7	0.05%	73	$23.5	0.06%
All Family Cereal	24	$6.8	0.10%	15	$48.9	0.16%	15	$55.7	0.15%
Unflavored Can Coffee	25	$6.8	0.10%	26	$34.3	0.11%	25	$41.0	0.11%
Bacon—Trad 16oz Or Less	26	$6.8	0.10%	30	$32.1	0.10%	30	$38.8	0.10%
Convenient Meals—Kids Meal C	27	$6.7	0.10%	58	$23.7	0.08%	43	$30.3	0.08%
Soft Drinks 20pk & 24pk Can Carb	28	$6.5	0.10%	63	$22.3	0.07%	53	$28.7	0.08%
Mainstream Variety Breads	29	$6.3	0.10%	24	$35.3	0.11%	22	$41.6	0.11%
Sandwiches & Handhelds	30	$6.2	0.09%	79	$18.6	0.06%	67	$24.8	0.07%
Sft Drnk Mlt-Pk Btl Carb (Excp)	31	$6.2	0.09%	28	$33.7	0.11%	26	$39.9	0.10%
Natural Cheese Chunks	32	$6.2	0.09%	18	$42.9	0.14%	18	$49.1	0.13%
Sugar	33	$6.1	0.09%	60	$23.3	0.07%	52	$29.4	0.08%
Potatoes Russet (Bulk & Bag)	34	$6.0	0.09%	33	$30.7	0.10%	32	$36.7	0.10%
Bananas	35	$6.0	0.09%	16	$48.2	0.15%	16	$54.2	0.14%
Frzn Chicken—Wht Meat	36	$5.6	0.09%	54	$24.6	0.08%	45	$30.2	0.08%
Ribs [Pork]	37	$5.6	0.08%	70	$20.7	0.07%	61	$26.3	0.07%
Premium [Ice Cream & Sherbert]	38	$5.5	0.08%	17	$46.9	0.15%	17	$52.4	0.14%
Isotonic Drinks Single Serve	39	$5.5	0.08%	37	$28.3	0.09%	39	$33.8	0.09%
Condensed Soup	40	$5.4	0.08%	29	$32.7	0.10%	31	$38.2	0.10%
Pourable Salad Dressings	41	$5.1	0.08%	35	$29.1	0.09%	37	$34.2	0.09%
Sft Drnk Sngl Srv Btl Carb (Ex)	42	$4.9	0.07%	104	$15.3	0.05%	85	$20.2	0.05%

Exhibit E–4: Top 100 Subcommodities for SNAP Households by Expenditure: Households with Children Present—Continued

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Choice Beef	43	$4.9	0.07%	77	$19.0	0.06%	71	$23.9	0.06%
Fz Family Style Entrées	44	$4.8	0.07%	80	$18.6	0.06%	74	$23.4	0.06%
Select Beef	45	$4.8	0.07%	38	$28.3	0.09%	40	$33.0	0.09%
Fz Ss Prem Nutritional Meals	46	$4.7	0.07%	9	$52.3	0.17%	14	$57.0	0.15%
Traditional [Ice Cream & Sherbert]	47	$4.6	0.07%	50	$24.9	0.08%	50	$29.6	0.08%
Aseptic Pack Juice And Drinks	48	$4.6	0.07%	74	$19.4	0.06%	69	$24.0	0.06%
Choice Beef	49	$4.6	0.07%	49	$25.1	0.08%	49	$29.7	0.08%
Fz Bag Vegetables—Plain	50	$4.5	0.07%	48	$25.4	0.08%	48	$29.9	0.08%
Mayonnaise & Whipped Dressing	51	$4.4	0.07%	66	$22.0	0.07%	60	$26.5	0.07%
Refrigerated Coffee Creamers	52	$4.4	0.07%	31	$31.1	0.10%	35	$35.5	0.09%
Strawberries	53	$4.4	0.07%	19	$40.0	0.13%	20	$44.4	0.12%
Adult Cereal	54	$4.2	0.06%	25	$35.0	0.11%	29	$39.2	0.10%
Macaroni & Cheese Dnrs	55	$4.2	0.06%	101	$15.5	0.05%	88	$19.7	0.05%
Mainstream [Pasta & Pizza Sauce]	56	$4.2	0.06%	72	$19.8	0.06%	70	$24.0	0.06%
Hot Dogs—Base Meat	57	$4.2	0.06%	134	$12.6	0.04%	115	$16.8	0.04%
Choice Beef	58	$4.0	0.06%	114	$14.4	0.05%	99	$18.5	0.05%
Can Pasta	59	$4.0	0.06%	133	$12.8	0.04%	113	$16.8	0.04%
Candy Bags—Chocolate	60	$4.0	0.06%	34	$29.9	0.09%	38	$33.8	0.09%
Margarine: Tubs And Bowls	61	$3.9	0.06%	78	$18.9	0.06%	78	$22.8	0.06%
Peanut Butter	62	$3.8	0.06%	40	$27.8	0.09%	42	$31.6	0.08%
Butter	63	$3.7	0.06%	23	$35.8	0.11%	27	$39.5	0.10%
Meat: Turkey Bulk	64	$3.7	0.06%	20	$37.8	0.12%	23	$41.5	0.11%
Mult Pk Bag Snacks	65	$3.7	0.06%	132	$12.9	0.04%	118	$16.6	0.04%
Frzn French Fries	66	$3.6	0.06%	138	$12.5	0.04%	123	$16.1	0.04%
Mexican Soft Tortillas And Wra	67	$3.6	0.06%	59	$23.4	0.07%	58	$27.0	0.07%
Sw Gds: Donuts	68	$3.6	0.05%	91	$16.7	0.05%	84	$20.2	0.05%
Pizza/Economy	69	$3.5	0.05%	158	$11.4	0.04%	136	$14.9	0.04%
Fruit Snacks	70	$3.5	0.05%	111	$14.5	0.05%	102	$18.0	0.05%
Tuna	71	$3.4	0.05%	73	$19.6	0.06%	77	$23.1	0.06%
Lunchment—Bologna/Sausage	72	$3.4	0.05%	156	$11.5	0.04%	135	$14.9	0.04%
Value Forms/18oz And Larger [Chicken]	73	$3.4	0.05%	139	$12.4	0.04%	128	$15.8	0.04%
Frzn Breakfast Sandwiches	74	$3.4	0.05%	122	$13.6	0.04%	110	$17.0	0.04%
Cheese Crackers	75	$3.4	0.05%	44	$26.8	0.09%	46	$30.2	0.08%
Frzn Meat—Beef	76	$3.3	0.05%	151	$11.7	0.04%	133	$15.1	0.04%
Waffles/Pancakes/French Toast	77	$3.3	0.05%	62	$22.5	0.07%	65	$25.9	0.07%
Frzn Chicken—Wings	78	$3.3	0.05%	470	$3.4	0.01%	308	$6.8	0.02%
Cream Cheese	79	$3.3	0.05%	45	$26.1	0.08%	51	$29.4	0.08%
Sandwich Cookies	80	$3.2	0.05%	83	$17.6	0.06%	83	$20.8	0.05%
Pizza/Traditional	81	$3.2	0.05%	100	$15.7	0.05%	94	$18.9	0.05%
Fz Skillet Meals	82	$3.2	0.05%	103	$15.4	0.05%	97	$18.6	0.05%
Sour Creams	83	$3.2	0.05%	69	$21.3	0.07%	68	$24.5	0.06%
Cakes: Birthday/Celebration Sh	84	$3.2	0.05%	160	$11.3	0.04%	143	$14.6	0.04%
Angus [Beef]	85	$3.2	0.05%	61	$22.8	0.07%	64	$25.9	0.07%
Flavored Milk	86	$3.2	0.05%	93	$16.4	0.05%	90	$19.6	0.05%
Chicken Wings	87	$3.2	0.05%	372	$4.7	0.01%	276	$7.8	0.02%
Hamburger Buns	88	$3.0	0.05%	92	$16.6	0.05%	89	$19.6	0.05%
Rts Soup: Chunky/Homestyle/Et	89	$3.0	0.05%	65	$22.0	0.07%	66	$25.1	0.07%
Vegetable Oil	90	$3.0	0.05%	269	$6.7	0.02%	221	$9.7	0.03%
Meat: Ham Bulk	91	$3.0	0.05%	43	$27.2	0.09%	44	$30.2	0.08%
String Cheese	92	$3.0	0.05%	51	$24.8	0.08%	55	$27.8	0.07%
Hot Dog Buns	93	$2.9	0.04%	115	$14.4	0.05%	106	$17.3	0.05%
Sweet Goods—Full Size	94	$2.9	0.04%	123	$13.5	0.04%	119	$16.4	0.04%
Bagged Cheese Snacks	95	$2.9	0.04%	149	$11.9	0.04%	138	$14.8	0.04%
Toaster Pastries	96	$2.9	0.04%	95	$16.1	0.05%	93	$19.0	0.05%
Grapes Red	97	$2.8	0.04%	42	$27.3	0.09%	47	$30.2	0.08%
Candy Bars (Singles) (Including)	98	$2.8	0.04%	159	$11.4	0.04%	148	$14.2	0.04%
Salsa & Dips	99	$2.8	0.04%	150	$11.8	0.04%	142	$14.6	0.04%
Ramen Noodles/Ramen Cups	100	$2.8	0.04%	274	$6.5	0.02%	229	$9.3	0.02%
Top 100 Subcommodities		**$585.8**	**8.90%**		**$2,937.8**	**9.32%**		**$3,523.7**	**9.25%**

Exhibit E–4: Top 100 Subcommodities for SNAP Households by Expenditure: Households with Children Present—Continued

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Total Expenditures		**$6,580.5**	**100%**		**$31,513.8**	**100%**		**$38,094.2**	**100%**

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.
Note: Columns may not sum to total shown due to rounding.
*Top 100 subcommodities based on SNAP household expenditures.

Exhibit E–5: Top 100 Subcommodities for SNAP Households by Expenditure: Households Without Children Present

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Fluid Milk/White Only	1	$50.6	0.77%	1	$322.1	1.02%	1	$372.7	0.98%
Soft Drinks 12/18 & 15pk Can Car	2	$44.1	0.67%	2	$234.1	0.74%	2	$278.3	0.73%
Lean [Beef]	3	$28.4	0.43%	10	$94.8	0.30%	6	$123.1	0.32%
Shredded Cheese	4	$19.9	0.30%	3	$126.8	0.40%	3	$146.7	0.39%
Sft Drnk 2 Liter Btl Carb Incl	5	$18.7	0.28%	17	$81.5	0.26%	15	$100.2	0.26%
Kids Cereal	6	$18.6	0.28%	40	$54.6	0.17%	30	$73.2	0.19%
Primal [Beef]	7	$17.4	0.26%	15	$88.0	0.28%	12	$105.4	0.28%
Potato Chips	8	$17.3	0.26%	8	$98.4	0.31%	8	$115.8	0.30%
Lunchment—Deli Fresh	9	$14.9	0.23%	12	$91.0	0.29%	11	$105.9	0.28%
Eggs—Large	10	$14.2	0.22%	9	$98.4	0.31%	9	$112.7	0.30%
Chicken Breast Boneless	11	$13.3	0.20%	5	$110.1	0.35%	5	$123.5	0.32%
Infant Formula Starter/ Solutio	12	$13.1	0.20%	314	$11.2	0.04%	157	$24.3	0.06%
Fz Ss Prem Traditional Meals	13	$12.6	0.19%	19	$77.2	0.24%	18	$89.7	0.24%
Unflavored Can Coffee	14	$12.5	0.19%	14	$88.7	0.28%	14	$101.2	0.27%
Mainstream White Bread	15	$12.5	0.19%	49	$49.8	0.16%	41	$62.3	0.16%
Still Water Drnking/Mnrl Water	16	$12.3	0.19%	29	$64.1	0.20%	25	$76.4	0.20%
Tortilla/Nacho Chips	17	$12.1	0.18%	22	$73.4	0.23%	19	$85.6	0.22%
Dairy Case 100% Pure Juice—O	18	$12.1	0.18%	6	$107.2	0.34%	7	$119.3	0.31%
American Single Cheese	19	$11.6	0.18%	42	$52.8	0.17%	38	$64.4	0.17%
Bacon—Trad 16oz Or Less	20	$11.2	0.17%	27	$64.6	0.20%	27	$75.8	0.20%
Enhanced [Pork Boneless Loin/Rib]	21	$11.1	0.17%	24	$68.3	0.22%	23	$79.4	0.21%
Snacks/Appetizers	22	$10.7	0.16%	81	$32.0	0.10%	69	$42.7	0.11%
Snack Cake—Multi Pack	23	$10.6	0.16%	68	$36.4	0.12%	61	$47.1	0.12%
Mainstream Variety Breads	24	$10.5	0.16%	25	$66.1	0.21%	24	$76.6	0.20%
Fz Ss Economy Meals All	25	$10.3	0.16%	94	$28.4	0.09%	75	$38.7	0.10%
Natural Cheese Chunks	26	$10.2	0.15%	13	$89.8	0.28%	16	$100.0	0.26%
Pizza/Premium	27	$10.1	0.15%	39	$55.5	0.18%	36	$65.6	0.17%
Soft Drinks 20pk & 24pk Can Carb	28	$10.0	0.15%	64	$38.7	0.12%	59	$48.7	0.13%
All Family Cereal	29	$10.0	0.15%	16	$85.8	0.27%	17	$95.7	0.25%
Sft Drnk Mlt-Pk Btl Carb (Excp)	30	$10.0	0.15%	21	$74.7	0.24%	20	$84.7	0.22%
Potatoes Russet (Bulk & Bag)	31	$9.9	0.15%	30	$64.0	0.20%	28	$73.9	0.19%
Bananas	32	$9.9	0.15%	7	$100.3	0.32%	10	$110.1	0.29%
Sugar	33	$9.6	0.15%	55	$44.8	0.14%	50	$54.4	0.14%
Ribs [Pork]	34	$9.4	0.14%	60	$42.4	0.13%	53	$51.8	0.14%
Premium [Ice Cream & Sherbert]	35	$9.1	0.14%	11	$94.7	0.30%	13	$103.8	0.27%
Condensed Soup	36	$8.7	0.13%	26	$64.7	0.21%	29	$73.4	0.19%
Sandwiches & Handhelds	37	$8.7	0.13%	128	$23.7	0.08%	94	$32.4	0.08%
Select Beef	38	$8.1	0.12%	33	$59.5	0.19%	33	$67.6	0.18%
Choice Beef	39	$8.1	0.12%	65	$38.3	0.12%	63	$46.4	0.12%
Fz Ss Prem Nutritional Meals	40	$8.0	0.12%	4	$117.8	0.37%	4	$125.7	0.33%
Choice Beef	41	$7.9	0.12%	38	$55.7	0.18%	39	$63.6	0.17%
Frzn Chicken—Wht Meat	42	$7.9	0.12%	70	$36.1	0.11%	66	$44.0	0.12%
Pourable Salad Dressings	43	$7.9	0.12%	36	$56.5	0.18%	37	$64.4	0.17%
Isotonic Drinks Single Serve	44	$7.8	0.12%	66	$37.9	0.12%	64	$45.7	0.12%
Convenient Meals—Kids Meal C	45	$7.8	0.12%	186	$18.0	0.06%	139	$25.8	0.07%
Traditional [Ice Cream & Sherbert]	46	$7.7	0.12%	44	$51.5	0.16%	43	$59.2	0.16%

Exhibit E–5: Top 100 Subcommodities for SNAP Households by Expenditure: Households Without Children Present—Continued

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Fz Bag Vegetables—Plain	47	$7.6	0.12%	37	$55.9	0.18%	40	$63.5	0.17%
Mayonnaise & Whipped Dressing	48	$7.5	0.11%	45	$50.9	0.16%	44	$58.4	0.15%
Refrigerated Coffee Creamers	49	$7.1	0.11%	34	$58.8	0.19%	35	$65.9	0.17%
Fz Family Style Entrées	50	$7.0	0.11%	85	$31.3	0.10%	76	$38.3	0.10%
Adult Cereal	51	$7.0	0.11%	18	$77.2	0.24%	21	$84.2	0.22%
Sft Drnk Sngl Srv Btl Carb (Ex)	52	$6.9	0.11%	122	$24.2	0.08%	101	$31.1	0.08%
Margarine: Tubs And Bowls	53	$6.5	0.10%	57	$44.0	0.14%	56	$50.5	0.13%
Strawberries	54	$6.5	0.10%	23	$69.9	0.22%	26	$76.4	0.20%
Butter	55	$6.5	0.10%	20	$76.9	0.24%	22	$83.3	0.22%
Hot Dogs—Base Meat	56	$6.3	0.10%	164	$20.4	0.06%	125	$26.7	0.07%
Choice Beef	57	$6.3	0.10%	93	$28.5	0.09%	86	$34.8	0.09%
Candy Bags—Chocolate	58	$6.2	0.09%	28	$64.3	0.20%	31	$70.5	0.19%
Mainstream [Pasta & Pizza Sauce]	59	$5.9	0.09%	96	$28.2	0.09%	88	$34.1	0.09%
Lunchment—Bologna/Sausage	60	$5.9	0.09%	117	$24.6	0.08%	102	$30.5	0.08%
Tuna	61	$5.9	0.09%	54	$45.0	0.14%	54	$50.9	0.13%
Macaroni & Cheese Dnrs	62	$5.8	0.09%	175	$19.1	0.06%	148	$24.9	0.07%
Mexican Soft Tortillas And Wra	63	$5.8	0.09%	63	$39.2	0.12%	65	$45.0	0.12%
Chicken Wings	64	$5.8	0.09%	355	$10.0	0.03%	253	$15.8	0.04%
Peanut Butter	65	$5.7	0.09%	47	$50.3	0.16%	46	$55.9	0.15%
Sw Gds: Donuts	66	$5.6	0.09%	83	$31.9	0.10%	77	$37.5	0.10%
Meat: Turkey Bulk	67	$5.6	0.08%	31	$62.3	0.20%	32	$67.9	0.18%
Aseptic Pack Juice And Drinks	68	$5.4	0.08%	242	$14.1	0.04%	202	$19.5	0.05%
Can Pasta	69	$5.4	0.08%	232	$14.8	0.05%	191	$20.2	0.05%
Frzn Chicken—Wings	70	$5.2	0.08%	547	$5.6	0.02%	372	$10.8	0.03%
Frzn French Fries	71	$5.2	0.08%	190	$17.8	0.06%	162	$23.0	0.06%
Rts Soup: Chunky/Homestyle/Et	72	$5.2	0.08%	48	$50.1	0.16%	48	$55.3	0.15%
Angus [Beef]	73	$5.1	0.08%	58	$43.9	0.14%	58	$49.0	0.13%
Fz Skillet Meals	74	$5.0	0.08%	80	$32.0	0.10%	79	$37.1	0.10%
Mult Pk Bag Snacks	75	$5.0	0.08%	263	$13.1	0.04%	220	$18.1	0.05%
Vegetable Oil	76	$5.0	0.08%	278	$12.5	0.04%	226	$17.5	0.05%
Frzn Breakfast Sandwiches	77	$4.9	0.07%	159	$20.6	0.07%	143	$25.5	0.07%
Cream Cheese	78	$4.9	0.07%	52	$45.6	0.14%	55	$50.5	0.13%
Sour Creams	79	$4.8	0.07%	67	$37.9	0.12%	70	$42.7	0.11%
Pizza/Economy	80	$4.8	0.07%	256	$13.5	0.04%	217	$18.3	0.05%
Sandwich Cookies	81	$4.7	0.07%	105	$26.5	0.08%	100	$31.2	0.08%
Frzn Meat—Beef	82	$4.7	0.07%	209	$16.2	0.05%	184	$20.9	0.05%
Pizza/Traditional	83	$4.5	0.07%	150	$21.4	0.07%	138	$25.9	0.07%
Chix: Frd 8pc/Cut Up (Hot)	84	$4.5	0.07%	73	$35.1	0.11%	73	$39.6	0.10%
Meat: Ham Bulk	85	$4.5	0.07%	51	$47.9	0.15%	52	$52.4	0.14%
Hamburger Buns	86	$4.4	0.07%	101	$26.9	0.09%	97	$31.4	0.08%
Grapes Red	87	$4.4	0.07%	50	$48.5	0.15%	51	$52.9	0.14%
Spring Water	88	$4.4	0.07%	71	$36.1	0.11%	71	$40.5	0.11%
Cottage Cheese	89	$4.4	0.07%	46	$50.7	0.16%	49	$55.1	0.14%
Waffles/Pancakes/French Toast	90	$4.4	0.07%	109	$25.8	0.08%	105	$30.2	0.08%
Value Forms/18oz And Larger [Chicken]	91	$4.4	0.07%	271	$12.7	0.04%	232	$17.1	0.04%
Candy Bars (Multi Pack)	92	$4.3	0.07%	97	$28.1	0.09%	93	$32.5	0.09%
Cakes: Birthday/Celebration Sh	93	$4.3	0.07%	204	$16.7	0.05%	183	$21.0	0.06%
Hot Dog Buns	94	$4.3	0.07%	137	$22.9	0.07%	120	$27.2	0.07%
Salsa & Dips	95	$4.3	0.07%	163	$20.5	0.06%	151	$24.7	0.06%
Sweet Goods—Full Size	96	$4.3	0.07%	139	$22.9	0.07%	121	$27.2	0.07%
Dnr Sausage—Links Pork Ckd/S	97	$4.3	0.07%	248	$13.9	0.04%	219	$18.2	0.05%
Bkfst Sausage—Fresh Rolls	98	$4.3	0.06%	113	$25.2	0.08%	111	$29.4	0.08%
Cheese Crackers	99	$4.2	0.06%	87	$30.0	0.10%	87	$34.2	0.09%
Bagged Cheese Snacks	100	$4.2	0.06%	177	$18.8	0.06%	161	$23.1	0.06%
Top 100 Subcommodities		**$894.8**	**13.60%**		**$5,251.7**	**16.66%**		**$6,146.5**	**16.13%**
Total Expenditures		**$6,580.5**	**100%**		**$31,513.8**	**100%**		**$38,094.2**	**100%**

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.
Note: Columns may not sum to total shown due to rounding.
*Top 100 subcommodities based on SNAP household expenditures.

Exhibit E–6: Top 100 Subcommodities for SNAP Households by Expenditure: Stores in the Midwest

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expendi-tures	Rank	$ in millions	% of Expendi-tures	Rank	$ in millions	% of Expendi-tures
Fluid Milk/White Only	1	$64.3	0.98%	1	$237.1	0.75%	1	$301.4	0.79%
Soft Drinks 12/18 & 15pk Can Car	2	$60.9	0.93%	2	$175.6	0.56%	2	$236.5	0.62%
Primal [Beef]	3	$34.5	0.52%	4	$101.5	0.32%	3	$136.0	0.36%
Lean [Beef]	4	$32.9	0.50%	28	$43.8	0.14%	12	$76.7	0.20%
Shredded Cheese	5	$28.5	0.43%	3	$102.0	0.32%	4	$130.4	0.34%
Kids Cereal	6	$26.3	0.40%	18	$51.4	0.16%	11	$77.7	0.20%
Sft Drnk 2 Liter Btl Carb Incl	7	$26.3	0.40%	8	$67.4	0.21%	6	$93.7	0.25%
Potato Chips	8	$23.0	0.35%	5	$76.5	0.24%	5	$99.5	0.26%
Snacks/Appetizers	9	$19.5	0.30%	43	$33.6	0.11%	31	$53.0	0.14%
Infant Formula Starter/ Solutio	10	$18.9	0.29%	180	$12.1	0.04%	68	$31.1	0.08%
Lunchment—Deli Fresh	11	$17.9	0.27%	10	$60.7	0.19%	10	$78.6	0.21%
Mainstream White Bread	12	$17.4	0.26%	35	$38.8	0.12%	28	$56.1	0.15%
Enhanced [Pork Boneless Loin/Rib]	13	$17.2	0.26%	16	$54.2	0.17%	16	$71.4	0.19%
American Single Cheese	14	$17.1	0.26%	30	$43.2	0.14%	22	$60.3	0.16%
Tortilla/Nacho Chips	15	$16.2	0.25%	14	$56.2	0.18%	15	$72.4	0.19%
Unflavored Can Coffee	16	$16.1	0.24%	12	$60.0	0.19%	13	$76.1	0.20%
Fz Ss Economy Meals All	17	$15.7	0.24%	68	$25.0	0.08%	45	$40.7	0.11%
Soft Drinks 20pk & 24pk Can Carb	18	$15.5	0.24%	38	$36.7	0.12%	34	$52.3	0.14%
Snack Cake—Multi Pack	19	$15.4	0.23%	42	$33.6	0.11%	38	$49.0	0.13%
Chicken Breast Boneless	20	$15.4	0.23%	7	$68.8	0.22%	7	$84.2	0.22%
Fz Ss Prem Traditional Meals	21	$15.2	0.23%	22	$46.5	0.15%	21	$61.7	0.16%
Bacon—Trad 16oz Or Less	22	$14.5	0.22%	32	$42.7	0.14%	25	$57.2	0.15%
Eggs—Large	23	$14.2	0.22%	15	$55.8	0.18%	18	$70.0	0.18%
Dairy Case 100% Pure Juice—O	24	$13.6	0.21%	9	$65.7	0.21%	9	$79.3	0.21%
Still Water Drnking/Mnrl Water	25	$13.5	0.20%	29	$43.5	0.14%	27	$57.0	0.15%
Convenient Meals—Kids Meal C	26	$13.0	0.20%	82	$20.7	0.07%	61	$33.7	0.09%
Potatoes Russet (Bulk & Bag)	27	$13.0	0.20%	31	$42.9	0.14%	29	$55.9	0.15%
Pizza/Premium	28	$12.9	0.20%	37	$37.1	0.12%	36	$50.0	0.13%
All Family Cereal	29	$12.6	0.19%	11	$60.1	0.19%	14	$72.7	0.19%
Sft Drnk Mlt-Pk Btl Carb (Excp)	30	$12.5	0.19%	19	$50.1	0.16%	19	$62.6	0.16%
Sandwiches & Handhelds	31	$12.4	0.19%	88	$20.2	0.06%	65	$32.6	0.09%
Frzn Chicken—Wht Meat	32	$12.4	0.19%	48	$31.9	0.10%	41	$44.3	0.12%
Ribs [Pork]	33	$12.3	0.19%	58	$27.8	0.09%	47	$40.1	0.11%
Mainstream Variety Breads	34	$11.8	0.18%	23	$45.3	0.14%	26	$57.1	0.15%
Sugar	35	$11.7	0.18%	56	$27.9	0.09%	49	$39.6	0.10%
Choice Beef	36	$11.3	0.17%	57	$27.9	0.09%	50	$39.2	0.10%
Condensed Soup	37	$11.2	0.17%	21	$46.8	0.15%	23	$58.0	0.15%
Traditional [Ice Cream & Sherbert]	38	$10.8	0.16%	26	$44.2	0.14%	30	$55.0	0.14%
Bananas	39	$10.7	0.16%	13	$59.9	0.19%	17	$70.6	0.19%
Pourable Salad Dressings	40	$10.6	0.16%	36	$38.6	0.12%	37	$49.2	0.13%
Fz Family Style Entrées	41	$9.7	0.15%	74	$22.9	0.07%	66	$32.6	0.09%
Macaroni & Cheese Dnrs	42	$9.7	0.15%	97	$19.0	0.06%	74	$28.7	0.08%
Choice Beef	43	$9.6	0.15%	44	$33.0	0.10%	43	$42.5	0.11%
Natural Cheese Chunks	44	$9.5	0.14%	20	$48.3	0.15%	24	$57.7	0.15%
Mainstream [Pasta & Pizza Sauce]	45	$9.4	0.14%	60	$27.2	0.09%	56	$36.6	0.10%
Margarine: Tubs And Bowls	46	$9.1	0.14%	51	$29.9	0.09%	51	$39.0	0.10%
Hot Dogs—Base Meat	47	$9.1	0.14%	95	$19.5	0.06%	75	$28.6	0.08%
Can Pasta	48	$9.0	0.14%	117	$16.1	0.05%	95	$25.1	0.07%
Mayonnaise & Whipped Dressing	49	$9.0	0.14%	54	$28.7	0.09%	54	$37.7	0.10%
Fz Ss Prem Nutritional Meals	50	$8.6	0.13%	6	$72.5	0.23%	8	$81.1	0.21%
Strawberries	51	$8.6	0.13%	17	$53.1	0.17%	20	$61.7	0.16%
Sft Drnk Sngl Srv Btl Carb (Ex)	52	$8.3	0.13%	127	$15.4	0.05%	100	$23.7	0.06%
Meat: Turkey Bulk	53	$8.1	0.12%	27	$43.9	0.14%	35	$52.0	0.14%
Lunchment—Bologna/Sau-sage	54	$8.1	0.12%	93	$19.7	0.06%	78	$27.8	0.07%
Aseptic Pack Juice And Drinks	55	$7.9	0.12%	124	$15.6	0.05%	101	$23.6	0.06%
Isotonic Drinks Single Serve	56	$7.9	0.12%	59	$27.6	0.09%	58	$35.4	0.09%
Fz Bag Vegetables—Plain	57	$7.8	0.12%	45	$32.7	0.10%	46	$40.6	0.11%
Select Beef	58	$7.7	0.12%	100	$18.5	0.06%	89	$26.2	0.07%

Exhibit E–6: Top 100 Subcommodities for SNAP Households by Expenditure: Stores in the Midwest—Continued

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Frzn French Fries	59	$7.6	0.12%	128	$15.3	0.05%	104	$23.0	0.06%
Adult Cereal	60	$7.6	0.12%	24	$45.1	0.14%	32	$52.7	0.14%
Pizza/Economy	61	$7.6	0.12%	113	$16.6	0.05%	96	$24.2	0.06%
Sw Gds: Donuts	62	$7.6	0.11%	66	$25.4	0.08%	64	$32.9	0.09%
Frzn Chicken—Wings	63	$7.5	0.11%	467	$4.2	0.01%	248	$11.7	0.03%
Flavored Milk	64	$7.5	0.11%	75	$22.7	0.07%	72	$30.3	0.08%
Premium [Ice Cream & Sherbert]	65	$7.5	0.11%	25	$45.1	0.14%	33	$52.6	0.14%
Candy Bags—Chocolate	66	$7.3	0.11%	34	$39.3	0.12%	40	$46.6	0.12%
Peanut Butter	67	$7.1	0.11%	40	$34.5	0.11%	44	$41.6	0.11%
Sweet Goods—Full Size	68	$7.1	0.11%	81	$20.9	0.07%	77	$28.0	0.07%
Meat: Ham Bulk	69	$7.0	0.11%	39	$36.5	0.12%	42	$43.4	0.11%
Refrigerated Coffee Creamers	70	$7.0	0.11%	49	$31.2	0.10%	53	$38.2	0.10%
Bkfst Sausage—Fresh Rolls	71	$6.6	0.10%	92	$19.7	0.06%	86	$26.4	0.07%
Tuna	72	$6.6	0.10%	62	$26.4	0.08%	63	$33.0	0.09%
Value Forms Frz Chick/ 18oz & Larger	73	$6.6	0.10%	157	$13.3	0.04%	126	$19.9	0.05%
Cakes: Birthday/Celebra- tion Sh	74	$6.5	0.10%	147	$14.1	0.04%	119	$20.6	0.05%
Pizza/Traditional	75	$6.5	0.10%	96	$19.2	0.06%	93	$25.7	0.07%
Cream Cheese	76	$6.4	0.10%	47	$32.0	0.10%	52	$38.4	0.10%
Fruit Snacks	77	$6.4	0.10%	167	$13.0	0.04%	129	$19.4	0.05%
Vegetable Oil	78	$6.4	0.10%	265	$8.5	0.03%	189	$14.9	0.04%
Frzn Breakfast Sand- wiches	79	$6.4	0.10%	145	$14.3	0.05%	118	$20.7	0.05%
Frzn Meat—Beef	80	$6.3	0.10%	164	$13.1	0.04%	130	$19.4	0.05%
Sandwich Cookies	81	$6.2	0.09%	89	$20.1	0.06%	85	$26.4	0.07%
Hamburger Buns	82	$6.2	0.09%	76	$22.4	0.07%	76	$28.6	0.08%
Fz Skillet Meals	83	$6.2	0.09%	83	$20.7	0.07%	82	$26.9	0.07%
Chicken Wings	84	$6.1	0.09%	368	$5.9	0.02%	240	$12.0	0.03%
Sour Creams	85	$6.1	0.09%	71	$24.3	0.08%	71	$30.4	0.08%
Cottage Cheese	86	$6.1	0.09%	41	$33.8	0.11%	48	$39.9	0.10%
Butter	87	$6.0	0.09%	33	$41.9	0.13%	39	$47.9	0.13%
Dnr Sausage—Links Fresh	88	$6.0	0.09%	103	$17.8	0.06%	99	$23.8	0.06%
Cheese Crackers	89	$5.9	0.09%	65	$25.5	0.08%	67	$31.4	0.08%
Rts Soup: Chunky/ Homestyle/Et	90	$5.8	0.09%	50	$30.3	0.10%	57	$36.1	0.09%
Hot Dog Buns	91	$5.7	0.09%	102	$17.9	0.06%	102	$23.5	0.06%
Waffles/Pancakes/French Toast	92	$5.6	0.09%	85	$20.5	0.07%	90	$26.1	0.07%
Mult Pk Bag Snacks	93	$5.6	0.09%	234	$9.9	0.03%	178	$15.5	0.04%
Candy Bars (Multi Pack)	94	$5.6	0.08%	91	$20.0	0.06%	94	$25.6	0.07%
Toaster Pastries	95	$5.5	0.08%	121	$15.8	0.05%	113	$21.3	0.06%
Salsa & Dips	96	$5.4	0.08%	151	$13.9	0.04%	131	$19.2	0.05%
Angus [Beef]	97	$5.3	0.08%	55	$28.0	0.09%	62	$33.4	0.09%
Dnr Sausage—Links Pork Ckd/S	98	$5.3	0.08%	182	$12.0	0.04%	155	$17.4	0.05%
Tray Pack/Choc Chip Cookies	99	$5.2	0.08%	125	$15.6	0.05%	116	$20.8	0.05%
Grapes White	100	$5.2	0.08%	80	$21.3	0.07%	84	$26.5	0.07%
Top 100 Subcommod- ities		**$1,174.1**	**17.84%**		**$3,685.6**	**11.70%**		**$4,859.7**	**12.76%**
Total Expenditures		**$6,580.5**	**100%**		**$31,513.8**	**100%**		**$38,094.2**	**100%**

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.
Note: Columns may not sum to total shown due to rounding.
*Top 100 subcommodities based on SNAP household expenditures.

Exhibit E–7: Top 100 Subcommodities for SNAP Households by Expenditure: Stores in the South

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Fluid Milk/White Only	1	$66.4	1.01%	1	$305.9	0.97%	1	$372.3	0.98%
Soft Drinks 12/18 & 15pk Can Car	2	$63.3	0.96%	2	$229.6	0.73%	2	$292.8	0.77%
Lean [Beef]	3	$38.6	0.59%	15	$75.2	0.24%	8	$113.8	0.30%
Kids Cereal	4	$29.8	0.45%	23	$63.5	0.20%	15	$93.3	0.24%

**Exhibit E–7: Top 100 Subcommodities for SNAP Households by
Expenditure: Stores in the South—Continued**

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expendi-tures	Rank	$ in millions	% of Expendi-tures	Rank	$ in millions	% of Expendi-tures
Sft Drnk 2 Liter Btl Carb Incl	5	$26.2	0.40%	9	$91.0	0.29%	7	$117.2	0.31%
Primal [Beef]	6	$25.7	0.39%	6	$100.9	0.32%	5	$126.6	0.33%
Shredded Cheese	7	$25.6	0.39%	3	$121.8	0.39%	3	$147.4	0.39%
Potato Chips	8	$23.5	0.36%	12	$87.7	0.28%	10	$111.2	0.29%
Lunchment—Deli Fresh	9	$22.8	0.35%	7	$95.8	0.30%	6	$118.6	0.31%
Mainstream White Bread	10	$21.3	0.32%	24	$62.7	0.20%	21	$84.0	0.22%
Still Water Drnking/Mnrl Water	11	$20.1	0.31%	16	$74.1	0.24%	14	$94.2	0.25%
Snack Cake—Multi Pack	12	$19.8	0.30%	37	$48.3	0.15%	32	$68.1	0.18%
Eggs—Large	13	$18.8	0.29%	11	$88.4	0.28%	12	$107.2	0.28%
American Single Cheese	14	$17.9	0.27%	32	$56.0	0.18%	27	$73.9	0.19%
Chicken Breast Boneless	15	$17.5	0.27%	4	$109.1	0.35%	4	$126.6	0.33%
Sugar	16	$17.4	0.26%	41	$46.5	0.15%	35	$63.9	0.17%
Sft Drnk Mlt-Pk Btl Carb (Excp)	17	$17.2	0.26%	10	$89.0	0.28%	13	$106.2	0.28%
Fz Ss Prem Traditional Meals	18	$16.7	0.25%	27	$59.9	0.19%	24	$76.6	0.20%
Infant Formula Starter/ Solutio	19	$16.5	0.25%	247	$13.1	0.04%	108	$29.5	0.08%
Tortilla/Nacho Chips	20	$16.1	0.24%	19	$71.5	0.23%	18	$87.6	0.23%
Dairy Case 100% Pure Juice—O	21	$15.9	0.24%	8	$92.7	0.29%	11	$108.6	0.29%
Pizza/Premium	22	$15.9	0.24%	29	$59.0	0.19%	26	$74.9	0.20%
Fz Ss Economy Meals All	23	$15.2	0.23%	84	$27.9	0.09%	59	$43.1	0.11%
Snacks/Appetizers	24	$15.2	0.23%	59	$35.7	0.11%	47	$50.9	0.13%
Soft Drinks 20pk & 24pk Can Carb	25	$15.2	0.23%	58	$36.1	0.11%	46	$51.2	0.13%
Bacon—Trad 16oz Or Less	26	$14.8	0.23%	30	$58.3	0.18%	29	$73.1	0.19%
Mainstream Variety Breads	27	$14.6	0.22%	18	$72.1	0.23%	19	$86.8	0.23%
Sandwiches & Handhelds	28	$14.6	0.22%	87	$27.1	0.09%	63	$41.7	0.11%
Ribs [Pork]	29	$14.1	0.21%	51	$40.4	0.13%	41	$54.5	0.14%
Convenient Meals—Kids Meal C	30	$14.1	0.21%	80	$28.6	0.09%	60	$42.7	0.11%
Enhanced [Pork Boneless Loin/Rib]	31	$14.0	0.21%	21	$66.0	0.21%	23	$80.0	0.21%
Potatoes Russet (Bulk & Bag)	32	$13.8	0.21%	26	$61.4	0.19%	25	$75.3	0.20%
Unflavored Can Coffee	33	$13.4	0.20%	17	$73.0	0.23%	20	$86.3	0.23%
Chicken Wings	34	$13.4	0.20%	224	$14.2	0.05%	119	$27.6	0.07%
Mult Pk Bag Snacks	35	$12.2	0.19%	137	$20.4	0.06%	87	$32.6	0.09%
Fz Bag Vegetables—Plain	36	$12.2	0.19%	33	$54.9	0.17%	33	$67.1	0.18%
Sft Drnk Sngl Srv Btl Carb (Ex)	37	$12.2	0.18%	85	$27.5	0.09%	66	$39.7	0.10%
Premium [Ice Cream & Sherbert]	38	$12.1	0.18%	13	$79.1	0.25%	16	$91.3	0.24%
Frzn Chicken—Wings	39	$12.1	0.18%	338	$9.0	0.03%	173	$21.1	0.06%
Bananas	40	$11.6	0.18%	14	$78.9	0.25%	17	$90.5	0.24%
All Family Cereal	41	$11.3	0.17%	20	$70.1	0.22%	22	$81.4	0.21%
Pourable Salad Dressings	42	$11.1	0.17%	38	$48.1	0.15%	36	$59.2	0.16%
Hot Dogs—Base Meat	43	$11.0	0.17%	106	$23.9	0.08%	80	$34.9	0.09%
Condensed Soup	44	$10.9	0.17%	31	$56.2	0.18%	34	$67.1	0.18%
Fz Family Style Entrées	45	$10.5	0.16%	69	$32.1	0.10%	61	$42.6	0.11%
Isotonic Drinks Single Serve	46	$10.2	0.16%	49	$40.6	0.13%	48	$50.8	0.13%
Frzn Chicken—Wht Meat	47	$10.2	0.16%	55	$37.3	0.12%	53	$47.5	0.12%
Vegetable Oil	48	$10.1	0.15%	204	$15.4	0.05%	132	$25.5	0.07%
Mayonnaise & Whipped Dressing	49	$10.1	0.15%	46	$43.1	0.14%	43	$53.2	0.14%
Aseptic Pack Juice And Drinks	50	$9.9	0.15%	115	$22.7	0.07%	88	$32.5	0.09%
Frzn Breakfast Sand-wiches	51	$9.5	0.14%	83	$27.9	0.09%	70	$37.4	0.10%
Macaroni & Cheese Dnrs	52	$9.4	0.14%	121	$21.8	0.07%	98	$31.3	0.08%
Fz Ss Prem Nutritional Meals	53	$9.2	0.14%	5	$102.2	0.32%	9	$111.5	0.29%
Frzn French Fries	54	$9.2	0.14%	127	$21.2	0.07%	103	$30.4	0.08%
Choice Beef	55	$8.9	0.14%	56	$37.2	0.12%	55	$46.1	0.12%
Lunchment—Bologna/Sau-sage	56	$8.9	0.14%	110	$23.5	0.07%	89	$32.4	0.09%
Natural Cheese Chunks	57	$8.9	0.14%	28	$59.2	0.19%	31	$68.1	0.18%
Can Pasta	58	$8.8	0.13%	156	$18.7	0.06%	121	$27.5	0.07%
Adult Cereal	59	$8.5	0.13%	22	$64.7	0.21%	28	$73.2	0.19%
Traditional [Ice Cream & Sherbert]	60	$8.5	0.13%	50	$40.5	0.13%	49	$49.0	0.13%
Mainstream [Pasta & Pizza Sauce]	61	$8.4	0.13%	81	$28.5	0.09%	74	$36.9	0.10%
Dnr Sausage—Links Pork Ckd/S	62	$8.3	0.13%	199	$15.7	0.05%	144	$24.1	0.06%

Exhibit E–7: Top 100 Subcommodities for SNAP Households by Expenditure: Stores in the South—Continued

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Chicken Drums	63	$8.3	0.13%	249	$12.9	0.04%	172	$21.2	0.06%
Margarine: Tubs And Bowls	64	$8.1	0.12%	63	$33.4	0.11%	64	$41.5	0.11%
Tuna	65	$8.0	0.12%	48	$40.9	0.13%	50	$48.9	0.13%
Pizza/Economy	66	$7.9	0.12%	181	$16.4	0.05%	142	$24.3	0.06%
Strawberries	67	$7.8	0.12%	25	$62.0	0.20%	30	$69.9	0.18%
Angus [Beef]	68	$7.8	0.12%	40	$46.9	0.15%	40	$54.7	0.14%
Shrimp—Raw	69	$7.6	0.12%	70	$31.8	0.10%	68	$39.4	0.10%
Value Forms/18oz And Larger [Chicken]	70	$7.5	0.11%	179	$16.5	0.05%	145 $	24.0	0.06%
Select Beef	71	$7.5	0.11%	36	$51.3	0.16%	37	$58.8	0.15%
Fz Skillet Meals	72	$7.4	0.11%	76	$29.7	0.09%	72	$37.1	0.10%
Cakes: Birthday/Celebration Sh	73	$7.3	0.11%	142	$19.7	0.06%	122	$27.1	0.07%
Bacon—Trad Greater Than 16oz	74	$7.2	0.11%	108	$23.7	0.08%	100	$30.9	0.08%
Pizza/Traditional	75	$7.2	0.11%	91	$26.2	0.08%	84	$33.4	0.09%
Refrigerated Biscuits	76	$7.1	0.11%	114	$22.8	0.07%	106	$29.9	0.08%
Sw Gds: Donuts	77	$7.0	0.11%	107	$23.8	0.08%	101	$30.8	0.08%
Frzn Meat—Beef	78	$7.0	0.11%	185	$16.3	0.05%	151	$23.3	0.06%
Salsa & Dips	79	$7.0	0.11%	122	$21.7	0.07%	114	$28.7	0.08%
Fruit Snacks	80	$7.0	0.11%	194	$16.0	0.05%	154	$23.0	0.06%
Candy Bags—Chocolate	81	$6.9	0.11%	42	$46.5	0.15%	42	$53.4	0.14%
Peanut Butter	82	$6.7	0.10%	43	$45.2	0.14%	45	$51.9	0.14%
Sandwich Cookies	83	$6.7	0.10%	100	$24.9	0.08%	93	$31.6	0.08%
Ramen Noodles/Ramen Cups	84	$6.6	0.10%	327	$9.5	0.03%	243	$16.2	0.04%
Waffles/Pancakes/French Toast	85	$6.6	0.10%	82	$27.9	0.09%	81	$34.5	0.09%
Hot Dog Buns	86	$6.3	0.10%	116	$22.5	0.07%	113	$28.9	0.08%
Candy Bars (Multi Pack)	87	$6.2	0.09%	96	$25.4	0.08%	95	$31.6	0.08%
Bagged Cheese Snacks	88	$6.2	0.09%	147	$19.4	0.06%	133	$25.5	0.07%
Prepared Beans—Baked W/Pork	89	$6.1	0.09%	125	$21.5	0.07%	118	$27.6	0.07%
Loaf Cheese	90	$6.1	0.09%	145	$19.5	0.06%	130	$25.6	0.07%
Meat: Turkey Bulk	91	$6.0	0.09%	34	$52.7	0.17%	38	$58.8	0.15%
Tray Pack/Choc Chip Cookies	92	$6.0	0.09%	141	$19.9	0.06%	129	$26.0	0.07%
Hamburger Buns	93	$6.0	0.09%	99	$25.1	0.08%	99	$31.1	0.08%
Green Beans: Fs/Whl/Cut	94	$6.0	0.09%	102	$24.8	0.08%	102	$30.8	0.08%
Grapes White	95	$6.0	0.09%	75	$29.7	0.09%	79	$35.6	0.09%
Spring Water	96	$6.0	0.09%	64	$32.9	0.10%	69	$38.8	0.10%
Rts Soup: Chunky/Homestyle/Et	97	$5.9	0.09%	54	$38.6	0.12%	57	$44.5	0.12%
Butter Spray Cracker	98	$5.9	0.09%	88	$26.2	0.08%	91	$32.1	0.08%
Instore Cut Fruit	99	$5.9	0.09%	57	$36.6	0.12%	62	$42.5	0.11%
Toaster Pastries	100	$5.8	0.09%	134	$20.5	0.07%	125	$26.4	0.07%
Top 100 Subcommodities		**$1,268.9**	**19.28%**		**$4,783.8**	**15.18%**		**$6,052.7**	**15.89%**
Total Expenditures		**$6,580.5**	**100%**		**$31,513.8**	**100%**		**$38,094.2**	**100%**

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.
Note: Columns may not sum to total shown due to rounding.
*Top 100 subcommodities based on SNAP household expenditures.

Exhibit E–8: Top 100 Subcommodities for SNAP Households by Expenditure: Stores in the West

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Fluid Milk/White Only	1	$60.4	0.92%	1	$310.8	0.99%	1	$371.2	0.97%
Lean [Beef]	2	$40.9	0.62%	3	$138.9	0.44%	3	$179.8	0.47%
Soft Drinks 12/18 & 15pk Can Car	3	$40.5	0.62%	2	$196.0	0.62%	2	$236.5	0.62%
Kids Cereal	4	$22.0	0.33%	22	$71.5	0.23%	17	$93.5	0.25%
Shredded Cheese	5	$20.7	0.31%	4	$118.2	0.38%	4	$138.9	0.36%
Eggs—Large	6	$19.1	0.29%	8	$107.4	0.34%	6	$126.5	0.33%
Infant Formula Starter/Solutio	7	$18.8	0.29%	167	$20.1	0.06%	75	$38.9	0.10%
Sft Drnk 2 Liter Btl Carb Incl	8	$18.4	0.28%	21	$71.8	0.23%	18	$90.2	0.24%

Exhibit E–8: Top 100 Subcommodities for SNAP Households by Expenditure: Stores in the West—Continued

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Potato Chips	9	$17.9	0.27%	13	$89.0	0.28%	11	$106.9	0.28%
Natural Cheese Chunks	10	$16.9	0.26%	7	$108.6	0.34%	7	$125.6	0.33%
Chicken Breast Boneless	11	$16.7	0.25%	5	$115.0	0.36%	5	$131.7	0.35%
Still Water Drnking/Mnrl Water	12	$15.2	0.23%	24	$70.1	0.22%	23	$85.3	0.22%
Lunchment—Deli Fresh	13	$15.2	0.23%	14	$86.0	0.27%	13	$101.2	0.27%
Tortilla/Nacho Chips	14	$15.1	0.23%	17	$81.3	0.26%	16	$96.4	0.25%
Mexican Soft Tortillas And Wra	15	$15.1	0.23%	23	$71.5	0.23%	21	$86.6	0.23%
Dairy Case 100% Pure Juice—O	16	$14.0	0.21%	6	$110.7	0.35%	8	$124.7	0.33%
Select Beef	17	$12.6	0.19%	19	$73.9	0.23%	22	$86.5	0.23%
Isotonic Drinks Single Serve	18	$12.4	0.19%	39	$51.4	0.16%	38	$63.7	0.17%
All Family Cereal	19	$12.3	0.19%	15	$84.7	0.27%	15	$97.0	0.25%
Mainstream Variety Breads	20	$12.0	0.18%	37	$55.8	0.18%	36	$67.8	0.18%
Fz Ss Prem Traditional Meals	21	$11.9	0.18%	27	$69.1	0.22%	25	$81.0	0.21%
Bananas	22	$11.9	0.18%	9	$103.9	0.33%	9	$115.8	0.30%
Unflavored Can Coffee	23	$11.9	0.18%	29	$65.0	0.21%	27	$76.9	0.20%
Premium [Ice Cream & Sherbert]	24	$11.6	0.18%	10	$101.7	0.32%	10	$113.3	0.30%
Refrigerated Coffee Creamers	25	$11.5	0.17%	18	$75.9	0.24%	20	$87.4	0.23%
Bacon—Trad 16oz Or Less	26	$11.4	0.17%	36	$56.6	0.18%	34	$68.1	0.18%
Pizza/Premium	27	$10.9	0.17%	35	$57.2	0.18%	35	$68.1	0.18%
Enhanced [Pork Boneless Loin/Rib]	28	$10.3	0.16%	49	$47.8	0.15%	42	$58.1	0.15%
Fz Ss Economy Meals All	29	$10.0	0.15%	104	$27.8	0.09%	83	$37.8	0.10%
Snacks/Appetizers	30	$10.0	0.15%	85	$31.2	0.10%	70	$41.1	0.11%
Choice Beef	31	$9.9	0.15%	28	$66.5	0.21%	28	$76.5	0.20%
Mainstream White Bread	32	$9.3	0.14%	71	$35.3	0.11%	64	$44.6	0.12%
American Single Cheese	33	$9.0	0.14%	66	$37.4	0.12%	62	$46.5	0.12%
Soft Drinks 20pk & 24pk Can Carb	34	$9.0	0.14%	77	$33.6	0.11%	67	$42.6	0.11%
Potatoes Russet (Bulk & Bag)	35	$9.0	0.14%	44	$50.1	0.16%	40	$59.1	0.16%
Adult Cereal	36	$8.8	0.13%	20	$72.8	0.23%	24	$81.6	0.21%
Sandwiches & Handhelds	37	$8.8	0.13%	113	$26.3	0.08%	92	$35.1	0.09%
Ribs [Pork]	38	$8.6	0.13%	62	$38.5	0.12%	59	$47.1	0.12%
Avocado	39	$8.4	0.13%	26	$69.5	0.22%	26	$77.9	0.20%
Choice Beef	40	$8.2	0.13%	102	$28.4	0.09%	85	$36.6	0.10%
Mayonnaise & Whipped Dressing	41	$8.2	0.12%	50	$47.2	0.15%	45	$55.4	0.15%
Sandwiches—(Cold)	42	$8.1	0.12%	54	$44.1	0.14%	51	$52.2	0.14%
Butter	43	$8.0	0.12%	16	$81.6	0.26%	19	$89.6	0.24%
Premium Bread	44	$7.9	0.12%	12	$89.1	0.28%	14	$97.0	0.25%
Sugar	45	$7.8	0.12%	64	$38.3	0.12%	63	$46.1	0.12%
Condensed Soup	46	$7.6	0.12%	42	$50.6	0.16%	41	$58.2	0.15%
Frzn Chicken—Wht Meat	47	$7.4	0.11%	90	$30.6	0.10%	81	$38.0	0.10%
Fz Family Style Entrées	48	$7.4	0.11%	100	$28.5	0.09%	87	$35.9	0.09%
Sft Drnk Sngl Srv Btl Carb (Ex)	49	$7.3	0.11%	101	$28.5	0.09%	88	$35.8	0.09%
Candy Bags—Chocolate	50	$7.3	0.11%	33	$61.8	0.20%	32	$69.0	0.18%
Pourable Salad Dressings	51	$7.3	0.11%	38	$52.8	0.17%	39	$60.1	0.16%
Convenient Meals—Kids Meal C	52	$7.1	0.11%	160	$20.5	0.06%	126	$27.6	0.07%
Strawberries	53	$7.0	0.11%	31	$63.3	0.20%	31	$70.3	0.18%
Fz Ss Prem Nutritional Meals	54	$6.9	0.10%	11	$96.9	0.31%	12	$103.7	0.27%
Sw Gds: Donuts	55	$6.7	0.10%	79	$33.1	0.11%	74	$39.8	0.10%
Peanut Butter	56	$6.6	0.10%	48	$48.1	0.15%	46	$54.7	0.14%
Tuna	57	$6.5	0.10%	59	$42.6	0.14%	57	$49.2	0.13%
Snack Cake—Multi Pack	58	$6.5	0.10%	168	$19.8	0.06%	141	$26.3	0.07%
Aseptic Pack Juice And Drinks	59	$6.4	0.10%	174	$18.8	0.06%	152	$25.3	0.07%
Traditional [Ice Cream & Sherbert]	60	$6.3	0.10%	75	$34.1	0.11%	73	$40.4	0.11%
Margarine: Tubs And Bowls	61	$6.2	0.09%	65	$37.5	0.12%	65	$43.8	0.11%
Sour Creams	62	$6.2	0.09%	60	$41.7	0.13%	58	$47.9	0.13%
String Cheese	63	$6.2	0.09%	55	$43.8	0.14%	54	$50.0	0.13%
Candy Bars (Singles) (Including)	64	$6.2	0.09%	103	$28.1	0.09%	95	$34.2	0.09%
Bagged Cheese Snacks	65	$6.1	0.09%	166	$20.2	0.06%	139	$26.4	0.07%
Cream Cheese	66	$6.1	0.09%	46	$48.4	0.15%	47	$54.5	0.14%
Dairy Case Juice Drnk Under 10	67	$6.0	0.09%	132	$23.5	0.07%	115	$29.5	0.08%

Exhibit E–8: Top 100 Subcommodities for SNAP Households by Expenditure: Stores in the West—Continued

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Rts Soup: Chunky/Homestyle/Et	68	$5.9	0.09%	40	$51.0	0.16%	43	$56.9	0.15%
Fz Bag Vegetables—Plain	69	$5.7	0.09%	53	$44.3	0.14%	55	$50.0	0.13%
Frzn Meat—Beef	70	$5.7	0.09%	199	$16.9	0.05%	168	$22.6	0.06%
Tea Sweetened	71	$5.7	0.09%	89	$30.6	0.10%	86	$36.3	0.10%
Chix: Rotisserie (Hot)	72	$5.6	0.09%	30	$64.7	0.21%	30	$70.3	0.18%
Burritos	73	$5.4	0.08%	286	$12.2	0.04%	220	$17.6	0.05%
Spring Water	74	$5.3	0.08%	52	$44.9	0.14%	53	$50.3	0.13%
Ramen Noodles/Ramen Cups	75	$5.3	0.08%	268	$12.8	0.04%	217	$18.1	0.05%
Macaroni & Cheese Dnrs	76	$5.2	0.08%	173	$18.8	0.06%	156	$24.0	0.06%
Natural Cheese Slices	77	$5.2	0.08%	41	$51.0	0.16%	44	$56.2	0.15%
Fz Skillet Meals	78	$5.2	0.08%	94	$29.0	0.09%	96	$34.1	0.09%
Waffles/Pancakes/French Toast	79	$5.2	0.08%	95	$28.9	0.09%	97	$34.1	0.09%
Mainstream [Pasta & Pizza Sauce]	80	$5.1	0.08%	117	$25.3	0.08%	113	$30.4	0.08%
Meat: Turkey Bulk	81	$5.1	0.08%	32	$63.0	0.20%	33	$68.1	0.18%
Cheese Crackers	82	$5.1	0.08%	78	$33.1	0.11%	79	$38.2	0.10%
Grapes Red	83	$5.1	0.08%	51	$46.6	0.15%	52	$51.6	0.14%
Sandwich Cookies	84	$5.1	0.08%	110	$26.7	0.08%	107	$31.8	0.08%
Shrimp—Cooked	85	$5.1	0.08%	124	$24.5	0.08%	114	$29.5	0.08%
Whole Chicken (Roasters/Fryer)	86	$5.0	0.08%	107	$27.3	0.09%	104	$32.3	0.08%
Shrimp—Raw	87	$5.0	0.08%	109	$27.2	0.09%	106	$32.2	0.08%
Hot Dogs—Base Meat	88	$4.9	0.08%	255	$13.5	0.04%	213	$18.4	0.05%
Cottage Cheese	89	$4.9	0.07%	45	$48.8	0.15%	49	$53.7	0.14%
Oranges Navels All	90	$4.9	0.07%	68	$36.8	0.12%	69	$41.6	0.11%
Chewing Gum	91	$4.8	0.07%	80	$33.0	0.10%	84	$37.8	0.10%
Lunchment—Bologna/Sausage	92	$4.8	0.07%	190	$17.7	0.06%	170	$22.5	0.06%
Apple Juice & Cider (Over 50%)	93	$4.7	0.07%	188	$18.0	0.06%	167	$22.7	0.06%
Super Premium Pints [Ice Cream & Sherbert]	94	$4.7	0.07%	47	$48.3	0.15%	50	$53.1	0.14%
Salsa & Dips	95	$4.7	0.07%	152	$21.4	0.07%	143	$26.2	0.07%
Cakes: Birthday/Celebration Sh	96	$4.7	0.07%	206	$16.5	0.05%	184	$21.2	0.06%
Yogurt/Ss Regular	97	$4.7	0.07%	70	$36.3	0.12%	71	$41.0	0.11%
Value Forms/18oz And Larger [Chicken]	98	$4.6	0.07%	270	$12.8	0.04%	226	$17.3	0.05%
Energy Drink—Single Serve (N)	99	$4.5	0.07%	108	$27.3	0.09%	108	$31.8	0.08%
Non-Carb Water Flvr—Drnk/Mnr	100	$4.5	0.07%	88	$30.7	0.09%	90	$35.1	0.09%
Top 100 Subcommodities		$971.3	14.76%		$5,340.7	16.93%		$6,312.0	16.56%
Total Expenditures		$6,580.5	100%		$31,513.8	100%		$38,094.2	100%

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.
Note: Columns may not sum to total shown due to rounding.
*Top 100 subcommodities based on SNAP household expenditures.

Exhibit E–9: Top 100 Subcommodities for SNAP Households by Expenditure: Stores in Large Metropolitan Counties

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Fluid Milk/White Only	1	$102.1	1.55%	1	$484.1	1.54%	1	$586.2	1.54%
Soft Drinks 12/18 & 15pk Can Car	2	$84.7	1.29%	2	$346.6	1.10%	2	$431.3	1.13%
Lean [Beef]	3	$58.3	0.89%	11	$142.4	0.45%	5	$200.7	0.53%
Kids Cereal	4	$44.8	0.68%	18	$110.5	0.35%	14	$155.3	0.41%
Shredded Cheese	5	$41.0	0.62%	3	$197.3	0.63%	3	$238.2	0.63%
Sft Drnk 2 Liter Btl Carb Incl	6	$39.6	0.60%	13	$135.9	0.43%	10	$175.5	0.46%
Potato Chips	7	$35.3	0.54%	9	$145.9	0.46%	8	$181.2	0.48%
Lunchment—Deli Fresh	8	$30.4	0.46%	12	$140.6	0.45%	11	$171.0	0.45%
Eggs—Large	9	$29.6	0.45%	8	$147.8	0.47%	9	$177.3	0.47%
Primal [Beef]	10	$29.6	0.45%	19	$109.9	0.35%	18	$139.5	0.37%
Infant Formula Starter/Solution	11	$29.1	0.44%	198	$26.5	0.08%	88	$55.6	0.15%

Exhibit E–9: Top 100 Subcommodities for SNAP Households by Expenditure: Stores in Large Metropolitan Counties—Continued

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Still Water Drnking/Mnrl Water	12	$28.9	0.44%	17	$119.0	0.38%	16	$147.9	0.39%
Chicken Breast Boneless	13	$27.5	0.42%	4	$178.4	0.57%	4	$205.9	0.54%
Dairy Case 100% Pure Juice—O	14	$26.7	0.41%	6	$168.2	0.53%	6	$194.9	0.51%
Tortilla/Nacho Chips	15	$25.7	0.39%	15	$122.3	0.39%	15	$148.0	0.39%
Fz Ss Prem Traditional Meals	16	$25.6	0.39%	23	$108.0	0.34%	20	$133.5	0.35%
Snacks/Appetizers	17	$24.7	0.38%	65	$61.0	0.19%	45	$85.7	0.22%
Mainstream White Bread	18	$24.3	0.37%	49	$73.5	0.23%	39	$97.8	0.26%
American Single Cheese	19	$23.7	0.36%	43	$77.3	0.25%	34	$101.0	0.27%
Mainstream Variety Breads	20	$23.2	0.35%	25	$102.4	0.32%	22	$125.7	0.33%
Fz Ss Economy Meals All	21	$22.6	0.34%	91	$46.0	0.15%	70	$68.7	0.18%
Bacon—Trad 16oz Or Less	22	$22.5	0.34%	31	$90.3	0.29%	28	$112.9	0.30%
Snack Cake—Multi Pack	23	$22.3	0.34%	72	$55.8	0.18%	59	$78.1	0.21%
Pizza/Premium	24	$21.7	0.33%	29	$91.8	0.29%	26	$113.5	0.30%
Unflavored Can Coffee	25	$20.3	0.31%	22	$108.3	0.34%	21	$128.7	0.34%
Sugar	26	$20.1	0.31%	62	$62.1	0.20%	54	$82.1	0.22%
Bananas	27	$19.9	0.30%	7	$148.3	0.47%	12	$168.2	0.44%
Enhanced [Pork Boneless Loin/Rib]	28	$19.8	0.30%	33	$86.6	0.27%	31	$106.5	0.28%
All Family Cereal	29	$19.8	0.30%	14	$124.8	0.40%	17	$144.6	0.38%
Premium [Ice Cream & Sherbert]	30	$19.3	0.29%	10	$144.6	0.46%	13	$163.9	0.43%
Sandwiches & Handhelds	31	$19.2	0.29%	95	$43.3	0.14%	78	$62.5	0.16%
Ribs [Pork]	32	$19.1	0.29%	64	$61.4	0.19%	56	$80.6	0.21%
Convenient Meals—Kids Meal C	33	$18.7	0.28%	103	$41.8	0.13%	82	$60.5	0.16%
Natural Cheese Chunks	34	$18.6	0.28%	16	$120.3	0.38%	19	$138.9	0.36%
Potatoes Russet (Bulk & Bag)	35	$18.5	0.28%	36	$85.2	0.27%	32	$103.7	0.27%
Isotonic Drinks Single Serve	36	$17.7	0.27%	47	$73.7	0.23%	43	$91.4	0.24%
Soft Drinks 20pk & 24pk Can Carb	37	$17.5	0.27%	75	$54.2	0.17%	64	$71.6	0.19%
Frzn Chicken—Wht Meat	38	$16.9	0.26%	73	$55.6	0.18%	63	$72.5	0.19%
Sft Drnk Mlt-Pk Btl Carb (Excp)	39	$16.3	0.25%	30	$90.4	0.29%	29	$106.7	0.28%
Pourable Salad Dressings	40	$16.2	0.25%	39	$82.7	0.26%	37	$98.9	0.26%
Choice Beef	41	$16.1	0.24%	40	$81.9	0.26%	38	$98.0	0.26%
Fz Family Style Entrées	42	$15.5	0.24%	82	$49.6	0.16%	74	$65.1	0.17%
Condensed Soup	43	$15.4	0.23%	38	$84.7	0.27%	35	$100.2	0.26%
Fz Bag Vegetables—Plain	44	$15.1	0.23%	42	$77.6	0.25%	42	$92.7	0.24%
Frzn Chicken—Wings	45	$15.1	0.23%	444	$11.1	0.04%	242	$26.3	0.07%
Mayonnaise & Whipped Dressing	46	$14.9	0.23%	55	$68.0	0.22%	50	$82.9	0.22%
Select Beef	47	$14.9	0.23%	34	$86.5	0.27%	33	$101.4	0.27%
Fz Ss Prem Nutritional Meals	48	$14.6	0.22%	5	$172.2	0.55%	7	$186.7	0.49%
Adult Cereal	49	$14.4	0.22%	20	$109.6	0.35%	23	$124.0	0.33%
Sft Drnk Sngl Srv Btl Carb (Ex)	50	$14.4	0.22%	107	$40.1	0.13%	92	$54.5	0.14%
Aseptic Pack Juice And Drinks	51	$14.3	0.22%	122	$36.3	0.12%	100	$50.6	0.13%
Chicken Wings	52	$14.0	0.21%	282	$18.6	0.06%	190	$32.6	0.09%
Traditional [Ice Cream & Sherbert]	53	$13.6	0.21%	58	$63.3	0.20%	62	$76.9	0.20%
Mult Pk Bag Snacks	54	$13.5	0.21%	182	$28.3	0.09%	134	$41.8	0.11%
Refrigerated Coffee Creamers	55	$13.5	0.20%	27	$93.2	0.30%	30	$106.6	0.28%
Mexican Soft Tortillas And Wra	56	$13.4	0.20%	53	$69.5	0.22%	51	$82.9	0.22%
Strawberries	57	$13.4	0.20%	21	$109.1	0.35%	24	$122.5	0.32%
Hot Dogs—Base Meat	58	$13.1	0.20%	174	$29.5	0.09%	130	$42.5	0.11%
Mainstream [Pasta & Pizza Sauce]	59	$13.0	0.20%	86	$48.2	0.15%	80	$61.2	0.16%
Macaroni & Cheese Dnrs	60	$12.8	0.19%	136	$34.4	0.11%	109	$47.1	0.12%
Choice Beef	61	$12.6	0.19%	114	$38.4	0.12%	99	$51.0	0.13%
Margarine: Tubs And Bowls	62	$12.6	0.19%	68	$58.4	0.19%	65	$71.0	0.19%
Tuna	63	$12.2	0.19%	56	$68.0	0.22%	57	$80.2	0.21%
Meat: Turkey Bulk	64	$12.1	0.18%	24	$105.2	0.33%	25	$117.4	0.31%
Vegetable Oil	65	$11.7	0.18%	256	$20.5	0.06%	194	$32.2	0.08%
Frzn French Fries	66	$11.4	0.17%	180	$28.5	0.09%	147	$39.8	0.10%
Lunchment—Bologna/Sausage	67	$11.3	0.17%	152	$32.9	0.10%	121	$44.2	0.12%
Candy Bags—Chocolate	68	$11.3	0.17%	37	$84.8	0.27%	41	$96.0	0.25%
Can Pasta	69	$11.3	0.17%	204	$26.0	0.08%	163	$37.3	0.10%

Exhibit E–9: Top 100 Subcommodities for SNAP Households by Expenditure: Stores in Large Metropolitan Counties—Continued

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Fz Skillet Meals	70	$11.2	0.17%	84	$48.9	0.16%	85	$60.1	0.16%
Sw Gds: Donuts	71	$11.1	0.17%	99	$43.0	0.14%	93	$54.1	0.14%
Butter	72	$11.1	0.17%	26	$102.0	0.32%	27	$113.1	0.30%
Peanut Butter	73	$11.0	0.17%	45	$74.1	0.23%	46	$85.0	0.22%
Frzn Meat—Beef	74	$10.7	0.16%	196	$26.6	0.08%	162	$37.3	0.10%
Frzn Breakfast Sand-wiches	75	$10.7	0.16%	143	$33.6	0.11%	120	$44.3	0.12%
Cakes: Birthday/Celebra-tion Sh	76	$10.7	0.16%	169	$30.1	0.10%	140	$40.8	0.11%
Waffles/Pancakes/French Toast	77	$10.4	0.16%	81	$50.0	0.16%	83	$60.5	0.16%
Spring Water	78	$10.4	0.16%	57	$67.7	0.21%	60	$78.0	0.20%
Value Forms/18oz And Larger [Chicken]	79	$10.2	0.16%	212	$24.9	0.08%	177	$35.1	0.09%
Sandwiches—(Cold)	80	$10.2	0.16%	92	$46.0	0.15%	87	$56.2	0.15%
Dairy Case Juice Drnk Under 10	81	$10.2	0.15%	158	$31.8	0.10%	131	$42.0	0.11%
Dnr Sausage—Links Pork Ckd/S	82	$10.2	0.15%	232	$23.0	0.07%	186	$33.2	0.09%
Sandwich Cookies	83	$10.1	0.15%	102	$42.0	0.13%	97	$52.1	0.14%
Pizza/Economy	84	$10.0	0.15%	234	$22.9	0.07%	188	$32.9	0.09%
Chicken Drums	85	$10.0	0.15%	276	$18.9	0.06%	225	$28.9	0.08%
Rts Soup: Chunky/Homestyle/Et	86	$9.9	0.15%	50	$73.4	0.23%	48	$83.4	0.22%
Ramen Noodles/Ramen Cups	87	$9.8	0.15%	302	$17.2	0.05%	237	$27.0	0.07%
Cream Cheese	88	$9.8	0.15%	54	$68.9	0.22%	58	$78.7	0.21%
Sour Creams	89	$9.7	0.15%	70	$56.7	0.18%	72	$66.4	0.17%
Bagged Cheese Snacks	90	$9.6	0.15%	167	$30.8	0.10%	144	$40.4	0.11%
Fruit Snacks	91	$9.6	0.15%	211	$25.1	0.08%	181	$34.6	0.09%
Salsa & Dips	92	$9.5	0.14%	139	$34.0	0.11%	124	$43.5	0.11%
Ground Turkey	93	$9.4	0.14%	74	$55.3	0.18%	75	$64.7	0.17%
Pizza/Traditional	94	$9.3	0.14%	128	$35.3	0.11%	117	$44.7	0.12%
Sweet Goods—Full Size	95	$9.3	0.14%	119	$36.5	0.12%	113	$45.7	0.12%
Candy Bars (Singles) (In-cluding)	96	$9.2	0.14%	155	$32.3	0.10%	136	$41.5	0.11%
Hot Dog Buns	97	$9.2	0.14%	118	$36.7	0.12%	112	$46.0	0.12%
Cheese Crackers	98	$9.2	0.14%	71	$55.9	0.18%	73	$65.1	0.17%
Shrimp—Raw	99	$9.2	0.14%	104	$41.3	0.13%	101	$50.5	0.13%
Grapes Red	100	$9.2	0.14%	51	$72.9	0.23%	55	$82.1	0.22%
Top 100 Subcommod-ities		**$1,843.6**	**28.02%**		**$7,796.5**	**24.74%**		**$9,640.1**	**25.31%**
Total Expenditures		**$6,580.5**	**100%**		**$31,513.8**	**100%**		**$38,094.2**	**100%**

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.
Note: Columns may not sum to total shown due to rounding.
*Top 100 subcommodities based on SNAP household expenditures.

Exhibit E–10: Top 100 Subcommodities for SNAP Households by Expenditure: Stores in Smaller Metropolitan Counties

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Fluid Milk/White Only	1	$62.4	0.95%	1	$264.0	0.84%	1	$326.5	0.86%
Soft Drinks 12/18 & 15pk Can Car	2	$52.7	0.80%	2	$176.7	0.56%	2	$229.4	0.60%
Lean [Beef]	3	$38.9	0.59%	5	$80.9	0.26%	4	$119.7	0.31%
Kids Cereal	4	$24.8	0.38%	20	$55.9	0.18%	13	$80.7	0.21%
Shredded Cheese	5	$24.6	0.37%	3	$104.4	0.33%	3	$129.1	0.34%
Primal [Beef]	6	$23.2	0.35%	8	$76.1	0.24%	6	$99.3	0.26%
Sft Drnk 2 Liter Btl Carb Incl	7	$23.2	0.35%	12	$70.0	0.22%	8	$93.1	0.24%
Potato Chips	8	$20.9	0.32%	7	$76.3	0.24%	7	$97.3	0.26%
Infant Formula Starter/Solutio	9	$18.7	0.28%	180	$13.8	0.04%	73	$32.5	0.09%
Lunchment—Deli Fresh	10	$18.4	0.28%	11	$74.4	0.24%	9	$92.8	0.24%
Eggs—Large	11	$16.4	0.25%	9	$74.8	0.24%	10	$91.2	0.24%
Mainstream White Bread	12	$16.1	0.24%	33	$42.8	0.14%	29	$58.9	0.15%
Chicken Breast Boneless	13	$15.9	0.24%	4	$84.6	0.27%	5	$100.5	0.26%
Tortilla/Nacho Chips	14	$15.8	0.24%	16	$63.2	0.20%	16	$79.0	0.21%
Enhanced [Pork Boneless Loin/Rib]	15	$14.7	0.22%	21	$54.7	0.17%	20	$69.4	0.18%

Exhibit E–10: Top 100 Subcommodities for SNAP Households by Expenditure: Stores in Smaller Metropolitan Counties—Continued

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
American Single Cheese	16	$14.5	0.22%	35	$41.3	0.13%	33	$55.8	0.15%
Snacks/Appetizers	17	$14.2	0.22%	66	$28.6	0.09%	48	$42.8	0.11%
Unflavored Can Coffee	18	$14.2	0.22%	17	$61.8	0.20%	18	$75.9	0.20%
Soft Drinks 20pk & 24pk Can Carb	19	$14.0	0.21%	49	$35.1	0.11%	38	$49.1	0.13%
Still Water Drnking/Mnrl Water	20	$13.9	0.21%	28	$47.9	0.15%	24	$61.8	0.16%
Fz Ss Prem Traditional Meals	21	$13.6	0.21%	25	$50.3	0.16%	22	$64.0	0.17%
Fz Ss Economy Meals All	22	$13.4	0.20%	76	$25.0	0.08%	59	$38.3	0.10%
Bacon—Trad 16oz Or Less	23	$13.2	0.20%	30	$46.6	0.15%	26	$59.8	0.16%
Snack Cake—Multi Pack	24	$13.0	0.20%	61	$30.5	0.10%	46	$43.5	0.11%
Pizza/Premium	25	$12.8	0.19%	32	$44.8	0.14%	31	$57.6	0.15%
Dairy Case 100% Pure Juice—O	26	$12.7	0.19%	10	$74.5	0.24%	11	$87.2	0.23%
Potatoes Russet (Bulk & Bag)	27	$12.0	0.18%	29	$47.4	0.15%	28	$59.4	0.16%
Sugar	28	$11.9	0.18%	50	$35.0	0.11%	42	$47.0	0.12%
Natural Cheese Chunks	29	$11.9	0.18%	14	$68.4	0.22%	14	$80.3	0.21%
All Family Cereal	30	$11.8	0.18%	15	$66.4	0.21%	17	$78.2	0.21%
Sandwiches & Handhelds	31	$11.7	0.18%	89	$21.8	0.07%	70	$33.5	0.09%
Sft Drnk Mlt-Pk Btl Carb (Excp)	32	$11.7	0.18%	19	$57.3	0.18%	21	$68.9	0.18%
Ribs [Pork]	33	$11.4	0.17%	57	$31.2	0.10%	50	$42.6	0.11%
Mainstream Variety Breads	34	$11.2	0.17%	24	$50.9	0.16%	23	$62.2	0.16%
Convenient Meals—Kids Meal C	35	$11.1	0.17%	103	$20.1	0.06%	77	$31.2	0.08%
Bananas	36	$10.4	0.16%	13	$69.3	0.22%	15	$79.7	0.21%
Condensed Soup	37	$10.0	0.15%	27	$48.8	0.15%	30	$58.7	0.15%
Frzn Chicken—Wht Meat	38	$9.6	0.15%	58	$31.1	0.10%	51	$40.7	0.11%
Choice Beef	39	$9.5	0.14%	36	$40.9	0.13%	36	$50.4	0.13%
Pourable Salad Dressings	40	$9.3	0.14%	37	$40.9	0.13%	37	$50.2	0.13%
Select Beef	41	$9.3	0.14%	34	$41.5	0.13%	35	$50.8	0.13%
Sft Drnk Sngl Srv Btl Carb (Ex)	42	$9.3	0.14%	87	$22.6	0.07%	76	$31.9	0.08%
Isotonic Drinks Single Serve	43	$9.2	0.14%	53	$33.6	0.11%	49	$42.7	0.11%
Premium [Ice Cream & Sherbert]	44	$8.9	0.14%	18	$61.5	0.19%	19	$70.4	0.18%
Fz Family Style Entrées	45	$8.8	0.13%	77	$24.8	0.08%	69	$33.6	0.09%
Mayonnaise & Whipped Dressing	46	$8.8	0.13%	45	$36.0	0.11%	45	$44.8	0.12%
Traditional [Ice Cream & Sherbert]	47	$8.7	0.13%	41	$39.7	0.13%	39	$48.4	0.13%
Hot Dogs—Base Meat	48	$8.3	0.13%	121	$18.0	0.06%	92	$26.3	0.07%
Choice Beef	49	$8.2	0.13%	79	$23.8	0.08%	74	$32.1	0.08%
Macaroni & Cheese Dnrs	50	$8.2	0.12%	118	$18.1	0.06%	93	$26.3	0.07%
Fz Bag Vegetables—Plain	51	$7.8	0.12%	42	$39.6	0.13%	41	$47.4	0.12%
Refrigerated Coffee Creamers	52	$7.7	0.12%	39	$40.6	0.13%	40	$48.3	0.13%
Margarine: Tubs And Bowls	53	$7.7	0.12%	63	$30.0	0.10%	61	$37.6	0.10%
Adult Cereal	54	$7.7	0.12%	22	$54.1	0.17%	25	$61.7	0.16%
Can Pasta	55	$7.6	0.12%	157	$15.3	0.05%	114	$22.9	0.06%
Mexican Soft Tortillas And Wra	56	$7.6	0.12%	56	$31.9	0.10%	56	$39.5	0.10%
Fz Ss Prem Nutritional Meals	57	$7.6	0.12%	6	$76.8	0.24%	12	$84.4	0.22%
Aseptic Pack Juice And Drinks	58	$7.3	0.11%	155	$15.3	0.05%	118	$22.6	0.06%
Mainstream [Pasta & Pizza Sauce]	59	$7.3	0.11%	80	$23.8	0.08%	78	$31.1	0.08%
Candy Bags—Chocolate	60	$7.3	0.11%	31	$46.3	0.15%	34	$53.5	0.14%
Strawberries	61	$7.2	0.11%	26	$50.2	0.16%	32	$57.4	0.15%
Lunchment—Bologna/Sau-sage	62	$7.2	0.11%	115	$18.6	0.06%	97	$25.8	0.07%
Sw Gds: Donuts	63	$7.1	0.11%	70	$27.0	0.09%	66	$34.1	0.09%
Pizza/Economy	64	$7.0	0.11%	151	$15.7	0.05%	117	$22.7	0.06%
Peanut Butter	65	$6.6	0.10%	43	$39.0	0.12%	44	$45.7	0.12%
Frzn French Fries	66	$6.5	0.10%	159	$15.2	0.05%	125	$21.7	0.06%
Vegetable Oil	67	$6.5	0.10%	246	$10.4	0.03%	184	$16.9	0.04%
Tuna	68	$6.5	0.10%	60	$30.7	0.10%	63	$37.2	0.10%
Chicken Wings	69	$6.4	0.10%	338	$7.6	0.02%	223	$14.1	0.04%
Butter	70	$6.3	0.09%	23	$53.3	0.17%	27	$59.5	0.16%
Frzn Meat—Beef	71	$6.1	0.09%	177	$14.2	0.04%	142	$20.3	0.05%
Mult Pk Bag Snacks	72	$6.1	0.09%	231	$11.1	0.04%	177	$17.1	0.04%
Value Forms/18oz And Larger [Chicken]	73	$6.0	0.09%	197	$12.7	0.04%	158	$18.7	0.05%

Exhibit E–10: Top 100 Subcommodities for SNAP Households by Expenditure: Stores in Smaller Metropolitan Counties—Continued

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Frzn Breakfast Sandwiches	74	$6.0	0.09%	147	$15.8	0.05%	123	$21.8	0.06%
Pizza/Traditional	75	$5.9	0.09%	101	$20.2	0.06%	94	$26.1	0.07%
Fruit Snacks	76	$5.9	0.09%	189	$13.3	0.04%	154	$19.2	0.05%
Frzn Chicken—Wings	77	$5.9	0.09%	479	$4.7	0.01%	289	$10.6	0.03%
Fz Skillet Meals	78	$5.7	0.09%	85	$23.0	0.07%	83	$28.7	0.08%
Sandwich Cookies	79	$5.7	0.09%	93	$21.4	0.07%	86	$27.1	0.07%
Sour Creams	80	$5.7	0.09%	69	$28.0	0.09%	68	$33.7	0.09%
Cakes: Birthday/Celebration Sh	81	$5.7	0.09%	178	$14.1	0.04%	147	$19.8	0.05%
Rts Soup: Chunky/Homestyle/Et	82	$5.6	0.09%	51	$34.7	0.11%	53	$40.3	0.11%
Chicken Drums	83	$5.5	0.08%	277	$9.0	0.03%	215	$14.6	0.04%
Bagged Cheese Snacks	84	$5.4	0.08%	161	$15.0	0.05%	141	$20.5	0.05%
Cream Cheese	85	$5.4	0.08%	52	$33.8	0.11%	57	$39.2	0.10%
Salsa & Dips	86	$5.4	0.08%	139	$16.5	0.05%	121	$21.9	0.06%
Flavored Milk	87	$5.4	0.08%	116	$18.5	0.06%	107	$23.9	0.06%
Ramen Noodles/Ramen Cups	88	$5.3	0.08%	312	$8.1	0.03%	233	$13.5	0.04%
Cheese Crackers	89	$5.3	0.08%	74	$25.8	0.08%	79	$31.0	0.08%
Hamburger Buns	90	$5.3	0.08%	92	$21.5	0.07%	90	$26.8	0.07%
Meat: Turkey Bulk	91	$5.3	0.08%	38	$40.9	0.13%	43	$46.1	0.12%
Waffles/Pancakes/French Toast	92	$5.2	0.08%	99	$20.7	0.07%	96	$25.9	0.07%
Candy Bars (Multi Pack)	93	$5.2	0.08%	90	$21.7	0.07%	89	$26.9	0.07%
Candy Bars (Singles) (Including)	94	$5.1	0.08%	140	$16.5	0.05%	127	$21.6	0.06%
Bkfst Sausage—Fresh Rolls	95	$5.1	0.08%	105	$19.4	0.06%	103	$24.5	0.06%
Angus [Beef]	96	$5.0	0.08%	65	$28.7	0.09%	67	$33.7	0.09%
Hot Dog Buns	97	$5.0	0.08%	119	$18.1	0.06%	112	$23.1	0.06%
Cottage Cheese	98	$5.0	0.08%	55	$33.0	0.10%	60	$38.0	0.10%
String Cheese	99	$4.9	0.07%	68	$28.1	0.09%	71	$33.0	0.09%
Sandwiches—(Cold)	100	$4.9	0.07%	145	$16.0	0.05%	135	$20.9 0	.05%
Top 100 Subcommodities		**$1,084.4**	**16.48%**		**$3,993.9**	**12.67%**		**$5,078.3**	**13.33%**
Total Expenditures		**$6,580.5**	**100%**		**$31,513.8**	**100%**		**$38,094.2**	**100%**

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.
Note: Columns may not sum to total shown due to rounding.
*Top 100 subcommodities based on SNAP household expenditures.

Exhibit E–11: Top 100 Subcommodities for SNAP Households by Expenditure: Smaller Micropolitan Counties

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Soft Drinks 12/18 & 15pk Can Car	1	$20.5	0.31%	2	$61.5	0.20%	2	$82.0	0.22%
Fluid Milk/White Only	2	$20.2	0.31%	1	$82.6	0.26%	1	$102.9	0.27%
Lean [Beef]	3	$12.0	0.18%	4	$27.1	0.09%	4	$39.0	0.10%
Primal [Beef]	4	$7.5	0.11%	5	$27.0	0.09%	5	$34.5	0.09%
Shredded Cheese	5	$7.2	0.11%	3	$31.9	0.10%	3	$39.1	0.10%
Kids Cereal	6	$6.8	0.10%	23	$16.0	0.05%	17	$22.8	0.06%
Sft Drnk 2 Liter Btl Carb Incl	7	$6.4	0.10%	15	$19.6	0.06%	12	$26.0	0.07%
Soft Drinks 20pk & 24pk Can Carb	8	$6.3	0.10%	33	$13.7	0.04%	24	$20.0	0.05%
Potato Chips	9	$6.3	0.10%	6	$24.3	0.08%	6	$30.5	0.08%
Mainstream White Bread	10	$5.6	0.08%	27	$15.7	0.05%	20	$21.3	0.06%
Lunchment—Deli Fresh	11	$5.4	0.08%	10	$21.7	0.07%	8	$27.2	0.07%
Enhanced [Pork Boneless Loin/Rib]	12	$5.4	0.08%	11	$21.1	0.07%	11	$26.5	0.07%
Unflavored Can Coffee	13	$5.1	0.08%	9	$21.8	0.07%	10	$26.9	0.07%
Infant Formula Starter/Solutio	14	$5.0	0.08%	190	$4.0	0.01%	78	$9.0	0.02%
Chicken Breast Boneless	15	$4.8	0.07%	7	$23.8	0.08%	7	$28.7	0.08%
Snack Cake—Multi Pack	16	$4.8	0.07%	41	$11.9	0.04%	36	$16.6	0.04%
Eggs—Large	17	$4.7	0.07%	8	$22.4	0.07%	9	$27.1	0.07%
Still Water Drnking/Mnrl Water	18	$4.7	0.07%	21	$16.4	0.05%	21	$21.0	0.06%

Exhibit E–11: Top 100 Subcommodities for SNAP Households by Expenditure: Smaller Micropolitan Counties—Continued

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Tortilla/Nacho Chips	19	$4.6	0.07%	19	$18.4	0.06%	16	$23.0	0.06%
American Single Cheese	20	$4.5	0.07%	31	$14.0	0.04%	28	$18.5	0.05%
Sft Drnk Mlt-Pk Btl Carb (Excp)	21	$4.5	0.07%	14	$20.1	0.06%	13	$24.5	0.06%
Snacks/Appetizers	22	$4.4	0.07%	65	$8.6	0.03%	47	$13.0	0.03%
Potatoes Russet (Bulk & Bag)	23	$4.0	0.06%	20	$16.9	0.05%	22	$20.9	0.05%
Pizza/Premium	24	$4.0	0.06%	35	$13.0	0.04%	34	$17.0	0.04%
Fz Ss Economy Meals All	25	$3.9	0.06%	71	$7.8	0.02%	56	$11.7	0.03%
Sandwiches & Handhelds	26	$3.8	0.06%	85	$6.8	0.02%	65	$10.7	0.03%
Bacon—Trad 16oz Or Less	27	$3.8	0.06%	24	$15.9	0.05%	25	$19.7	0.05%
Sugar	28	$3.8	0.06%	39	$12.0	0.04%	37	$15.8	0.04%
Fz Ss Prem Traditional Meals	29	$3.7	0.06%	32	$13.7	0.04%	31	$17.4	0.05%
Natural Cheese Chunks	30	$3.6	0.06%	12	$20.8	0.07%	14	$24.5	0.06%
Ribs [Pork]	31	$3.6	0.06%	45	$11.3	0.04%	41	$14.9	0.04%
Convenient Meals—Kids Meal C	32	$3.5	0.05%	95	$6.3	0.02%	74	$9.8	0.03%
All Family Cereal	33	$3.5	0.05%	17	$18.8	0.06%	19	$22.3	0.06%
Condensed Soup	34	$3.3	0.05%	22	$16.1	0.05%	26	$19.4	0.05%
Dairy Case 100% Pure Juice—O	35	$3.2	0.05%	13	$20.7	0.07%	15	$23.9	0.06%
Select Beef	36	$3.2	0.05%	34	$13.6	0.04%	35	$16.8	0.04%
Sft Drnk Sngl Srv Btl Carb (Ex)	37	$3.2	0.05%	86	$6.7	0.02%	73	$9.8	0.03%
Mainstream Variety Breads	38	$3.1	0.05%	28	$15.7	0.05%	27	$18.8	0.05%
Bananas	39	$3.0	0.05%	16	$19.6	0.06%	18	$22.6	0.06%
Isotonic Drinks Single Serve	40	$2.9	0.04%	53	$10.0	0.03%	50	$12.9	0.03%
Hot Dogs—Base Meat	41	$2.8	0.04%	78	$7.2	0.02%	68	$10.1	0.03%
Frzn Chicken—Wht Meat	42	$2.8	0.04%	50	$10.5	0.03%	46	$13.3	0.04%
Pourable Salad Dressings	43	$2.8	0.04%	37	$12.4	0.04%	38	$15.2	0.04%
Mayonnaise & Whipped Dressing	44	$2.7	0.04%	42	$11.8	0.04%	42	$14.5	0.04%
Macaroni & Cheese Dnrs	45	$2.7	0.04%	107	$5.8	0.02%	88	$8.4	0.02%
Can Pasta	46	$2.7	0.04%	129	$5.1	0.02%	94	$7.8	0.02%
Fz Family Style Entrées	47	$2.7	0.04%	77	$7.2	0.02%	71	$9.9	0.03%
Traditional [Ice Cream & Sherbert]	48	$2.6	0.04%	38	$12.3	0.04%	40	$14.9	0.04%
Lunchment—Bologna/Sausage	49	$2.5	0.04%	80	$7.2	0.02%	75	$9.7	0.03%
Margarine: Tubs And Bowls	50	$2.5	0.04%	57	$9.8	0.03%	51	$12.2	0.03%
Sw Gds: Donuts	51	$2.4	0.04%	59	$9.4	0.03%	55	$11.8	0.03%
Premium [Ice Cream & Sherbert]	52	$2.4	0.04%	25	$15.8	0.05%	29	$18.2	0.05%
Angus [Beef]	53	$2.4	0.04%	40	$12.0	0.04%	43	$14.3	0.04%
Choice Beef	54	$2.3	0.03%	72	$7.6	0.02%	72	$9.9	0.03%
Fz Bag Vegetables—Plain	55	$2.3	0.03%	43	$11.8	0.04%	44	$14.0	0.04%
Refrigerated Coffee Creamers	56	$2.3	0.03%	46	$10.7	0.03%	48	$13.0	0.03%
Pizza/Economy	57	$2.3	0.03%	124	$5.2	0.02%	97	$7.5	0.02%
Choice Beef	58	$2.3	0.03%	48	$10.6	0.03%	49	$12.9	0.03%
Candy Bags—Chocolate	59	$2.3	0.03%	36	$12.9	0.04%	39	$15.1	0.04%
Adult Cereal	60	$2.2	0.03%	30	$15.0	0.05%	33	$17.1	0.05%
Strawberries	61	$2.2	0.03%	29	$15.0	0.05%	32	$17.1	0.05%
Peanut Butter	62	$2.2	0.03%	44	$11.6	0.04%	45	$13.7	0.04%
Mexican Soft Tortillas And Wra	63	$2.1	0.03%	64	$8.9	0.03%	59	$11.0	0.03%
Mainstream [Pasta & Pizza Sauce]	64	$2.1	0.03%	81	$7.1	0.02%	77	$9.2	0.02%
Fz Ss Prem Nutritional Meals	65	$2.1	0.03%	18	$18.6	0.06%	23	$20.7	0.05%
Aseptic Pack Juice And Drinks	66	$2.0	0.03%	163	$4.5	0.01%	121	$6.5	0.02%
Frzn French Fries	67	$2.0	0.03%	128	$5.1	0.02%	108	$7.2	0.02%
Flavored Milk	68	$2.0	0.03%	96	$6.2	0.02%	91	$8.2	0.02%
Pizza/Traditional	69	$2.0	0.03%	89	$6.6	0.02%	86	$8.6	0.02%
Tuna	70	$2.0	0.03%	62	$8.9	0.03%	64	$10.9	0.03%
Frzn Breakfast Sandwiches	71	$1.9	0.03%	132	$5.1	0.02%	112	$7.0	0.02%
Hamburger Buns	72	$1.9	0.03%	68	$8.1	0.03%	69	$10.1	0.03%
Value Forms/18oz And Larger [Chicken]	73	$1.9	0.03%	187	$4.0	0.01%	146	$5.9	0.02%
Vegetable Oil	74	$1.8	0.03%	214	$3.5	0.01%	168	$5.3	0.01%
Pails [Ice Cream & Sherbert]	75	$1.8	0.03%	131	$5.1	0.02%	114	$6.9	0.02%
Butter	76	$1.8	0.03%	26	$15.8	0.05%	30	$17.6	0.05%

Exhibit E–11: Top 100 Subcommodities for SNAP Households by Expenditure: Smaller Micropolitan Counties—Continued

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Candy Bars (Multi Pack)	77	$1.7	0.03%	83	$6.9	0.02%	83	$8.7	0.02%
Cakes: Birthday/Celebration Sh	78	$1.7	0.03%	154	$4.7	0.01%	126	$6.4	0.02%
Fruit Snacks	79	$1.7	0.03%	198	$3.9	0.01%	159	$5.6	0.01%
Cottage Cheese	80	$1.7	0.03%	52	$10.2	0.03%	54	$11.9	0.03%
Sandwich Cookies	81	$1.7	0.03%	91	$6.5	0.02%	90	$8.2	0.02%
Salsa & Dips	82	$1.7	0.03%	133	$5.0	0.02%	116	$6.7	0.02%
Frzn Meat—Beef	83	$1.7	0.03%	174	$4.3	0.01%	144	$6.0	0.02%
Mult Pk Bag Snacks	84	$1.7	0.03%	230	$3.2	0.01%	186	$4.9	0.01%
Bkfst Sausage—Fresh Rolls	85	$1.7	0.03%	76	$7.3	0.02%	80	$8.9	0.02%
Refrigerated Biscuits	86	$1.6	0.03%	116	$5.4	0.02%	111	$7.0	0.02%
Sour Creams	87	$1.6	0.02%	66	$8.3	0.03%	70	$10.0	0.03%
Rts Soup: Chunky/ Homestyle/Et	88	$1.6	0.02%	60	$9.4	0.03%	61	$11.0	0.03%
Bagged Cheese Snacks	89	$1.6	0.02%	143	$4.8	0.02%	129	$6.4	0.02%
Cream Cheese	90	$1.6	0.02%	54	$10.0	0.03%	57	$11.6	0.03%
Skillet Dinners	91	$1.6	0.02%	245	$3.1	0.01%	198	$4.7	0.01%
Cheese Crackers	92	$1.6	0.02%	84	$6.8	0.02%	89	$8.4	0.02%
Chicken Wings	93	$1.5	0.02%	374	$2.0	0.01%	258	$3.5	0.01%
Angus [Beef]	94	$1.5	0.02%	148	$4.8	0.02%	133	$6.3	0.02%
String Cheese	95	$1.5	0.02%	75	$7.3	0.02%	81	$8.9	0.02%
Fz Skillet Meals	96	$1.5	0.02%	99	$6.0	0.02%	98	$7.5	0.02%
Hot Dog Buns	97	$1.5	0.02%	110	$5.7	0.02%	104	$7.2	0.02%
Sweet Goods—Full Size	98	$1.5	0.02%	135	$5.0	0.02%	123	$6.5	0.02%
Candy Bars (Singles) (Including)	99	$1.5	0.02%	153	$4.7	0.01%	135	$6.2	0.02%
Toaster Pastries	100	$1.5	0.02%	155	$4.7	0.01%	136	$6.2	0.02%
Top 100 Subcommodities		**$339.6**	**5.16%**		**$1,243.8**	**3.95%**		**$1,583.4**	**4.16%**
Total Expenditures		**$6,580.5**	**$100%**		**$31,513.8**	**$100%**		**$38,094.2**	**$100%**

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.
Note: Columns may not sum to total shown due to rounding.
*Top 100 subcommodities based on SNAP household expenditures.

Exhibit E–12: Top 100 Subcommodities for SNAP Households by Expenditure: Stores in Noncore Counties

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Soft Drinks 12/18 & 15pk Can Car	1	$6.7	0.10%	2	$16.3	0.05%	2	$23.1	0.06%
Fluid Milk/White Only	2	$6.4	0.10%	1	$23.0	0.07%	1	$29.4	0.08%
Lean [Beef]	3	$3.2	0.05%	4	$7.6	0.02%	3	$10.8	0.03%
Primal [Beef]	4	$2.1	0.03%	5	$6.8	0.02%	5	$8.9	0.02%
Shredded Cheese	5	$2.0	0.03%	3	$8.4	0.03%	4	$10.3	0.03%
Soft Drinks 20pk & 24pk Can Carb	6	$2.0	0.03%	34	$3.5	0.01%	24	$5.5	0.01%
Mainstream White Bread	7	$1.9	0.03%	20	$4.8	0.02%	14	$6.7	0.02%
Potato Chips	8	$1.9	0.03%	6	$6.7	0.02%	6	$8.6	0.02%
Kids Cereal	9	$1.8	0.03%	27	$4.0	0.01%	22	$5.8	0.02%
Sft Drnk 2 Liter Btl Carb Incl	10	$1.7	0.03%	21	$4.7	0.01%	16	$6.4	0.02%
Unflavored Can Coffee	11	$1.7	0.03%	9	$6.1	0.02%	8	$7.8	0.02%
Sft Drnk Mlt-Pk Btl Carb (Excp)	12	$1.6	0.02%	11	$5.8	0.02%	10	$7.5	0.02%
Lunchment—Deli Fresh	13	$1.6	0.02%	12	$5.8	0.02%	11	$7.4	0.02%
Snack Cake—Multi Pack	14	$1.6	0.02%	36	$3.5	0.01%	27	$5.0	0.01%
Enhanced [Pork Boneless Loin/Rib]	15	$1.5	0.02%	14	$5.5	0.02%	13	$7.1	0.02%
Eggs—Large	16	$1.4	0.02%	7	$6.6	0.02%	7	$8.0	0.02%
Infant Formula Starter/ Solutio	17	$1.4	0.02%	186	$1.1	0.00%	81	$2.5	0.01%
American Single Cheese	18	$1.4	0.02%	29	$4.0	0.01%	25	$5.4	0.01%
Chicken Breast Boneless	19	$1.3	0.02%	10	$6.1	0.02%	12	$7.4	0.02%
Tortilla/Nacho Chips	20	$1.3	0.02%	16	$5.1	0.02%	18	$6.4	0.02%
Potatoes Russet (Bulk & Bag)	21	$1.3	0.02%	17	$5.0	0.02%	19	$6.2	0.02%
Still Water Drnking/Mnrl Water	22	$1.3	0.02%	23	$4.5	0.01%	23	$5.7	0.02%

Exhibit E–12: Top 100 Subcommodities for SNAP Households by Expenditure: Stores in Noncore Counties—Continued

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Snacks/Appetizers	23	$1.2	0.02%	67	$2.3	0.01%	49	$3.5	0.01%
Pizza/Premium	24	$1.2	0.02%	32	$3.7	0.01%	30	$4.9	0.01%
Bacon—Trad 16oz Or Less	25	$1.2	0.02%	19	$4.8	0.02%	20	$6.0	0.02%
Natural Cheese Chunks	26	$1.1	0.02%	8	$6.5	0.02%	9	$7.7	0.02%
Sugar	27	$1.1	0.02%	35	$3.5	0.01%	34	$4.6	0.01%
Sandwiches & Handhelds	28	$1.0	0.02%	96	$1.7	0.01%	71	$2.8	0.01%
All Family Cereal	29	$1.0	0.02%	18	$4.9	0.02%	21	$5.9	0.02%
Fz Ss Economy Meals All	30	$1.0	0.02%	80	$2.0	0.01%	65	$3.0	0.01%
Fz Ss Prem Traditional Meals	31	$1.0	0.01%	38	$3.4	0.01%	36	$4.4	0.01%
Convenient Meals—Kids Meal C	32	$1.0	0.01%	111	$1.6	0.00%	79	$2.5	0.01%
Sft Drnk Sngl Srv Btl Carb (Ex)	33	$0.9	0.01%	77	$2.0	0.01%	67	$2.9	0.01%
Condensed Soup	34	$0.9	0.01%	28	$4.0	0.01%	29	$5.0	0.01%
Bananas	35	$0.9	0.01%	15	$5.5	0.02%	17	$6.4	0.02%
Dairy Case 100% Pure Juice—O	36	$0.9	0.01%	13	$5.7	0.02%	15	$6.6	0.02%
Mainstream Variety Breads	37	$0.9	0.01%	24	$4.2	0.01%	26	$5.1	0.01%
Choice Beef	38	$0.9	0.01%	59	$2.7	0.01%	48	$3.5	0.01%
Hot Dogs—Base Meat	39	$0.8	0.01%	74	$2.1	0.01%	66	$2.9	0.01%
Ribs [Pork]	40	$0.8	0.01%	48	$2.9	0.01%	43	$3.7	0.01%
Lunchment—Bologna/Sausage	41	$0.8	0.01%	71	$2.2	0.01%	62	$3.0	0.01%
Mayonnaise & Whipped Dressing	42	$0.8	0.01%	41	$3.3	0.01%	40	$4.1	0.01%
Sw Gds: Donuts	43	$0.8	0.01%	49	$2.9	0.01%	45	$3.7	0.01%
Traditional [Ice Cream & Sherbert]	44	$0.8	0.01%	39	$3.4	0.01%	38	$4.2	0.01%
Pourable Salad Dressings	45	$0.8	0.01%	40	$3.4	0.01%	39	$4.1	0.01%
Frzn Chicken—Wht Meat	46	$0.7	0.01%	60	$2.5	0.01%	56	$3.3	0.01%
Margarine: Tubs And Bowls	47	$0.7	0.01%	58	$2.7	0.01%	51	$3.4	0.01%
Can Pasta	48	$0.7	0.01%	159	$1.3	0.00%	108	$2.0	0.01%
Candy Bags—Chocolate	49	$0.7	0.01%	33	$3.6	0.01%	37	$4.3	0.01%
Macaroni & Cheese Dnrs	50	$0.7	0.01%	121	$1.5	0.00%	93	$2.2	0.01%
Isotonic Drinks Single Serve	51	$0.7	0.01%	66	$2.3	0.01%	64	$3.0	0.01%
Fz Family Style Entrées	52	$0.7	0.01%	89	$1.8	0.01%	77	$2.5	0.01%
Peanut Butter	53	$0.7	0.01%	44	$3.1	0.01%	42	$3.8	0.01%
Strawberries	54	$0.7	0.01%	25	$4.2	0.01%	31	$4.8	0.01%
Adult Cereal	55	$0.6	0.01%	31	$4.0	0.01%	33	$4.6	0.01%
Hamburger Buns	56	$0.6	0.01%	64	$2.4	0.01%	63	$3.0	0.01%
Pizza/Traditional	57	$0.6	0.01%	79	$2.0	0.01%	76	$2.6	0.01%
Choice Beef	58	$0.6	0.01%	42	$3.2	0.01%	41	$3.9	0.01%
Premium [Ice Cream & Sherbert]	59	$0.6	0.01%	26	$4.1	0.01%	32	$4.7	0.01%
Flavored Milk	60	$0.6	0.01%	107	$1.6	0.01%	91	$2.2	0.01%
Refrigerated Coffee Creamers	61	$0.6	0.01%	56	$2.8	0.01%	53	$3.4	0.01%
Angus [Beef]	62	$0.6	0.01%	57	$2.7	0.01%	54	$3.3	0.01%
Pails [Ice Cream & Sherbert]	63	$0.6	0.01%	110	$1.6	0.00%	95	$2.2	0.01%
Mexican Soft Tortillas And Wra	64	$0.6	0.01%	52	$2.8	0.01%	52	$3.4	0.01%
Pizza/Economy	65	$0.6	0.01%	162	$1.3	0.00%	117	$1.9	0.00%
Cottage Cheese	66	$0.6	0.01%	45	$3.1	0.01%	46	$3.6	0.01%
Mainstream [Pasta & Pizza Sauce]	67	$0.6	0.01%	84	$1.9	0.01%	83	$2.4	0.01%
Frzn French Fries	68	$0.6	0.01%	123	$1.5	0.00%	107	$2.0	0.01%
Fz Bag Vegetables—Plain	69	$0.5	0.01%	46	$3.0	0.01%	47	$3.5	0.01%
Candy Bars (Multi Pack)	70	$0.5	0.01%	78	$2.0	0.01%	78	$2.5	0.01%
Cakes: Birthday/Celebration Sh	71	$0.5	0.01%	149	$1.3	0.00%	116	$1.9	0.00%
Aseptic Pack Juice And Drinks	72	$0.5	0.01%	183	$1.1	0.00%	146	$1.6	0.00%
Refrigerated Biscuits	73	$0.5	0.01%	104	$1.6	0.01%	99	$2.1	0.01%
Salsa & Dips	74	$0.5	0.01%	130	$1.4	0.00%	111	$1.9	0.01%
Value Forms/18oz And Larger [Chicken]	75	$0.5	0.01%	192	$1.1	0.00%	158	$1.6	0.00%
Fz Ss Prem Nutritional Meals	76	$0.5	0.01%	30	$4.0	0.01%	35	$4.5	0.01%
Tuna	77	$0.5	0.01%	70	$2.2	0.01%	72	$2.8	0.01%
Sandwich Cookies	78	$0.5	0.01%	83	$1.9	0.01%	85	$2.4	0.01%
Bkfst Sausage—Fresh Rolls	79	$0.5	0.01%	73	$2.1	0.01%	75	$2.6	0.01%
Butter	80	$0.5	0.01%	22	$4.5	0.01%	28	$5.0	0.01%
Frzn Breakfast Sandwiches	81	$0.5	0.01%	172	$1.2	0.00%	139	$1.7	0.00%

Exhibit E–12: Top 100 Subcommodities for SNAP Households by Expenditure: Stores in Noncore Counties—Continued

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Vegetable Oil	82	$0.5	0.01%	203	$1.0	0.00%	166	$1.5	0.00%
Sweet Goods—Full Size	83	$0.5	0.01%	129	$1.4	0.00%	114	$1.9	0.00%
Hot Dog Buns	84	$0.5	0.01%	98	$1.7	0.01%	94	$2.2	0.01%
Candy Bars (Singles) (Including)	85	$0.5	0.01%	119	$1.5	0.00%	110	$2.0	0.01%
Bagged Cheese Snacks	86	$0.5	0.01%	147	$1.3	0.00%	127	$1.8	0.00%
Sandwiches—(Cold)	87	$0.5	0.01%	102	$1.6	0.01%	103	$2.1	0.01%
Cream Cheese	88	$0.5	0.01%	54	$2.8	0.01%	57	$3.3	0.01%
Sour Creams	89	$0.5	0.01%	69	$2.3	0.01%	73	$2.7	0.01%
Select Beef	90	$0.5	0.01%	75	$2.0	0.01%	80	$2.5	0.01%
Frzn Meat—Beef	91	$0.5	0.01%	166	$1.2	0.00%	136	$1.7	0.00%
Sticks/Enrobed [Frozen Novelties]	92	$0.5	0.01%	124	$1.5	0.00%	113	$1.9	0.01%
String Cheese	93	$0.4	0.01%	76	$2.0	0.01%	82	$2.5	0.01%
Fruit Snacks	94	$0.4	0.01%	222	$0.9	0.00%	185	$1.4	0.00%
Rts Soup: Chunky/Homestyle/Et	95	$0.4	0.01%	63	$2.4	0.01%	68	$2.8	0.01%
Angus [Beef]	96	$0.4	0.01%	177	$1.1	0.00%	156	$1.6	0.00%
Cheese Crackers	97	$0.4	0.01%	93	$1.8	0.01%	92	$2.2	0.01%
Meat: Ham Bulk	98	$0.4	0.01%	62	$2.4	0.01%	69	$2.8	0.01%
Meat: Turkey Bulk	99	$0.4	0.01%	51	$2.8	0.01%	58	$3.3	0.01%
Tray Pack/Choc Chip Cookies	100	$0.4	0.01%	133	$1.4	0.00%	119	$1.8	0.00%
Top 100 Subcommodities		**$99.1**	**1.57%**		**$341.8**	**1.08%**		**$440.9**	**1.23%**
Total Expenditures		**$6,580.5**	**100%**		**$31,513.8**	**100%**		**$38,094.2**	**100%**

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.
Note: Columns may not sum to total shown due to rounding.
* Top 100 subcommodities based on SNAP household expenditures.

Exhibit E–13: Top 100 Subcommodities for SNAP Households by Expenditure: Stores with more than $12 Million in Sales

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Fluid Milk/White Only	1	$38.9	0.59%	1	$229.9	0.73%	1	$268.8	0.71%
Soft Drinks 12/18 & 15pk Can Car	2	$32.4	0.49%	2	$162.4	0.52%	2	$194.8	0.51%
Lean [Beef]	3	$22.2	0.34%	8	$74.1	0.24%	5	$96.4	0.25%
Shredded Cheese	4	$16.2	0.25%	3	$103.2	0.33%	3	$119.4	0.31%
Kids Cereal	5	$15.5	0.23%	23	$52.1	0.17%	17	$67.5	0.18%
Sft Drnk 2 Liter Btl Carb Incl	6	$13.3	0.20%	18	$56.1	0.18%	16	$69.4	0.18%
Potato Chips	7	$13.0	0.20%	10	$70.8	0.22%	9	$83.8	0.22%
Lunchment—Deli Fresh	8	$11.6	0.18%	13	$69.9	0.22%	11	$81.5	0.21%
Chicken Breast Boneless	9	$11.4	0.17%	4	$89.3	0.28%	4	$100.7	0.26%
Infant Formula Starter/Solutio	10	$11.1	0.17%	259	$10.4	0.03%	119	$21.5	0.06%
Eggs—Large	11	$10.8	0.16%	9	$73.1	0.23%	8	$83.9	0.22%
Primal [Beef]	12	$10.8	0.16%	24	$49.1	0.16%	23	$59.9	0.16%
Snacks/Appetizers	13	$10.4	0.16%	63	$31.6	0.10%	47	$42.1	0.11%
Tortilla/Nacho Chips	14	$9.9	0.15%	15	$62.4	0.20%	15	$72.3	0.19%
Dairy Case 100% Pure Juice—O	15	$9.4	0.14%	6	$80.1	0.25%	6	$89.5	0.23%
Fz Ss Prem Traditional Meals	16	$9.1	0.14%	26	$47.5	0.15%	25	$56.6	0.15%
Unflavored Can Coffee	17	$9.1	0.14%	21	$54.4	0.17%	19	$63.4	0.17%
Natural Cheese Chunks	18	$9.0	0.14%	12	$70.0	0.22%	12	$79.1	0.21%
Still Water Drnking/Mnrl Water	19	$8.8	0.13%	30	$46.5	0.15%	28	$55.3	0.15%
Mainstream White Bread	20	$8.6	0.13%	56	$33.6	0.11%	46	$42.3	0.11%
Enhanced [Pork Boneless Loin/Rib]	21	$8.6	0.13%	28	$47.3	0.15%	26	$55.9	0.15%
Bacon—Trad 16oz Or Less	22	$8.4	0.13%	34	$44.1	0.14%	29	$52.6	0.14%
All Family Cereal	23	$8.4	0.13%	14	$66.3	0.21%	14	$74.7	0.20%
Pizza/Premium	24	$8.4	0.13%	29	$47.0	0.15%	27	$55.4	0.15%
American Single Cheese	25	$8.3	0.13%	51	$35.4	0.11%	44	$43.7	0.11%
Fz Ss Economy Meals All	26	$8.1	0.12%	105	$21.1	0.07%	81	$29.2	0.08%
Soft Drinks 20pk & 24pk Can Carb	27	$7.9	0.12%	67	$30.2	0.10%	58	$38.1	0.10%

Exhibit E–13: Top 100 Subcommodities for SNAP Households by Expenditure: Stores with more than $12 Million in Sales—Continued

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Bananas	28	$7.8	0.12%	7	$74.4	0.24%	10	$82.2	0.22%
Snack Cake—Multi Pack	29	$7.4	0.11%	81	$25.3	0.08%	73	$32.7	0.09%
Premium [Ice Cream & Sherbert]	30	$7.4	0.11%	11	$70.2	0.22%	13	$77.6	0.20%
Mainstream Variety Breads	31	$7.3	0.11%	32	$44.6	0.14%	32	$51.8	0.14%
Select Beef	32	$7.2	0.11%	37	$41.6	0.13%	36	$48.8	0.13%
Sandwiches & Handhelds	33	$7.2	0.11%	107	$20.6	0.07%	89	$27.8	0.07%
Frzn Chicken—Wht Meat	34	$7.2	0.11%	65	$31.2	0.10%	57	$38.4	0.10%
Potatoes Russet (Bulk & Bag)	35	$7.2	0.11%	35	$42.4	0.13%	35	$49.6	0.13%
Ribs [Pork]	36	$6.8	0.10%	69	$29.4	0.09%	65	$36.2	0.10%
Sugar	37	$6.8	0.10%	64	$31.3	0.10%	59	$38.1	0.10%
Choice Beef	38	$6.7	0.10%	40	$41.1	0.13%	38	$47.8	0.13%
Convenient Meals—Kids Meal C	39	$6.7	0.10%	114	$19.5	0.06%	98	$26.2	0.07%
Condensed Soup	40	$6.5	0.10%	33	$44.1	0.14%	34	$50.6	0.13%
Refrigerated Coffee Creamers	41	$6.4	0.10%	31	$46.0	0.15%	31	$52.3	0.14%
Isotonic Drinks Single Serve	42	$6.2	0.09%	66	$30.9	0.10%	62	$37.1	0.10%
Fz Family Style Entrées	43	$6.1	0.09%	85	$24.7	0.08%	77	$30.8	0.08%
Pourable Salad Dressings	44	$6.0	0.09%	38	$41.5	0.13%	39	$47.6	0.12%
Sft Drnk Mlt-Pk Btl Carb (Excp)	45	$5.9	0.09%	36	$42.2	0.13%	37	$48.1	0.13%
Fz Ss Prem Nutritional Meals	46	$5.9	0.09%	5	$82.0	0.26%	7	$87.9	0.23%
Sft Drnk Sngl Srv Btl Carb (Ex)	47	$5.8	0.09%	103	$21.3	0.07%	93	$27.1	0.07%
Mayonnaise & Whipped Dressing	48	$5.7	0.09%	54	$34.5	0.11%	54	$40.2	0.11%
Choice Beef	49	$5.7	0.09%	97	$22.6	0.07%	85	$28.3	0.07%
Adult Cereal	50	$5.6	0.08%	20	$55.1	0.17%	22	$60.7	0.16%
Strawberries	51	$5.4	0.08%	19	$55.9	0.18%	21	$61.3	0.16%
Meat: Turkey Bulk	52	$5.4	0.08%	17	$57.3	0.18%	20	$62.7	0.16%
Mexican Soft Tortillas And Wra	53	$5.4	0.08%	53	$35.2	0.11%	53	$40.6	0.11%
Butter	54	$5.4	0.08%	16	$58.3	0.19%	18	$63.7	0.17%
Fz Bag Vegetables—Plain	55	$5.2	0.08%	49	$36.6	0.12%	48	$41.8	0.11%
Candy Bags—Chocolate	56	$5.0	0.08%	27	$47.4	0.15%	30	$52.4	0.14%
Traditional [Ice Cream & Sherbert]	57	$5.0	0.08%	68	$29.4	0.09%	69	$34.4	0.09%
Margarine: Tubs And Bowls	58	$5.0	0.08%	71	$29.2	0.09%	70	$34.2	0.09%
Macaroni & Cheese Dnrs	59	$4.9	0.07%	139	$17.4	0.06%	113	$22.3	0.06%
Peanut Butter	60	$4.8	0.07%	44	$39.1	0.12%	43	$43.9	0.12%
Aseptic Pack Juice And Drinks	61	$4.7	0.07%	168	$15.3	0.05%	136	$20.0	0.05%
Tuna	62	$4.7	0.07%	60	$33.0	0.10%	61	$37.6	0.10%
Mainstream [Pasta & Pizza Sauce]	63	$4.6	0.07%	96	$22.9	0.07%	91	$27.5	0.07%
Hot Dogs—Base Meat	64	$4.6	0.07%	188	$13.8	0.04%	159	$18.3	0.05%
Cream Cheese	65	$4.5	0.07%	48	$37.3	0.12%	49	$41.7	0.11%
Sw Gds: Donuts	66	$4.4	0.07%	92	$23.3	0.07%	90	$27.7	0.07%
Sushi—In Store Prepared	67	$4.3	0.07%	42	$40.4	0.13%	40	$44.7	0.12%
Premium Bread	68	$4.3	0.06%	22	$53.9	0.17%	24	$58.1	0.15%
Can Pasta	69	$4.3	0.06%	216	$12.4	0.04%	179	$16.7	0.04%
Frzn Meat—Beef	70	$4.2	0.06%	182	$14.1	0.04%	160	$18.3	0.05%
Fz Skillet Meals	71	$4.2	0.06%	87	$24.4	0.08%	84	$28.6	0.08%
Meat: Ham Bulk	72	$4.1	0.06%	43	$40.2	0.13%	41	$44.3	0.12%
Angus [Beef]	73	$4.1	0.06%	62	$31.9	0.10%	66	$35.9	0.09%
Cakes: Birthday/Celebration Sh	74	$4.0	0.06%	170	$15.1	0.05%	151	$19.1	0.05%
Sour Creams	75	$4.0	0.06%	72	$29.2	0.09%	71	$33.2	0.09%
Cheese Crackers	76	$4.0	0.06%	73	$29.0	0.09%	72	$33.0	0.09%
Value Forms/18oz And Larger [Chicken]	77	$4.0	0.06%	218	$12.3	0.04%	188	$16.3	0.04%
Frzn French Fries	78	$4.0	0.06%	187	$13.8	0.04%	165	$17.8	0.05%
Rts Soup: Chunky/Homestyle/Et	79	$3.9	0.06%	52	$35.2	0.11%	56	$39.2	0.10%
String Cheese	80	$3.9	0.06%	58	$33.2	0.11%	63	$37.1	0.10%
Sandwiches—(Cold)	81	$3.9	0.06%	98	$22.2	0.07%	99	$26.1	0.07%
Instore Cut Fruit	82	$3.9	0.06%	55	$33.8	0.11%	60	$37.6	0.10%
Lunchment—Bologna/Sausage	83	$3.9	0.06%	175	$14.6	0.05%	156	$18.5	0.05%
Frzn Chicken—Wings	84	$3.8	0.06%	585	$3.9	0.01%	395	$7.7	0.02%
Frzn Breakfast Sandwiches	85	$3.8	0.06%	161	$15.8	0.05%	142	$19.6	0.05%
Waffles/Pancakes/French Toast	86	$3.8	0.06%	91	$23.3	0.07%	92	$27.1	0.07%

Exhibit E–13: Top 100 Subcommodities for SNAP Households by Expenditure: Stores with more than $12 Million in Sales—Continued

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Pizza/Economy	87	$3.8	0.06%	226	$11.9	0.04%	200	$15.6	0.04%
Spring Water	88	$3.7	0.06%	77	$27.7	0.09%	75	$31.4	0.08%
Mult Pk Bag Snacks	89	$3.7	0.06%	222	$12.0	0.04%	198	$15.7	0.04%
Grapes Red	90	$3.6	0.05%	46	$37.7	0.12%	51	$41.3	0.11%
Sandwich Cookies	91	$3.6	0.05%	110	$20.3	0.06%	107	$23.9	0.06%
Candy Bars (Singles) (Including)	92	$3.6	0.05%	144	$17.1	0.05%	131	$20.6	0.05%
Fruit Snacks	93	$3.5	0.05%	209	$12.6	0.04%	189	$16.2	0.04%
Pizza/Traditional	94	$3.5	0.05%	134	$17.9	0.06%	120	$21.4	0.06%
Flavored Milk	95	$3.5	0.05%	148	$16.8	0.05%	133	$20.3	0.05%
Sweet Goods—Full Size	96	$3.5	0.05%	162	$15.7	0.05%	150	$19.2	0.05%
Vegetable Oil	97	$3.4	0.05%	306	$8.8	0.03%	248	$12.2	0.03%
Natural Cheese Slices	98	$3.4	0.05%	50	$36.0	0.11%	55	$39.4	0.10%
Salsa & Dips	99	$3.4	0.05%	152	$16.5	0.05%	139	$19.9	0.05%
Avocado	100	$3.4	0.05%	47	$37.5	0.12%	52	$40.9	0.11%
Top 100 Subcommodities		**$699.9**	**10.64%**		**$4,012.7**	**12.73%**		**$4,712.5**	**12.37%**
Total Expenditures		**$6,580.5**	**100%**		**$31,513.8**	**100%**		**$38,094.2**	**100%**

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.
Note: Columns may not sum to total shown due to rounding.
*Top 100 subcommodities based on SNAP household expenditures.

Exhibit E–14: Top 100 Subcommodities for SNAP Households by Expenditure: Stores with $2 to $12 Million in Sales

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Fluid Milk/White Only	1	$151.9	2.31%	1	$622.5	1.98%	1	$774.4	2.03%
Soft Drinks 12/18 & 15pk Can Car	2	$131.9	2.00%	2	$437.9	1.39%	2	$569.9	1.50%
Lean [Beef]	3	$90.0	1.37%	7	$183.4	0.58%	4	$273.4	0.72%
Kids Cereal	4	$62.6	0.95%	20	$134.2	0.43%	13	$196.7	0.52%
Shredded Cheese	5	$58.4	0.89%	3	$238.3	0.76%	3	$296.8	0.78%
Sft Drnk 2 Liter Btl Carb Incl	6	$57.5	0.87%	10	$173.7	0.55%	7	$231.2	0.61%
Primal [Beef]	7	$51.5	0.78%	12	$169.9	0.54%	9	$221.4	0.58%
Potato Chips	8	$51.3	0.78%	8	$182.1	0.58%	6	$233.4	0.61%
Lunchment—Deli Fresh	9	$44.1	0.67%	11	$172.4	0.55%	11	$216.5	0.57%
Infant Formula Starter/ Solutio	10	$43.0	0.65%	169	$34.9	0.11%	71	$77.9	0.20%
Eggs—Large	11	$41.3	0.63%	9	$178.2	0.57%	10	$219.5	0.58%
Still Water Drnking/Mnrl Water	12	$39.9	0.61%	19	$141.1	0.45%	16	$180.9	0.48%
Mainstream White Bread	13	$39.2	0.60%	32	$102.9	0.33%	27	$142.1	0.37%
Chicken Breast Boneless	14	$38.1	0.58%	4	$203.4	0.65%	5	$241.5	0.63%
Tortilla/Nacho Chips	15	$37.4	0.57%	16	$146.3	0.46%	15	$183.7	0.48%
American Single Cheese	16	$35.7	0.54%	36	$101.0	0.32%	31	$136.7	0.36%
Fz Ss Prem Traditional Meals	17	$34.7	0.53%	23	$127.8	0.41%	21	$162.5	0.43%
Snack Cake—Multi Pack	18	$34.1	0.52%	57	$76.2	0.24%	43	$110.4	0.29%
Dairy Case 100% Pure Juice—O	19	$34.1	0.52%	6	$188.7	0.60%	8	$222.9	0.58%
Snacks/Appetizers	20	$34.1	0.52%	66	$68.7	0.22%	50	$102.8	0.27%
Enhanced [Pork Boneless Loin/Rib]	21	$32.9	0.50%	26	$120.4	0.38%	24	$153.2	0.40%
Fz Ss Economy Meals All	22	$32.8	0.50%	76	$59.5	0.19%	58	$92.3	0.24%
Bacon—Trad 16oz Or Less	23	$32.2	0.49%	28	$113.2	0.36%	26	$145.4	0.38%
Unflavored Can Coffee	24	$32.2	0.49%	18	$143.4	0.46%	19	$175.6	0.46%
Soft Drinks 20pk & 24pk Can Carb	25	$31.7	0.48%	58	$76.0	0.24%	46	$107.7	0.28%
Pizza/Premium	26	$31.2	0.47%	31	$106.2	0.34%	30	$137.4	0.36%
Mainstream Variety Breads	27	$31.1	0.47%	22	$128.4	0.41%	22	$159.5	0.42%
Sugar	28	$30.1	0.46%	51	$81.2	0.26%	42	$111.3	0.29%
Sandwiches & Handhelds	29	$28.6	0.43%	88	$52.9	0.17%	67	$81.5	0.21%
Potatoes Russet (Bulk & Bag)	30	$28.5	0.43%	29	$111.8	0.35%	28	$140.3	0.37%
Ribs [Pork]	31	$28.2	0.43%	54	$77.3	0.25%	48	$105.4	0.28%
Sft Drnk Mlt-Pk Btl Carb (Excp)	32	$28.0	0.43%	21	$131.2	0.42%	23	$159.2	0.42%

Exhibit E–14: Top 100 Subcommodities for SNAP Households by Expenditure: Stores with $2 to $12 Million in Sales—Continued

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expendi-tures	Rank	$ in millions	% of Expendi-tures	Rank	$ in millions	% of Expendi-tures
All Family Cereal	33	$27.7	0.42%	15	$148.4	0.47%	18	$176.1	0.46%
Convenient Meals—Kids Meal C	34	$27.5	0.42%	95	$50.1	0.16%	72	$77.6	0.20%
Bananas	35	$26.3	0.40%	13	$168.0	0.53%	14	$194.4	0.51%
Natural Cheese Chunks	36	$26.2	0.40%	17	$145.8	0.46%	20	$172.0	0.45%
Isotonic Drinks Single Serve	37	$24.2	0.37%	45	$88.5	0.28%	41	$112.7	0.30%
Premium [Ice Cream & Sherbert]	38	$23.9	0.36%	14	$155.6	0.49%	17	$179.5	0.47%
Condensed Soup	39	$23.2	0.35%	30	$109.2	0.35%	32	$132.4	0.35%
Pourable Salad Dressings	40	$22.9	0.35%	39	$97.8	0.31%	35	$120.7	0.32%
Frzn Chicken—Wht Meat	41	$22.8	0.35%	67	$68.4	0.22%	59	$91.2	0.24%
Sft Drnk Sngl Srv Btl Carb (Ex)	42	$22.0	0.33%	96	$49.9	0.16%	81	$71.9	0.19%
Choice Beef	43	$21.7	0.33%	40	$95.4	0.30%	37	$117.1	0.31%
Fz Family Style Entrées	44	$21.5	0.33%	79	$58.8	0.19%	69	$80.3	0.21%
Mayonnaise & Whipped Dressing	45	$21.5	0.33%	48	$84.4	0.27%	47	$105.9	0.28%
Select Beef	46	$20.6	0.31%	34	$102.0	0.32%	34	$122.6	0.32%
Traditional [Ice Cream & Sherbert]	47	$20.6	0.31%	43	$89.1	0.28%	44	$109.7	0.29%
Fz Bag Vegetables—Plain	48	$20.5	0.31%	41	$95.2	0.30%	40	$115.7	0.30%
Hot Dogs—Base Meat	49	$20.5	0.31%	121	$42.9	0.14%	93	$63.3	0.17%
Aseptic Pack Juice And Drinks	50	$19.5	0.30%	131	$41.7	0.13%	99	$61.3	0.16%
Macaroni & Cheese Dnrs	51	$19.4	0.29%	127	$42.2	0.13%	97	$61.6	0.16%
Adult Cereal	52	$19.3	0.29%	24	$127.3	0.40%	25	$146.7	0.38%
Chicken Wings	53	$18.9	0.29%	274	$22.1	0.07%	176	$41.0	0.11%
Fz Ss Prem Nutritional Meals	54	$18.8	0.29%	5	$189.5	0.60%	12	$208.2	0.55%
Margarine: Tubs And Bowls	55	$18.4	0.28%	64	$71.5	0.23%	61	$89.9	0.24%
Frzn Chicken—Wings	56	$18.3	0.28%	425	$13.4	0.04%	240	$31.8	0.08%
Mainstream [Pasta & Pizza Sauce]	57	$18.3	0.28%	80	$58.0	0.18%	76	$76.3	0.20%
Choice Beef	58	$18.3	0.28%	97	$49.7	0.16%	86	$68.0	0.18%
Mexican Soft Tortillas And Wra	59	$18.3	0.28%	53	$77.8	0.25%	53	$96.1	0.25%
Strawberries	60	$18.0	0.27%	25	$122.4	0.39%	29	$140.3	0.37%
Mult Pk Bag Snacks	61	$17.9	0.27%	194	$31.3	0.10%	143	$49.3	0.13%
Can Pasta	62	$17.9	0.27%	165	$35.2	0.11%	120	$53.1	0.14%
Lunchment—Bologna/Sau-sage	63	$17.9	0.27%	105	$46.2	0.15%	91	$64.1	0.17%
Refrigerated Coffee Creamers	64	$17.7	0.27%	35	$101.2	0.32%	36	$118.9	0.31%
Vegetable Oil	65	$17.1	0.26%	237	$26.5	0.08%	167	$43.6	0.11%
Sw Gds: Donuts	66	$16.9	0.26%	78	$58.9	0.19%	78	$75.8	0.20%
Frzn French Fries	67	$16.5	0.25%	157	$36.4	0.12%	121	$52.9	0.14%
Tuna	68	$16.5	0.25%	56	$76.8	0.24%	56	$93.3	0.24%
Candy Bags—Chocolate	69	$16.4	0.25%	37	$100.0	0.32%	38	$116.5	0.31%
Pizza/Economy	70	$16.0	0.24%	180	$33.1	0.11%	144	$49.2	0.13%
Peanut Butter	71	$15.6	0.24%	44	$88.6	0.28%	49	$104.2	0.27%
Frzn Breakfast Sand-wiches	72	$15.3	0.23%	139	$39.9	0.13%	112	$55.2	0.14%
Frzn Meat—Beef	73	$14.7	0.22%	190	$32.1	0.10%	154	$46.8	0.12%
Value Forms/18oz And Larger [Chicken]	74	$14.7	0.22%	201	$30.2	0.10%	160	$44.9	0.12%
Cakes: Birthday/Celebra-tion Sh	75	$14.6	0.22%	167	$35.1	0.11%	139	$49.8	0.13%
Fz Skillet Meals	76	$14.5	0.22%	82	$54.9	0.17%	85	$69.4	0.18%
Sandwich Cookies	77	$14.4	0.22%	92	$51.4	0.16%	88	$65.8	0.17%
Chicken Drums	78	$14.3	0.22%	251	$23.7	0.08%	197	$38.1	0.10%
Pizza/Traditional	79	$14.3	0.22%	106	$46.1	0.15%	101	$60.4	0.16%
Butter	80	$14.2	0.22%	27	$117.1	0.37%	33	$131.3	0.34%
Fruit Snacks	81	$14.1	0.21%	200	$30.5	0.10%	163	$44.6	0.12%
Meat: Turkey Bulk	82	$13.9	0.21%	33	$102.3	0.32%	39	$116.1	0.30%
Bagged Cheese Snacks	83	$13.8	0.21%	146	$38.3	0.12%	125	$52.1	0.14%
Salsa & Dips	84	$13.7	0.21%	136	$40.4	0.13%	118	$54.0	0.14%
Ramen Noodles/Ramen Cups	85	$13.7	0.21%	293	$20.5	0.07%	225	$34.2	0.09%
Rts Soup: Chunky/ Homestyle/Et	86	$13.7	0.21%	47	$84.6	0.27%	52	$98.2	0.26%
Waffles/Pancakes/French Toast	87	$13.5	0.21%	85	$54.0	0.17%	87	$67.5	0.18%
Sour Creams	88	$13.5	0.20%	69	$65.9	0.21%	70	$79.4	0.21%
Dnr Sausage—Links Pork Ckd/S	89	$13.3	0.20%	233	$26.7	0.08%	184	$40.0	0.11%
Angus [Beef]	90	$13.1	0.20%	63	$71.9	0.23%	66	$84.9	0.22%
Hot Dog Buns	91	$13.0	0.20%	111	$45.1	0.14%	105	$58.1	0.15%

Exhibit E–14: Top 100 Subcommodities for SNAP Households by Expenditure: Stores with $2 to $12 Million in Sales—Continued

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expendi-tures	Rank	$ in millions	% of Expendi-tures	Rank	$ in millions	% of Expendi-tures
Sandwiches—(Cold)	92	$13.0	0.20%	108	$45.4	0.14%	104	$58.4	0.15%
Dairy Case Juice Drnk Under 10	93	$12.9	0.20%	170	$34.8	0.11%	151	$47.6	0.13%
Hamburger Buns	94	$12.8	0.20%	94	$50.1	0.16%	94	$63.0	0.17%
Candy Bars (Singles) (In-cluding)	95	$12.8	0.19%	149	$37.8	0.12%	132	$50.6	0.13%
Cream Cheese	96	$12.8	0.19%	52	$78.1	0.25%	60	$90.9	0.24%
Candy Bars (Multi Pack)	97	$12.5	0.19%	93	$50.4	0.16%	95	$62.9	0.17%
Cheese Crackers	98	$12.5	0.19%	74	$61.2	0.19%	79	$73.7	0.19%
Spring Water	99	$12.5	0.19%	68	$67.9	0.22%	68	$80.3	0.21%
Flavored Milk	100	$12.4	0.19%	124	$42.5	0.13%	114	$54.9	0.14%
Top 100 Subcommod-ities		**$2,658.3**	**40.40%**		**$9,463.7**	**30.03%**		**$12,122.1**	**31.82%**
Total Expenditures		**$6,580.5**	**100%**		**$31,513.8**	**100%**		**$38,094.2**	**100%**

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.
Note: Columns may not sum to total shown due to rounding.
*Top 100 subcommodities based on SNAP household expenditures.

Exhibit E–15: Top 100 Subcommodities for SNAP Households by Expenditure: Stores with less than $2 Million in Sales

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expendi-tures	Rank	$ in millions	% of Expendi-tures	Rank	$ in millions	% of Expendi-tures
Fluid Milk/White Only	1	$0.4	0.01%	1	$1.4	0.00%	1	$1.8	0.00%
Soft Drinks 12/18 & 15pk Can Car	2	$0.3	0.01%	2	$0.8	0.00%	2	$1.2	0.00%
Primal [Beef]	3	$0.2	0.00%	3	$0.7	0.00%	3	$0.9	0.00%
Lean [Beef]	4	$0.2	0.00%	6	$0.4	0.00%	5	$0.5	0.00%
Sft Drnk 2 Liter Btl Carb Incl	5	$0.1	0.00%	7	$0.3	0.00%	7	$0.5	0.00%
Mainstream White Bread	6	$0.1	0.00%	11	$0.3	0.00%	9	$0.4	0.00%
Soft Drinks 20pk & 24pk Can Carb	7	$0.1	0.00%	19	$0.2	0.00%	13	$0.3	0.00%
Potato Chips	8	$0.1	0.00%	5	$0.4	0.00%	6	$0.5	0.00%
Shredded Cheese	9	$0.1	0.00%	4	$0.4	0.00%	4	$0.5	0.00%
Kids Cereal	10	$0.1	0.00%	28	$0.2	0.00%	20	$0.3	0.00%
Lunchment—Deli Fresh	11	$0.1	0.00%	8	$0.3	0.00%	8	$0.4	0.00%
Snack Cake—Multi Pack	12	$0.1	0.00%	31	$0.2	0.00%	26	$0.3	0.00%
American Single Cheese	13	$0.1	0.00%	16	$0.2	0.00%	14	$0.3	0.00%
Enhanced [Pork Boneless Loin/Rib]	14	$0.1	0.00%	10	$0.3	0.00%	11	$0.3	0.00%
Tortilla/Nacho Chips	15	$0.1	0.00%	12	$0.3	0.00%	12	$0.3	0.00%
Unflavored Can Coffee	16	$0.1	0.00%	15	$0.2	0.00%	16	$0.3	0.00%
Eggs—Large	17	$0.1	0.00%	9	$0.3	0.00%	10	$0.3	0.00%
Potatoes Russet (Bulk & Bag)	18	$0.1	0.00%	18	$0.2	0.00%	17	$0.3	0.00%
Still Water Drnking/Mnrl Water	19	$0.1	0.00%	20	$0.2	0.00%	19	$0.3	0.00%
Fz Ss Economy Meals All	20	$0.1	0.00%	57	$0.1	0.00%	45	$0.2	0.00%
Sugar	21	$0.1	0.00%	32	$0.2	0.00%	31	$0.2	0.00%
Bacon—Trad 16oz Or Less	22	$0.1	0.00%	21	$0.2	0.00%	21	$0.3	0.00%
Convenient Meals—Kids Meal C	23	$0.1	0.00%	66	$0.1	0.00%	52	$0.2	0.00%
Mainstream Variety Breads	24	$0.1	0.00%	13	$0.3	0.00%	15	$0.3	0.00%
Infant Formula Starter/ Solutio	25	$0.1	0.00%	143	$0.1	0.00%	78	$0.1	0.00%
Sft Drnk Sngl Srv Btl Carb (Ex)	26	$0.1	0.00%	51	$0.1	0.00%	44	$0.2	0.00%
Sft Drnk Mlt-Pk Btl Carb (Excp)	27	$0.1	0.00%	27	$0.2	0.00%	27	$0.3	0.00%
Chicken Breast Boneless	28	$0.1	0.00%	14	$0.2	0.00%	18	$0.3	0.00%
Hot Dogs—Base Meat	29	$0.0	0.00%	46	$0.1	0.00%	36	$0.2	0.00%
Snacks/Appetizers	30	$0.0	0.00%	70	$0.1	0.00%	60	$0.1	0.00%
Traditional [Ice Cream & Sherbert]	31	$0.0	0.00%	23	$0.2	0.00%	24	$0.3	0.00%
Pizza/Economy	32	$0.0	0.00%	55	$0.1	0.00%	49	$0.2	0.00%
Pizza/Premium	33	$0.0	0.00%	43	$0.1	0.00%	38	$0.2	0.00%
Condensed Soup	34	$0.0	0.00%	25	$0.2	0.00%	25	$0.3	0.00%
Lunchment—Bologna/Sau-sage	35	$0.0	0.00%	45	$0.1	0.00%	43	$0.2	0.00%

**Exhibit E–15: Top 100 Subcommodities for SNAP Households by
Expenditure: Stores with less than $2 Million in Sales—Continued**

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Flavored Milk	36	$0.0	0.00%	64	$0.1	0.00%	57	$0.1	0.00%
All Family Cereal	37	$0.0	0.00%	22	$0.2	0.00%	23	$0.3	0.00%
Sandwiches & Handhelds	38	$0.0	0.00%	75	$0.1	0.00%	66	$0.1	0.00%
Hamburger Buns	39	$0.0	0.00%	38	$0.1	0.00%	34	$0.2	0.00%
Bananas	40	$0.0	0.00%	17	$0.2	0.00%	22	$0.3	0.00%
Pizza/Traditional	41	$0.0	0.00%	47	$0.1	0.00%	46	$0.2	0.00%
Pails [Ice Cream & Sherbert]	42	$0.0	0.00%	59	$0.1	0.00%	55	$0.2	0.00%
Margarine: Tubs And Bowls	43	$0.0	0.00%	42	$0.1	0.00%	39	$0.2	0.00%
Natural Cheese Chunks	44	$0.0	0.00%	26	$0.2	0.00%	29	$0.2	0.00%
Fz Ss Prem Traditional Meals	45	$0.0	0.00%	41	$0.1	0.00%	41	$0.2	0.00%
Macaroni & Cheese Dnrs	46	$0.0	0.00%	88	$0.1	0.00%	74	$0.1	0.00%
Pourable Salad Dressings	47	$0.0	0.00%	35	$0.1	0.00%	35	$0.2	0.00%
Choice Beef	48	$0.0	0.00%	53	$0.1	0.00%	54	$0.2	0.00%
Isotonic Drinks Single Serve	49	$0.0	0.00%	44	$0.1	0.00%	48	$0.2	0.00%
Strawberries	50	$0.0	0.00%	29	$0.2	0.00%	30	$0.2	0.00%
Can Pasta	51	$0.0	0.00%	118	$0.1	0.00%	97	$0.1	0.00%
Mayonnaise & Whipped Dressing	52	$0.0	0.00%	48	$0.1	0.00%	50	$0.2	0.00%
Ribs [Pork]	53	$0.0	0.00%	52	$0.1	0.00%	53	$0.2	0.00%
Candy Bags—Chocolate	54	$0.0	0.00%	36	$0.1	0.00%	37	$0.2	0.00%
Cottage Cheese	55	$0.0	0.00%	37	$0.1	0.00%	42	$0.2	0.00%
Dairy Case 100% Pure Juice—O	56	$0.0	0.00%	24	$0.2	0.00%	28	$0.2	0.00%
Mexican Soft Tortillas And Wra	57	$0.0	0.00%	56	$0.1	0.00%	58	$0.1	0.00%
Frzn French Fries	58	$0.0	0.00%	93	$0.1	0.00%	80	$0.1	0.00%
Candy Bars (Multi Pack)	59	$0.0	0.00%	71	$0.1	0.00%	70	$0.1	0.00%
Sweet Goods—Full Size	60	$0.0	0.00%	95	$0.1	0.00%	85	$0.1	0.00%
Butts [Pork Shoulder]	61	$0.0	0.00%	80	$0.1	0.00%	76	$0.1	0.00%
Frzn Chicken—Wht Meat	62	$0.0	0.00%	54	$0.1	0.00%	59	$0.1	0.00%
Sandwich Cookies	63	$0.0	0.00%	63	$0.1	0.00%	63	$0.1	0.00%
Mainstream [Pasta & Pizza Sauce]	64	$0.0	0.00%	73	$0.1	0.00%	71	$0.1	0.00%
Fz Bag Vegetables—Plain	65	$0.0	0.00%	34	$0.2	0.00%	40	$0.2	0.00%
Bagged Cheese Snacks	66	$0.0	0.00%	90	$0.1	0.00%	79	$0.1	0.00%
Choice Beef	67	$0.0	0.00%	40	$0.1	0.00%	47	$0.2	0.00%
Peanut Butter	68	$0.0	0.00%	50	$0.1	0.00%	56	$0.2	0.00%
Bkfst Sausage—Fresh Rolls	69	$0.0	0.00%	61	$0.1	0.00%	62	$0.1	0.00%
Adult Cereal	70	$0.0	0.00%	33	$0.2	0.00%	33	$0.2	0.00%
Loaf Cheese	71	$0.0	0.00%	67	$0.1	0.00%	67	$0.1	0.00%
Refrigerated Biscuits	72	$0.0	0.00%	86	$0.1	0.00%	82	$0.1	0.00%
Vegetable Oil	73	$0.0	0.00%	131	$0.1	0.00%	108	$0.1	0.00%
Hot Dog Buns	74	$0.0	0.00%	79	$0.1	0.00%	77	$0.1	0.00%
Candy Bars (Singles) (Including)	75	$0.0	0.00%	84	$0.1	0.00%	83	$0.1	0.00%
Sour Creams	76	$0.0	0.00%	62	$0.1	0.00%	65	$0.1	0.00%
Sticks/Enrobed [Frozen Novelties]	77	$0.0	0.00%	99	$0.1	0.00%	92	$0.1	0.00%
Angus [Beef]	78	$0.0	0.00%	83	$0.1	0.00%	81	$0.1	0.00%
Tray Pack/Choc Chip Cookies	79	$0.0	0.00%	85	$0.1	0.00%	84	$0.1	0.00%
Salsa & Dips	80	$0.0	0.00%	106	$0.1	0.00%	99	$0.1	0.00%
Skillet Dinners	81	$0.0	0.00%	142	$0.1	0.00%	120	$0.1	0.00%
Aseptic Pack Juice And Drinks	82	$0.0	0.00%	154	$0.1	0.00%	126	$0.1	0.00%
Tuna	83	$0.0	0.00%	72	$0.1	0.00%	75	$0.1	0.00%
Sw Gds: Donuts	84	$0.0	0.00%	89	$0.1	0.00%	89	$0.1	0.00%
Head Lettuce	85	$0.0	0.00%	65	$0.1	0.00%	69	$0.1	0.00%
Fz Family Style Entrées	86	$0.0	0.00%	170	$0.0	0.00%	138	$0.1	0.00%
Cubed Meats [Beef]	87	$0.0	0.00%	97	$0.1	0.00%	94	$0.1	0.00%
Select Beef	88	$0.0	0.00%	91	$0.1	0.00%	91	$0.1	0.00%
Value Forms/18oz And Larger [Chicken]	89	$0.0	0.00%	166	$0.0	0.00%	139	$0.1	0.00%
Fz Ss Prem Nutritional Meals	90	$0.0	0.00%	30	$0.2	0.00%	32	$0.2	0.00%
Variety Beans—Kidney/Pinto/E	91	$0.0	0.00%	77	$0.1	0.00%	87	$0.1	0.00%
Cream Cheese	92	$0.0	0.00%	58	$0.1	0.00%	64	$0.1	0.00%
Dnr Sausage—Links Pork Ckd/S	93	$0.0	0.00%	129	$0.1	0.00%	122	$0.1	0.00%
Lunchmeat—Chop/Form Pltry & Ha	94	$0.0	0.00%	186	$0.0	0.00%	155	$0.1	0.00%
Frzn Meat—Beef	95	$0.0	0.00%	194	$0.0	0.00%	162	$0.1	0.00%
Toaster Pastries	96	$0.0	0.00%	121	$0.1	0.00%	116	$0.1	0.00%

Exhibit E–15: Top 100 Subcommodities for SNAP Households by Expenditure: Stores with less than $2 Million in Sales—Continued

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Bacon—Trad Greater Than 16oz	97	$0.0	0.00%	76	$0.1	0.00%	88	$0.1	0.00%
Corn Chips	98	$0.0	0.00%	108	$0.1	0.00%	105	$0.1	0.00%
Water Ice [Frozen Novelties]	99	$0.0	0.00%	220	$0.0	0.00%	182	$0.1	0.00%
Eggs—Medium	100	$0.0	0.00%	164	$0.0	0.00%	144	$0.1	0.00%
Top 100 Subcommodities		**$4.9**	**0.07%**		**$16.8**	**0.05%**		**$21.7**	**0.06%**
Total Expenditures		**$6,580.5**	**100%**		**$31,513.8**	**100%**		**$38,094.2**	**100%**

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.
Note: Columns may not sum to total shown due to rounding.
*Top 100 subcommodities based on SNAP household expenditures.

Exhibit E–16: Top 100 Subcommodities for SNAP Households by Expenditure: Stores in Counties with Poverty Rates Less than 10%

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Fluid Milk/White Only	1	$12.2	0.18%	1	$105.5	0.33%	1	$117.6	0.31%
Soft Drinks 12/18 & 15pk Can Car	2	$10.3	0.16%	2	$74.1	0.24%	2	$84.4	0.22%
Lean [Beef]	3	$6.3	0.10%	7	$32.5	0.10%	5	$38.9	0.10%
Shredded Cheese	4	$4.8	0.07%	3	$47.5	0.15%	3	$52.3	0.14%
Kids Cereal	5	$4.3	0.06%	20	$24.1	0.08%	18	$28.3	0.07%
Sft Drnk 2 Liter Btl Carb Incl	6	$3.9	0.06%	18	$25.3	0.08%	17	$29.2	0.08%
Potato Chips	7	$3.8	0.06%	9	$31.6	0.10%	7	$35.4	0.09%
Primal [Beef]	8	$3.6	0.05%	16	$27.7	0.09%	14	$31.3	0.08%
Chicken Breast Boneless	9	$3.4	0.05%	4	$39.9	0.13%	4	$43.3	0.11%
Lunchment—Deli Fresh	10	$3.3	0.05%	11	$29.7	0.09%	10	$33.0	0.09%
Eggs—Large	11	$3.1	0.05%	8	$31.8	0.10%	9	$34.9	0.09%
Infant Formula Starter/Solutio	12	$3.1	0.05%	268	$4.3	0.01%	169	$7.4	0.02%
Snacks/Appetizers	13	$3.0	0.05%	54	$14.2	0.05%	48	$17.3	0.05%
Tortilla/Nacho Chips	14	$3.0	0.05%	13	$28.8	0.09%	12	$31.8	0.08%
Enhanced [Pork Boneless Loin/Rib]	15	$2.8	0.04%	21	$23.6	0.07%	20	$26.4	0.07%
Mainstream White Bread	16	$2.8	0.04%	40	$17.3	0.05%	36	$20.1	0.05%
Unflavored Can Coffee	17	$2.8	0.04%	22	$23.4	0.07%	21	$26.1	0.07%
Still Water Drnking/Mnrl Water	18	$2.7	0.04%	27	$21.6	0.07%	26	$24.2	0.06%
Soft Drinks 20pk & 24pk Can Carb	19	$2.6	0.04%	59	$13.8	0.04%	53	$16.3	0.04%
Pizza/Premium	20	$2.5	0.04%	28	$21.3	0.07%	27	$23.9	0.06%
Fz Ss Prem Traditional Meals	21	$2.5	0.04%	32	$19.3	0.06%	30	$21.8	0.06%
Dairy Case 100% Pure Juice—O	22	$2.5	0.04%	6	$33.2	0.11%	6	$35.7	0.09%
Natural Cheese Chunks	23	$2.4	0.04%	15	$28.1	0.09%	15	$30.6	0.08%
American Single Cheese	24	$2.4	0.04%	46	$16.3	0.05%	41	$18.7	0.05%
All Family Cereal	25	$2.3	0.04%	14	$28.2	0.09%	16	$30.5	0.08%
Bacon—Trad 16oz Or Less	26	$2.3	0.03%	35	$19.0	0.06%	35	$21.3	0.06%
Snack Cake—Multi Pack	27	$2.2	0.03%	70	$12.5	0.04%	64	$14.7	0.04%
Select Beef	28	$2.2	0.03%	34	$19.2	0.06%	33	$21.4	0.06%
Bananas	29	$2.2	0.03%	10	$30.5	0.10%	11	$32.7	0.09%
Potatoes Russet (Bulk & Bag)	30	$2.2	0.03%	33	$19.3	0.06%	32	$21.5	0.06%
Sft Drnk Mlt-Pk Btl Carb (Excp)	31	$2.2	0.03%	25	$22.5	0.07%	24	$24.6	0.06%
Fz Ss Economy Meals All	32	$2.2	0.03%	112	$8.7	0.03%	94	$10.8	0.03%
Premium [Ice Cream & Sherbert]	33	$2.1	0.03%	12	$29.6	0.09%	13	$31.7	0.08%
Mainstream Variety Breads	34	$2.1	0.03%	26	$21.8	0.07%	28	$23.8	0.06%
Sft Drnk Sngl Srv Btl Carb (Ex)	35	$2.1	0.03%	90	$10.1	0.03%	81	$12.2	0.03%
Convenient Meals—Kids Meal C	36	$2.1	0.03%	94	$9.7	0.03%	86	$11.8	0.03%
Sandwiches & Handhelds	37	$2.0	0.03%	104	$9.0	0.03%	91	$11.0	0.03%
Sugar	38	$1.9	0.03%	61	$13.6	0.04%	55	$15.5	0.04%

Exhibit E–16: Top 100 Subcommodities for SNAP Households by Expenditure: Stores in Counties with Poverty Rates Less than 10%—Continued

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Condensed Soup	39	$1.9	0.03%	31	$19.6	0.06%	31	$21.5	0.06%
Fz Family Style Entrées	40	$1.8	0.03%	83	$11.0	0.03%	77	$12.8	0.03%
Ribs [Pork]	41	$1.8	0.03%	68	$12.9	0.04%	63	$14.7	0.04%
Isotonic Drinks Single Serve	42	$1.7	0.03%	60	$13.8	0.04%	56	$15.5	0.04%
Refrigerated Coffee Creamers	43	$1.7	0.03%	38	$18.3	0.06%	37	$20.0	0.05%
Pourable Salad Dressings	44	$1.7	0.03%	39	$18.0	0.06%	38	$19.7	0.05%
Fz Ss Prem Nutritional Meals	45	$1.7	0.03%	5	$33.6	0.11%	8	$35.3	0.09%
Frzn Chicken—Wht Meat	46	$1.7	0.03%	74	$12.2	0.04%	69	$13.9	0.04%
Strawberries	47	$1.7	0.03%	17	$26.3	0.08%	19	$27.9	0.07%
Mayonnaise & Whipped Dressing	48	$1.6	0.02%	52	$14.6	0.05%	54	$16.1	0.04%
Mexican Soft Tortillas And Wra	49	$1.6	0.02%	51	$14.8	0.05%	51	$16.4	0.04%
Candy Bags—Chocolate	50	$1.5	0.02%	30	$20.3	0.06%	29	$21.9	0.06%
Adult Cereal	51	$1.5	0.02%	24	$22.8	0.07%	25	$24.3	0.06%
Choice Beef	52	$1.5	0.02%	63	$13.5	0.04%	60	$15.1	0.04%
Sw Gds: Donuts	53	$1.5	0.02%	77	$11.7	0.04%	76	$13.2	0.03%
Traditional [Ice Cream & Sherbert]	54	$1.5	0.02%	56	$13.9	0.04%	58	$15.3	0.04%
Meat: Turkey Bulk	55	$1.4	0.02%	19	$24.3	0.08%	22	$25.7	0.07%
Aseptic Pack Juice And Drinks	56	$1.4	0.02%	136	$7.8	0.02%	115	$9.2	0.02%
Fz Bag Vegetables—Plain	57	$1.4	0.02%	47	$16.0	0.05%	46	$17.4	0.05%
Butter	58	$1.4	0.02%	23	$23.3	0.07%	23	$24.7	0.06%
Margarine: Tubs And Bowls	59	$1.4	0.02%	75	$12.1	0.04%	72	$13.5	0.04%
Hot Dogs—Base Meat	60	$1.4	0.02%	174	$6.5	0.02%	149	$7.9	0.02%
Can Pasta	61	$1.4	0.02%	193	$6.1	0.02%	166	$7.4	0.02%
Macaroni & Cheese Dnrs	62	$1.4	0.02%	133	$7.9	0.02%	114	$9.2	0.02%
Choice Beef	63	$1.4	0.02%	107	$8.9	0.03%	100	$10.2	0.03%
Pizza/Economy	64	$1.4	0.02%	191	$6.1	0.02%	164	$7.5	0.02%
Peanut Butter	65	$1.3	0.02%	45	$16.4	0.05%	45	$17.7	0.05%
Mainstream [Pasta & Pizza Sauce]	66	$1.3	0.02%	88	$10.4	0.03%	88	$11.7	0.03%
Pizza/Traditional	67	$1.3	0.02%	98	$9.3	0.03%	95	$10.6	0.03%
Tuna	68	$1.3	0.02%	64	$13.3	0.04%	65	$14.6	0.04%
Value Forms/18oz And Larger [Chicken]	69	$1.2	0.02%	209	$5.8	0.02%	181	$7.0	0.02%
Angus	70	$1.2	0.02%	62	$13.6	0.04%	62	$14.8	0.04%
Meat: Ham Bulk	71	$1.2	0.02%	36	$18.4	0.06%	39	$19.6	0.05%
Frzn Breakfast Sandwiches	72	$1.2	0.02%	135	$7.8	0.02%	122	$9.0	0.02%
Cream Cheese	73	$1.2	0.02%	49	$15.5	0.05%	50	$16.7	0.04%
Cheese Crackers	74	$1.2	0.02%	66	$13.1	0.04%	67	$14.2	0.04%
Fz Skillet Meals	75	$1.2	0.02%	89	$10.3	0.03%	90	$11.5	0.03%
String Cheese	76	$1.2	0.02%	53	$14.3	0.05%	57	$15.4	0.04%
Fruit Snacks	77	$1.2	0.02%	170	$6.6	0.02%	152	$7.8	0.02%
Frzn Meat—Beef	78	$1.1	0.02%	184	$6.3	0.02%	168	$7.4	0.02%
Frzn French Fries	79	$1.1	0.02%	173	$6.5	0.02%	159	$7.7	0.02%
Instore Cut Fruit	80	$1.1	0.02%	57	$13.8	0.04%	61	$14.9	0.04%
Waffles/Pancakes/French Toast	81	$1.1	0.02%	84	$10.9	0.03%	83	$12.0	0.03%
Sandwiches—(Cold)	82	$1.1	0.02%	140	$7.7	0.02%	130	$8.8	0.02%
Sour Creams	83	$1.1	0.02%	73	$12.4	0.04%	73	$13.5	0.04%
Cakes: Birthday/Celebration Sh	84	$1.1	0.02%	164	$6.7	0.02%	150	$7.8	0.02%
Avocado	85	$1.1	0.02%	48	$15.7	0.05%	49	$16.8	0.04%
Rts Soup: Chunky/Homestyle/Et	86	$1.1	0.02%	55	$14.2	0.05%	59	$15.3	0.04%
Salsa & Dips	87	$1.1	0.02%	132	$7.9	0.02%	124	$9.0	0.02%
Flavored Milk	88	$1.1	0.02%	145	$7.5	0.02%	137	$8.5	0.02%
Grapes Red	89	$1.1	0.02%	42	$17.0	0.05%	43	$18.0	0.05%
Candy Bars (Singles) (Including)	90	$1.1	0.02%	152	$7.1	0.02%	142	$8.2	0.02%
Lunchment—Bologna/Sausage	91	$1.1	0.02%	179	$6.4	0.02%	167	$7.4	0.02%
Sandwich Cookies	92	$1.0	0.02%	99	$9.3	0.03%	98	$10.4	0.03%
Bkfst Sausage—Fresh Rolls	93	$1.0	0.02%	109	$8.8	0.03%	105	$9.9	0.03%
Spring Water	94	$1.0	0.02%	82	$11.0	0.03%	82	$12.0	0.03%
Chix: Frd 8pc/Cut Up (Hot)	95	$1.0	0.02%	85	$10.8	0.03%	84	$11.8	0.03%
Bagged Cheese Snacks	96	$1.0	0.02%	176	$6.4	0.02%	165	$7.4	0.02%
Natural Cheese Slices	97	$1.0	0.02%	50	$15.3	0.05%	52	$16.4	0.04%
Hamburger Buns	98	$1.0	0.02%	102	$9.1	0.03%	103	$10.1	0.03%
Sweet Goods—Full Size	99	$1.0	0.01%	175	$6.5	0.02%	163	$7.5	0.02%

Exhibit E–16: Top 100 Subcommodities for SNAP Households by Expenditure: Stores in Counties with Poverty Rates Less than 10%—Continued

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Yogurt/Kids	100	$1.0	0.01%	165	$6.7	0.02%	155	$7.7	0.02%
Top 100 Subcommodities		**$204.3**	**3.10%**		**$1,763.9**	**5.60%**		**$1,968.2**	**5.17%**
Total Expenditures		**$6,580.5**	**100%**		**$31,513.8**	**100%**		**$38,094.2**	**100%**

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.
Note: Columns may not sum to total shown due to rounding.
*Top 100 subcommodities based on SNAP household expenditures.

Exhibit E–17: Top 100 Subcommodities for SNAP Households by Expenditure: Stores in Counties with Poverty Rates of 10% to 20%

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Fluid Milk/White Only	1	$147.5	2.24%	1	$651.2	2.07%	1	$798.7	2.10%
Soft Drinks 12/18 & 15pk Can Car	2	$123.8	1.88%	2	$456.0	1.45%	2	$579.8	1.52%
Lean [Beef]	3	$85.1	1.29%	7	$199.9	0.63%	4	$285.0	0.75%
Kids Cereal	4	$59.3	0.90%	20	$141.9	0.45%	13	$201.2	0.53%
Shredded Cheese	5	$57.3	0.87%	3	$255.8	0.81%	3	$313.1	0.82%
Sft Drnk 2 Liter Btl Carb Incl	6	$54.3	0.83%	13	$175.5	0.56%	9	$229.8	0.60%
Potato Chips	7	$49.2	0.75%	8	$192.5	0.61%	6	$241.8	0.63%
Primal [Beef]	8	$44.4	0.68%	17	$156.1	0.50%	15	$200.6	0.53%
Infant Formula Starter/ Solutio	9	$42.1	0.64%	179	$35.8	0.11%	79	$77.9	0.20%
Lunchment—Deli Fresh	10	$42.1	0.64%	11	$183.1	0.58%	11	$225.2	0.59%
Eggs—Large	11	$40.0	0.61%	9	$191.2	0.61%	8	$231.2	0.61%
Chicken Breast Boneless	12	$38.5	0.58%	4	$221.7	0.70%	5	$260.2	0.68%
Still Water Drnking/Mnrl Water	13	$37.9	0.58%	19	$146.8	0.47%	19	$184.8	0.48%
Tortilla/Nacho Chips	14	$36.3	0.55%	16	$157.8	0.50%	17	$194.1	0.51%
Mainstream White Bread	15	$35.0	0.53%	42	$100.2	0.32%	35	$135.3	0.36%
Snacks/Appetizers	16	$34.2	0.52%	67	$75.2	0.24%	49	$109.4	0.29%
Fz Ss Prem Traditional Meals	17	$33.7	0.51%	22	$136.9	0.43%	21	$170.6	0.45%
Dairy Case 100% Pure Juice—O	18	$33.7	0.51%	6	$206.7	0.66%	7	$240.4	0.63%
American Single Cheese	19	$32.8	0.50%	41	$102.4	0.32%	36	$135.2	0.35%
Unflavored Can Coffee	20	$31.4	0.48%	18	$149.8	0.48%	20	$181.2	0.48%
Enhanced [Pork Boneless Loin/Rib]	21	$31.1	0.47%	27	$122.2	0.39%	24	$153.3	0.40%
Fz Ss Economy Meals All	22	$31.1	0.47%	80	$62.1	0.20%	65	$93.1	0.24%
Bacon—Trad 16oz Or Less	23	$31.0	0.47%	29	$119.4	0.38%	26	$150.3	0.39%
Pizza/Premium	24	$30.2	0.46%	34	$115.3	0.37%	29	$145.5	0.38%
Snack Cake—Multi Pack	25	$30.2	0.46%	70	$74.2	0.24%	54	$104.4	0.27%
Mainstream Variety Breads	26	$29.7	0.45%	25	$130.8	0.42%	22	$160.5	0.42%
Soft Drinks 20pk & 24pk Can Carb	27	$29.0	0.44%	62	$79.6	0.25%	50	$108.6	0.29%
Natural Cheese Chunks	28	$28.2	0.43%	14	$167.0	0.53%	16	$195.1	0.51%
All Family Cereal	29	$28.0	0.43%	15	$163.5	0.52%	18	$191.6	0.50%
Sugar	30	$27.3	0.42%	58	$84.4	0.27%	46	$111.8	0.29%
Sandwiches & Handhelds	31	$27.0	0.41%	93	$56.0	0.18%	73	$83.0	0.22%
Potatoes Russet (Bulk & Bag)	32	$26.8	0.41%	32	$116.0	0.37%	30	$142.8	0.37%
Bananas	33	$26.6	0.40%	10	$187.2	0.59%	12	$213.7	0.56%
Ribs [Pork]	34	$25.8	0.39%	60	$80.9	0.26%	53	$106.7	0.28%
Convenient Meals—Kids Meal C	35	$25.2	0.38%	106	$51.5	0.16%	82	$76.7	0.20%
Premium [Ice Cream & Sherbert]	36	$24.8	0.38%	12	$176.1	0.56%	14	$200.9	0.53%
Isotonic Drinks Single Serve	37	$24.2	0.37%	45	$93.9	0.30%	42	$118.1	0.31%
Sft Drnk Mlt-Pk Btl Carb (Excp)	38	$24.0	0.36%	26	$123.5	0.39%	28	$147.5	0.39%
Select Beef	39	$23.8	0.36%	30	$117.5	0.37%	31	$141.3	0.37%
Frzn Chicken—Wht Meat	40	$22.7	0.35%	69	$74.8	0.24%	61	$97.5	0.26%
Condensed Soup	41	$22.5	0.34%	33	$115.5	0.37%	32	$138.0	0.36%
Pourable Salad Dressings	42	$21.7	0.33%	39	$105.6	0.34%	39	$127.3	0.33%
Choice Beef	43	$21.3	0.32%	38	$106.3	0.34%	38	$127.6	0.33%

Exhibit E–17: Top 100 Subcommodities for SNAP Households by Expenditure: Stores in Counties with Poverty Rates of 10% to 20%—Continued

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Fz Family Style Entrées	44	$21.2	0.32%	78	$63.1	0.20%	72	$84.3	0.22%
Sft Drnk Sngl Srv Btl Carb (Ex)	45	$20.9	0.32%	99	$53.5	0.17%	85	$74.4	0.20%
Mayonnaise & Whipped Dressing	46	$20.9	0.32%	49	$90.9	0.29%	45	$111.8	0.29%
Mexican Soft Tortillas And Wra	47	$19.8	0.30%	50	$90.3	0.29%	48	$110.1	0.29%
Refrigerated Coffee Creamers	48	$19.5	0.30%	31	$116.6	0.37%	33	$136.1	0.36%
Adult Cereal	49	$19.3	0.29%	21	$139.5	0.44%	23	$158.8	0.42%
Traditional [Ice Cream & Sherbert]	50	$19.2	0.29%	52	$88.6	0.28%	51	$107.8	0.28%
Fz Ss Prem Nutritional Meals	51	$19.1	0.29%	5	$208.6	0.66%	10	$227.7	0.60%
Fz Bag Vegetables—Plain	52	$19.0	0.29%	43	$98.9	0.31%	43	$117.9	0.31%
Aseptic Pack Juice And Drinks	53	$18.6	0.28%	137	$43.3	0.14%	107	$61.9	0.16%
Choice Beef	54	$18.4	0.28%	97	$53.6	0.17%	89	$72.1	0.19%
Hot Dogs—Base Meat	55	$18.4	0.28%	145	$42.1	0.13%	111	$60.5	0.16%
Macaroni & Cheese Dnrs	56	$18.2	0.28%	129	$44.6	0.14%	103	$62.8	0.16%
Margarine: Tubs And Bowls	57	$18.1	0.27%	63	$77.4	0.25%	64	$95.5	0.25%
Strawberries	58	$17.8	0.27%	24	$132.8	0.42%	25	$150.6	0.40%
Mainstream [Pasta & Pizza Sauce]	59	$17.4	0.26%	85	$60.8	0.19%	78	$78.2	0.21%
Candy Bags—Chocolate	60	$16.7	0.25%	36	$112.6	0.36%	37	$129.3	0.34%
Can Pasta	61	$16.5	0.25%	185	$35.3	0.11%	144	$51.8	0.14%
Frzn Chicken—Wings	62	$16.4	0.25%	469	$13.0	0.04%	268	$29.4	0.08%
Tuna	63	$16.4	0.25%	59	$84.4	0.27%	58	$100.8	0.26%
Sw Gds: Donuts	64	$16.2	0.25%	84	$61.0	0.19%	80	$77.2	0.20%
Peanut Butter	65	$15.8	0.24%	44	$96.9	0.31%	44	$112.7	0.30%
Lunchment—Bologna/Sausage	66	$15.7	0.24%	124	$45.6	0.14%	108	$61.3	0.16%
Mult Pk Bag Snacks	67	$15.4	0.23%	205	$32.4	0.10%	161	$47.8	0.13%
Butter	68	$15.3	0.23%	23	$134.9	0.43%	27	$150.1	0.39%
Meat: Turkey Bulk	69	$15.1	0.23%	28	$120.3	0.38%	34	$135.4	0.36%
Frzn French Fries	70	$15.1	0.23%	177	$37.0	0.12%	141	$52.1	0.14%
Vegetable Oil	71	$14.9	0.23%	250	$26.7	0.08%	193	$41.6	0.11%
Pizza/Economy	72	$14.6	0.22%	195	$33.3	0.11%	159	$48.0	0.13%
Frzn Meat—Beef	73	$14.6	0.22%	188	$35.0	0.11%	154	$49.6	0.13%
Fz Skillet Meals	74	$14.5	0.22%	87	$60.4	0.19%	84	$74.9	0.20%
Value Forms/18oz And Larger [Chicken]	75	$14.2	0.22%	214	$31.9	0.10%	168	$46.2	0.12%
Frzn Breakfast Sandwiches	76	$14.1	0.21%	154	$41.0	0.13%	128	$55.0	0.14%
Cakes: Birthday/Celebration Sh	77	$14.1	0.21%	172	$37.9	0.12%	143	$52.0	0.14%
Chicken Wings	78	$14.0	0.21%	319	$20.8	0.07%	238	$34.8	0.09%
Sandwiches—(Cold)	79	$13.9	0.21%	94	$56.0	0.18%	92	$69.9	0.18%
Sandwich Cookies	80	$13.8	0.21%	95	$54.6	0.17%	94	$68.4	0.18%
Sour Creams	81	$13.7	0.21%	71	$73.2	0.23%	71	$86.9	0.23%
Rts Soup: Chunky/Homestyle/Et	82	$13.7	0.21%	47	$93.1	0.30%	52	$106.8	0.28%
Pizza/Traditional	83	$13.6	0.21%	118	$47.2	0.15%	109	$60.8	0.16%
Cream Cheese	84	$13.5	0.21%	53	$88.0	0.28%	57	$101.6	0.27%
Waffles/Pancakes/French Toast	85	$13.4	0.20%	89	$58.6	0.19%	88	$72.1	0.19%
Fruit Snacks	86	$13.4	0.20%	209	$32.1	0.10%	172	$45.5	0.12%
Bagged Cheese Snacks	87	$13.3	0.20%	158	$40.0	0.13%	136	$53.2	0.14%
Angus [Beef]	88	$13.1	0.20%	64	$77.0	0.24%	67	$90.2	0.24%
Ramen Noodles/Ramen Cups	89	$12.9	0.20%	298	$22.0	0.07%	237	$34.8	0.09%
Salsa & Dips	90	$12.8	0.20%	140	$42.7	0.14%	124	$55.5	0.15%
Cheese Crackers	91	$12.8	0.19%	74	$67.9	0.22%	77	$80.7	0.21%
Candy Bars (Singles) (Including)	92	$12.8	0.19%	139	$42.9	0.14%	123	$55.7	0.15%
Dairy Case Juice Drnk Under 10	93	$12.6	0.19%	170	$38.2	0.12%	149	$50.7	0.13%
Spring Water	94	$12.5	0.19%	65	$76.3	0.24%	68	$88.8	0.23%
Chicken Drums	95	$12.4	0.19%	276	$23.9	0.08%	226	$36.3	0.10%
Hot Dog Buns	96	$12.3	0.19%	119	$47.0	0.15%	113	$59.3	0.16%
Sweet Goods—Full Size	97	$12.3	0.19%	128	$44.9	0.14%	118	$57.2	0.15%
Hamburger Buns	98	$12.2	0.19%	104	$52.5	0.17%	98	$64.8	0.17%
Grapes Red	99	$12.1	0.18%	48	$91.9	0.29%	55	$104.0	0.27%
Flavored Milk	100	$12.1	0.18%	130	$44.6	0.14%	120	$56.7	0.15%
Top 100 Subcommodities		**$2,551.7**	**38.78%**		**$10,139.2**	**32.17%**		**$12,690.9**	**33.31%**

Exhibit E–17: Top 100 Subcommodities for SNAP Households by Expenditure: Stores in Counties with Poverty Rates of 10% to 20%—Continued

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Total Expenditures		**$6,580.5**	**100%**		**$31,513.8**	**100%**		**$38,094.2**	**100%**

Source: *Foods Typically Purchased by SNAP Households,* IMPAQ International, LLC, 2016.
Note: Columns may not sum to total shown due to rounding.
*Top 100 subcommodities based on SNAP household expenditures.

Exhibit E–18: Top 100 Subcommodities for SNAP Households by Expenditure: Stores in Counties with Poverty Rates Greater than 20%

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Fluid Milk/White Only	1	$31.5	0.48%	1	$97.0	0.31%	1	$128.5	0.34%
Soft Drinks 12/18 & 15pk Can Car	2	$30.5	0.46%	2	$71.0	0.23%	2	$101.6	0.27%
Lean [Beef]	3	$21.0	0.32%	13	$25.4	0.08%	5	$46.4	0.12%
Kids Cereal	4	$14.6	0.22%	21	$20.4	0.06%	13	$35.0	0.09%
Primal [Beef]	5	$14.4	0.22%	4	$35.9	0.11%	4	$50.3	0.13%
Shredded Cheese	6	$12.7	0.19%	3	$38.6	0.12%	3	$51.3	0.13%
Sft Drnk 2 Liter Btl Carb Incl	7	$12.6	0.19%	8	$29.3	0.09%	6	$42.0	0.11%
Potato Chips	8	$11.3	0.17%	10	$29.1	0.09%	7	$40.4	0.11%
Lunchment—Deli Fresh	9	$10.5	0.16%	6	$29.8	0.09%	8	$40.2	0.11%
Mainstream White Bread	10	$10.1	0.15%	26	$19.3	0.06%	19	$29.4	0.08%
Snack Cake—Multi Pack	11	$9.2	0.14%	38	$15.1	0.05%	30	$24.2	0.06%
Eggs—Large	12	$9.0	0.14%	11	$28.6	0.09%	10	$37.6	0.10%
Infant Formula Starter/Solutio	13	$9.0	0.14%	172	$5.2	0.02%	61	$14.2	0.04%
American Single Cheese	14	$8.8	0.13%	31	$17.9	0.06%	24	$26.8	0.07%
Still Water Drnking/Mnrl Water	15	$8.1	0.12%	24	$19.3	0.06%	21	$27.5	0.07%
Soft Drinks 20pk & 24pk Can Carb	16	$8.1	0.12%	46	$13.1	0.04%	39	$21.2	0.06%
Tortilla/Nacho Chips	17	$8.1	0.12%	17	$22.4	0.07%	16	$30.5	0.08%
Sft Drnk Mlt-Pk Btl Carb (Excp)	18	$7.9	0.12%	12	$27.7	0.09%	12	$35.6	0.09%
Fz Ss Economy Meals All	19	$7.7	0.12%	64	$10.0	0.03%	48	$17.7	0.05%
Sugar	20	$7.7	0.12%	41	$14.6	0.05%	36	$22.3	0.06%
Fz Ss Prem Traditional Meals	21	$7.7	0.12%	27	$19.3	0.06%	23	$26.9	0.07%
Chicken Breast Boneless	22	$7.6	0.12%	5	$31.3	0.10%	9	$39.0	0.10%
Chicken Wings	23	$7.6	0.12%	181	$5.1	0.02%	72	$12.7	0.03%
Enhanced [Pork Boneless Loin/Rib]	24	$7.6	0.11%	18	$22.2	0.07%	18	$29.7	0.08%
Bacon—Trad 16oz Or Less	25	$7.5	0.11%	28	$19.2	0.06%	25	$26.7	0.07%
Ribs [Pork]	26	$7.4	0.11%	47	$12.9	0.04%	41	$20.3	0.05%
Dairy Case 100% Pure Juice—O	27	$7.4	0.11%	9	$29.1	0.09%	11	$36.5	0.10%
Snacks/Appetizers	28	$7.4	0.11%	60	$11.0	0.03%	44	$18.4	0.05%
Unflavored Can Coffee	29	$7.2	0.11%	15	$24.9	0.08%	15	$32.1	0.08%
Convenient Meals—Kids Meal C	30	$7.0	0.11%	86	$8.5	0.03%	53	$15.5	0.04%
Pizza/Premium	31	$6.9	0.10%	35	$16.7	0.05%	32	$23.6	0.06%
Sandwiches & Handhelds	32	$6.9	0.10%	82	$8.6	0.03%	56	$15.4	0.04%
Potatoes Russet (Bulk & Bag)	33	$6.7	0.10%	29	$19.2	0.06%	26	$25.9	0.07%
Mainstream Variety Breads	34	$6.6	0.10%	20	$20.7	0.07%	22	$27.3	0.07%
All Family Cereal	35	$5.8	0.09%	16	$23.2	0.07%	20	$29.0	0.08%
Frzn Chicken—Wht Meat	36	$5.6	0.09%	49	$12.8	0.04%	42	$18.4	0.05%
Choice Beef	37	$5.6	0.09%	34	$16.8	0.05%	34	$22.5	0.06%
Pourable Salad Dressings	38	$5.6	0.09%	37	$15.8	0.05%	37	$21.4	0.06%
Bananas	39	$5.5	0.08%	14	$24.9	0.08%	17	$30.4	0.08%
Fz Bag Vegetables—Plain	40	$5.3	0.08%	33	$17.0	0.05%	35	$22.3	0.06%
Hot Dogs—Base Meat	41	$5.3	0.08%	89	$8.2	0.03%	67	$13.5	0.04%
Mult Pk Bag Snacks	42	$5.3	0.08%	178	$5.1	0.02%	101	$10.4	0.03%
Condensed Soup	43	$5.3	0.08%	30	$18.5	0.06%	31	$23.8	0.06%
Frzn Chicken—Wings	44	$5.2	0.08%	356	$2.6	0.01%	156	$7.8	0.02%
Lunchment—Bologna/Sausage	45	$5.0	0.08%	79	$8.9	0.03%	65	$14.0	0.04%
Traditional [Ice Cream & Sherbert]	46	$5.0	0.08%	36	$16.3	0.05%	38	$21.3	0.06%
Sft Drnk Sngl Srv Btl Carb (Ex)	47	$4.8	0.07%	99	$7.8	0.02%	73	$12.6	0.03%

Exhibit E–18: Top 100 Subcommodities for SNAP Households by Expenditure: Stores in Counties with Poverty Rates Greater than 20%—Continued

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Vegetable Oil	48	$4.8	0.07%	193	$4.9	0.02%	113	$9.7	0.03%
Macaroni & Cheese Dnrs	49	$4.8	0.07%	110	$7.2	0.02%	77	$11.9	0.03%
Mayonnaise & Whipped Dressing	50	$4.7	0.07%	43	$13.6	0.04%	43	$18.4	0.05%
Natural Cheese Chunks	51	$4.7	0.07%	19	$21.0	0.07%	27	$25.7	0.07%
Fz Family Style Entrées	52	$4.6	0.07%	70	$9.4	0.03%	64	$14.0	0.04%
Isotonic Drinks Single Serve	53	$4.6	0.07%	56	$11.9	0.04%	49	$16.4	0.04%
Can Pasta	54	$4.4	0.07%	135	$6.3	0.02%	96	$10.7	0.03%
Mainstream [Pasta & Pizza Sauce]	55	$4.3	0.07%	67	$9.7	0.03%	63	$14.0	0.04%
Premium [Ice Cream & Sherbert]	56	$4.3	0.07%	22	$20.3	0.06%	28	$24.6	0.06%
Frzn French Fries	57	$4.3	0.06%	118	$6.8	0.02%	90	$11.0	0.03%
Choice Beef	58	$4.2	0.06%	65	$10.0	0.03%	62	$14.2	0.04%
Aseptic Pack Juice And Drinks	59	$4.2	0.06%	144	$6.1	0.02%	102	$10.3	0.03%
Chicken Drums	60	$4.1	0.06%	231	$4.2	0.01%	140	$8.4	0.02%
Dnr Sausage—Links Pork Ckd/S	61	$4.1	0.06%	209	$4.7	0.01%	130	$8.8	0.02%
Adult Cereal	62	$4.0	0.06%	23	$20.3	0.06%	29	$24.3	0.06%
Strawberries	63	$4.0	0.06%	25	$19.3	0.06%	33	$23.3	0.06%
Margarine: Tubs And Bowls	64	$4.0	0.06%	57	$11.3	0.04%	57	$15.3	0.04%
Fz Ss Prem Nutritional Meals	65	$4.0	0.06%	7	$29.4	0.09%	14	$33.4	0.09%
Frzn Breakfast Sand-wiches	66	$3.9	0.06%	116	$6.9	0.02%	95	$10.8	0.03%
Pizza/Economy	67	$3.8	0.06%	160	$5.7	0.02%	119	$9.5	0.02%
Sw Gds: Donuts	68	$3.7	0.06%	69	$9.5	0.03%	68	$13.2	0.03%
Tuna	69	$3.5	0.05%	54	$12.2	0.04%	51	$15.7	0.04%
Cakes: Birthday/Celebra-tion Sh	70	$3.4	0.05%	162	$5.6	0.02%	125	$9.1	0.02%
Bacon—Trad Greater Than 16oz	71	$3.4	0.05%	117	$6.8	0.02%	103	$10.3	0.03%
Peanut Butter	72	$3.3	0.05%	42	$14.5	0.05%	46	$17.8	0.05%
Candy Bags—Chocolate	73	$3.3	0.05%	40	$14.6	0.05%	45	$17.9	0.05%
Sandwich Cookies	74	$3.2	0.05%	98	$7.9	0.02%	89	$11.0	0.03%
Salsa & Dips	75	$3.2	0.05%	130	$6.4	0.02%	115	$9.6	0.03%
Frzn Meat—Beef	76	$3.2	0.05%	185	$5.0	0.02%	143	$8.2	0.02%
Bkfst Sausage—Fresh Rolls	77	$3.2	0.05%	87	$8.5	0.03%	81	$11.7	0.03%
Value Forms/18oz And Larger [Chicken]	78	$3.2	0.05%	192	$4.9	0.02%	145	$8.1	0.02%
Fz Skillet Meals	79	$3.1	0.05%	81	$8.6	0.03%	80	$11.7	0.03%
Refrigerated Biscuits	80	$3.1	0.05%	121	$6.7	0.02%	109	$9.8	0.03%
Fruit Snacks	81	$3.1	0.05%	218	$4.5	0.01%	162	$7.5	0.02%
Hot Dog Buns	82	$3.0	0.05%	104	$7.5	0.02%	100	$10.5	0.03%
Ramen Noodles/Ramen Cups	83	$3.0	0.05%	330	$2.9	0.01%	213	$5.9	0.02%
Hamburger Buns	84	$3.0	0.05%	83	$8.5	0.03%	82	$11.5	0.03%
Tray Pack/Choc Chip Cookies	85	$3.0	0.05%	124	$6.6	0.02%	116	$9.6	0.03%
Pizza/Traditional	86	$3.0	0.05%	101	$7.6	0.02%	99	$10.6	0.03%
Candy Bars (Multi Pack)	87	$2.9	0.04%	91	$8.1	0.03%	88	$11.1	0.03%
Pails [Ice Cream & Sherbert]	88	$2.9	0.04%	194	$4.9	0.02%	153	$7.9	0.02%
Grapes White	89	$2.9	0.04%	72	$9.3	0.03%	76	$12.2	0.03%
Refrigerated Coffee Creamers	90	$2.9	0.04%	53	$12.3	0.04%	58	$15.2	0.04%
Butter	91	$2.9	0.04%	32	$17.5	0.06%	40	$20.4	0.05%
Shrimp—Cooked	92	$2.9	0.04%	161	$5.6	0.02%	135	$8.5	0.02%
Rts Soup: Chunky/Homestyle/Et	93	$2.9	0.04%	51	$12.6	0.04%	55	$15.5	0.04%
Bagged Cheese Snacks	94	$2.8	0.04%	163	$5.6	0.02%	138	$8.4	0.02%
Butter Spray Cracker	95	$2.8	0.04%	85	$8.5	0.03%	83	$11.4	0.03%
Angus [Beef]	96	$2.8	0.04%	45	$13.1	0.04%	50	$15.9	0.04%
Flavored Milk	97	$2.8	0.04%	107	$7.4	0.02%	105	$10.2	0.03%
Waffles/Pancakes/French Toast	98	$2.8	0.04%	97	$7.9	0.03%	97	$10.7	0.03%
Dnr Sausage—Pork Rope Ckd/Sm	99	$2.8	0.04%	150	$5.9	0.02%	133	$8.7	0.02%
Traditional Spices	100	$2.8	0.04%	109	$7.2	0.02%	107	$10.0	0.03%
Top 100 Subcommodities		**$610.2**	**9.27%**		**$1,500.2**	**4.76%**		**$2,110.3**	**5.54%**

Exhibit E–18: Top 100 Subcommodities for SNAP Households by Expenditure: Stores in Counties with Poverty Rates Greater than 20%—Continued

Subcommodity	SNAP Household Expenditures			Non-SNAP Household Expenditures			Total Household Expenditures		
	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures	Rank	$ in millions	% of Expenditures
Total Expenditures		**$6,580.5**	**100%**		**$31,513.8**	**100%**		**$38,094.2**	**100%**

Source: *Foods Typically Purchased by SNAP Households*, IMPAQ International, LLC, 2016.
Note: Columns may not sum to total shown due to rounding.
* Top 100 subcommodities based on SNAP household expenditures.

———————

Submitted Policy Brief by Feeding Texas

Policy Brief: Maintaining Choices for SNAP Recipients

Feeding Texas

> ***Our View:*** *SNAP restrictions are an ineffective and costly strategy to improve recipient health. Our nation would be better served by educating and empowering recipients to make better choices, not restricting those choices.*

Obesity: A Problem for All, but Improving

Obesity and diet-related disease affect Americans of all income levels and backgrounds. SNAP consumers face additional barriers to healthy eating, including limited geographic access to affordable, healthy food; tight food budgets overall; and inadequate SNAP allotments. SNAP recipients sometimes manage this shortfall by buying less-nutritious foods that can adversely affect their health.

Despite these challenges, the most recent USDA report on SNAP purchases found no major differences in the expenditures of SNAP and non-SNAP households. Put simply, SNAP consumers shop like Americans do as a whole.

And Americans as a whole are eating better. Soda consumption, the behavior most often targeted for SNAP restrictions, is at a thirty-year low in America. And while dietary quality remains poor, American diets have steadily improved in recent years.

SNAP Restrictions Can Not Force Dietary Change

A recent, *peer-reviewed study* (*https://www.ncbi.nlm.nih.gov/pubmed/27653735*) in the medical journal *JAMA* demonstrated how simply restricting SNAP purchases would not improve recipients' diets. Participants in this study reported a slight reduction in calories consumed but no change in overall diet quality.

An *associated meta-study* (*https://www.ncbi.nlm.nih.gov/pubmed/26647851*) concluded that restricting SNAP participants from spending their benefits on soda only had a "small to moderate" impact, because recipients substituted their own money to purchase soda.

SNAP Restrictions Are Neither Free, nor Freeing

There are significant costs to SNAP purchase restrictions that would be borne by participants, businesses and the program itself.

Participants

Americans of all income levels view the government restricting food choices as an intrusion into their autonomy to decide what is best for their families. Because SNAP restrictions unfairly single out low-income Americans for a problem that affects all Americans, they increase the stigma associated with SNAP participation. Increased stigma could actually reduce health outcomes, as it would lead some families to forgo nutrition assistance rather than put their dinner table under Federal scrutiny.

Businesses

Restricting SNAP purchases would constitute an unfunded Federal mandate on business. SNAP retailers would likely bear the cost of re-training cashiers, creating signage, reprogramming computers and implementing rules associated with this broad change.

Because SNAP serves a diverse group of Americans with a wide range of dietary needs, it would be impossible to restrict SNAP benefits to an easy-to-control, "affirmative list" of approved foods like that found in the WIC program. More likely, restrictions would be implemented as a short list of restricted foods, forcing retailers

to evaluate each product on their shelves, as well as thousands of new products each year against rules made in Washington.

Program Efficiency & Effectiveness

Implementation of EBT technology has made SNAP efficient and cost-effective for retailers and government. The introduction of purchase restrictions at checkout would complicate SNAP transactions and undermine these gains.

Unless SNAP restrictions were accompanied by an increase in overall benefits, they would also result in a *de facto* benefit cut by forcing recipients to purchase alternative foods that cost more. In this way, restrictions could result in decreased purchasing power for SNAP recipients, resulting in less food on the family table and a less effective hunger-fighting program.

There is a Better Way

Our nation would be better served pursuing policies that seek to educate and empower clients to make better choices, not restrict those choices.

Congress could achieve these aims in two ways:

1. *Make SNAP benefits reflect the actual costs of eating healthy.* The Institute of Medicine has *recommended* (*https://www.nap.edu/catalog/13485/supplemental-nutrition-assistance-program-examining-the-evidence-to-define-benefit*) increasing SNAP benefit levels to more accurately reflect the costs involved in eating a healthy diet. Absent a broad increase in benefits, research suggests that funding "double-dollar incentive" programs may also improve participants' consumption patterns

2. *Promote well-evaluated, outcomes-driven nutrition education.* Programming directed by Feeding Texas and our local food banks has demonstrated that health interventions and nutrition education strategies funded through SNAP-Ed can effectively promote healthy eating and improve dietary health. These strategies are especially effective when paired with the distribution of free produce, which helps participants to bridge the transition to healthier habits. We call this combined approach *"Feeding with Impact (https://www.feedingtexas.org/product/2017/02/Feeding-with-Impact-Factsheet/)."*

––––––––

SUBMITTED STATEMENT BY SECRETARIES' INNOVATION GROUP

The Secretaries' Innovation Group (SIG) is a network of state human services secretaries who have program responsibility for the state SNAP program, among many others. These SIG member secretaries serve under Republican governors from states which make up 46% of the country. In November 2014 the members of the Secretaries' Innovation Group issued a statement from which these recommendations derive.

The Supplemental Nutrition Assistance Program (SNAP), which is known as Food Stamps, has quadrupled in cost since 2001. A common sense approach is needed to allow states the ability to ensure welfare benefits are being used appropriately. Despite intense opposition, states have made significant strides in some areas to tackle wasteful expenditures, fraud and abuse in the system, and with the help of reform-minded voices in Congress and a new Administration, states will be able to go much further.

Recommendations

The program which is intended as a nutritional supplement should restrict the purchase of soda, candy and other unhealthy products.

The Supplemental Nutrition Assistance Program is intended to subsidize nutrition for needy families. Too many recipients are utilizing their benefit to purchase items that are ⅓ of adults and 17% of youth in the United States are obese, according to the *Journal of the American Medical Association*.[1] According to a *Health Affairs* study, the medical costs associated with obesity are an estimated $147 billion in 2008.[2]

One option to balance SNAP purchases toward healthier choices is to allow SNAP purchases to mirror allowable purchases in the Women, Infants and Children (WIC) program. A second alternative is to restrict the purchase of products with zero nutritional value such as candy, energy drinks and other sugar-sweetened drinks. A third alternative is to establish a pilot project with up to ten states for a one-time waiver

––––––––

[1] *http://jama.jamanetwork.com/article.aspx?articleid=1832542.*
[2] *http://content.healthaffairs.org/content/28/5/w822.full.pdf+html.*

that would allow for some nutrition controls on SNAP purchases. These pilot waivers would require an evaluation of measurable outcomes.

Make key SNAP purchase data available to states.

Micro-level transaction data which shows how SNAP benefits are being spent is not available to the states. However this data would provide an objective, measurable picture of where reforms are needed to ensure the program is effective in providing essential nutrition for those in need. SIG recommends FNS and SNAP–EBT vendors (*i.e.,* Xerox) to capture all SNAP transaction-level data and make it available to states. Transparency is important to inform program officials, legislators and the public on what changes are needed in the program to ensure its effectiveness as a supplementary nutrition program.

Convenience stores need more stringent requirements to participate in SNAP.

The "convenience store" category of EBT retailers is of particular concern (*e.g.,* gas stations, food marts, party stores). The majority of EBT trafficking occurs in these venues. These establishments typically do not stock the type of eligible food products that satisfy the original intent of the SNAP program. EBT redemptions often exceed eligible food inventory at these locations. We recommend increasing the minimum eligible food inventory requirements of the four major food groups to be stocked for sale at convenience store category retailers. An alternative option is to require EBT retailers to submit food inventory records on a frequency basis (quarterly or semi-annually) in order to reconcile with EBT redemptions which could serve as a deterrent to trafficking redemptions.

————

Submitted Letter by David B. Allison, Ph.D., Distinguished Quetelet Endowed Professor; Associate Dean for Research & Science; Director, Office of Energetics; Director, Nutrition & Obesity Research Center, Department of Nutrition Sciences, School of Health Professions, University of Alabama at Birmingham

Tuesday, February 14, 2017

Hon. K. Michael Conaway,
Chairman,
House Committee on Agriculture,
Washington, D.C.

Thank you for inviting me to testify before the House Committee on Agriculture for your February 16, 2017 meeting.

I regret that I will be unable to join you at that meeting, but instead wanted to offer you some thoughts, information, and materials that may be helpful to you and the Committee in your deliberations. I reference several articles below and include them, as well as my current CV,* as enclosed attachments to this e-mail.

Before proceeding further, I wish to emphasize that the opinions below are my own and I am not speaking on behalf of my university or any other organization.

I. The Challenge in Predicting Intervention Effects

Some individuals may assert that if society implements a particular policy, scientists can predict that it will have a particular effect on obesity levels. In the vast majority of cases, at present, such statements are unwarranted. This is so for two reasons.

First, human physiology and even more so human behavior are complex and insufficiently understood to permit confident conclusions about how even the average person will respond to some intervention, let alone to predict with confidence how any one individual will respond, without performing an experiment to actually observe the effects. That is why scientists do randomized controlled trials (RCTs) to test the effects of things. If you look at this website (*http://www.obesityandenergetics.org/*) under the category "Contrary or Null Findings," in each weekly entry, you will see many examples of this unpredictability of intervention effects. That does not mean that scientists have no ability to predict effects, but rather that our ability is rather limited.

Second, some will posit that if it is known that an intervention affects energy (calorie) intake or expenditure by a particular amount, then one can calculate the expected weight or obesity change that will result from such an intervention using validated mathematical models (for such a claim, see: *http://www.ajpmonline.org/*

———

* The document referred to is retained in Committee file.

article/S0749-3797(13)00269-9/abstract). The problem with such reasoning is that these calculations assume that people take no compensatory action, *i.e.,* that they do not change their food intake, physical patterns, or any other factors that influence weight in response to the proposed intervention. However, much evidence indicates that people do take such compensatory actions (see: *https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4516704/*). As a result, interventions generally have far lesser impact on body weight than one might initially predict.

II. Myths & Presumptions in Nutrition and Obesity.

Many academics or nutrition or obesity experts may assert that a particular thing is known to be true about nutrition or obesity. In some cases, they will be correct. However, experience shows that in many cases, propositions asserted to be true by such experts turn out to be either false or unsupported presumptions. Therefore, when any assertions are made, the complete scientific evidence supporting those assertions should be requested. Two papers which discuss the commonness of mistaken beliefs about nutrition or obesity are these:

- Casazza, K., Fontaine, K.R., Astrup, A., Birch, L., Brown, A.W., Bohan Brown, M.M., Durant, N., Dutton, G., Foster, E.M., Heymsfield, S.B., McIver, K., Mehta, T., Menachemi, N., Newby, P.K., Pate, R., Rolls, B. J., Sen, B., Smith, D. L., Thomas, D., & Allison, D. B. (2013). *Myths, Presumptions, and Facts about Obesity.* NEW ENGLAND JOURNAL OF MEDICINE, Jan. 31; 368(5): 446–54. doi: 10.1056/NEJMsa1208051. *https://www.ncbi.nlm.nih.gov/pubmed/23363498*.

- Allison D.B., Assaganya-Riera J., Burlingame B., Brown A., Le Coutre J., Dickson S.L., Van Eden W., Garssen J., Hontecillas R., Khoo C.S., Knorr D., Kussmann M., Magiestretti P.J., Mehta T., Meule Adrian, Rychlik M., & Vögele C. (2015). *Goals in Nutrition Science 2015–2020.* FRONTIERS IN NUTRITION, Sep 2015 2:26. doi: 10.3389/fnut.2015.00026. *http://journal.frontiersin.org/article/10.3389/fnut.2015.00026/abstract*.

III. Separating the Moral, Social, and Legal Issues from the Scientific Issues

It is important not to conflate the moral, social, and legal issues with the scientific issues in policy questions around nutrition and weight. The scientific information can inform the policy decision, but generally cannot determine the best policy decision, because moral, social, and legal factors are also involved. In some cases, moral, social, or legal factors may be overwhelming and may appropriately drive a decision largely independently of data.

You have asked me about the wisdom of restriction on purchases of certain food items with SNAP benefits.

Some persons might offer reasonable arguments for such restriction which rely minimally on data. Here the values of beneficence (wanting to help people) and responsible stewardship of taxpayer dollars predominate. Such persons could argue that certain foods (*e.g.,* confections, pastries, sugar-sweetened beverages) are luxuries which are unnecessary for life or health and without which most persons' health would be no worse and possibly better. Given that, it can be argued that: (a) It is in the best interests of SNAP participants (*i.e.,* beneficence) to not consume these items; and (b) It is questionable for the government to spend tax-payer money on items which are at best unnecessary and at worst harmful. By these arguments, one could, with little need to rely on specific data, argue for such exclusions.

Alternatively, other persons might offer reasonable arguments against such restriction which rely minimally on data. Here the values of autonomy (allowing people to make their own choices about their lives) and equity (not disadvantaging lower-income persons further and unduly hampering their access to goods others can partake of) predominate. Some might argue that these are important values and people should have a right to decide how to spend their resources on food and which food choices to make, however nutritionally sound or unsound those choices are.

The choice between the two perspectives above is largely not one that hinges on data, but rather on the differential value one places on beneficence and responsible stewardship of taxpayer dollars vs autonomy and equity. These are, of course, not the only values or factors that can be brought to bear on these questions. See:

- Brown, A. & Allison, D.B. (2013). *Unintended consequences of obesity-targeted health policy.* VIRTUAL MENTOR. 2013 Apr. 1; 15(4):339–46. doi: 10.1001/virtualmentor.2013.15.4.pfor2-1304. *http://journalofethics.ama-assn.org/2013/04/pfor2-1304.html*.

IV. Standards of Evidence for Scientific Conclusions *vs.* Policy Decisions

A frequent question is "what is the standard of evidence for effectiveness of a policy needed to justify a ***decision*** to enact a policy?" The answer is that there is no single standard that applies in all contexts and this is a matter of social and legal judgment, not scientific judgement. In contrast, there are standards (albeit with some judgement still involved) for drawing scientific ***conclusions*** about the effects of interventions or policies. I raise this important distinction because this distinction is sometimes blurred by those who feel strongly that it is reasonable to move forward with a ***decision*** to take some action. Such individuals sometimes seem to feel compelled to dispute a data-based ***conclusion*** that evidence is insufficient to show the proposed action will have its desired effects. However, definitiveness in a decision to act despite uncertainty about drawing a conclusion, poses no contradiction. These ideas are discussed more fully in these two papers.

- Allison, D.B. (2011). *Evidence, Discourse, and Values in Obesity-Oriented Policy: Menu-Labeling as a Conversation Starter.* INTERNATIONAL JOURNAL OF OBESITY, Apr.; 35(4): 464–71. *http://www.nature.com/ijo/journal/v35/n4/full/ijo201128a.html.*
- Richardson, M.B. Williams, M.S., Fontaine, K.R., & Allison, D.B. (in press). *The development of scientific evidence for health policies for obesity: why and how.* INTERNATIONAL JOURNAL OF OBESITY.

V. Information on Sugar Sweetened Beverages and Weight

You have specifically asked me about the effects of sugar-sweetened beverages (SSBs) on weight. Two papers I have written on this topic are:

- Kaiser, K.A., Shikany, J.M., Keating, K.D. & Allison, D.B. (2013). *Will reducing sugar-sweetened beverage consumption reduce obesity? Evidence supporting conjecture is strong, but evidence when testing effect is weak.* OBESITY REVIEWS, Aug.; 14(8): 620–33. doi: 10.1111/obr.12048. *https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3929296/.*
- Allison, D.B. (2014). *Liquid calories, energy compensation, and weight: what we know and what we still need to learn. Invited Commentary.* BRITISH JOURNAL OF NUTRITION, Feb.; 111(3):384–6. doi: 10.1017/S0007114513003309. *https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4973863/.*

VI. Biases and Emotion

The topics you are addressing are ones where many strong interests are at play. These interests include selfless interests in benefitting members of our country, economic interests, and personal interests. Consideration of this fact is important for at least two reasons:

A. Some will try to discredit the statements of individuals who have some connection to commerce involving food or agriculture,[1] based on claims that they are biased. In considering this, persons interested in reason and rationality should:

1. First and foremost note that in Science, three things matter: (a) The data; (b) The methods by which the data were collected which give them their probative value; and (c) The logic by which the data are connected to conclusions. Everything else is a distraction.

2. The claim that research produced by those with financial connections to food and agricultural commerce are biased has not been demonstrated. See:

   - *http://jamanetwork.com/journals/jamainternalmedicine/articleabstract/2517951.*
   - *https://www.theatlantic.com/health/archive/2017/01/the-limits-of-sugarguidelines/512045/.*
   - *http://journals.sagepub.com/doi/abs/10.1177/0162243912456271.*

3. Trying to overturn arguments or discredit individuals based on their personal characteristics is *argumentum ad hominem.* It is logically invalid, uncivil, and unethical. See:

   - *http://www.nature.com/ijo/journal/v38/n5/full/ijo201432a.html.*

---

[1] For the record, I disclose that I have received funds from multiple for-profit, not-for-profit, and government organizations with interests in nutrition and obesity, including commodity groups and food, beverage, and restaurant companies.

- *http://www.prnewswire.com/news-releases/the-obesity-society-encourages-science-industry-collaborations-to-support-obesity-science-public-health-252453321.html.*
- *http://utminers.utep.edu/omwilliamson/ENGL1311/fallacies.htm.*

B. Interests other than financial connections to for-profit groups can create biases. Therefore,the scientific bases of everyone's statements need to be scrutinized. See the articles below.

- Cope, M., Allison, D.B. (2010). *White Hat Bias: A Threat to the Integrity of Scientific Reporting.* ACTA PAEDIATRICA, Nov.; 99(11): 1615–7. *https://www.ncbi.nlm.nih.gov/pubmed/21039822*
- Cope, M. B. & Allison, D. B. (2010). *White Hat Bias: Examples of its Presence in Obesity Research and a Call for Renewed Commitment to Faithfulness in Research Reporting.* INTERNATIONAL JOURNAL OF OBESITY, 34(1): 84–8. *https://www.ncbi.nlm.nih.gov/pubmed/19949416.*

VII. Things You Can Do to Enhance The Science

Finally, there are things your Committee can do to enhance what society knows on questions about the effects of interventions. For questions such as "What is the effect of some intervention on health or weight," the best way to answer that question, if feasible, is with randomized controlled trials (RCTs).

- When such trials exist, your Committee could request the raw data from all investigators who have conducted these RCTs and commission a statistician to analyze all the data together in an open and transparent manner and issue a public report to you.
- When such trials do not exist or are insufficient to generate confident conclusions, your Committee could take steps to have a large, statistically powerful, well-designed RCT commissioned and executed.

In doing so, you would add substantially to our objective knowledge about outcomes.

I hope this information is helpful to you in your deliberations.

Sincerely,

DAVID B. ALLISON, PH.D.

ATTACHMENT 1

The Caloric Calculator: Average Caloric Impact of Childhood Obesity Interventions

August 2013

Y. Claire Wang, M.D., Sc.D., Amber Hsiao, M.P.H., C. Tracy Orleans, Ph.D., Steven L. Gortmaker, Ph.D.*

This activity is available for CME credit. See page A4 for information.

Background: The childhood obesity epidemic reflects the daily accumulation of an "energy gap"—excess calories consumed over calories expended. Population-level interventions to reverse the epidemic can be assessed by the degree to which they increase energy expenditure and/or reduce caloric intake. However, no common metric exists for such comparative assessment.

Purpose: To develop a common metric, the Average Caloric Impact (ACI), for estimating and comparing population-level effect sizes of a range of childhood obesity interventions.

*From the Department of Health Policy & Management (Wang, Hsiao), Mailman School of Public Health, Columbia University, New York, New York; the Robert Wood Johnson Foundation (Orleans), Princeton, New Jersey; and Department of Society, Health, and Human Development (Gortmaker), Harvard School of Public Health, Cambridge, Massachusetts

Address correspondence to: Y. Claire Wang, M.D., Sc.D., Department of Health Policy and Management, Mailman School of Public Health, Columbia University, 600 W 168th St, Rm 602 New York NY 10032. E-mail: *Ycw2102@columbia.edu.*

Methods: An iterative, collaborative process was used to review literature from 1996 to 2012 and select illustrative interventions showing effects on youth diet and/or activity levels, energy balance, and weight. The ACIs of physical activity interventions were estimated based on program reach, frequency, duration, and intensity and mean body weight of the targeted age and gender group from the 2009–2010 National Health and Nutrition Examination Survey. ACIs of dietary interventions were based on reach and changes in foods and/or beverages consumed.

Results: Fifteen interventions informed by 29 studies were included, ranging from individual behavioral to population-level policies. A web tool, the Caloric Calculator, was developed to allow researchers and policymakers to estimate the ACIs of interventions on target populations with reference to energy gap reductions required to reach the nation's Healthy People childhood obesity goals.

Conclusions: The Caloric Calculator and ACIs provide researchers and policymakers with a common metric for estimating the potential effect sizes of various interventions for reducing childhood obesity, providing a platform for evidence-based dialogues on new program or policy approaches as data emerge.

(*Am. J. Prev. Med.* 2013; 45(2): e3–e13) ©2013 *American Journal of Preventive Medicine*.

Background

The obesity epidemic costs the U.S. \$147–\$210 billion in annual healthcare costs.[1] Although the trends have shown some signs of leveling, more than ⅓ of U.S. adults and nearly 17% of children and adolescents are obese.[2] As a result, it was predicted that one in three children born in 2000 would be diagnosed with type 2 diabetes in his or her lifetime.[3]

The rise in childhood obesity since the early 1970s reflects the accumulation of the small daily "energy gap"—the excess of calories consumed over calories expended.[4–5] Previous analyses estimated that an average surplus of 110–165 kcal/day in energy accounted for the excess weight gain seen in U.S. children and youth over a 10 year period.[4] Thus, effective interventions would have to bring about a net reduction in this energy gap to reverse the epidemic. A recent study estimated that among U.S. children aged 2–19 years, a net reduction of 64 kcal/day per capita in energy surplus would be needed to achieve the Healthy People 2020 childhood obesity goals, with a range from 22 kcal/day for those aged 2–5 years, to 77 kcal/day for those aged 6–11 years, 98 kcal/day for those aged 12–19 years, and much higher levels among those who are already overweight or obese.[5]

The evidence base for population-level interventions to reduce childhood obesity levels has grown rapidly, ranging from strategies to change individual behaviors to those that seek to alter policies, environments, and social norms. In most cases, however, these policies or programs are evaluated independently. No common metric exists to allow comparative assessments of effects across interventions with varied configurations for a target population.[6–7]

In the current paper, the Average Caloric Impact (ACI) is proposed as a metric to gauge the population-level average effect on daily calories expended/consumed. This metric was applied to an illustrative set of interventions evaluated in the literature. Greater emphasis was placed on population-, school-, or state-level programs than on medical treatments of overweight/obese youth. The results are presented using a user-friendly web tool, the Caloric Calculator.

Methods

Selection of Interventions

Using recently published reviews, a set of obesity prevention interventions targeting U.S. children and adolescents aged 2–5 years (preschool); 6–11 years (primary school); 12–14 years (middle school); and/or 15–18 years (high school) was selected. Target populations were defined by grade level based on the divisions within the typical K–12 system. Mean height and weight for each age group (by gender) were based on the nationally representative 2009–2010 National Health and Nutrition Examination Survey (NHANES).

From an initial list of 67 studies published between 2000 and 2009, as reviewed by Brennan, *et al.,*[8] only seven physical activity interventions were included that lasted >6 months and reported outcome measures that were sufficient to have an influence on calories. For example, several studies of school lunch programs or wellness policies were excluded because they reported consumption of only specific nutrients (*e.g., %* fat), and/or servings of fruits and vegetables, rather than changes in total calories consumed or body weight. Similarly, many evaluations of physical

activity programs did not use objective measures of activity levels (*e.g.,* accelerometers) and thus were unable to inform changes in energy expenditure.

An iterative and collaborative process was used to identify an additional 22 studies published between 1996 and 2012; of these, 12 were empirical studies that met the research design and measurement standards used in the Brennan, *et al.,* review. The remaining studies provided inputs for the model-based estimates. For dietary interventions selected, the studies assessed changes in daily caloric intake before and after the intervention (*e.g.,* California schools' competitive foods standards).[9] For studies reporting changes in consumption of particular foods and/or beverages, published estimates on the average caloric contribution of these foods and beverages in the indicated setting (*e.g.,* removing sugar-sweetened beverages from schools)[10] were used. Strategies were categorized by implementation level (individual, school, state/national). Because empirical data were lacking for some strategies (*e.g.,* promoting walking to schools), analytic models were used to incorporate available evidence to estimate the likely caloric effect of these strategies, if broadly implemented.

Caloric Impact Calculations

Physical activity interventions. The physical activity interventions were placed into one of the following categories: (1) varied school physical education (PE) classes; (2) school PE interventions designed to increase moderate-to-vigorous physical activity (MVPA) levels to achieve more active PE; (3) afterschool physical activity programs; and (4) active commuting (*e.g.,* walking) to school. When multiple high-quality studies were available within a category, the study with the largest effect size was typically used to represent the best-possible outcome and population-level implementation.

The effect of the intervention on daily caloric impact was estimated based on the calculated basal metabolic rate (BMR, which is a function of age, gender, and body weight), as well as the frequency (*e.g.,* twice a week); duration (*e.g.,* 30 minutes); and the intensity of the physical activity (*e.g.,* moderate/vigorous). BMR for an average-weight child is calculated based on published equations.[11] Intervention intensity was estimated in METs, representing the amount of energy expended from carrying out a specific activity relative to sitting quietly (MET value of 1.0) for a defined period of time. For instance, walking at a pace of 3 miles per hour represents an average intensity of 3.3 METs, which burns 3.3 times as many calories than sitting quietly for the same individual.[12]

Pre-intervention activity levels were based on published baseline measures of study participants and/or national averages. When MET values were not reported, activity-specific MET values from the Ainsworth Compendium for adults[12] were combined with calculated youth-specific BMR estimates, following recommendations by Ridley, *et al.*[13] *Table 1* provides examples of how various inputs affect the number of calories expended by different physical activity interventions.

Dietary interventions. Dietary interventions were similarly reviewed and categorized. For example, a number of interventions only measured changes in fruit and vegetable intake, and were excluded because net impact on caloric intake could not be estimated. One study that empirically measured the caloric impact of competitive food policies in high schools was included.[9] The other five dietary interventions (*e.g.,* reducing intake of calories from chips) were estimated based on the authors' calculations.

For policy interventions with limited direct, empirical data (*e.g.,* removing sugar-sweetened beverages [SSBs] from schools, and a portion-size cap on sugary drinks sold in New York City),[14] dietary data from NHANES were used to inform the baseline consumption level among those who would be hypothetically affected by the policy. For example, NHANES 1999–2004 showed that SSBs contributed an average of 224 kcal/day to the overall caloric intake of U.S. children and adolescents, and 7–15% of SSBs were consumed in schools.[10] The estimated caloric impact of replacing all SSB intake from schools (in session 180 days a year) with water was averaged across the whole calendar year.

Combined physical activity/dietary interventions. Sonneville and Gortmaker[15] have estimated that every 1 hour increase in TV watching is associated with a 105.5-kcal increase in net total energy intake, or a 92-kcal increase in energy intake for video- or computer-game playing. Their findings are consistent with a previously published randomized trial, which found that reducing TV watching among children led to lower caloric intake.[16] It was hypothesized that children who spend more time watching TV or playing video games may be more exposed and/or influenced by food advertising through characters present in commercials and interactive games that can shape food preferences and intake.[17–19]

Table 1. Daily Caloric Effects of Physical Activity for Select Groups Using Schofield Equations

Population	Average weight (kg)	Schofield equation (BMR=)[a]	Intervention	Inputs			
				Δ METs	Duration (minutes/day)	School-based?[b]	Caloric effect (kcal/day)[c]
Boys, age in years:							
2–5	18	22.706 kg + 504.3	Add 30 minutes/day of walking	2.3	30	No	44
6–11	34	22.706 kg + 504.3	Add 30 minutes/day of jogging	7	30	No	186
12–14	59	17.686 kg + 658.2	Add 15 minutes/day of PE	2.6	15	Yes	23
15–18	77	17.686 kg + 658.2	Implement SPARK	3.5	30	Yes	73
Girls, age in years:							
2–5	17	20.315 kg + 485.9	Add afterschool program	3.5	10.5	Yes	11
6–11	35	13.384 kg + 485.9	Make PE more active	Varies[d]	60	Yes	9
12–14	57	13.384 kg + 692.6	Add 30 minutes/day of PE	2.6	30	Yes	39
15–18	65	13.384 kg + 692.6	Add 10 minutes/day of jogging	7	10	No	76

[a] The Schofield equations are grouped by gender and age groups (broken down as 0–3 years, 3–10 years, and 10–18 years). Because of this, some age groups have the same equations.

[b] If the intervention is applied over a full school year, it multiples the caloric impact by 180 days. This is then averaged over 365 days to account for no change in activity on holidays, weekends, and summer vacation.

[c] Daily caloric impact = (BMR × Δ METs × duration in minutes) ÷ 1,440 minutes/day.

[d] The MET value for "Make PE more active" is a composite of MET values from five different activities, based on the Ainsworth Compendium:[12] lying down, sitting, standing, walking, and running. The change in METs from the intervention depends on user input of baseline *versus* target % MVPA. BMR, basal metabolism rate; MVPA, moderate-to-vigorous physical activity; PE, physical education; SPARK, Sports, Play, and Active Recreation for Kids.

Online "Caloric Calculator" Tool

Accompanying the current paper is a web-based tool (*www.caloriccalculator.org*) designed to help users visualize and query the estimated caloric effects of defined interventions within a defined target population. Programmed in PHP script for HTML, the tool allows users to choose one or more interventions and customize their configurations. For example, the user can select as the target "Boys" and "Middle School (12–14)" from the dropdown menu, and "implement" an intervention to increase PE intensity (*e.g.,* moderate/vigorous) for a duration of time by specifying the baseline MVPA (default is 37%) and desired post-intervention level (*e.g.,* 50% as recommended).[20]

The resulting caloric effect is benchmarked against two "energy gap" goals: to return the prevalence of obesity to (1) the early 1970s and/or (2) the Year-2000 levels. The former more ambitious goal corresponds to the original goals set in Healthy People 2010;[21] the latter provides a rough estimate of the current, more modest Healthy People 2020 goals.[22] The methodology underlying the calculations of these targets for various population subgroups has been described previously.[5] All interventions listed assume that no compensatory changes affecting daily energy balance occur, beyond any effects observed in the empirical studies cited. For example, the ACI of increasing MVPA from 37% to 50% during PE classes assumes that students will not consume additional calories to compensate for additional physical activity, or that removing a food item from one's diet does not result in increased consumption of other foods or beverages.

Results

The estimated caloric effect of the 15 interventions in the tool, by gender and age group, are summarized in *Tables 2* and *3*. For instance, for high school boys and girls, adding 15 minutes of PE time per day for a full school year was estimated to increase mean energy expenditure by 25 kcal/day; replacing SSBs with water in schools for the same group would reduce mean energy intake by 15 kcal/day. For this group, however, an average per capita reduction of 82 kcal/day in energy surplus would be needed to meet the Healthy People 2020 obesity prevalence goal of reducing obesity rates from 20.8% to 14.8%. Returning to the early 1970s level of obesity prevalence—the target set by the more ambitious Healthy People 2010 goal—would require an average per capita reduction in energy gap of 217 kcal/day. These estimates suggest that although any single intervention may not be sufficient to achieve the Healthy People goals, substantial progress could be made through a combination of feasible, sustained policy and environmental interventions.

Table 2. Caloric Impact of Physical Activity Interventions for Average Student, By Age Group

Intervention	Population (age group, years)	Inputs for caloric calculations			Assumptions
		Target METs[a]	Avg.weight (lbs)[b]	Avg. caloric impact (kcal/day)	
Modeled estimates					
Add walking at a 3-mph pace, 15 minutes/day	Both (2–5) Both (6–11) Both (12–14) Both (15–18)	3.3 3.3 3.3 3.3	39 76 127 157	21 30 38 43	Same baseline (1.0, sitting quietly) and target METs for all ages, based on Ainsworth, *et al.,*[12] and Ridley, *et al.*[13]
Add jogging at a 5-mph pace, 15 minutes/day	Both (2–5) Both (6–11) Both (12–14) Both (15–18)	8.0 8.0 8.0 8.0	39 76 127 157	64 90 115 130	Same baseline (1.0, sitting quietly) and target METs for all ages, based on Ainsworth, *et al.,*[12] and Ridley, *et al.*[13]
Walking to and from school (roundtrip)	Both (2–5) Both (6–11) Both (12–14) Both (15–18)	3.3 3.3 3.3 3.3	39 76 127 157	9 12 15 17	Intervention model estimates based on METs from Ainsworth, *et al.,*[12] and Ridley, *et al.,*[13] and published data on average distances from schools and students living within 1 mile of school.[23–24] Caloric impact estimate uses METs of 1.0 as baseline (*i.e.,* sitting in car). Implemented for a full academic year.[b]
Empirical estimates					
Add school PE time, 15 minutes/day	Both (2–5) Both (6–11) Both (12–14) Both (15–18)	3.4 3.4 3.6 3.7	39 76 127 157	11 15 21 25	McKenzie, *et al.,*[25] estimate 3.4 METs for elementary school PE. Same value used for preschool. Nader, *et al.,*[26] estimate 3.6 METs for middle school PE. Smith, *et al.,*[27] estimate 3.7 METs for high school PE. Implemented for a full academic year.[b]
Make current PE more active, 30 minutes/day	Both (2–5) Both (6–11) Both (12–14) Both (15–18)	4.5 4.5 4.5 4.5	39 76 127 157	3 4 6 6	MET values used at baseline and target is a composite of estimated MET values, based on Wu, *et al.,*[7] and Ainsworth, *et al.,*[12] (4.5 METs) for MVPA, 1.8 METs for non-MVPA). Because of high variance in METs, baseline activity levels, and population characteristics between CATCH,[20, 26, 28–29] MSPAN,[25] and TAAG[30–35] interventions, same averaged MVPA% used for all age groups. Changing the intensity of current PE time (not adding additional PE time). Base case increases MVPA from 37% to 50%, based on DHHS national recommendation.[20] Implemented for a full academic year.[b]
Implement SPARK using only PE specialists to teach PE, 30 minutes/day	Both (2–5) Both (6–11) Both (12–14) Both (15–18)	7.2 7.2 7.2 7.2	39 76 127 157	34 48 58 64	7.2 METs for PE specialists for SPARK intervention from McKenzie, *et al.,*[36] and Sallis, *et al.,*[37] used in calculation to demonstrate maximum potential of intervention (compared to 5.8 METs for trained classroom teachers). Adding PE time to existing PE time. Baseline METs assumed to be 3.4 for preschool and elementary,[25] 3.6 for middle,[26] and 3.7 for high school.[27]
Add afterschool physical activity program	Both (2–5) Both (6–11) Both (12–14) Both (15–18)	4.5 4.5 4.5 4.5	39 76 127 157	11 16 20 22	Gortmaker, *et al.,*[38] estimate ≥4.0 METs in intervention. 4.5 METs is used here as a conservative composite target based on Wu, *et al.*[7] Same baseline (1.0, sitting quietly) and target METs for all ages, based on Ainsworth, *et al.,*[12] and Ridley, *et al.*[13] Implemented for a full academic year.[b]

[a] METs expresses how much energy is needed for physical activities. Caloric impacts expressed in this table are calculated assuming the physical activity is above a baseline of 1.0 METs (except where noted, as with implementing SPARK), which is the baseline resting metabolic rate when sitting quietly.

[b] Intervention is applied over a full school year (on average, 180 days). The total caloric impact is averaged over 365 days to account for no change in activity on holidays, weekends, and summer vacation. CATCH, The Child and Adolescent Trial for Cardiovascular Health; MSPAN, The Middle-School Physical Activity and Nutrition intervention; MVPA, moderate-to-vigorous physical activity; PE, physical education; SPARK, Sports, Play, and Active Recreation for Kids; TAAG, The Trial of Activity for Adolescent Girls.

Table 3. Caloric Impact of Dietary and Other Interventions for Average Student By Group

Intervention	Population (age group, years)	Inputs for caloric calculations			Assumptions
		Amount [a]	Affected pop., % [b]	Avg. caloric impact (kcal/day)	
Modeled estimates					
Reduce unhealthy food intake	All All	1-oz bag of chips per day 1 cookie per day	100 100	154 55	Intervention models estimates based on published caloric values of average bag of regular potato chips and single Oreo cookie.
Reduce SSB intake	All All	12-oz can per day 20-oz bottle per day	100 100	136 240	Intervention models estimates based on published caloric values of average can or bottle of regular caffeinated cola.
Replace SSBs with water in schools	Both (2–5) Both (6–11) Both (12–14) Both (15–18)	124 184 301 301	5.5 6.5 10.3 10.3	3 6 15 15	Affected population and amounts based on published analysis from Wang, et al.[10] Implemented for a full academic year.[c]
Switch from 1 cup of sugary cereals to cereals scored highest in nutritional quality	Both (2–5) Boys (2–5) Girls (2–5) Both (6–11) Boys (6–11) Girls (6–11) Both (12–14) Boys (12–14) Girls (12–14) Both (15–18) Boys (15–18) Girls (15–18)	0.64 cups 0.64 cups 0.64 cups 0.93 cups 0.93 cups 0.94 cups 1.16 cups 1.32 cups 1.0 cups 1.15 cups 1.25 cups 1.06 cups	48.4 47.3 49.6 39.5 40.2 38.8 34.5 35.5 33.5 26.6 26.1 27.0	7 7 7 6 6 6 5 5 5 4 4 4	Averaged grams/cup and standardized serving sizes of top ten[39] and bottom ten[40] cereals by nutrition score, as determined by *CerealFACTS. org.*[41] Affected population and average grams/serving consumed based on analysis of NHANES 2007–2010 data on 24-hour dietary recall. Proportion of cups consumed in Amount column based on standardized 39.2 grams/cup (as described above), and grams/serving from NHANES.
Pass NYC's proposed sugary drink size limit	Both (2–5) Boys (2–5) Girls (2–5) Both (6–11) Boys (6–11) Girls (6–11) Both (12–14) Boys (12–14) Girls (12–14) Both (15–18) Boys (15–18) Girls (15–18)	24.2 21.1 32.3 67.9 70.0 64.9 93.6 109.3 77.7 111.8 120.3 100.1	0.6 0.9 0.4 5.1 6.1 4.2 9.4 10.1 8.7 13.3 15.3 11.2	0 0 0 3 4 3 9 11 7 15 18 11	Amount is average kilocalorie reduction per day if limited consumption to 16 oz/day as in Elbel, *et al.*,[42] and Wang, *et al.*[14] Affected population and average kilocalorie reduction based on analysis of NHANES 2007–2010 data on 24-hour dietary recall. Those consuming >16 oz limit consumption to maximum of 16 oz/day No "upsizing" occurs (*i.e.,* individuals purchase more than one 16-oz beverage to compensate for size limit). SSB definition includes sodas, sports drinks, fruit drinks and punches, low-calorie drinks, sweetened tea, and other sweetened beverages consumed in food service establishments. Implemented nationally.
Empirical estimates					
Pass California's competitive food nutrition standards in high schools nationally	Both (15–18)	157.8	100	78	Taber, *et al.*,[9] estimate 157.9 kcal per weekday fewer calories consumed in California high schools, compared to 14 other states with weaker competitive food laws states. The intervention only applies to high school students. Implemented for a full academic year.[c]
Reduce TV viewing, 60 minutes/day	All	106	100	106	Sonneville and Gortmaker[38] estimate TV watching and video/computer game playing associated with 105.5-kcal/hour and 91.8-kcal/hour increase in total energy intake in boys aged 13–15 years and girls aged 12–14 years. Epstein, *et al.*,[16] and Miller, *et al.*,[18] report similar changes in energy intake.
Reduce video- or computer-game playing time, 60 minutes/day	All	92	100	92	Same calorie change for other age groups

[a] The amount designates the current pre-intervention consumption level of the item by the selected population; amounts are kilocalories unless otherwise specified.

[b] The impact designates the percentage of the selected eligible population that is affected by the intervention.

[c] Intervention is applied over a full school year (on average, 180 days). The total caloric impact is averaged over 365 days to account for no change in activity on holidays, weekends, and summervacation.

NHANES, National Health and Nutrition Examination Survey; NYC, New York City; SSB, sugar-sweetened beverage.

Many of the ACI estimates built into the Caloric Calculator require stipulated assumptions, which are shown in detail in *Tables 2* and *3,* as well as within the web tool. For example, the calculations of energy expended through increased MVPA

during PE involved the following assumptions: a national baseline of 37% MVPA during PE time,[28] a target level of 50% recommended by the CDC,[20] and 180 school days a year for school-based interventions. The assumed MET level for non-MVPA PE time was estimated as 1.8 METs, using an average of lying down, sitting, and standing.[12]

The time spent on MVPA was estimated to be 4.5 METs based on the average of moderate physical activity (3 METs) and vigorous physical activity (6 METs).[7] For example, for a typical high school adolescent (average weight: 157 lbs), increasing MVPA from 37% to 50% during a daily 30 minute PE class for a school year was estimated to produce an average increase in energy expenditure of 6 kcal/day—clearly insufficient on its own to reverse the childhood obesity epidemic. Further, even this small effect could potentially be diminished if compensation occurred for this additional caloric expenditure with increased food or beverage consumption.

It is important to note that all estimates used in creating the Caloric Calculator were population-based. In addition, for interventions designed to remove a particular food or beverage from the diet, caloric benefits were accrued only from the population affected (*e.g.,* the population affected by the NYC sugary drink portion-size cap was presumed to include those consuming sugary beverages of >16 ounces per serving, estimated to include only 12% of adolescents aged 12–19 years).[14]

Discussion

Reversing the nation's current childhood obesity epidemic will require multiple individual, behavioral, policy, environmental, and normative changes—through public health and clinical strategies—to reverse the daily accumulation of a positive "energy gap" that brought us to this point. New evidence from New York City,[43] Philadelphia,[44] California,[9, 45] and Mississippi[46] demonstrates that broad approaches involving multifaceted policies and environmental strategies have the power to halt and reverse the trend.[47] However, what has been missing is a metric for estimating the individual and combined effects of specific interventions to increase children's activity levels and reduce their intake of energy-dense, low-nutrient foods and beverages.

This paper expands on the previously published "energy gap" framework—which estimated the magnitude of energy surplus underlying the obesity epidemic among U.S. youth[4–5]—to examine the effects of various interventions, alone or in combination, to favorably tip the energy balance. The lack of a common metric for comparing the effectiveness of strategies with differing behavioral targets (*i.e.,* reducing excess caloric intake and/or increasing physical activity) has stymied past efforts to apply analytic tools to rank existing strategies on their contribution to reversing the childhood obesity trend. The development and application of the Average Caloric Impact (ACI) metric and the Caloric Calculator tool offer an opportunity to fill this gap.

Although the Caloric Calculator begins to address these issues, there are nuances in the obesity reduction equation that will require further research and discussion. The evidence used to estimate ACIs is still in many ways limited and dependent on the rigor of existing intervention studies and on the availability and reliability of intervention outcome measures (*e.g.,* the use of objectively measured, *versus* self-reported, outcomes or ecologic associations that can be examined across studies). In addition, many studies focus narrowly on specific populations, such as middle school girls[30] or a specific age range.[29, 36, 37]

Most challenging at this stage in childhood obesity prevention research is the lack of high-quality studies with a sufficiently long follow-up. A 2011 Cochrane review of obesity prevention efforts found that only 14 of the 55 included studies had interventions lasting more than 12 months, most of which focused only on children aged 6–12 years. There is virtually no evidence from studies aimed at younger children to determine whether intervention benefits can be sustained into later adolescence or adulthood.[6] Therefore, it would be inaccurate to make predictions of weight change from fixed caloric changes using these estimates, particularly given the multitude of factors that drive weight change over time[48] and the large changes seen from childhood to adolescence.[49]

Study populations also have varied widely with respect to racial/ethnic composition, SES, and prevalence of obesity at baseline, limiting the generalizability and comparability of intervention effects. Thus, the tool represents the authors' best effort to assess the average impact if these programs were broadly implemented. Local contexts and subpopulation characteristics are likely to modify the actual outcomes. The estimates will continue to be refined and updated as new data emerge from periodic scans of newly published data and feedback from collaborators in the field of childhood obesity prevention. Going forward, the Calculator will be further developed to address specific subsets of the population or allow more user inputs to facilitate broader dissemination and policy discussions. For example, a principal of a dis-

proportionately low-income school could use the tool based on the school's demographics, or parents could use the tool by entering their child's age, gender, and body weight.

Despite these limitations, there is value in the Caloric Calculator's ability to translate evidence into practice by generating caloric impact estimates and projecting the potential cumulative effects of multicomponent interventions addressing one or both sides of the energy balance equation. The ACI is a summary measure of several dimensions of the program or policy evaluated: reach, effectiveness/efficacy, adoption, implementation, and maintenance.[50] These dimensions also convey why the net caloric impact of the same program will vary from population to population when implemented in the real world. As such, the tool is expected to offer a starting point to support policymakers and practitioners in using existing evidence to drive decision making in a more straightforward manner.

The development of a common metric can lay the groundwork for more evidence-based resource allocation decisions, both in program implementation and in further evidence gathering. Future expansion of this framework may include finer granularity in the population targeted, such as overweight status, race/ethnicity, and urban/rural locations as well as concerns for equity, cost effectiveness, and other long-term outcomes.[47] Further, the current review underscored the need to encourage the evaluations of programs and policies to use and report objective and comparable outcome measures, such as changes in activity levels (*e.g.,* MET values); duration (*e.g.,* minutes of MVPA added); net changes in calories consumed in addition to key nutrients or diet quality; and measured BMI whenever possible.

Because the Caloric Calculator uses national data with the aim of estimating mean population-level effect sizes, the effect of an intervention is averaged across those who received and benefited from the program and those who did not. Therefore, an intervention that has a large effect but reaches only a small number of children may appear to have less of an impact at the population level. For example, an active transport program may target children who live within 1 mile of their school, which will reach at most 31% of children in Grades K–8.[23] The daily caloric impact, when averaged across all children, is therefore a fraction of the net caloric impact for those who participate in walking to school. Although not evaluated in the current study, the same consideration applies to interventions specifically targeted at overweight adolescents (who have an average energy gap of 700–1,000 kcal/day).[4]

It is important to note that although the analyses presented in this paper focus on intervention effects on daily energy gaps and obesity levels in youth, there are important health and nonhealth benefits gained from improving physical activity and diet that are not captured by the ACI measure. For instance, there is growing evidence that physical activity has beneficial effects on mental health outcomes and academic performance.[51] Similarly, an intervention to improve the nutritional quality of *à la carte* foods and beverages improves the overall nutritional profile of foods consumed at school despite having no significant effect on the total number of calories sold.[52–53]

Some investments in childhood obesity prevention have been projected to be cost effective.[54] But without knowing what types of interventions to invest in, efforts may fail to produce the expected results. There have been many controversial, yet noteworthy, recent policy recommendations that will be scaled up to the national level (*e.g.,* menu labeling). Without experimental evidence, however, it can be difficult to convince the public and policymakers of the implications and demonstrate the possible impact of implementation. The Caloric Calculator provides a novel tool for appraising these policies and interventions based on their potential efficacy, alone or combined, providing an evidence-based platform to inform practice and policy.

References

1. Trust for America's Health and the Robert Wood Johnson Foundation. *F as in fat: how obesity threatens America's future 2012.* healthyamericans.org/report/100/2012.

2. Ogden C.L., Carroll M.D., Kit B.K., Flegal K.M. *Prevalence of obesity and trends in body mass index among U.S. children and adolescents, 1999–2010.* JAMA 2012; 307(5): 483–90.

3. Narayan K.M., Boyle J.P., Thompson T.J., Sorensen S.W., Williamson D.F. *Lifetime risk for diabetes mellitus in the U.S.* JAMA 2003; 290(14): 1884–90.

4. Wang Y.C., Gortmaker S.L., Sobol A.M., Kuntz K.M. *Estimating the energy gap among U.S. children: a counterfactual approach.* PEDIATRICS 2006; 118(6): e1721–e1733.

5. Wang Y.C., Orleans C.T., Gortmaker S.L. *Reaching the healthy people goals for reducing childhood obesity: closing the energy gap.* AM. J. PREV. MED. 2012; 42(5): 437–44.

6. Waters E., de Silva-Sanigorski A., Hall B.J., *et al. Interventions for preventing obesity in children.* COCHRANE DATABASE SYST. REV. (Online) 2011(12): CD001871.

7. Wu S., Cohen D., Shi Y., Pearson M., Sturm R.. *Economic analysis of physical activity interventions.* AM. J. PREV. MED. 2011; 40(2): 149–58.

8. Brennan L., Castro S., Brownson R.C., Claus J., Orleans C.T. *Accelerating evidence reviews and broadening evidence standards to identify effective, promising, and emerging policy and environmental strategies for prevention of childhood obesity.* ANNU. REV. PUBLIC HEALTH 2011; 32: 199–223.

9. Taber D.R., Chriqui J.F., Chaloupka F.J.. *Differences in nutrient intake associated with state laws regarding fat, sugar, and caloric content of competitive foods.* ARCH. PEDIATR. ADOLESC. MED. 2012; 166(5): 452–8.

10. Wang Y.C., Bleich S.N., Gortmaker S.L. *Increasing caloric contribution from sugar-sweetened beverages and 100% fruit juices among U.S. children and adolescents, 1988–2004.* PEDIATRICS 2008; 121(6): e1604–e1614.

11. Schofield W.N. *Predicting basal metabolic rate, new standards and review of previous work.* HUM. NUTR. CLIN. NUTR. 1985; 39(S 1): 5–41.

12. Ainsworth B.E., Haskell W.L., Whitt M.C., *et al. Compendium of physical activities: an update of activity codes and MET intensities.* Med. Sci. Sports Exerc. 2000; 32(9S): S498–S504.

13. Ridley K., Olds T.S. *Assigning energy costs to activities in children: a review and synthesis.* MED. SCI. SPORTS EXERC. 2008; 40(8): 1439–46.

14. Wang Y., Vine S. *Caloric impact of a 16-ounce portion size cap on sugar-sweetened beverages served in restaurants.* AM. J. CLIN. NUTR. 2013 [In Press].

15. Sonneville K.R., Gortmaker S.L. *Total energy intake, adolescent discretionary behaviors and the energy gap.* INT. J. OBES. 2008; 32(S6): S19–S27.

16. Epstein L.H., Roemmich J.N., Robinson J.L., *et al. A randomized trial of the effects of reducing television viewing and computer use on body mass index in young children.* ARCH. PEDIATR. ADOLESC. MED. 2008; 162(3): 239–45.

17. Guran T., Bereket A. *International epidemic of childhood obesity and television viewing.* MINERVA PEDIATR. 2011; 63(6): 483–90.

18. Miller S.A., Taveras E.M., Rifas-Shiman S.L., Gillman M.W. *Association between television viewing and poor diet quality in young children.* INT. J. PEDIATR. OBES. 2008; 3(3): 168–76.

19. *Healthy Eating Research. Food and beverage marketing to children and adolescents: an environment at odds with good health.* Robert Wood Johnson Foundation, 2011.

20. DHHS. *Strategies to improve the quality of physical education.* Washington D.C.: CDC, National Center for Chronic Disease Prevention and Healthy Promotion, Division of Adolescent and School Health, 2010.

21. DHHS, Office of Disease Prevention and Health Promotion. *Healthy People 2010: nutrition and overweight.* hp2010.nhlbihin.net/2010Objs/19Nutrition.html.

22. DHHS, Office of Disease Prevention and Health Promotion. *Healthy People 2020: nutrition and weight status. 2012.* www.healthypeople.gov/2020/topicsobjectives2020/objectiveslist.aspx?topicId=29.

23. McDonald N.C., Brown A.L., Marchetti L.M., Pedroso M.S. *U.S. school travel, 2009 an assessment of trends.* AM. J. PREV. MED. 2011; 41(2): 146–51.

24. National Center for Safe Routes to School. *How children get to school: school travel patterns from 1969 to 2009.* November 2011.

25. McKenzie T.L., Sallis J.F., Prochaska J.J., Conway T.L., Marshall S.J., Rosengard P. *Evaluation of a two-year middle-school physical education intervention: M–SPAN.* MED. SCI. SPORTS EXERC. 2004; 36(8): 1382–8.

26. Nader P.R. *Frequency and intensity of activity of third-grade children in physical education.* ARCH. PEDIATR. ADOLESC. MED. 2003; 157(2): 185–90.

27. Smith N.J., Lounsbery M.A., McKenzie T.L. *Physical activity in high school physical education: impact of lesson context and class gender composition.* J. PHYS. ACT. HEALTH 2013: In Press.

28. McKenzie T.L., Nader P.R., Strikmiller P.K., *et al. School physical education: effect of the Child and Adolescent Trial for Cardiovascular Health.* PREV. MED. 1996; 25(4): 423–31.

29. Kelder S., Hoelscher D.M., Barroso C.S., Walker J.L., Cribb P., Hu S. *The CATCH Kids Club: a pilot after-school study for improving elementary students' nutrition and physical activity.* PUBLIC HEALTH NUTR. 2005; 8(2): 133–40.

30. Stevens J., Murray D.M., Catellier D.J, *et al. Design of the Trial of Activity in Adolescent Girls (TAAG).* CONTEMP. CLIN. TRIALS 2005; 26(2): 223–33.

31. Baggett C.D., Stevens J., Catellier D.J., *et al. Compensation or displacement of physical activity in middle-school girls: the Trial of Activity for Adolescent Girls.* INT. J. OBES. 2010; 34(7): 1193–9.

32. Elder J.P., Shuler L., Moe S.G., *et al. Recruiting a diverse group of middle school girls into the trial of activity for adolescent girls.* J. SCHOOL HEALTH 2008; 78(10): 523–31.

33. Gittelsohn J., Steckler A., Johnson C.C., *et al. Formative research in school and community-based health programs and studies: "state of the art" and the TAAG approach.* HEALTH. EDUC. BEHAV. 2006; 33(1): 25–39.

34. Webber L.S., Catellier D.J., Lytle L.A., *et al. Promoting physical activity in middle school girls: Trial of Activity for Adolescent Girls.* AM. J. PREV. MED. 2008; 34(3): 173–84.

35. Young D.R., Johnson C.C., Steckler A., *et al. Data to action: using formative research to develop intervention programs to increase physical activity in adolescent girls.* HEALTH EDUC. BEHAV. 2006; 33(1): 97–111.

36. McKenzie T.L., Sallis J.F., Kolody B., Faucette F.N. *Long-term effects of a physical education curriculum and staff development program: SPARK.* RES. Q. EXERC. SPORT 1997; 68(4): 280–91.

37. Sallis J.F., McKenzie T.L., Alcaraz J.E., Kolody B., Faucette N., Hovell M.F. *The effects of a 2-year physical education program (SPARK) on physical activity and fitness in elementary school students. Sports, Play and Active Recreation for Kids.* AM. J. PUBLIC HEALTH 1997; 87(8): 1328–34.

38. Gortmaker S.L., Lee R.M., Mozaffarian R.S., *et al. Effect of an after-school intervention on increases in children's physical activity.* MED. SCI. SPORTS EXERC. 2012; 44(3): 450–7.

39. Cereal FACTS. *Top 10 cereals by nutrition score.* n.d.; cerealfacts.org/cereal_nutrition_advanced_earch.aspx?l=t.

40. Cereal FACTS. *Bottom 10 cereals by nutrition score.* n.d.; cerealfacts.org/cereal_nutrition_advanced_search.aspx?l=b.

41. Yale Rudd Center for Food Policy & Obesity. *Limited progress in the nutrition quality and marketing of children's cereals,* 2012.

42. Elbel B., Cantor J., Mijanovich T. *Potential effect of the New York City policy regarding sugared beverages.* N. ENGL. J. MED. 2012; 367(7): 680–1.

43. CDC. *Obesity in K–8 students—New York City, 2006–07 to 2010–11 school years.* MMWR MORBID MORTAL WKLY. REP. 2011; 60(49): 1673–8.

44. Robbins J.M., Mallya G., Polansky M., Schwarz D.F. *Prevalence, disparities, and trends in obesity and severe obesity among students in the Philadelphia, Pennsylvania, school district, 2006–2010.* PREV. CHRONIC DIS. 2012; 9: E145.

References—Continued

45. Babey S.H., Wolstein J., Diamant A.L., Bloom A., Goldstein H.A.. *Patchwork of progress: changes in overweight and obesity among California's 5th, 7th, and 9th graders, 2005–2010.* 2011.

46. Molaison E.F., Kolbo J.R., Zhang L., *et al. Prevalence and trends in obesity among Mississippi public school students, 2005– 2009.* J. MISS. STATE. MED. ASSOC. 2010; 51(3): 67–72.

47. Gortmaker S.L., Swinburn B.A., Levy D., *et al. Changing the future of obesity: science, policy, and action.* LANCET 2011; 378(9793): 838–47.

48. Hall K.D., Sacks G., Chandramohan D., *et al. Quantification of the effect of energy imbalance on bodyweight.* LANCET 2011; 378(9793): 826–37.

49. Van Cleave J., Gortmaker S.L., Perrin J.M.. *Dynamics of obesity and chronic health conditions among children and youth.* JAMA 2010; 303(7): 623–30.

50. Glasgow R.E., Vogt T.M., Boles S.M.. *Evaluating the public health impact of health promotion interventions: the RE–AIM framework.* AM. J. PUBLIC HEALTH 1999; 89(9): 1322–7.

51. Singh A., Uijtdewilligen L., Twisk J.W., van Mechelen W., Chinapaw M.J. *Physical activity and performance at school: a systematic review of the literature including a methodological quality assessment.* ARCH. PEDIATR. ADOLESC. MED. 2012; 166(1): 49–55.

52. Cullen K.W., Hartstein J., Reynolds K.D., *et al. Improving the school food environment: results from a pilot study in middle schools.* J. AM. DIET. ASSOC. 2007; 107(3): 484–9.

53. Hartstein J., Cullen K.W., Reynolds K.D., Harrell J., Resnicow K., Kennel P. *Impact of portion-size control for school ǎ la carte items: changes in kilocalories and macronutrients purchased by middle school students.* J. AM. DIET. ASSOC. 2008; 108(1): 140–4.

54. Trasande L. *How much should we invest in preventing childhood obesity?* HEALTH AFF. 2010; 29(3): 372–8.

ATTACHMENT 2

Predicting Adult Weight Change in the Real World: A Systematic Review and Meta-Analysis Accounting for Compensatory Changes in Energy Intake or Expenditure *

Review

E.J. Dhurandhar,[1–3, 7] K.A. Kaiser,[1, 3–4, 7] J.A. Dawson,[3] A.S. Alcorn,[3] K.D. Keating[5–6] and D.B. Allison[1, 3–4]

Background: Public health and clinical interventions for obesity in free-living adults may be diminished by individual compensation for the intervention. Approaches to predict weight outcomes do not account for all mechanisms of compensation, so they are not well suited to predict outcomes in free-living adults. Our objective was to quantify the range of compensation in energy intake or expenditure observed in human randomized controlled trials (RCTs).

Methods: We searched multiple databases (PubMed, CINAHL, SCOPUS, Cochrane, ProQuest, PsycInfo) up to 1 August 2012 for RCTs evaluating the effect of dietary and/or physical activity interventions on body weight/composition. Inclusion criteria: subjects per treatment arm ≥5; ≥1 week intervention; a reported outcome of body weight/body composition; the intervention was either a prescribed amount of over- or underfeeding and/or supervised or monitored physical activity was prescribed; ≥80% compliance; and an objective method was used to verify compliance with the intervention (for example, observation and electronic monitoring). Data were independently extracted and analyzed by multiple reviewers with consensus reached by discussion. We compared observed weight change with predicted weight change using two models that predict weight change accounting only for metabolic compensation.

Findings: Twenty-eight studies met inclusion criteria. Overfeeding studies indicate 96% less weight gain than expected if no compensation occurred. Dietary restriction and exercise studies may result in up to 12–44% and 55–64% less weight loss than expected, respectively, under an assumption of no behavioral compensation.

Interpretation: Compensation is substantial even in high-compliance conditions, resulting in far less weight change than would be expected. The simple algorithm we report allows for more realistic predictions of interven-

[1] Nutrition Obesity Research Center, University of Alabama at Birmingham, Birmingham, AL, USA; [2] Department of Health Behavior, University of Alabama at Birmingham, Birmingham, AL, USA; [3] Office of Energetics, University of Alabama at Birmingham, Birmingham, AL, USA; [4] School of Public Health, Dean's Office, University of Alabama at Birmingham, Birmingham, AL, USA; [5] Department of Biostatistics, School of Public Health, University of Alabama at Birmingham, Birmingham, AL, USA and [6] Department of Statistics, Kansas State University, Manhattan, KS, USA. Correspondence: Dr. Professor D.B. Allison, School of Public Health, Dean's Office, University of Alabama at Birmingham, 1665 University Boulevard, RPHB 140J, Birmingham, AL 35294, USA.

E-mail: *dallison@uab.edu*.

[7] These authors contributed equally to this work.

tion effects in free-living populations by accounting for the significant compensation that occurs.

Introduction

Obesity is a serious and prevalent public health concern.[1] New public health and clinical interventions to reduce obesity are frequently advocated or implemented based on hypothetical estimates of an outcome that may have little empirical support (for example, the 3,500 kcal rule). For example, imagine an initiative from a large company that replaces its 250 kcal candy bars in its vending machines with 50 kcal protein bars to reduce energy intake (EI) from snacking among its employees. This initiative can be expected to produce (in those who consume at least 250 kcal per day from such snacks), on average, 5.7 kg of weight loss after 1 year (for example, for a 35 year old man who is 183 cm tall and weighs 100 kg at baseline, body mass index = 30). This estimate is based on one of the mathematically validated prediction models[2] sometimes used to justify such interventions.[3] But is this estimate realistic?

On the basis of the evidence, this estimate is likely optimistic because current models for predicting weight change are not well suited for use in free-living subjects. A common rule of thumb used for decades to predict weight change outcomes is that losing or gaining 1 pound of fat requires a deficit of 3,500 kcals of energy.[4] This rule does not consider that human energy balance is a dynamic and adaptable system or that lean and fat mass is lost during negative energy balance, and this leads to an underestimation of the change in EI or energy expenditure (EE) needed to produce weight change.[5–8] Recently, more sophisticated models have been developed to predict weight changes, which consider the metabolic adaptations that occur during weight change.[9–12] To accurately predict weight change in free-living individuals, however, both metabolic and behavioral compensatory mechanisms must be accounted for.

Specifically, we define the modes of possible compensation as follows:

Metabolic Compensation

It is a compensation for an energy balance intervention through physiological changes in metabolism. For example, current mathematical models account for changes in resting metabolic rate, fluid balance, the thermic effect of food and spontaneous physical activity resulting from an energy balance intervention.[11–13]

Behavioral Compensation

It is a compensation for an energy balance intervention through behavior changes. For example, when a dietary or physical activity intervention attempts to create negative energy balance, an individual may respond by reducing voluntary EE and/or increasing EI if these avenues are not strictly controlled. Similarly, during an energy balance intervention of added energy, voluntary EE may increase and/or EI may decrease from other sources.

Others have shown that behavioral compensation occurs for physical activity interventions.[14] Behavioral compensation may also occur for interventions that reduce caloric intake or add calorie-containing foods to the diet.[15–16] Current prediction models are intended for use where interventions are implemented with high fidelity (that is, intended intervention exposure was achieved) in isolation, and when metabolic compensation is the only route of compensation for the intervention possible. During interventions in free-living subjects, however, compensation can occur through metabolic compensation and through behavioral compensation. Behavioral compensation may diminish the effects of an intervention, making it important to quantify and account for when predicting outcomes in free-living populations. It is imperative that more realistic models be used for predicting outcomes for the reasons stated recently:

> ". . . to establish a less controversial legacy for this important field, we should avoid past traps and be explicit about reasonable expectations. Implausible results that are 'too good to be true' still threaten nutritional research on many fronts, including survey measurements, observational associations, treatment effects in randomized trials, and estimates of the impact on populations."[17]

We therefore set out to build an empirically based model to predict weight change outcomes in free-living subjects, and to quantify the extent to which observed weight change in free-living subjects differs from that predicted under the assumption of no behavioral compensation. The approach we took was to use systematic review techniques to collect study data and conduct meta-regression on studies meeting *a*

priori inclusion criteria. These criteria guided identification of high-fidelity interventions implemented in free-living adults. The subjects had some ability to behaviorally compensate for the intervention, yet the reported information about the intervention and compliance verification allowed for a high degree of confidence in treatment fidelity. For our main analysis, we compared the predictions from models that assume no active compensation[2, 18] with the observed outcomes as an estimate of the effects of behavioral compensation.

Materials and Methods

Systematic Review of the Literature and Study Selection

Articles, abstracts and doctoral dissertations were retrieved using searches performed on the following electronic databases: PubMed, Cochrane Library, SCOPUS, PsycInfo, Cumulative Index to Nursing and Allied Health Literature (CINAHL) and Dissertation Abstracts. We searched PubMed without MeSH headings to identify publications for inclusion, using the following limits: dated 1 August 2012 back to earliest records of human studies. Detailed search methods are provided on the PROSPERO registry website (Registry #CRD42013002912). No ethics committee approval was required as the data used are published summary statistics.

All studies were evaluated according to the following inclusion criteria: (1) the data were from adult human randomized controlled trials in free-living subjects, (2) the intervention was either a prescribed amount of over- or underfeeding given and reported (or could be converted) in kcal and/or supervised or monitored physical activity was prescribed and verified, (3) an objective verification method was used to verify the intervention at ≥80% (for example, observation, electronic monitoring and provision of food with returned unused portions), (4) the study had a total sample size of at least five participants at enrollment, (5) the study protocol included an intervention period of at least 7 days, (6) the publication was available in the English language and (7) the study was published and listed in the above databases on or before 1 August 2012.

Our exclusion criteria are detailed in the online Supplementary Material. Briefly, we excluded studies on samples that were completely or predominantly made up of individuals younger than 18 years old or older than 60 years or having any health conditions that may affect weight. The filtering process of the initial search results is detailed in *Figure 1* and also described in more detail in the online supplement.

Statistical Analysis

Quantifying the effect of behavioral compensation-comparison with metabolic compensation models. We entered sample demographic and intervention data into each of the metabolic compensation model calculators to most closely represent each intervention as described in the published papers to estimate weight changes that would occur if only metabolic compensation occurred. As we included data that had samples of both men and women where separate baseline data and results were not reported (only combined summaries), we entered the data for both genders and mathematically adjusted the outputs for the relative proportions of men and women. For the NIDDK simulator,[2] we assumed a baseline value (when not otherwise reported) of sedentary activity level (1.4 metabolic equivalents). The difference between the observed weight change for each study and the weight change predicted by these models is indicative of the degree of behavioral compensation that is observed for the interventions in free-living adults included in our review and meta-analysis.

All model data were analyzed with R routines[19] and descriptive summaries were generated with Microsoft Excel version 2010. Further details of statistical approaches used for the predictive model building are on the online supplement. Risk of bias was assessed by two authors (EJD and KAK) independently and discrepancies were discussed until consensus was reached.

Role of Funding Source

The funding agency (International Life Science Institute—North America) had no role in the design, conduct, analysis, manuscript preparation or decision to publish the results of this study.

Results

Results of Publication Search

We retrieved citations dated back to 1935, but more than ⅔ of the initial publications retrieved were published after 2001. The final data set for building the predictive model consisted of 28 studies published between 1987 and 2012, including 15 exercise studies, nine studies with added energy, three dietary restriction studies and two studies that included both dietary restriction and exercise in the interven-

tion (see *Table 1* for a complete listing of included studies with selected summary data and intervention descriptions). The primary reasons for exclusion after full text review were studies not being truly randomized or not having a control group, followed by reliance only on self-report for EI or physical activity without any objective verification of compliance. Studies were all published journal articles, except for two dissertations.[20–21] Eleven studies had samples that were either 100% men or 100% women. Three other studies reported results by gender separately if both males and females were included in the sample. Only six studies (21%) reported the racial makeup of the samples; therefore, this factor was excluded from further analysis. Mean ages of the samples ranged from 20.6 to 60 years. Mean baseline body mass index of the samples ranged from 22.6 to 35.1 kgm^{-2}.

Figure 1

PRISMA diagram-literature search and study selection process.
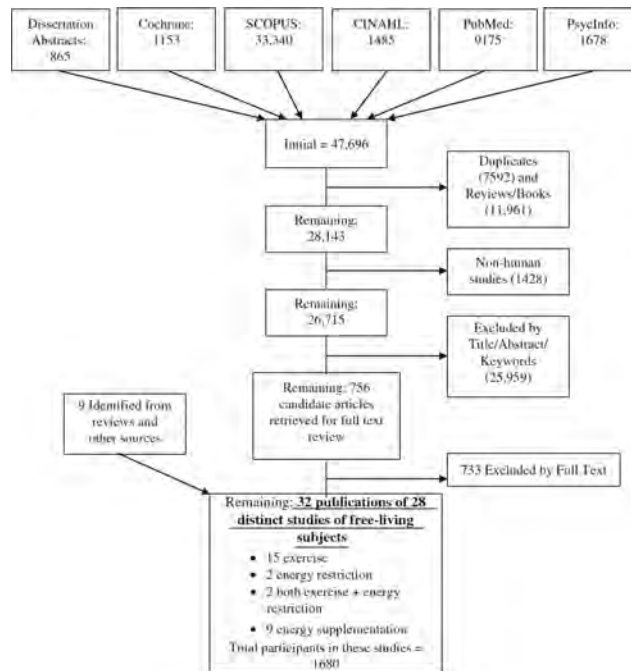
Table 1. Master List and Summary of Included Studies Grouped By Treatment Type and Sorted in Ascending Year of Publication

Reference(s)	Intervention	Sample studied (mean age-years, pct female, baseline BMI kgm^{-2})	Adjusted daily dose(s) (kcal: treatment-control)	Study duration (weeks)	Intervention notes	N randomized, completed, analyzed	Method of missing data handling	Overall mean compliance
Johnstone, et al.[22]	Diet	38, 0%, 35.1	−167.2	4	High protein, ketogenic diet	20, 17, 17	Completers	100
Das, et al.[23]	Diet	35, 76.3%, 27.6	−285.6	26	Caloric restriction	46, 39, 39	Completers	100
Zachwieja, et al.[24]	Diet and exercise	24, 45.8%, 24.1	−675	2	Caloric restriction and daily treadmill exercise	24, 24, 24	No drops	90
Moreira, et al.[25]	Diet and exercise (separate treatments)	49, 68%, 30	−556.0, −753.3	11	25% caloric restriction (controlled feeding) versus aerobic exercise (individualized and supervised sessions 3× per week)	36, 35, 36	ITT	99
Leon, et al.[26]	Exercise	32.6, 0%, 26	−245.6	12	Walking and stair climbing	22, 16, 16	Completers	86
Van Etten, et al.[27]	Exercise	33.7, 0%, 23.7	−31.6	18	Weight training	26, 26, 26	Completers	95
Murphy, et al.[28]	Exercise	44.4, 100%, 25.76	−81.6, −84.5	10	Long versus short bouts of walking	47, 34, 34	Completers	86.5
Crandall[21]	Exercise	51.75, 44%, 30.8	−76.7	12	Recumbent cycle ergometer	13, 13, 13	No drops	100
Shaw and Shaw[29]	Exercise	41, 92%, 32.6	−13.7	8	Resistance training	28, 28, 28	Completers	91.1
Kirk, et al.[30]	Exercise	20.6, 0%, 28.2	−104.7	24	High-intensity resistance training	25, 19, 19	Completers	96
Whybrow, et al.[31]	Exercise	27.2, 50%, 23.6	−513.6, −907.1	2	Progressive exercise on cycle ergometer or treadmill	12, 12, 12	No drops	100
Guadalupe-Grau, et al.[32]	Exercise	23.7, 65.2%, 23.03	−51.7	9	Strength training and plyometric jumps	88, 72, 66	Completers	85
Alves, et al.[33]	Exercise	38.2, 100%, 30	−106.1	26	Group exercises	156, 146, 156	ITT, BOCF	96
Turner, et al.[34]	Exercise	54, 0%, 28	−187.3	24	Structured exercise	54, 41, 29	Completers	94
Bell, et al.[35]	Exercise	49, 100%, 34.7	−399.0, −395.1	24	Pedometer-based walking program	211, 128, 128	Completers	84.77
Vispute, et al.[36]	Exercise	23.66, 41.7%, 24.6	−41.9	6	Abdominal exercises	24, 24, 24	No drops	95.71
Hornbuckle, et al.[37]	Exercise	28.5, 0%, 25.42	−57.7	12	Resistance training	44, 32, 44	ITT	96
Heydari, et al.[38]	Exercise	37.7, 56.3%, 27.8	−186.4	12	High-intensity intermittent exercise	46, 38, 38	Completers	100
Thompson, et al.[39] and Church, et al.[40]	Exercise	49.7, 72.8%, 31.8	−174.8	16	Supervised aerobic exercise	162, 137, 162	ITT	91
Addington[20]	Feeding	38.74, 63.8%, 32.09	2.9 (aspartame group), 142.9 (SSB group)	4	Artificially sweetened beverage (aspartame) versus SSB	150, 111, 111	Completers	100
Lammert, et al.[41]	Feeding	22.4, 0%, 22.61	191	3	Overfeeding carbohydrate or fat	20, 20, 20	No drops	100
Martin, et al.[42]	Feeding	37.7, 56.3%, 27.8	597.1	2	Low- versus high-calorie breakfast	10, 10, 10	No drops	100
Sabate, et al.[43]	Feeding	42.6, 45.2%, 23.7	219	26	Walnuts	90, 90, 90	No drops	95
Whybrow, et al.[44]	Feeding	60, 26.7%, 27.7	122.8, 227.5	8	Added fruits and vegetables	90, 62, 62	Completers	92.6
Whybrow, et al.[45]	Feeding	35.05, 50%, 25.35	343.9, 687.9	2	Added snacks	100, 87, 72	Completers	96
Sheridan, et al.[46]	Feeding	24.9, 0%, 28.7	314.8	4	Pistachio nuts	15, 15, 15	No drops	99
Casas-Agustench, et al.[47]	Feeding	54.4, 56.3%, 26.5	176.9	12	Mixed nuts	52, 50, 50	Completers	94
Maersk, et al.[48]	Feeding	28, 0%, 22.2	3.1, 365.2, 385.5	26	11 per day of diet soda, SSB or milk versus water	60, 47, 47	Completers	85

Abbreviations: BOCF, baseline observation carried forward; ITT, intention-to-treat analysis reported; pct, percentage; SSB, sugar-sweetened beverage.

Building a Predictive Model

We expected to find enough studies to build a robust regression model, incorporating mean participant characteristics and evaluating any significant interactions. However, the relatively low number and sparsely distributed data prevented reliable estimates from our final model. Details of the model and its estimations can be found in the online supplement, Supplementary *Figure S*1 and Supplementary *Tables S1a* and *S1b.*

Comparison with Metabolic Compensation Models—Estimating Behavioral Compensation

To address our main research question (What is the effect of behavioral compensation that occurs in free-living subjects who receive an energy balance intervention on weight outcomes?), we generated output for each study using the NIDDK and Pennington weight change prediction calculators [2, 18] to estimate weight changes that would occur if only metabolic compensation occurred. The difference between the observed weight loss for each study and the weight change predicted by these models is indicative of behavioral compensation occurring during the intervention. The NIDDK and Pennington models are highly correlated (Pearson's r = 0.98, $P<0.0001$) in predicted weight change (Supplementary *Figure S2*). In general, the Pennington calculator is slightly more conservative than the predictions made by the NIDDK calculator.

The overall degree of behavioral compensation estimated by the gap between the observed and metabolic compensation—only predicted values is illustrated in Supplementary *Figure S3,* panels A and B. Both slopes being less than 1 (that is, 0.344 and 0.399 for the NIDDK and Pennington Models, respectively) indicate that the observed weight change is less than predicted after accounting for metabolic compensation. This quantifies the degree of behavioral compensation that is occurring (that is, the compensation that is in addition to the metabolic compensation, resulting in less weight change than expected).

The degree of behavioral compensation appears to differ depending on intervention type. As shown in Supplementary *Figure S3,* panels A and B, all types of interventions demonstrated less weight change than either the Pennington or NIDDK calculators predicted. The plot of overfeeding trials has a slope (95% confidence interval) of 0.06 (-0.04, 0.16) and 0.07 (-0.05, 0.18), plotted against the NIDDK and Pennington calculators, respectively (*Figure 2,* panels a and b). A slope of 1 would indicate that, on average, the interventions produced exactly as much weight change as expected from the mathematical models, which assume no behavioral compensation. As such, this suggests that behavioral compensation may result in as much as 96% less weight gain than predicted by metabolic calculators when adding energy to the diet. The slopes of the plots for dietary restriction and exercise studies are more similar to each other. Specifically, slopes (95% confidence interval) of 0.56 (0.17, 0.96) and 0.88 (0.36, 1.40) were plotted against the NIDDK and Pennington calculators, respectively, for dietary restriction studies (*Figure 2*). For exercise intervention studies, slopes (confidence interval) of 0.38 (0.16, 0.60) and 0.46 (0.19, 0.72) were plotted against the NIDDK and Pennington calculators, respectively (*Figure 3*). Thus, behavioral compensation may result in up to 12–44% less weight loss than predicted for dietary restriction studies and 55–64% less weight loss than predicted for exercise intervention studies.

Risk of Bias Assessment for Included Studies

See online supplement for risk of bias summary and detailed rating figure (Supplementary *Figure S4*) for each included study. The greatest proportions of study aspects with high risk of bias were judged to be due to the lack of analysis for incomplete data (attrition bias—for example, use of intention-to-treat analysis) and lack of attention placebo for control groups. Four studies reported results using intention-to-treat analysis.

Figure 2
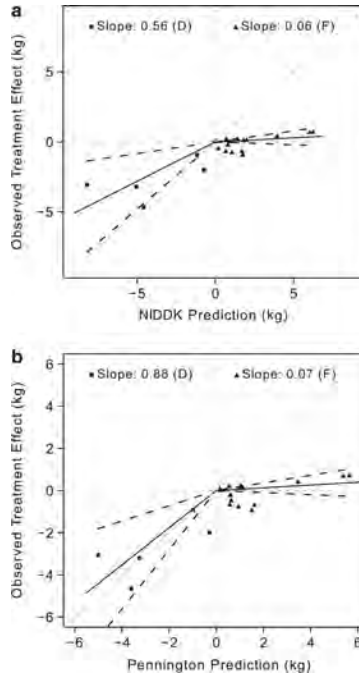
NIDDK and Pennington calculator predictions for caloric restriction (D, squares) and overfeeding (F, triangles) interventions. NIDDK (**a**) and Pennington (**b**) model predictions (x axis) *versus* actual observed weight changes for all studies (y axis). Each individual point represents a control *versus* treatment comparison; the solid lines are lines of best fit for slope and black dashed lines are 95% confidence intervals. Gray dashes lines are axes and lines of identity. Overall, predictions are an overestimate of observed weight change.

Figure 3
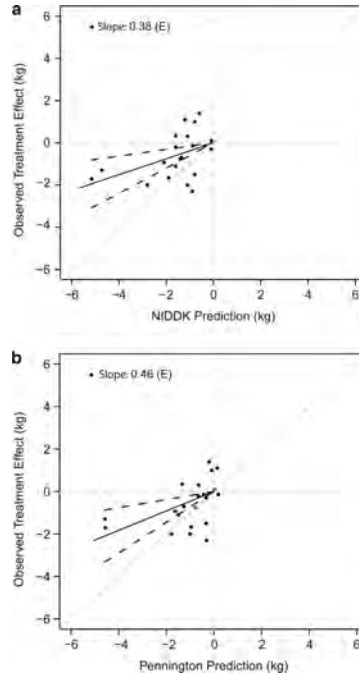
NIDDK and Pennington calculator predictions for exercise interventions (E). NIDDK (**a**) and Pennington (**b**) model predictions (x axis) *versus* actual observed weight changes for all studies (y axis). Each individual point represents a treatment *versus* control comparison; the solid lines are lines of best fit for slope and black dashed lines are 95% confidence intervals. Gray dashes lines are axes and lines of identity. Overall, predictions are an overestimate of observed weight change.

Discussion

We generated simple adjustment factors to predict weight change resulting from energy balance interventions in free-living adult populations, with the ability to compensate both behaviorally and metabolically, using 73 treatment and control arm group outcomes from 28 studies. One of the notable findings was the small number of studies meeting our inclusion criteria (that is, where compliance was objectively measured), making it difficult to study the role of behavioral compensation in a free-living context beyond a very basic level. Although our estimates are the only ones for this purpose to date based on the currently available literature, this highlights a gap in the literature of studies designed to determine the impact of energy balance perturbations in humans in the context of a full range of compensation that prevents a more precise estimate. As these studies are crucial to understanding the effect of public health interventions, their limited quantity underscores a need for future research in this area.

Perhaps, the most robust finding from our study most relevant to public health is that currently available predictions consistently overestimate weight change, which is evidence of significantly diminished weight change resulting from behavioral compensation. This is in spite of some instances where explicit instructions were given to make no other changes in routine habits, a form of compliance that is less commonly tracked or verified. In particular, the treatment effect of added calories was only, on average, ~5% of the weight gain predicted from models assuming no behavioral compensation. Several included studies reported a mean weight loss effect from added energy. This indicates that even if a new food is introduced to the diet, for example, adding a daily snack or beverage, EI and/or EE can be adjusted reasonably well, resulting in very little weight gain relative to how much would be expected if this behavioral compensation did not occur. Behavioral compensation for

negative energy balance interventions such as exercise or dietary restriction is also evident from our analysis, and results in 37–45% and 56–88% of the weight loss predicted from metabolic-only compensation models. In our initial example of reducing EI via snacks by 200 kcals per day for the hypothetical man, the adjusted estimate of weight change after 1 year would be closer to 3.2 kg. This is lower than the 5.7 kg estimate given by the body weight simulator that predicts metabolic compensation only.

Therefore, our results suggest that current public health interventions or clinical interventions that alter one aspect of energy balance, without holding other aspects constant, may result in more modest weight changes than predicted or desired. A similar approach has been reported in pediatric studies,[3] but it did not attempt to account for both behavioral and metabolic compensation components. It is important to take all modes of compensation into consideration when planning an intervention with targeted amounts of weight change and when anticipating its outcomes. It is likely that increased doses of energy perturbations are required. Increased control over compliance and compensation is necessary to achieve target outcomes. Estimates of what is required to achieve a specific weight change may be made more accurate for the purposes of public health recommendations if the present estimations are considered.

Our results suggest that there might be a differential effect of treatment type on the degree of behavioral compensation. However, an aspect of our data set needs to be considered in interpreting this result. Dietary restriction interventions are associated with greater treatment effects, and less behavioral compensation, than either exercise or overfeeding interventions. However, this finding may be because the dietary restriction interventions included in our analysis only allowed for behavioral compensation through EE changes, whereas all exercise and overfeeding interventions allowed for behavioral compensation through both dietary intake and EE changes.

Our approach has strengths and limitations. First, our inclusion criteria were rigorous. All included studies have at least 80% compliance with the prescribed intervention, with compliance verified objectively (no reliance solely on self-report). In addition, the dose was corrected in our calculations for the level of compliance reported in the study. Further, included studies were randomized controlled trials, and our outcome for generating the predictive model and for comparing with metabolic compensation models was the control group-adjusted weight change. Therefore, our models are built to assess true treatment effect, and are corrected for any weight change due to factors such as regression to the mean, maturation, historical factors and behaviors that result from simply participating in a study, rather than from the treatment itself.

Several limitations should also be considered when interpreting our analysis. Weight was not always the primary outcome in studies that met our inclusion criteria. This is particularly true for those with added EI in the form of nuts. Differences in stated outcomes of interest, time with researchers and other factors may affect weight outcomes for individual studies. In addition, body composition may be an important outcome that we were not able to adequately analyze because of the limited number of studies including body composition measurements such as changes in fat mass and fat-free mass. Because of our rigorous inclusion criteria, our data set is small (28 studies). The types of studies we selected are necessary for making definitive conclusions about the impact of perturbations in one aspect of energy balance on body weight. Studies also tended to be shorter in duration, thus it is difficult to make conclusions about long-term effects. This is a large gap in the literature, and a more systematic approach to large, well-controlled studies to answer these questions is warranted. In addition, 16 of the 28 studies reported data only for those participants who completed the intervention period, and across all studies there was a 17.8% dropout rate (*Table 1*), which may have biased our estimates of weight change toward overestimation. We used the intention to treat data when reported (four studies). Eight studies reported no dropouts.

Future research is needed to understand potential differences in compensation between dietary interventions (added or reduced energy), different food forms and macronutrient compositions. Also, certain factors should be considered as potential confounders when quantifying the compensatory response to a specific intervention. For example, bioavailability of energy in food, efficiencies in physical activity and food utilization, seasonal effects and durations of interventions may all influence both the metabolic and behavioral compensatory response to an intervention. It is also unclear whether compensation would remain constant over time. Moreover, evaluating the influence of participant characteristics related to eating behavior (cognitive restraint, disinhibition and hunger) and compensation during interventions is needed as this may hold promise for optimizing treatment effectiveness.

To conclude, we have presented the first empirically based, quantitative estimation for the range of behavioral compensation that may be observed for energy balance interventions. This information may assist in the estimation of weight outcomes of clinical health interventions. It may also inform public health projections for obesity interventions or public health initiatives.

Author Contributions

EJD, KAK and DBA conceived the study and developed the design and selection criteria. KAK performed the literature searches. KAK and EJD reviewed the literature, selected studies, extracted data, evaluated risk of bias and wrote significant portions of the manuscript. ASA assisted with literature selection, data extraction and summary calculations. JAD and KDK performed the statistical analysis and wrote some portions of the manuscript. DBA directed the statistical analysis and wrote some portions of the manuscript.

Supplementary Information accompanies this paper on *International Journal of Obesity* website (*http://www.nature.com/ijo*).

References

1. Flegal K.M., Carroll M.D., Kit B.K., Ogden C.L. *Prevalence of obesity and trends in the distribution of body mass index among U.S. adults, 1999–2010.* JAMA 2012; 307: 491–497.
2. National Institute of Diabetes and Digestive and Kidney Diseases *Body weight simulator.* 2013. Available at *http://bwsimulator.niddk.nih.gov/* (accessed on 28 September 2013).
3. Wang Y.C., Hsiao A., Tracy Orleans C., Gortmaker S.L. *The caloric calculator: average caloric impact of childhood obesity interventions.* AM. J. PREV. MED. 2013; 45: e3–e13.
4. Wishnofsky M. *Caloric equivalents of gained or lost weight.* AM. J. CLIN. NUTR. 1958; 6: 542–546.
5. Hall K.D. *What is the required energy deficit per unit weight loss?* INT. J. OBES. (Lond) 2008; 32: 573–576.
6. Hall K.D., Chow C.C. *Why is the 3,500 kcal per pound weight loss rule wrong?* INT. J. OBES. (Lond) 2013; 37: 1614.
7. Thomas D.M., Martin C.K., Lettieri S., Bredlau C., Kaiser K., Church T., *et al. Response to 'Why is the 3500 kcal per pound weight loss rule wrong?'.* INT. J. OBES. (Lond) 2013; 37: 1614–1615.
8. Thomas D.M., Martin C.K., Lettieri S., Bredlau C., Kaiser K., Church T., *et al. Can a weight loss of one pound a week be achieved with a 3,500-kcal deficit? Commentary on a commonly accepted rule.* INT. J. OBES. (Lond) 2013; 37: 1611–1613.
9. Hall K.D., Butte B.A., Swinburn B.A., Chow C.C. *Dynamics of childhood growth and obesity: development and validation of a quantitative mathematical model.* LANCET DIABETES ENDOCRINOL. 2013; 1: 97–105.
10. Hall K.D., Chow C.C. *Estimating changes in free-living energy intake and its confidence interval.* AM. J. CLIN. NUTR. 2011; 94: 66–74.
11. Thomas D.M., Ciesla A., Levine J.A., Stevens J.G., Martin C.K. *A mathematical model of weight change with adaptation.* MATH BIOSCI. ENG. 2009; 6: 873–887.
12. Thomas D.M., Schoeller D.A., Redman L.A., Martin C.K., Levine J.A., Heymsfield S.B. *A computational model to determine energy intake during weight loss.* AM. J. CLIN. NUTR. 2010; 92: 1326–1331.
13. Hall K.D. *Predicting metabolic adaptation, body weight change, and energy intake in humans.* AM. J. PHYSIOL. ENDOCRINOL. METAB. 2010; 298: E449–E466.
14. Thomas D.M., Bouchard C., Church T., Slentz C., Kraus W.E., Redman L.M., *et al. Why do individuals not lose more weight from an exercise intervention at a defined dose? An energy balance analysis.* OBES. REV. 2012; 13: 835–847.
15. Martin C.K., Heilbronn L.K., de Jonge L., DeLany J.P., Volaufova J., Anton S.D., *et al. Effect of calorie restriction on resting metabolic rate and spontaneous physical activity.* OBESITY (Silver Spring) 2007; 15: 2964–2973.
16. Alper C.M., Mattes R.D. *Effects of chronic peanut consumption on energy balance and hedonics.* INT. J. OBES. RELAT. METAB. DISORD. 2002; 26: 1129–1137.
17. Ioannidis J.P. *Implausible results in human nutrition research.* BMJ 2013; 347: f6698.
18. *Multisubject weight change predictor.* Pennington Biomedical Research Center. Available at: *http://www.pbrc.edu/research-and-faculty/calculators/mswcp/* (accessed on 28 September 2013).
19. Team RDC. *R: A Language and Environment for Statistical Computing.* R Foundation for Statistical Computing: Vienna, Austria, 2009.
20. Addington E. *Aspartame- or Sugar-Sweetened Beverages. Effects on Food Appetites and Mood in Young Adults* (Doctoral Dissertation). Kansas State University: Manhattan, KS, USA, 1998.
21. Crandall K.J. *The Effects of Exercise Intensity on Energy-Derived Macronutrient Intake, Caloric Intake, Body Composition, and Body Weight in the Overweight* (Doctoral Dissertation). University of Northern Colorado: Greeley, CO, USA, 1999.
22. Johnstone A.M., Horgan G.W., Murison S.D., Bremner D.M., Lobley G.E. *Effects of a high-protein ketogenic diet on hunger, appetite, and weight loss in obese men feeding **ad libitum.*** AM. J. CLIN. NUTR. 2008; 87: 44–55.
23. Das S.K, Saltzman E., Gilhooly C.H., Delany J.P., Golden J.K., Pittas A.G., *et al. Low or moderate dietary energy restriction for long-term weight loss: what works best.* OBESITY 2009; 17: 2019–2024.
24. Zachwieja J.J., Ezell D.M., Cline A.D., Ricketts J.C., Vicknair P.C., Schorle S.M., *et al. Short-term dietary energy restriction reduces lean body mass but not performance in physically active men and women.* INT. J. SPORTS MED. 2001; 22: 310–316.
25. Moreira E.A., Most M., Howard J., Ravussin E. *Dietary adherence to long-term controlled feeding in a calorie-restriction study in overweight men and women.* NUTR. CLIN. PRACT. 2011; 26: 309–315.
26. Leon A.S., Casal D., Jacobs D., Jr. *Effects of 2,000 kcal per week of walking and stair climbing on physical fitness and risk factors for coronary heart disease.* J. CARDIOPULM. REHABIL. 1996; 16: 183–192.
27. Van Etten L.M., Westerterp K.R., Verstappen F.T., Boon B.J., Saris W.H. *Effect of an 18-wk weight-training program on energy expenditure and physical activity.* J. APPL. PHYSIOL/ 1997; 82: 298–304.
28. Murphy M.H., Hardman A.E. *Training effects of short and long bouts of brisk walking in sedentary women.* MED. SCI. SPORTS EXERC. 1998; 30: 152–157.
29. Shaw I., Shaw B.S. *Consequence of resistance training on body composition and coronary artery disease risk.* CARDIOVASC. J. S. AFR. 2006; 17: 111–116.
30. Kirk E.P., Washburn R.A., Bailey B.W., LeCheminant J.D., Donnelly J.E. *Six months of supervised high-intensity low-volume resistance training improves strength independent of changes in muscle mass in young overweight men.* J. STRENGTH COND. RES. 2007; 21: 151–156.

References—Continued

31. Whybrow S., Hughes D.A., Ritz P., Johnstone A.M., Horgan G.W., King N., *et al. The effect of an incremental increase in exercise on appetite, eating behaviour and energy balance in lean men and women feeding.* Br. J. Nutr. 2008; 100: 1109–1115.

32. Guadalupe-Grau A., Perez-Gomez J., Olmedillas H., Chavarren J., Dorado C., Santana A., *et al. Strength training combined with plyometric jumps in adults: sex differences in fat-bone axis adaptations.* J. Appl. Physiol. 2009; 106: 1100–1111.

33. Alves J.G., Gale C.R., Mutrie N., Correia J.B., Batty G.D. *A 6-month exercise intervention among inactive and overweight Favela-residing women in Brazil: the caranguejo exercise trial.* Am. J. Public Health 2009; 99: 76–80.

34. Turner J.E., Markovitch D., Betts J.A., Thompson D. *Nonprescribed physical activity energy expenditure is maintained with structured exercise and implicates a compensatory increase in energy intake.* Am. J. Clin. Nutr. 2010; 92: 1009–1016.

35. Bell G.J., Harber V., Murray T., Courneya K.S., Rodgers W. *A comparison of fitness training to a pedometer-based walking program matched for total energy cost.* J. Phys. Act. Health 2010; 7: 203–213.

36. Vispute S.S., Smith J.D., Lecheminant J.D., Hurley K.S. *The effect of abdominal exercise on abdominal fat.* J. Strength Cond. Res. 2011; 25: 2559–2564.

37. Hornbuckle L.M., Liu P.Y., Ilich J.Z., Kim J.S., Arjmandi B.H., Panton L.B. *Effects of resistance training and walking on cardiovascular disease risk in African-American Women.* Med. Sci. Sports Exerc. 2012; 44: 525–533.

38. Heydari M., Freund J., Boutcher S.H. *The effect of high-intensity intermittent exercise on body composition of overweight young males.* J. Obes. 2012; 2012: 480467.

39. Thompson A.M., Mikus C.R., Rodarte R.Q., Distefano B., Priest E.L., Sinclair E., *et al. Inflammation and exercise (INFLAME): Study rationale, design, and methods.* Contemp. Clin. Trials 2008; 29: 418–427.

40. Church T.S., Earnest C.P., Thompson A.M., Priest E.L., Rodarte R.Q., Saunders T., *et al. Exercise without weight loss does not reduce C-reactive protein: the INFLAME study.* Med. Sci. Sports Exerc. 2010; 42: 708–716.

41. Lammert O., Grunnet N., Faber P., Bjornsbo K.S., Dich J., Larsen L.O., *et al. Effects of isoenergetic overfeeding of either carbohydrate or fat in young men.* Br. J. Nutr. 2000; 84: 233–245.

42. Martin A., Normand S., Sothier M., Peyrat J., Louche-Pelissier C., Laville M. *Is advice for breakfast consumption justified? Results from a short-term dietary and metabolic experiment in young healthy men.* Br. J. Nutr. 2000; 84: 337–344.

43. Sabate J., Cordero-Macintyre Z., Siapco G., Torabian S., Haddad E. *Does regular walnut consumption lead to weight gain?* Br. J. Nutr. 2005; 94: 859–864.

44. Whybrow S., Harrison C.L., Mayer C., James Stubbs R. *Effects of added fruits and vegetables on dietary intakes and body weight in Scottish adults.* Br. J. Nutr. 2006; 95: 496–503.

45. Whybrow S., Mayer C., Kirk T.R., Mazlan N., Stubbs R.J. *Effects of two weeks' mandatory snack consumption on energy intake and energy balance.* Obesity 2007; 15: 673–685.

46. Sheridan M.J., Cooper J.N., Erario M., Cheifetz C.E. *Pistachio nut consumption and serum lipid levels.* J. Am. Coll. Nutr. 2007; 26: 141–148.

47. Casas-Agustench P., Lopez-Uriarte P., Bullo M., Ros E., Cabre-Vila J.J., Salas-Salvado J. *Effects of one serving of mixed nuts on serum lipids, insulin resistance and inflammatory markers in patients with the metabolic syndrome.* Nutr. Metab. Cardiovasc. Dis. 2011; 21: 126–135.

48. Maersk M., Belza A., Stodkilde-Jorgensen H., Ringgaard S., Chabanova E., Thomsen H., *et al. Sucrose-sweetened beverages increase fat storage in the liver, muscle, and visceral fat depot: a 6-mo randomized intervention study.* Am. J. Clin. Nutr. 2012; 95: 283–289.

ATTACHMENT 3

*Myths, Presumptions, and Facts About Obesity**

Krista Casazza, Ph.D., R.D., Kevin R. Fontaine, Ph.D., Arne Astrup, M.D., Ph.D., Leann L. Birch, Ph.D., Andrew W. Brown, Ph.D., Michelle M. Bohan Brown, Ph.D., Nefertiti Durant, M.D., M.P.H., Gareth Dutton, Ph.D., E. Michael Foster, Ph.D., Steven B. Heymsfield, M.D., Kerry McIver, M.S., Tapan Mehta, M.S., Nir Menachemi, Ph.D., P.K. Newby, Sc.D., M.P.H., Russell Pate, Ph.D., Barbara J. Rolls, Ph.D., Bisakha Sen, Ph.D., Daniel L. Smith, Jr., Ph.D., Diana M. Thomas, Ph.D., and David B. Allison, Ph.D.**

Abstract

Background

Many beliefs about obesity persist in the absence of supporting scientific evidence (presumptions); some persist despite contradicting evidence (myths). The promulgation of unsupported beliefs may yield poorly informed policy decisions, inaccurate clinical and public health recommendations, and an unproductive allocation of research resources and may divert attention away from useful, evidence-based information.

Methods

Using Internet searches of popular media and scientific literature, we identified, reviewed, and classified obesity-related myths and presumptions. We also examined facts that are well supported by evidence, with an emphasis on those that have practical implications for public health, policy, or clinical recommendations.

Results

We identified seven obesity-related myths concerning the effects of small sustained increases in energy intake or expenditure, establishment of realistic goals for weight loss, rapid weight loss, weight-loss readiness, physical-education classes, breast-feeding, and energy expended during sexual activity. We also identified six presumptions about the purported effects of regularly eating breakfast, early childhood experiences, eating fruits and vegetables, weight cycling, snacking, and the built (*i.e.,* human-made) environment. Finally, we identified nine evidence-supported facts that are relevant for the formulation of sound public health, policy, or clinical recommendations.

Conclusions

False and scientifically unsupported beliefs about obesity are pervasive in both scientific literature and the popular press. (Funded by the National Institutes of Health.)

Passionate interests, the human tendency to seek explanations for observed phenomena, and everyday experience appear to contribute to strong convictions about obesity, despite the absence of supporting data. When the public, mass media, government agencies, and even academic scientists espouse unsupported beliefs, the result may be ineffective policy, unhelpful or unsafe clinical and public health recommendations, and an unproductive allocation of resources. In this article, we review some common beliefs about obesity that are not supported by scientific evidence and also provide some useful evidence-based concepts. We define myths as beliefs held to be true despite substantial refuting evidence, presumptions as beliefs held to be true for which convincing evidence does not yet confirm or disprove their truth, and facts as propositions backed by sufficient evidence to consider them empirically proved for practical purposes.

When standards for evidence are considered, it is critical to distinguish between drawing conclusions from scientific evidence and making decisions about prudent actions. Stakeholders must sometimes take action in the absence of strong scientific evidence. Yet this principle of action should not be mistaken as justification for drawing conclusions. Regardless of the urgency of public health issues, scientific principles remain unchanged. We find the language of the Federal Trade Commission to be apt: its standard for making claims is "competent and reliable scientific evidence," defined as "tests, analyses, research, studies, or other evidence . . . conducted and evaluated in an objective manner . . . using procedures generally accepted . . . to yield accurate and reliable results."[1]

The scientific community recognizes that randomized experiments offer the strongest evidence for drawing causal inferences. Nevertheless, at least since the 1960s, when Sir Austin Bradford Hill spearheaded the scientific activities that led to the acceptance of the claim that smoking causes lung cancer and to his classic writing on association and causation,[2] the scientific community has acknowledged that under some circumstances (*i.e.,* when it is unethical or unfeasible to conduct a randomized study and when observed associations are not plausibly due to confounding), inferring causality in the absence of data from randomized, controlled trials is necessary and appropriate. However, the fact that the appropriateness of inferring causality holds only under certain circumstances is sometimes discounted by those who are eager to garner support for a proposal in the absence of strong data from randomized studies.

Notably, the circumstances that justify drawing a conclusion of causation from nonexperimental data are rarely met in clinical and public proposals regarding obesity. It is possible to conduct randomized studies of even the most sensitive and invasive obesity procedures, as exemplified by recent articles in the *Journal*. Moreover, observational associations germane to the causes, treatment, and prevention of obesity are subject to substantial confounding, fraught with measurement problems, and typically small and inconsistent.[3] Such observational associations are often found to differ from those later obtained by more rigorously designed studies.[4] Hence, in the present discussion, we generally conclude that a proposition has been shown to be true only when it has been supported by confirmatory randomized studies. References to published studies are used sparingly herein, with a more com-

prehensive listing provided in the Supplementary *Appendix,* available with the full text of this article at *NEJM.org*.

Myths

We review seven myths about obesity, along with the refuting evidence. *Table 1* provides anecdotal support that the beliefs are widely held or stated, in addition to reasons that support conjecture.

Table 1. Seven Myths about Obesity *

Myth	Basis of Conjecture
Small sustained changes in energy intake or expenditure will produce large, long-term weight changes	National health guidelines and reputable websites advertise that large changes in weight accumulate indefinitely after small sustained daily lifestyle modifications (*e.g.,* walking for 20 minutes or eating two additional potato chips)
Setting realistic goals in obesity treatment is important because otherwise patients will become frustrated and lose less weight	According to goal-setting theory, unattainable goals impair performance and discourage goal-attaining behavior; in obesity treatment, incongruence between desired and actual weight loss is thought to undermine the patient's perceived ability to attain goals, which may lead to the discontinuation of behaviors necessary for weight loss
Large, rapid weight loss is associated with poorer long-term weight outcomes than is slow, gradual weight loss	This notion probably emerged in reaction to the adverse effects of nutritionally insufficient very-low-calorie diets (<800 kcal per day) in the 1960s; the belief has persisted, has been repeated in textbooks and recommendations from health authorities, and has been offered as a rule by dietitians
Assessing the stage of change or diet readiness is important in helping patients who seek weight-loss treatment	Many believe that patients who feel ready to lose weight are more likely to make the required lifestyle changes
Physical-education classes in their current format play an important role in preventing or reducing childhood obesity	The health benefits of physical activity of sufficient duration, frequency, and intensity are well established and include reductions in adiposity
Breast-feeding is protective against obesity	The belief that breast-fed children are less likely to become obese has persisted for more than a century and is passionately defended
A bout of sexual activity burns 100 to 300 kcal for each person involved	Many sources state that substantial energy is expended in typical sexual activity between two adults

* We define myths as beliefs held true despite substantial evidence refuting them. A list of articles in which these myths are espoused is provided in the *Supplementary Appendix.*

Small Sustained Changes in Energy Intake Or Expenditure

Myth number 1: Small sustained changes in energy intake or expenditure will produce large, long-term weight changes.

Predictions suggesting that large changes in weight will accumulate indefinitely in response to small sustained lifestyle modifications rely on the half-century-old 3,500-kcal rule, which equates a weight alteration of 1 lb (0.45 kg) to a 3,500-kcal cumulative deficit or increment.[5–6] However, applying the 3,500-kcal rule to cases in which small modifications are made for long periods violates the assumptions of the original model, which were derived from short-term experiments predominantly performed in men on very-low-energy diets (<800 kcal per day).[5, 7] Recent studies have shown that individual variability affects changes in body composition in response to changes in energy intake and expenditure,[7] with analyses predicting substantially smaller changes in weight (often by an order of magnitude across extended periods) than the 3,500-kcal rule does.[5, 7] For example, whereas the 3,500-kcal rule predicts that a person who increases daily energy expenditure by 100 kcal by walking 1 mile (1.6 km) per day will lose more than 50 lb (22.7 kg) over a period of 5 years, the true weight loss is only about 10 lb (4.5 kg),[6] assuming no compensatory increase in caloric intake, because changes in mass concomitantly alter the energy requirements of the body.

Setting Realistic Weight-Loss Goals

Myth number 2: Setting realistic goals for weight loss is important, because otherwise patients will become frustrated and lose less weight.

Although this is a reasonable hypothesis, empirical data indicate no consistent negative association between ambitious goals and program completion or weight loss.[8] Indeed, several studies have shown that more ambitious goals are sometimes associated with better weight-loss outcomes (see the *Supplementary Appendix*).[8] Furthermore, two studies showed that interventions designed to improve weight-loss outcomes by altering unrealistic goals resulted in more realistic weight-loss expectations but did not improve outcomes.

Rate of Weight Loss

Myth number 3: Large, rapid weight loss is associated with poorer long-term weight-loss outcomes, as compared with slow, gradual weight loss.

Within weight-loss trials, more rapid and greater initial weight loss has been associated with lower body weight at the end of long-term follow-up.[9-10] A meta-analysis of randomized, controlled trials that compared rapid weight loss (achieved with very-low-energy diets) with slower weight loss (achieved with low-energy diets—*i.e.,* 800 to 1200 kcal per day) at the end of short-term follow-up (<1 yr) and long-term follow-up (≥1 year) showed that, despite the association of very-low-energy diets with significantly greater weight loss at the end of short-term follow-up (16.1% of body weight lost, *vs.* 9.7% with low-energy diets), there was no significant difference between the very-low-energy diets and low-energy diets with respect to weight loss at the end of long-term follow-up.[10] Although it is not clear why some obese persons have a greater initial weight loss than others do, a recommendation to lose weight more slowly might interfere with the ultimate success of weight-loss efforts.

Diet Readiness

Myth number 4: It is important to assess the stage of change or diet readiness in order to help patients who request weight-loss treatment.

Readiness does not predict the magnitude of weight loss or treatment adherence among persons who sign up for behavioral programs or who undergo obesity surgery.[11] Five trials (involving 3,910 participants; median study period, 9 months) specifically evaluated stages of change (not exclusively readiness) and showed an average weight loss of less than 1 kg and no conclusive evidence of sustained weight loss (see the *Supplementary Appendix*). The explanation may be simple—people voluntarily choosing to enter weight-loss programs are, by definition, at least minimally ready to engage in the behaviors required to lose weight.

Importance of Physical Education

Myth number 5: Physical-education classes, in their current form, play an important role in reducing or preventing childhood obesity.

Physical education, as typically provided, has not been shown to reduce or prevent obesity. Findings in three studies that focused on expanded time in physical education[12] indicated that even though there was an increase in the number of days children attended physical-education classes, the effects on body-mass index (BMI) were inconsistent across sexes and age groups. Two meta-analyses showed that even specialized school-based programs that promoted physical activity were ineffective in reducing BMI or the incidence or prevalence of obesity.[13] There is almost certainly a level of physical activity (a specific combination of frequency, intensity, and duration) that would be effective in reducing or preventing obesity. Whether that level is plausibly achievable in conventional school settings is unknown, although the dose-response relationship between physical activity and weight warrants investigation in clinical trials.

Breast-Feeding and Obesity

Myth number 6: Breast-feeding is protective against obesity.

A World Health Organization (WHO) report states that persons who were breast-fed as infants are less likely to be obese later in life and that the association is "not likely to be due to publication bias or confounding."[14] Yet the WHO, using Egger's test and funnel plots, found clear evidence of publication bias in the published literature it synthesized.[15] Moreover, studies with better control for confounding (*e.g.,* studies including within-family sibling analyses) and a randomized, controlled trial involving more than 13,000 children who were followed for more than 6 years[16] provided no compelling evidence of an effect of breast-feeding on obesity. On the basis of these findings, one long-term proponent of breast-feeding for the prevention of obesity wrote that breast-feeding status "no longer appears to be a major determinant" of obesity risk;[17] however, he speculated that breast-feeding may yet be shown to be modestly protective, current evidence to the contrary. Although existing data indicate that breast-feeding does not have important antiobesity effects in children, it has other important potential benefits for the infant and mother and should therefore be encouraged.

Sexual Activity and Energy Expenditure

Myth number 7: A bout of sexual activity burns 100 to 300 kcal for each participant.

The energy expenditure of sexual intercourse can be estimated by taking the product of activity intensity in metabolic equivalents (METs),[18] the body weight in kilograms, and time spent. For example, a man weighing 154 lb (70 kg) would, at 3 METs, expend approximately 3.5 kcal per minute (210 kcal per hour) during a stim-

ulation and orgasm session. This level of expenditure is similar to that achieved by walking at a moderate pace (approximately 2.5 miles [4 km] per hour). Given that the average bout of sexual activity lasts about 6 minutes,[19] a man in his early-to-mid-30s might expend approximately 21 kcal during sexual intercourse. Of course, he would have spent roughly ⅓ that amount of energy just watching television, so the incremental benefit of one bout of sexual activity with respect to energy expended is plausibly on the order of 14 kcal.

Presumptions

Just as it is important to recognize that some widely held beliefs are myths so that we may move beyond them, it is important to recognize presumptions, which are widely accepted beliefs that have neither been proved nor disproved, so that we may move forward to collect solid data to support or refute them. Instead of attempting to comprehensively describe all the data peripherally related to each of the six presumptions shown in *Table 2,* we describe the best evidence.

Table 2. Presumptions about Obesity*

Presumption	Basis of Conjecture
Regularly eating (*vs.* skipping) breakfast is protective against obesity	Skipping breakfast purportedly leads to overeating later in the day
Early childhood is the period during which we learn exercise and eating habits that influence our weight throughout life	Weight-for-height indexes, eating behaviors, and preferences that are present in early childhood are correlated with those later in life
Eating more fruits and vegetables will result in weight loss or less weight gain, regardless of whether one intentionally makes any other behavioral or environmental changes	By eating more fruits and vegetables, a person presumably spontaneously eats less of other foods, and the resulting reduction in calories is greater than the increase in calories from the fruit and vegetables
Weight cycling (*i.e.,* yo-yo dieting) is associated with increased mortality	In observational studies, mortality rates have been lower among persons with stable weight than among those with unstable weight
Snacking contributes to weight gain and obesity	Snack foods are presumed to be incompletely compensated for at subsequent meals, leading to weight gain
The built environment, in terms of sidewalk and park availability, influences obesity	Neighborhood-environment features may promote or inhibit physical activity, thereby affecting obesity

* We define presumptions as unproved yet commonly espoused propositions. A list of articles in which these presumptions are implied is provided in the *Supplementary Appendix.*

Value of Breakfast

Presumption number 1: Regularly eating (*versus* skipping) breakfast is protective against obesity.

Two randomized, controlled trials that studied the outcome of eating *versus* skipping breakfast showed no effect on weight in the total sample.[20] However, the findings in one study suggested that the effect on weight loss of being assigned to eat or skip breakfast was dependent on baseline breakfast habits.[20]

Early Childhood Habits and Weight

Presumption number 2: Early childhood is the period in which we learn exercise and eating habits that influence our weight throughout life.

Although a person's BMI typically tracks over time (*i.e.,* tends to be in a similar percentile range as the person ages), longitudinal genetic studies suggest that such tracking may be primarily a function of genotype rather than a persistent effect of early learning.[21] No randomized, controlled clinical trials provide evidence to the contrary.

Value of Fruits and Vegetables

Presumption number 3: Eating more fruits and vegetables will result in weight loss or less weight gain, regardless of whether any other changes to one's behavior or environment are made.

It is true that the consumption of fruits and vegetables has health benefits. However, when no other behavioral changes accompany increased consumption of fruits and vegetables, weight gain may occur or there may be no change in weight.[22]

Weight Cycling and Mortality

Presumption number 4: Weight cycling (*i.e.,* yo-yo dieting) is associated with increased mortality.

Although observational epidemiologic studies show that weight instability or cycling is associated with increased mortality, such findings are probably due to con-

founding by health status. Studies of animal models do not support this epidemiologic association.[23]

Snacking and Weight Gain

Presumption number 5: Snacking contributes to weight gain and obesity.

Randomized, controlled trials do not support this presumption.[24] Even observational studies have not shown a consistent association between snacking and obesity or increased BMI.

Built Environment and Obesity

Presumption number 6: The built environment, in terms of sidewalk and park availability, influences the incidence or prevalence of obesity.

According to a systematic review, virtually all studies showing associations between the risk of obesity and components of the built environment (*e.g.,* parks, roads, and architecture) have been observational.[25] Furthermore, these observational studies have not shown consistent associations, so no conclusions can be drawn.

Facts

Our proposal that myths and presumptions be seen for what they are should not be mistaken as a call for nihilism. There are things we do know with reasonable confidence. *Table 3* lists nine such facts and their practical implications for public health, policy, or clinical recommendations. The first two facts help establish a framework in which intervention and preventive techniques may work. The next four facts are more prescriptive, offering tools that can be conveyed to the public as well established. The last three facts are suited to clinical settings.

Table 3. Facts about Obesity *

Fact	Implication
Although genetic factors play a large role, heritability is not destiny; calculations show that moderate environmental changes can promote as much weight loss as the most efficacious pharmaceutical agents available [26]	If we can identify key environmental factors and successfully influence them, we can achieve clinically significant reductions in obesity
Diets (*i.e.,* reduced energy intake) very effectively reduce weight, but trying to go on a diet or recommending that someone go on a diet generally does not work well in the long-term [27]	This seemingly obvious distinction is often missed, leading to erroneous conceptions regarding possible treatments for obesity; recognizing this distinction helps our understanding that energy reduction is the ultimate dietary intervention required and approaches such as eating more vegetables or eating breakfast daily are likely to help only if they are accompanied by an overall reduction in energy intake
Regardless of body weight or weight loss, an increased level of exercise increases health [28]	Exercise offers a way to mitigate the health-damaging effects of obesity, even without weight loss
Physical activity or exercise in a sufficient dose aids in long-term weight maintenance [28–29]	Physical-activity programs are important, especially for children, but for physical activity to affect weight, there must be a substantial quantity of movement, not mere participation
Continuation of conditions that promote weight loss promotes maintenance of lower weight [30]	Obesity is best conceptualized as a chronic condition, requiring ongoing management to maintain long-term weight loss
For overweight children, programs that involve the parents and the home setting promote greater weight loss or maintenance [31]	Programs provided only in schools or other out-of-home structured settings may be convenient or politically expedient, but programs including interventions that involve the parents and are provided at home are likely to yield better outcomes
Provision of meals and use of meal-replacement products promote greater weight loss [32]	More structure regarding meals is associated with greater weight loss, as compared with seemingly holistic programs that are based on concepts of balance, variety, and moderation
Some pharmaceutical agents can help patients achieve clinically meaningful weight loss and maintain the reduction as long as the agents continue to be used [33]	While we learn how to alter the environment and individual behaviors to prevent obesity, we can offer moderately effective treatmentto obese persons
In appropriate patients, bariatric surgery results in long-term weight loss and reductions in the rate of incident diabetes and mortality [34]	For severely obese persons, bariatric surgery can offer a life-changing, and in some cases lifesaving, treatment

* We classify the listed propositions as facts because there is sufficient evidence to consider them empirically proved.

312

Implications

Myths and presumptions about obesity are common. Several presumptions appear to be testable, and some of them (*e.g.,* effects of eating breakfast daily, eating more fruits and vegetables, and snacking) can be tested with standard study designs. Despite enormous efforts promoting these ideas, research often seems mired in the accrual of observational data. Many of the trials that have been completed or are in progress do not isolate the effect of the presumed influence and the findings are therefore not definitive.

Many of the myths and presumptions about obesity reflect a failure to consider the diverse aspects of energy balance,[35] especially physiological compensation for changes in intake or expenditure.[36] Some myths and presumptions involve an implicit assumption that there is no physiological compensation whatsoever (*i.e.,* the 3,500-kcal rule) or only minimal compensation (*e.g.,* a reduction in snacking as a means of reducing weight). In other cases, there is an implicit assumption of overcompensation (*e.g.,* eating breakfast daily or increasing the intake of fruits and vegetables as a means of reducing weight). Proponents of other unsupported ideas fail to consider that people burn some amount of energy even without engaging in the activity in question (*e.g.,* increased sexual activity). In addition, interested parties do not regularly request the results from randomized, long-term studies that measure weight or adiposity as an outcome. Therefore, the presented data are rife with circumstantial evidence, and people are not informed that the existing evidence is not compelling (*e.g.,* breakfast consumption). Furthermore, some suggested treatment or prevention strategies may work well (*e.g.,* increasing the consumption of fruits and vegetables) but only as part of a multifaceted program for weight reduction. Yet such a strategy is often presented as though it will have effects in isolation and even among persons not participating in weight-loss programs. We must recognize that evidence that a technique is beneficial for the treatment of obesity is not necessarily evidence that it will be helpful in population-based approaches to the prevention of obesity, and *vice versa.*

Knowing and Not Knowing

Why do we think or claim we know things that we actually do not know? Numerous cognitive biases lead to an unintentional retention of erroneous beliefs.[37–38] When media coverage about obesity is extensive, many people appear to believe some myths (*e.g.,* rapid weight loss facilitates weight regain) simply because of repeated exposure to the claims.[39] Cognitive dissonance may prevent us from abandoning ideas that are important to us, despite contradictory evidence (*e.g.,* the idea that breast-feeding prevents obesity in children). Similarly, confirmation bias may prevent us from seeking data that might refute propositions we have already intuitively accepted as true because they seem obvious (*e.g.,* the value of realistic weight-loss goals). Moreover, we may be swayed by persuasive yet fallacious arguments (Whately provides a classic catalogue)[40] unless we are prepared to identify them as spurious.

Fortunately, the scientific method and logical thinking offer ways to detect erroneous statements, acknowledge our uncertainty, and increase our knowledge. When presented with an alleged truth, we can pause to ask simple questions, such as, "How could someone actually know that?" Such a simple question allows one to easily recognize some beliefs as spurious (*e.g.,* 300 kcal is burned during sexual intercourse). Moreover, we often settle for data generated with the use of inadequate methods in situations in which inferentially stronger study designs, including quasi-experiments and true randomized experiments, are possible, as recently illustrated (see the *Supplementary Appendix*). In addition, eliminating the distortions of scientific information that sometimes occur with public health advocacy would reduce the propagation of misinformation.

The myths and presumptions about obesity that we have discussed are just a sampling of the numerous unsupported beliefs held by many people, including academics, regulators, and journalists, as well as the general public. Yet there are facts about obesity of which we may be reasonably certain—facts that are useful today. While we work to generate additional useful knowledge, we may in some cases justifiably move forward with hypothesized, but not proved, strategies. However, as a scientific community, we must always be open and honest with the public about the state of our knowledge and should rigorously evaluate unproved strategies.

References

1. Federal Trade Commission. *Dietary supplements: an advertising guide for industry.* April 2001 (*http://business.ftc.gov/documents/bus09-dietary-supplementsadvertising-guide-industry#endnotes*).

2. Hill A.B. *The environment and disease: association or causation?* Proc. R. Soc. Med. 1965; 58: 295–300.

3. Taubes G. *Epidemiology faces its limits.* Science 1995; 269: 164–9.

4. Fairman K.A. *Why hypotheses informed by observation are often wrong: results of randomized controlled trials challenge chronic disease management strategies based on epidemiological evidence.* J. Manag. Care. Pharm. 2011; 17: 224–31.

5. Hall K.D. *Predicting metabolic adaptation, body weight change, and energy intake in humans.* Am. J. Physiol. Endocrinol. Metab. 2010; 298: E449–66.

6. Thomas D.M., Martin C.K., Heymsfield S., Redmon L.M., Schoeller D.A., Levine J.A. *A simple model predicting individual weight change in humans.* J. Biol. Dyn. 2011; 5: 579–99.

7. Thomas D.M., Schoeller D.A., Redman L.A., Martin C.K., Levine J.A., Heymsfield S.B. *A computational model to determine energy intake during weight loss.* Am. J. Clin. Nutr. 2010; 92: 1326–31.

8. Linde J.A., Jeffery R.W., Levy R.L., Pronk N.P., Boyle R.G. *Weight loss goals and treatment outcomes among overweight men and women enrolled in a weight loss trial.* Int. J. Obes. (Lond) 2005; 29: 1002–5.

9. Astrup A., Rossner S. *Lessons from obesity management programmes: greater initial weight loss improves long-term maintenance.* Obes. Rev. 2000; 1: 17–9.

10. Nackers L.M., Ross K.M., Perri M.G. *The association between rate of initial weight loss and long-term success in obesity treatment: does slow and steady win the race?* Int. J. Behav. Med. 2010; 17: 161–7.

11. Fontaine K.R., Wiersema L. *Dieting readiness test fails to predict enrollment in a weight loss program.* J. Am. Diet. Assoc. 1999; 99 :664.

12. Kriemler S., Zahner L., Schindler C., *et al. Effect of school based physical activity programme (KISS) on fitness and adiposity in primary schoolchildren: cluster randomised controlled trial.* BMJ 2010; 340: c785.

13. Dobbins M., De Corby K., Robeson P., Husson H., Tirilis D. *School-based physical activity programs for promoting physical activity and fitness in children and adolescents aged 6–18.* Cochrane Database Syst. Rev. 2009; 1: CD007651.

14. Horta B.L., Bahl R., Martinés J.C., Victora C.G. *Evidence of the long-term effects of breastfeeding: systematic reviews and meta-analyses.* Geneva: World Health Organization, 2007.

15. Casazza K., Fernandez J.R., Allison D.B. *Modest protective effects of breast-feeding on obesity: is the evidence truly supportive?* Nutr. Today 2012; 47: 33–8.

16. Kramer M.S., Matush L., Vanilovich I., *et al. Effects of prolonged and exclusive breastfeeding on child height, weight, adiposity, and blood pressure at age 6.5 y: evidence from a large randomized trial.* Am. J. Clin. Nutr. 2007; 86: 1717–21.

17. Gillman M.W. *Breastfeeding and obesity—the 2011 scorecard.* Int. J. Epidemiol. 2011; 40: 681–4.

18. Jetté M., Sidney K., Blümchen G. *Metabolic equivalents (METS) in exercise testing, exercise prescription, and evaluation of functional capacity.* Clin. Cardiol. 1990; 13: 555–65.

19. Bohlen J.G., Held J.P., Sanderson M.O., Patterson R.P. *Heart rate, rate-pressure product, and oxygen uptake during four sexual activities.* Arch. Intern. Med. 1984; 144: 1745–8.

20. Schlundt D.G., Hill J.O., Sbrocco T., Pope-Cordle J., Sharp T. *The role of breakfast in the treatment of obesity: a randomized clinical trial.* Am. J. Clin. Nutr. 1992; 55: 645–51.

21. Brisbois T.D., Farmer A.P., McCargar L.J. *Early markers of adult obesity: a review.* Obes. Rev. 2012; 13: 347–67.

22. Rolls B.J., Ello-Martin J.A., Tohill B.C. *What can intervention studies tell us about the relationship between fruit and vegetable consumption and weight management?* Nutr. Rev. 2004; 62: 1–17.

23. Vasselli J.R., Weindruch R., Heymsfield S.B., *et al. Intentional weight loss reduces mortality rate in a rodent model of dietary obesity.* Obes. Res. 2005; 13: 693–702.

24. Whybrow S., Mayer C., Kirk T.R., Mazlan N., Stubbs R.J. *Effects of two weeks' mandatory snack consumption on energy intake and energy balance.* Obesity (Silver Spring) 2007; 15: 673–85.

25. Ferdinand A., Sen B., Rahurkar S., Engler S., Menachemi N. *The relationship between built environments and physical activity: a systematic review.* Am. J. Public Health 2012; 102(10): e7–e13.

26. Hewitt J.K. *The genetics of obesity: what have genetic studies told us about the environment.* Behav. Genet. 1997; 27: 353–8.

27. Heymsfield S.B. *Energy intake: reduced as prescribed?* Am. J. Clin. Nutr. 2011; 94: 3–4.

28. Carroll S., Dudfield M. *What is the relationship between exercise and metabolic abnormalities? A review of the metabolic syndrome.* Sports Med. 2004; 34: 371–418.

29. Wu T., Gao X., Chen M, van Dam R.M. *Long-term effectiveness of diet-plus-exercise interventions vs. diet-only interventions for weight loss: a meta-analysis.* Obes. Rev. 2009; 10: 313–23.

30. Middleton K.M., Patidar S.M., Perri M.G. *The impact of extended care on the long-term maintenance of weight loss: a systematic review and meta-analysis.* Obes. Rev. 2012; 13: 509–17.

31. McLean N., Griffin S., Toney K., Hardeman W. *Family involvement in weight control, weight maintenance and weightloss interventions: a systematic review of randomised trials.* Int. J. Obes. Relat. Metab. Disord. 2003; 27: 987–1005.

32. Wing R.R., Jeffery R.W. *Food provision as a strategy to promote weight loss.* Obes. Res. 2001; 9: Suppl. 4: 271S–275S.

33. Wright S.M., Aronne L.J. *Obesity in 2010: the future of obesity medicine: where do we go from here?* Nat. Rev. Endocrinol. 2011; 7: 69–70.

34. Sjöström L., Lindroos A.-K., Peltonen M., *et al. Lifestyle, diabetes, and cardiovascular risk factors 10 years after bariatric surgery.* N. Engl. J. Med. 2004; 351: 2683–93.

References—Continued

35. Hill J.O., Wyatt H.R., Peters J.C. *Energy balance and obesity. Circulation* 2012; 126: 126–32.

36. Hall K.D., Heymsfield S.B., Kemnitz J.W., Klein S., Schoeller D.A., Speakman J.R. *Energy balance and its components: implications for body weight regulation.* AM. J. CLIN. NUTR. 2012; 95: 989–94.

37. Lilienfeld S.O., Ammirti R., Landfield K. *Giving debiasing away: can psychological research on correcting cognitive errors promote human welfare?* PERSPECT. PSYCHOL. SCI. 2007; 4: 390–8.

38. Shermer M. *Why people believe weird things: pseudoscience, superstition, and other confusions of our time.* 3rd ed. London: Souvenir Press, 2007.

39. Kahneman D. *Thinking fast and slow.* New York: Farrar, Straus and Giroux, 2011.

40. Whately R. *Elements of logic.* 9th ed. London: Longman, Greens, 1875.

ATTACHMENT 4

Goals in Nutrition Science 2015–2020 *

David B. Allison,[1–4] Josep Bassaganya-Riera,[5] Barbara Burlingame,[6–7] Andrew W. Brown,[1] Johannes le Coutre,[8–10, *] Suzanne L. Dickson,[11] Willem van Eden,[12] Johan Garssen,[13] Raquel Hontecillas,[5] Chor San H. Khoo,[14] Dietrich Knorr,[15] Martin Kussmann,[10, 16] Pierre J. Magistretti,[17–18] Tapan Mehta,[19] Adrian Meule,[20] Michael Rychlik,[21] and Claus Vögele [22]

With the definition of goals in Nutrition Science, we are taking a brave step and a leap of faith with regard to predicting the scope and direction of nutrition science over the next 5 years. The content of this editorial has been discussed, refined, and evaluated with great care by the Frontiers in Nutrition editorial board. We feel the topics described represent the key opportunities, but also the biggest challenges in our field. We took a clean-slate, bottom-up approach to identify and address these topics and present them in eight categories. For each category, the authors listed take responsibility, and deliberately therefore this document is a collection of thoughts from active minds, rather than a complete integration or consensus.

At *Frontiers in Nutrition,* we are excited to develop and share a platform for this discussion. Healthy Nutrition for all—an ambition too important to be handled by detachedinterest groups.

JOHANNES LE COUTRE, *Field Chief Editor,* FRONTIERS IN NUTRITION.

Sustainable Development Goals for Food and Nutrition

(Barbara Burlingame, Chor San H. Khoo, and Dietrich Knorr)

To deliver successfully, nutrition research needs a bold dose of innovation. Moving forward from the Millennium Development Goals to the post-2015 sustainable devel-

[1]Office of Energetics and Nutrition Obesity Research Center, School of Public Health, University of Alabama at Birmingham, Birmingham, AL, USA, [2]Section on Statistical Genetics, University of Alabama at Birmingham, Birmingham, AL, USA, [3]Department of Nutrition Sciences, University of Alabama at Birmingham, Birmingham, AL, USA, [4]Department of Biostatistics, University of Alabama at Birmingham, Birmingham, AL, USA, [5]Nutritional Immunology and Molecular Medicine Laboratory, Virginia Bioinformatics Institute, Virginia Tech, Blacksburg, VA, USA, [6]Deakin University, Melbourne, VIC, Australia, [7]American University of Rome, Rome, Italy, [8]Nestlé Research Center, Lausanne, Switzerland, [9]Organization for Interdisciplinary Research Projects, The University of Tokyo, Tokyo, Japan, [10]Ecole Polytechnique Fédérale de Lausanne, Lausanne, Switzerland, [11]Institute of Neuroscience and Physiology, The Sahlgrenska Academy at the University of Gothenburg, Gothenburg, Sweden, [12]Department of Infectious Diseases and Immunology, Faculty of Veterinary Medicine, Utrecht University, Utrecht, Netherlands, [13]Faculty of Science, Utrecht Institute for Pharmaceutical Sciences, Utrecht University, Utrecht, Netherlands, [14]North American Branch of International Life Sciences Institute, Washington, D.C., USA, 15 Technische Universität Berlin, Berlin, Germany, [16]Nestlé Institute of Health Sciences SA, Lausanne, Switzerland, [17]Division of Biological and Environmental Sciences and Engineering, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia, [18]Laboratory of Neuroenergetics and Cellular Dynamics, Brain Mind Institute, Ecole Polytechnique Fédérale de Lausanne, Lausanne, Switzerland, [19]Department of Health Services Administration, Nutrition Obesity Research Center, University of Alabama at Birmingham, Birmingham, AL, USA, [20]Department of Psychology, University of Salzburg, Salzburg, Austria, [21]Analytical Food Chemistry, Technische Universität München, Freising, Germany, [22]Research Unit INSIDE, Institute for Health and Behaviour, University of Luxembourg, Luxembourg, Luxembourg.

***Correspondence:** Johannes le Coutre *johannes.lecoutre@frontiersin.org*, *johannes.lecoutre@rdls.nestle.com*.

opment goals (SDG), global nutrition appears to require an improved model. Under current practices, feeding the exploding world population necessitates to close a gap of nearly 70% between the amount of food available today and the projected availability by 2050.[1] Today, globally, an estimated 805 million people are undernourished or food-insecure,[2] yet 1 out of 4 calories from food goes uneaten. Meanwhile, overweight and obesity affect approximately two billion people, including 42 million children under the age of 5. Human health notwithstanding environmental health is also at stake. Agriculture alone accounts for about 70% of our global water usage and 24% of our greenhouse gas emissions. As a result, our strategies to overcome issues of food sustainability, food waste, and food loss must be multifarious and include, at the very least: (i) Improving the global consumption of food. (ii) Increasing production efficiencies on existing agricultural land. (iii) Developing sustainable approaches that reduce the environmental impact of food production, and in particular greenhouse gas emissions. Certainly, the impact of agriculture on climate, ecosystems, and water will have to be reduced, while at the same time, we will need to ensure that it supports inclusive economic and social development.[1]

Systems science, the interdisciplinary field that explores the nature of complex systems, is perhaps the best research model we have for addressing the urgent needs of a precariously unhealthy planet. For better or for worse, nutrition imparts a quintessential challenge, straddling many sectors and disciplines.

In the past, at times, the agenda for mainstream nutrition has been pushing sectoral lines of reasoning by implementing policies that leave long-standing problems unresolved, while disrupting other sectors in the process. Of course, nutrition is not alone in this, but the history of unintended consequence is long and discouraging.[3–4]

Agriculture and health have been the mainstay sectors at the United Nations level, in government ministries, and in academic departments. Increasingly, nutrition is being recognized as an important pillar for the environmental sector, with biodiversity for food and nutrition acknowledged by the Convention on Biological Diversity,[5] and the Commission on Genetic Resources for Food and Agriculture accepting whole diets, food, and nutrients for human nutrition as ecosystem services.[6]

For all their embracing of nutrition, these sectors often work at cross-purposes, providing many useful illustrations of policies and programs that undermine each other's development efforts. We have policies and interventions in agriculture that contribute to diet-related chronic disease, environmental degradation, and food insecurity;[4, 7] conversely, in the health sector we have policies and interventions that compromise agricultural development;[8] and in the environmental sector that lead to micronutrient malnutrition.[9] Agriculture in particular, while solving some of its own sector problems, has been associated with many of the environmental and human health crises we now face, which directly impact upon nutrition, including chemical contamination of food supplies, loss of agrobiodiversity, and severe environmental degradation.[10]

In spite of the clear need to develop innovation for the future, "*systematic attempts to explore existing methods and to develop new technologies of more sustainable food production systems have so far been scarce*".[11] Although this quote is from over 30 years ago, it still quite accurately describes the current situation regarding activities related to sustainable diets and sustainable food systems. A sustainable development lens with a systems science approach offers not only a new analytical model for nutrition, but also an ethical and inclusive framework. Within this framework, nutrition encompasses more than its traditional domains and takes on issues of climate change,[12] biodiversity and ecosystems,[13] water use/waste,[14] food losses and waste,[15–16] sustainable forests and seas,[17] chemical contamination of food and water supplies,[18] environmental regulatory issues and food law, risk and risk/benefit assessments,[19] and monitoring adherence to and compliance with a range of relevant treaties and signed declarations/commitments.[13]

With this mindset of sensitive, cross-sectoral resolve, tangible and specific solutions will envisage a holistic food chain integration taking into account a total life cycle assessment. Food and nutrition security must be an intrinsic component of any solution for food sustainability. Forthcoming strategies will also have to explore the potential and utilization of new raw materials.

Improvements of food safety, storage, packaging, and transportation—including the use of sensor technologies—can reduce food losses and waste. Innovation will have to equally encompass the re-evaluation of existing food processing, storage, and home preparation operations employing existing modern toolboxes. Moreover, low energy, waste-free or waste-reduced processing, and preparation operations need to be implemented to a larger extent, including alternative energy sources. In the same context, water decontamination, recycling, and preservation tools need to be applied.

Unintended consequences must be considered with any sustainability program and global solutions are not necessarily applicable in local contexts. For example, reducing livestock production and consumption in one setting may benefit both human and environmental health, while in another setting it may reduce further already marginal intakes of high-quality protein and micronutrients and marginalize grazing lands that are self-renewing, sustainable repositories of biodiversity. Finally, young engineers and scientists need to be encouraged, trained, and involved to tackle the challenges of the future.

We have a planet in crisis on so many fronts. Regardless of how the SDGs evolve, this multi-sectoral vision of nutrition research and action has the potential to make meaningful, and sustainable, contributions.

Identifying and Mitigating Errors in Nutritional Science

(David B. Allison, Andrew W. Brown, and Tapan Mehta)

"Science," as Adam Smith famously said, "is the great antidote to the poison of enthusiasm and superstition".[20] Complementarily, Stephen Hawking has called scientists, "the bearers of the torch of discovery in our quest for knowledge".[21] Thus, science can be seen as having two key complementary roles—dispelling false beliefs, and creating new knowledge. For science to fulfill this joint mission, its practice must be true to its principles and precepts, including objectivity, methodological rigor, transparency, and reproducibility. Yet, there are concerns that departures from these precepts are too common.[22–28] Some have speculated that deviations from good scientific practices have increased in recent years due to a number of social, institutional, and economic factors in science.[25, 29] Others have speculated that the problem may be especially severe in the related domains of nutrition research and obesity research, perhaps because of emotional, economic, and other factors involved in those topics or because the everyday familiarity with aspects of those topics is mistaken for expertise.[23, 26–28] It is difficult to quantify whether the situation is better or worse today than in the past, or whether this is especially true in nutrition and obesity research compared to other fields. Nevertheless, it is clear that the problem exists.

Table 1: Common Errors Noted in the Published Literature[a]

Error	Example(s) of error
Errors involving or resulting from poor measurement	• Self-reported energy intake [33, 118, 119]b [34]c [32]d • Self-reported weights [120]b [121, 122]d
Errors involving inappropriate choice of or incorrect study design	• Cluster randomized trials with no degrees of freedom [123]c • Lack of control for non-specific factors, *i.e.,* failure to isolate the independent variable of interest [124]c • Non-random assignment in self-described RCTs [125]b
Errors involving replication	• Not validating prediction models in fresh samples [126]d • Gratuitous replication [35]d
Errors in statistical analyses	• Inappropriate baseline testing in parallel groups RCTs [127]c [128]d • Failure to appropriately manage missing data [129]c [130, 131]d • Not accounting for clustering in cluster randomized trials [132, 133]b [134, 135]c [136]d
Errors involving insufficient transparency in choices made about how to analyze and present the data	• Changing endpoints in a study [137]b [138]d • Excessive or unacknowledged multiple testing [called p-hacking,[139]d investigator degrees of freedom,[140]d or p-value fiddling,[141]d among other names] [142]c [143]b
Errors of misleadingly describing past literature	• Selectively citing only the part of a study that supports a hypothesis [35]d • Perpetuating citations from previous researchwithout confirming the original source [144]b
Errors that distort the scientific record by publishing studies as a function of study outcomes	• Publication bias [145]b [23, 146]d
Errors of interpretation or communication	• Inappropriate use of causal language [24, 35]d • Exaggerating or mis-describing results [35]d • Highlighting benefits of treatment when the effects were non-significant (*i.e.,* spin)[147]d • Issuing misleading press-releases [148]d
Errors of logic and mathematics	• Unreasonable linear extrapolations (*e.g.,* 3,500 kcal rule)[149–150]b

[a] Errors, examples, and references were identified in a manner neither systematic nor comprehensive.
[b] Denotes references correcting or commenting on specific errors.
[c] references in which the error in question occurred.

Several initiatives are going to be important in the coming years to improve nutrition as a science. First is classifying errors that exist in the nutrition literature. Just as Mendeleev's *Periodic Table of the Elements* led to increased understanding of chemistry and Linnaeus' taxonomy of life led to a framework for the study of biology, if we can develop a "pathology" or classification of these errors, we may be better able to quantify the situation, identify patterns, develop an understanding of origins, and ultimately reduce the occurrence and severity of these errors. In our non-systematic study of these issues, we see a number of categories of common errors (*Table 1*). We refer to them as errors without making any inference that they are intentional or unintentional errors.

Second, there is a general movement in science for "Transparency and Openness Promotion," formalized in "The TOP Guidelines".[30] The guidelines recognize eight standards: citation, data transparency, analytic methods (code) transparency, research materials transparency, design and analysis transparency, preregistration of studies, preregistration of analysis plans, and replication. These standards aim to improve the communication of science, allowing improved understanding and replicability of results. Because the TOP Guidelines are being adopted across fields of science, the field of nutrition will not have to act in isolation to improve its scientific practices. Instead, we can build on and work with the minds and resources coming from a spectrum of scientific inquiry. Indeed, *Frontiers in Nutrition* was one of the initial signatories.

Third, there is a need to develop sound methodology for evaluating nutrition and diet in free-living research participants. Issues are continually documented with self-report diet methodology,[31–33] and yet dietary recommendations depend heavily on dietary recall data.[34] Similarly, although existing nutrition-related health hypotheses can be investigated using randomized controlled trials (pragmatic or explanatory), the field often relies on ordinary association tests using observational data to quantify evidence [35–36] that policy-makers may then use to create policies or guidelines. The needs here are twofold: to develop and implement study designs that lie in the causality spectrum between ordinary association tests and randomized controlled trials [37–38] and to develop objective, reliable data on dietary patterns and nutrient status.[31–33]

We believe that by recognizing and acknowledging these problems, we also recognize and acknowledge that our field can do better. This will pave the way toward constructive efforts to reduce such problems and to ultimately improve the scientific foundations of nutrition science.

Building the Foundation: Procurement of Relevant Measures and Big Data Analysis

(Martin Kussmann, Josep Bassaganya-Riera, Raquel Hontecillas, Tapan Mehta, and Chor San H. Khoo)

Diet is considered a key environmental factor for maintaining health and preventing disease. As such, we need to better understand the interactions of nutrition and lifestyle with an individual's genetic makeup in order to delay or prevent metabolic and cognitive decline. Nutrition science is therefore undergoing a paradigm shift to better leverage the potential of nutrigenomics, a discipline that is already transforming the field.[39] To achieve this, the field will need to transform its current approach to research and implementation actions, and to take advantage of emerging advances in other disciplines—research designs, methods, new technologies, big data analysis, and bioinformation sharing.

The conceptual basis of gene—environmental interactions require not only research and technology, but also the cross-fertilization of disciplines: genomics will encompass other-omics, and nutrition research will need to take on a holistic or system biology approach rather than just nutrients, ingredients, or genes. Nutrition science now encompasses more than the classic reductionist and descriptive approaches to more quantitative and systems-level approaches.[40] Translational research to maintain health and prevent or delay disease onset requires a *transdisciplinary* approach that embraces the complexity of human individuality in a rapidly changing environment. Nutrigenomics fuels this research by investigating how genomic and epigenomic individuality predisposes dietary, health, and disease responses. It also influences how an individual's genome expresses itself at different omic levels (proteomics, metabolomics, lipidomics) in response to environmental factors, including nutrition. Molecular phenotyping of humans over time and across healthy and safe exposures and challenges have thus been proposed.[41]

Both the ongoing prevalence of malnutrition and the increasing incidence of nutrition- and lifestyle-related chronic diseases require comprehensive characteriza-

tion of the complex interactions between environment and genetic makeup. Systems thinking in human nutrition, environment, and health requires improvement and translational thinking in three areas:

(a) **_In vitro_ and _in vivo_ models:** a systems approach to human health implies rethinking of _in vitro_ and _in vivo_ models with regard to their translatability into human phenotypes: natural human cell models and panels of rodent strains should complement cancer cell lines and single rodent strains.

(b) _Human intervention study designs:_ classical case/control designs of human clinical/nutritional intervention studies should be complemented by longitudinal crossover studies, in which every subject is one's own case and control. Human clinical study subjects should not only be assessed at homeostasis, but also during a challenge to, and restoration of, homeostasis.

(c) _Tools for molecular phenotyping and capturing of human diet and lifestyle:_ nutrigenomic studies have typically been technology-driven rather than technology-rooted. Normative science methods and approaches need to be complemented by more comprehensive systems biology-based investigations deploying a multitude of omic platforms in an integrated fashion.[41] While comprehensive and quantitative omics are rapidly progressing in terms of data generation, quantitative capture and monitoring of diet and lifestyle have lagged behind. Non-invasive technologies are now providing more attractive and precise image- and webbased or body-wearable consumer/research interfaces.[42] The bottleneck in knowledge generation has moved from (omics and clinical) data acquisition to processing, visualization, and interpretation. Innovative tools and methods for statistical treatment and biological network analysis are now at the forefront of nutritional and biomedical sciences.[43]

To achieve this transformation and advancement of nutritional science, it is critical to connect researchers from all disciplines conducting direct or indirect research in the areas, _e.g.,_ (gen) omics, clinicals, dietetics, food science and technology, physiology, epidemiology, bioengineering, analytics, biomathematics. A _transdisciplinary_ approach needs to be considered—enabling a spectrum of communicating and sharing from fundamental laboratory research, patient- and consumer-relevant outputs from personalized dietary/nutritional counseling to monitoring/diagnostics. Progress in advancing nutrigenomic interventions for consumers and patients can only be accelerated if nutrition research is broadened to include quantitative, holistic, and molecular sciences.[44]

"Let the food be your medicine, and medicine be your food," a statement attributed to Hippocrates, the father of Western Medicine, delineates the impact of nutrition in human health and disease. Indeed, several decades of research at the interface of nutrition and immunology demonstrate that infectious, immune-mediated and metabolic diseases are safely and effectively preventable through dietary interventions. Nonetheless, there is a major disconnect between the description of nutrition-based protection from disease and an insufficient mechanistic understanding at the systems-level of the complex network interactions by which nutrition mediates clinical protection. As a result, a comprehensive understanding of the mechanisms of action underlying the actions of nutritional interventions and the combinatorial effects of nutrients (_i.e.,_ synergistic, antagonistic, or additive) at the systems-level remains largely unknown. As about 70% of the immune system is located in the gastrointestinal tract since the gut mucosa houses the largest repertoire of immune cells and commensal microbiota that symbiotically coexist to elicit protective immunity, studying nutritional immunology of the gut mucosa is incredibly important.[45] Coupling host-nutrient-microbiota actions, enabled through computational modeling of the gastrointestinal tract[46–50] with systems immunology frameworks has the potential to predict combinatorial outcomes of nutrient-microbiota-immune system interactions and advance toward a comprehensive systems-level mechanistic understanding of how nutrition and foods prevent disease. Computational models of nutritional immunology that funnel omics and cellular data judiciously, coupled with systems biology models of the underlying disease/organ, will bridge the connection between traditional methods of nutritional immunology research and their effect on the whole organism, which will enhance mechanistic insights and translational value. Over 163 nutrition themed systems biology markup language models (SBML) are already available in the Biomodels database.[51] In summary, applying the iterative systems biology cycle of model building, calibration, refinement, and validation in nutritional immunology research has the potential to accelerate the discovery of novel network biomarkers and systems-level mechanistic understanding of the action of dietary components on immuneresponses.

There has been an explosion in data collection and aggregation, some of which can be used for public health purposes, including obesity and nutrition-related research. Consequently, ample opportunities emerge to utilize "big data" in the pursuit of interesting outcomes and effectiveness studies related to nutrition and obesity using techniques such as quasi-experimental approaches. These approaches, when assumptions are satisfied, are intermediate between ordinary association tests and randomized controlled trials [37] in terms of presenting evidence for causality. In this article, the term "big data," which is often used subjectively, refers to very large amounts of data: structured and unstructured that may also increase over time rapidly.[52] These types of data are collected by both the public and private sectors and increasingly require a distributed architecture to manage them efficiently. Big data analysis has generally referred to the confluence of statistical, machine learning and computational approaches to synthesize and analyze these large amounts of data. Administrative data, such as micro-level data aggregated by governments as well as private companies, can be used to evaluate the effectiveness of pharmacological and surgical interventions. In fact, private companies have started collecting unprecedented amounts of data with some companies specializing in data linkages. For example, companies such as Optum not only aggregate claims data from private insurance companies but are able to provide linked clinical data from the corresponding electronic health records (EHR). Data linkages are an extremely powerful tool since they allow researchers to answer questions that are otherwise not accessible using a single data source. For example, claims data do not provide information about the height and weight of an individual, but the linked clinical data do. Similarly, the increasing availability of EHR data and the initiatives to link these EHR data with genomic data can enable us to pursue a variety of studies, including pharmacogenetic and precision medicine studies. One of the challenges in accessing and leveraging "big data" is the resources, including the associated cost of purchasing the data, especially from private companies. Collaborations between industry and academic researchers are essential to fully exploit the data and to overcome logistical challenges.[53–54]

So far, big data analysis has primarily focused on high-dimensional prediction models. The data mining and statistical toolkit for such approaches includes, but is not limited to, techniques such as boosting, random forests, classification and regression trees, and lasso-like penalized regression models.[53] While randomized control trials are considered gold standards, there are a variety of methods and designs that may allow us to generate evidence that may lie in the spectrum between purely association and definitively causal. Coupled with "big data" is an opportunity to estimate a degree of causality using techniques such as high-dimensional propensity score and differential comparison approaches to provide evidence that is indicative of causality.[55–56] There is also a potential to use instrument variable approaches, used commonly in health policy studies, by identifying appropriate instruments from "big data." Recent attempts to develop methods that enable to provide a degree of causal evidence are very encouraging and can allow us to maximize the potential of "big data".[57–58]

Authenticity and Safety of Foods

(Michael Rychlik)

The authenticity of food is generally related to one or more of the following attributes: geographic origin, type of agricultural production, species and kind of raw materials, or certain process qualities such as sustainability or ecological foot print.

Regularly uncovered crises of food adulteration underline the sensitivity of consumers to this issue. Apart from meat, foods that are often adulterated are olive oil, fish, organic foods, spices, tea, cocoa, coffee, and nuts.

In recent years, there has been tremendous progress in high-resolution methods to elucidate the molecular fingerprint of food. On the genetic scale, apart from classical polymerase chain reaction, new developments of isothermal amplifications or next generation sequencing will enable more accurate identification of species.

On the protein level, specific biomarker peptides can be used. For a fingerprint of metabolites, the new methods of non-targeted and targeted metabolomics already allow a specific authentication. In this field, the methods currently showing the best resolution are Fourier transform ion cyclotron mass spectrometry (FT/ICR–MS) or nuclear magnetic resonance (NMR) spectroscopy.[59] These new methodologies generate "big data," from which the relevant information is only accessible when applying novel bioinformatics approaches.

Regarding food safety, microbiological decay and foodborne infections still play an important role. However, contaminants also endanger the safety of all links in the whole food chain. The recent discoveries of process contaminants encompass simple molecules, such as acrylamide, furan, benzene, styrene, as well as more complex

compounds such as 3-monochloropropane-1,2-diol (MCPD) esters. An end of new discoveries cannot be foreseen yet and we may assume that the sum of all these contaminants has a significant impact on life-style diseases such as cancer. Further new contaminants arise from packaging materials such as mineral oil saturated hydrocarbons (MOSH) or mineral oil aromatic hydrocarbons (MOAH), and pollutants from the environment such as the polyfluorinated alkyl substances (PFAS). Moreover, the historic toxin arsenic is more relevant than ever as rice and rice products are often contaminated and the mechanisms of arsenic carcinogenicity are still under controversial discussion.

Generally, risk assessment of food contaminants or residues is predominantly performed on single compounds. However, almost completely missing is an assessment of the combined effects of toxins, be it within one group of compounds or spanning various structural groups. The current concept for assessing combinatorial effects is that of cumulative assessment groups (CAGs), which, *e.g.,* assess the cumulative potency corrected dose of acute reference doses (ARfD) for pesticides showing the same mode of toxic action.[60] However, this approach is still preliminary and lacks comprehensive confirmation.

The Science Behind Food-Related Behavior in Humans

(Adrian Meule, Chor San H. Khoo, and Claus Vögele)

Numerous environmental, social, and individual factors influence human food choice and intake.[61] In Western and Westernized societies, household expenditures and dietary energy availability decreased for unprocessed or minimally processed foods in the last decades while they increased for convenience foods and processed products.[62–63] An environment where there is easy and frequent accessibility to food, and where cues signaling food are ubiquitous, requires constant self-monitoring and -regulation in order to prevent or manage weight gain.[61] This, however, can be a highly effortful endeavor, leading many people to struggle with long-term weight maintenance. As evident from data from the last century, these self-regulatory efforts are made more difficult by increased consumption of energy-dense palatable foods and ingredients (*e.g.,* sugar, fat, and salt).[64] As a result, some have argued that these foods might have an addictive potential and that a subset of individuals who have difficulties in controlling consumption of these foods may be addicted to them.[65–68]

In the scientific literature, the association between food and addiction and the actual use of the term *food addiction* has a long history, dating back to the 1950s and even earlier times.[69–70] Not until recently, however, have researchers tried to more precisely define what is meant by food addiction and to systematically investigate its validity, as a consequence of which the number of publications, including the term *food addiction,* increased substantially over the past 5–6 years.[65, 71] In humans, research on food addiction has been promoted by the Yale Food Addiction Scale (YFAS), a self-report questionnaire developed in 2009, which measures symptoms of addiction-like eating based on the diagnostic criteria for substance dependence as outlined in the fourth version of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM–IV).[72] Since 2013, these diagnostic criteria have been revised in the fifth version of the DSM and a new version of the YFAS, which has been adapted accordingly, is currently under way.[73]

Although research on food addiction is growing, it remains a controversial and debated topic with many researchers questioning the validity of the food addiction concept based on conceptual considerations or physiological mechanisms.[74–78] To address these issues, more and better human studies are needed to resolve questions related to, for example, whether animal models of food addiction are transferable to human eating behavior.[79–80] These controversies, in particular, lead us to argue that food addiction research in humans is still in its infancy, that it would be premature to conclude that some foods are addictive, and that research efforts to clarify this will further increase in the years to come.

There are numerous avenues for future directions, which may include, but are not limited to: how do we define and harmonize definitions of food addiction? What are the implications of changes in the diagnostic criteria for substance dependence in the DSM–5 for food addiction?[73] Are all addiction criteria (as described in the DSM–5) equally applicable to human eating behavior? If not, does this obliterate the concept of food addiction?[81] How can food addiction be measured in humans other than using the YFAS and which methodological improvements need to be made to better design human behavior studies, including randomized controlled trials?[72] How relevant is the concept of food addiction for the treatment of obesity or binge eating and in public policy making? If it is relevant, how can it best be implemented?[70, 82] What are the disadvantages (if any) of the concept of food addiction?[83–85] How can animal models of addiction-like eating be improved to more spe-

cifically reflect relevant processes in humans?[86] Which foods are possibly addictive?[87] Can addiction-like eating actually be reduced to the addictive effects of substances or should the discussion about "food addiction" rather be replaced by a discussion on "eating addiction"?[88]

The Molecular and Physiological Science Underlying Nutrition and Brain Health

(Pierre Magistretti, Johannes le Coutre, and Suzanne L. Dickson)

Cognitive decline, dementia, Alzheimer's disease, and other age-related neurological diseases are on a rise in high income countries as well as in low and middle income countries.[89] Achieving and maintaining brain health is a lifelong endeavor with identifiable targets that are specific for each period in a lifetime. Thus, targeting cognitive development in the early phases of life and preventing cognitive decline during aging are priorities for any preventive or interventional approach. While pharmacological approaches can only be envisioned for brief periods of time and, for the most part, have been unsuccessful, nutritional approaches are implementable for extended periods of time. Initiatives on brain health should incorporate a nutrition-based approach that can be implemented throughout the different phases of life.

In order to identify valid nutritional approaches for brain health, it is important to better understand the mechanisms that are at the basis of brain energy metabolism regulation. Key advances have been made in recent years in the identification of the molecular and cellular mechanisms that regulate the delivery of energy to active neurons. In particular, an active metabolic exchange has been characterized between neurons and astrocytes with specific molecular steps that can become targets for nutritional interventions.

For the identification of the efficacy of such nutritional interventions, means for appropriate monitoring of markers need to be defined. This can be achieved by monitoring with brain imaging techniques, structural markers with morphometric approaches and myelination with MR as well as functional activation with fMRI, PET, EEG, and MRS, coupled with neuropsychological tests monitoring cognitive performance, motivation, and attention. The utility of these technologies goes beyond brain health and many of these approaches are being used to validate, in humans, the neuroscience of nutrition that, so far, has only been conducted in rodent models.[90–91]

There is no doubt that targeting the molecular steps of brain metabolism with nutritional interventions and monitoring their structural and functional outcomes in vivo in humans, in particular regarding cognitive performance, represents a promising approach for developing nutritional interventions for achieving brain health that can be maintained on the long term. Meaningful nutrient intake and nutritional intervention likely has an impact on the development of cognitive and behavioral performance measures, thereby determining our health span throughout life. Brain imaging studies on infants demonstrate how breast milk promotes healthy neural growth and early white matter development.[92]

Nutrients also engage brain pathways linked to metabolic control, appetite, and food-linked behaviors. There has been a general expectation that it must be possible to use food formulation/composition to control how much and what we eat by altering the satiating and/or reward value of food combinations.[93–94] Currently, we lack a sufficient scientific evidence base that certain "unhealthy" foods fall short of "healthy" foods in their ability to induce satiation, limit hunger, or reduce hedonic over-eating. Moreover, it has not yet been demonstrated that any food or combination of foods has beneficial effects on appetite and energy intake of sufficient duration or magnitude to impact on body weight or metabolic health.[95] This is a new and emerging field for which major advances are likely to progress through a better understanding of how nutrients communicate with the appetite-regulatory brain networks. Nutrient-brain communication could be direct but likely engages intrinsic physiological control systems. For example, when we eat, sensing mechanisms in the gut signal information about the amount and content of the food to the brain by nervous and endocrine afferent signals. Indeed, gut-derived hormones such as ghrelin and glucagon-like peptide 1 communicate with hypothalamic and brainstem areas linked to energy balance but also to brain areas processing the reward value of food and even brain areas linked to emotion and cognition.[96–97] Thus, while it seems clear that appetite-regulating hormones have a capacity to redirect behaviors important for governing how much and what we eat, the extent to which nutrients can control these behaviors through engaging intrinsic endocrine signals remains to be elucidated.

A related question is whether specific nutrients or food combinations can act on the brain to reinforce their own intake, leading to addictive-like over-consumption.

As reviewed recently[88] and as mentioned already in the previous section, it is very difficult to demonstrate in humans or rodents that foods act on the brain in a manner similar to addictive drugs, causing individuals to become addicted to them. It was suggested therefore that the term "eating addiction" rather than "food addiction" should be used to better describe addiction-like behavioral over-eating disorders. If it becomes possible to diagnose this patient group, *e.g.,* through combining questionnaires about addictive-like behavior for food with brain imaging,[98–99] there will be a large public health impact on treatment and prevention strategies. Additionally, industrial stakeholders and politicians will need to find solutions to circumvent or treat eating addiction.[88]

The Science of the Human Microbiome

(Dietrich Knorr and Chor San H. Khoo)

The human body harbors over eight million microbial genes, over 10,000 species, and plays host to over a trillion microbes. Microbial cells outnumber human cells by a factor of 10.[100] As a result, there is considerable interest to better define and understand the microbial role in host physiology, health, and disease etiology. In the last decade, there has been a tremendous surge in microbiome research funded by programs such as the Human Microbiome Project (HMP) and the MetHIT Program. Advancing new and multiple technological approaches—whole genome sequencing, metagenomics, high-throughput-analysis, proteomics, transcriptomics, cultivation, metabolomics, and bioinformatics—has led to new insights into microbial variety and abundance in 15–18 body sites, including the oral cavity, skin, airway, gut, and vagina, from 242 healthy participants in the largest cohort study to date. Findings from this research were published in two seminal papers in 2012 by the Human Microbiome Consortium.[100–101] The HMP study has the largest collection of data on abundance and variety of the human microbiome, with 5,177 unique microbial taxonomic profiles from 16S ribosomal RNA genes, more than 3.5 terabases of metagenomic sequence, and 800 reference strains isolated and sequenced.[100] Noteworthy observations from the HMP study are outlined in *Table 2.*[102]

Table 2: Variation in Microbial Ecology Among Individuals [102]

Each person's microbiome is unique and no two individuals have the same microbiome [102] However, in spite of individual microbial differences, different individuals can still be considered healthy
Microbial communities across varying body regions may predict some characteristics such as breast fed history and educational level
Microbial communities from different body regions from an individual were predictive for others. For example, the oral community can be used to predict the gut community
Overall, low relative numbers of pathogens have been observed
Strong site specialization but considerable variation in diversity and abundance of each habitat's signature microbes among subjects
Strong functional stability. This means that while the microbial compositions were widely different, the functionality is similar. This suggests flexibility to develop microbial communities that can provide similar performance
Wide variation in patterns of alpha and beta diversity (alpha-diversity within a site; beta diversity among subjects)
Correlations between ethnicity and microbiome composition across all body habitats
A positive correlation of vaginal pH to microbial diversity (higher pH having higher diversity)
An association of age with skin microbiome-associated metabolic pathways and oral microbiome composition

Translating learnings from emerging microbiome and health research presents exciting opportunities for future food and nutrition development. The use of microbes in food product development is not new. Fermented products are widespread and common in the marketplace. Food biotechnology has been in existence for more than 8,000 years.[103] The potential health impact of gut microbiota has been postulated by Metchnikoff[104] and since then, numerous related research results have been provided.[105–107] Probiotics are supplied in starter cultures and thus need to be preserved for transportation and use. As the highest possible cell density is required, losses that occur during processing, transportation, and storage, including in products, are detrimental. Consequently, approaches to increase and retain physiological fitness have been explored.[108–109]

Emerging capabilities to characterize microbial communities and their functions in the oral cavity present insights into the role microbes may play in taste and olfaction, and present new opportunities to further personalize and refine food products to better suit individual taste and palatability preferences. Oral pre- and probiotics may be an opportunity for innovation.

These emerging advances in human microbiome structure, diversity, and function present exciting new opportunities for new food products, ingredients, or dietary approaches that can be used for supporting daily health, direct or adjunct intervention

for risk reduction, or for new therapeutics for symptom reliefs (IBS). However, to advance these undertakings, several key questions need to be addressed. How easy is it to translate microbiome research to food and dietary applications? Limited well-designed studies have been performed that explore the impact of food and diet on microbial ecology and function. What biomarkers are available or need to be developed to understand how food and diet impact on the microbiome (gut, gut-brain, gut-kidney, *etc.*)? What microbial combination will be best suited for achieving specific outcomes? Of challenge is the ability to identify and separate the "good" from the "bad" microbes that can present foodborne illness or exacerbate disease risks. Gene sequencing and whole genome sequencing technologies have been used to diagnose and trace food contamination, and are now also applied in medicine. How can current microbiome research be easily translated for food and product applications? How easy is it to transfer available technologies and tools already developed for use in food and nutrition applications?

In addition, there remains room for improvement when translating to innovative or tailor-made products. Needs and opportunities include process generated structures, which impact on food properties (process-structure-function relationship) as outlined in the European Technology Platform Strategic Research Agenda (ETP SRA) (2007; 2012; 2014) for designing tailor-made foods for the targeted release of essential food constituents at points of need to support human microbiota growth and metabolic fitness. This needs to include the entire human digestion system encompassing the chewing apparatus, mouth microbiota, and enzymes. Moreover, food can contain viable microbial cultures as well as active enzymes. Understanding their role in and during digestion as well as their impact on gut, mouth, and skin microbiota may lead to the development of new food design concepts with targeted nutritional benefits.

Finally, emerging technologies are being introduced to the food processing area, including high hydrostatic pressure, pulsed electric fields, and atmospheric plasma. Little is known about their impact and function with regard to the human microbiota. These technologies could open new avenues for process-function-structure relationships as well as provide foods with metabolic properties not achieved via traditional processing.[36]

Nourishing the Immune System and Preventing Disease
(Johan Garssen, Willem van Eden, and Josep Bassaganya-Riera)

Whereas the disciplines of pharmaceutical and nutritional sciences have evolved separately in the Western world, for Asia these two research areas have been connected for centuries. However, today, with the ever-growing burden of chronic diseases in modern societies, the high relevance of specialized nutrition in both prevention and therapeutic approaches receives increased attention and recognition. The gap between food and pharma is narrowing.[110] One reason might be that, scientifically, the evidence for the so-called multi-target or polypharmacology approaches aimed at disease management is growing. Medical nutrition is beginning to be recognized as a unique and potentially powerful area in Western societies at the interface between food and pharma.

Medical nutrition targets innovative nutritional therapies, offering healthcare professionals solutions to effectively manage disease-related malnutrition and specific disease states. Medical nutrition is and will be increasingly understood as a useful and sometimes even essential component in the management of patient health. Many medical conditions can be managed better when patients are receiving a specialized diet adapted to their unique circumstances. Sometimes, the constraints on appetite may be physical, as in the case of stroke patients who may find it difficult or impossible to swallow, or of young children with neurological disabilities. Sometimes, the problem may simply be insufficient intake, caused by the loss of appetite. It is well known that many chronic diseases are associated with malnutrition, a phenomenon that is not solely based on body mass index or body weight. Many obese patients suffer from specific malnutrition. Examples of disease areas that might be associated with specific malnutrition are cancer, stroke, and COPD. However, frail or elderly people are treated and fed with this type of medical nutrition as well. Medical nutrition might bring solutions and support to these cases across a broad range of care settings—in the hospital, in the care home, or in the community. It contains unique compositions of specific nutrients that would be impossible or impractical to achieve through normal food intake alone. In most cases, it is administered via the gastrointestinal tract orally or with a feeding tube, utilizing the natural route for nutrient digestion and absorption. These cases are underpinned by a unique scientific rationale, preclinical and clinical research, and health economic evaluation making it very similar to the traditional pharma approach. By making medical nutrition an integral part of care, patient outcomes are significantly im-

proved. Lower healthcare costs by shortening hospital stays and keeping patients independent for longer are key outcomes for medical nutrition intervention. The food for special medical purposes (FSMP) is the regulatory directive involved with the quality/safety and efficacy of medical foods.

Another and unique medical area for which medical nutrition is aimed is disease-specific (the so-called disease targeted) medical nutrition. This type of medical nutrition is a unique, effective, therapeutic nutritional intervention for patients with, *e.g.,* a clinical need to avoid certain nutrients due to specific diseases or conditions where normal food intake is harmful. Examples are inborn errors of metabolism such as phenylketonuria (PKU) or severe cow's milk allergy and childhood epilepsy. Ketogenic therapy during refractory epilepsy can reduce seizures significantly. Other examples for disease-specific medical nutrition are science-driven concepts containing different and uniquely selected nutrients that can act in an orchestra leading to a delay in disease progression. Validated examples have been described for Alzheimer's, HIV, diabetes, and cancer.[111–114]

Disease-targeted medical nutrition can be aimed at conditions such as chronic inflammation. These inflammatory conditions are on the rise. This is caused by changes in life-style, food consumption patterns, and aging. Inflammation-associated conditions, such as atherosclerosis, type 1 and type 2 diabetes, obesity, Alzheimer's disease, and many others, are a growing burden to health budgets. Inflammatory conditions are thought to result from failing mechanisms of immunological tolerance. Of these mechanisms, deficient suppressive activities of a specialized subset of T cells, called regulatory T cells (Tregs), are being recognized as a major factor in the failure of immunological tolerance. A start has been made with the definition of antigen-specific Tregs with a broad anti-inflammatory effect, such as, for example, those that recognize inflammation-associated stress-proteins.[115] Herewith, the restoration of this regulation will be a widely sought goal, also for the field of nutrition. A telling example of what may be possible is the following. Wieten, *et al.,* have shown that the up-regulation of stress-proteins, such as heat shock protein 70 (HSP70), in the cells lining the gut, leads to the local induction of Tregs.[116] Working with a model of chronic and relapsing arthritis, it was found that HSP70 was also induced in Peyer's patches and the induced HSP70-specific Tregs were having a systemic effect seen to fully control arthritis. This up-regulation was achieved by the oral administration in mice of carvacrol, an essential oil of Oregano species. It showed that our diet may contain effective coinducers of stress-proteins and that these co-induced proteins can elicit anti-inflammatory activity in the immune system. Similar activities have now been described for other food components.[117] Therefore, especially for the diets of the aging individual, substances with anti-inflammatory activities will be an attractive component. In the field of veterinary medicine and food animal production, restrictions are now being imposed on the use of antibiotics, certainly on the use of antibiotics as growth-enhancers. Also here, feed additives are searched with the purpose of controlling inflammation and thereby enhancing weight gain.

In combination with drugs, medical devices and lifestyle modification, medical nutrition, and immune system targeted nutraceuticals can play an essential role in health care and precision medicine. Expectedly, it will lead to lower costs of care: fewer complications, shorter hospital stays and reduced mortality, and the reduction of disease manifestations.

Over the coming years, Medical Nutrition and Nutraceuticals have the opportunity to be accepted as a bridge between food and traditional pharma approaches—not as isolated therapy but as part of integrated systems-wide health care. Additionally, pharma often is focusing on a monotherapeutic approach (one molecule one target) and medical nutrition will be recognized as the multi-target approach for disease management. Regulation and acceptance depends on national and international guidelines. Changes in regulation for medical nutrition are to be expected since medical nutrition is a relatively new therapeutic area that falls between different regulations and guidelines. For instance, in the USA, under section 5(b) of the Orphan Drug Act [21 U.S.C. 360ee(b)(3)], a medical food is formulated to be consumed or administered enterally under the supervision of a physician and which is intended for the specific dietary management of a disease or condition for which distinctive nutritional requirements, based on recognized scientific principles, are established by medical evaluation. Thus, from a regulatory perspective, medical foods are different than dietary supplements in that claims for medical foods can allude to disease management whereas dietary supplement claims cannot. Medical foods are exempted from the labeling requirements for health claims and nutrient content claims under the Nutrition Labeling and Education Act of 1990. In order to be a medical food, a product must meet the following criteria: to be a food for oral or tube feeding, the product must be labeled for the dietary management of a specific med-

ical disorder, disease, or condition for which there are distinctive nutritional requirements, and the product must be intended to be used under medical supervision. Essentially, medical food comes into play when dietary management cannot be achieved by the modification of the normal diet alone. For instance, medical foods could be used to replete key metabolic components that might be depleted in diabetes or inflammation. Only translational research and randomized, placebo controlled double-blind clinical trials can validate these new concepts.

References

1. *Creating a Sustainable Food Future.* Available from: *http://www.wri.org/sites/default/files/wri13_report_4c_wrr_online.pdf.*

2. FAO, IFAD, and WFP. *The State of Food Insecurity in the World 2014. Strengthening the Enabling Environment for Food Security and Nutrition.* Rome (2014). Available from: *http://www.fao.org/3/a-i4030e.pdf.*

3. Garnett T., Appleby M.C., Balmford A., Bateman I.J., Benton T.G., Bloomer P., *et al. Agriculture. Sustainable intensification in agriculture: premises and policies.* SCIENCE (2013) 341: 33–4. *doi:10.1126/science.1234485.*

4. Tillotson J.E. A*merica's obesity: conflicting public policies, industrial economic development, and unintended human consequences.* ANNU. REV. NUTR. (2004) 24: 617–43. *doi:10.1146/annurev.nutr.24.012003.132434.*

5. Agricultural Biodiversity A. *Cross-Cutting Initiative on Biodiversity for Food and Nutrition* (2006). Available from: *https://www.cbd.int/decision/cop/?id=11037.*

6. *Fourteenth Regular Session of the Commission on Genetic Resources for Food and Agriculture.* Rome (2013). Available from: *http://www.fao.org/docrep/meeting/028/mg538e.pdf.*

7. Zhang R. *Food security: food trade regime and food aid regime.* J. INT. ECON. LAW (2004) 7: 565–84. *doi:10.1093/jiel/7.3.565.*

8. Latham M. *The great vitamin A fiasco.* WORLD. NUTR. (2010) 1: 12–45.

9. Golden C.D., Fernald L.C.H., Brashares J.S., Rasolofoniaina B.J.R., Kremen C. *Benefits of wildlife consumption to child nutrition in a biodiversity hotspot.* PROC. NATL. ACAD. SCI. USA (2011) 108:19653–6. *doi:10.1073/pnas.1112586108.*

10. Foley J.A., Defries R., Asner G.P., Barford C., Bonan G., Carpenter S.R., *et al.Global consequences of land use.* SCIENCE (2005) 309:570–4. *doi:10.1126/science.1111772.*

11. Knorr D, editor. *Sustainable Food Systems.* Westport, CT: AVI Publishing (1983).

12. Wheeler T., von Braun J. *Climate change impacts on global food security.* SCIENCE (2013) 341:508–13. *doi:10.1126/science.1239402.*

13. Toledo A., Burlingame B. *Biodiversity and nutrition: a common path toward global food security and sustainable development.* J. FOOD. COMPOST. ANAL. (2006) 19: 477–83. *doi:10.1016/j.jfca.2006.05.001.*

14. Waldron S., Flowers H., Arlaud C., Bryant C., McFarlane S. *The significance of organic carbon and nutrient export from peatland-dominated landscapes subject to disturbance, a stoichiometric perspective.* BIOGEOSCIENCES (2009) 6: 363–74. *doi:10.5194/bg-6-363-2009.*

15. Gustavsson J., Cederberg C., Sonesson U., Meybeck A., van Otterdijk R.. *Global food losses and food waste.* In: *Interpack* 2011 (Düsseldorf) (2011). Available from: *http://www.fao.org/docrep/014/mb060e/mb060e.pdf.*

16. Godfray H.C.J., Beddington J.R., Crute I.R., Haddad L., Lawrence D., Muir J.F., *et al. Food security: the challenge of feeding 9 billion people.* SCIENCE (2010) 327: 812–8. *doi:10.1126/science.1185383.*

17. Vinceti B., Termote C., Ickowitz A., Powell B., Kehlenbeck K., Hunter D. *The contribution of forests and trees to sustainable diets.* SUSTAINABILITY (2013) 5: 4797–824. *doi:10.3390/su5114797.*

18. Meffe R., de Bustamante I. *Emerging organic contaminants in surface water and groundwater: a first overview of the situation in Italy.* SCI. TOTAL ENVIRON. (2014) 481: 280–95. *doi:10.1016/j.scitotenv.2014.02.053.*

19. Myers G.J., Davidson P.W., Strain J.J. *Nutrient and methyl mercury exposure from consuming fish.* J. NUTR. (2007) 137: 2805–8.

20. Smith A. *An Inquiry into the Nature and Causes of the Wealth of Nations.* Vol. 3, 4th ed. London: W. Strahan and T. Cadell (1786). 206 p.

21. Hawking S., Mlodinow L. *The Grand Design.* New York: Random House Publishing Group (2010) p. 5.

22. Collins F.S., Tabak L.A. *Policy: NIH plans to enhance reproducibility.* NATURE (2014) 505: 612–3. *doi:10.1038/505612a.*

23. Schoenfeld J.D., Ioannidis J.P.A. *Is everything we eat associated with cancer? A systematic cookbook review.* AM. J. CLIN. NUTR. (2013) 97: 127–34. *doi:10.3945/ajcn.112.047142.*

24. Cofield S.S., Corona R.V., Allison D.B. *Use of causal language in observational studies of obesity and nutrition.* OBES. FACTS (2010) 3: 353–6. *doi:10.1159/000322940.*

25. Kaiser K.A., Cofield S.S., Fontaine K.R., Glasser S.P., Thabane L., Chu R., *et al. Is funding source related to study reporting quality in obesity or nutrition randomized control trials in top-tier medical journals?* INT. J. OBES. (Lond) (2012) 36: 977–81. *doi:10.1038/ijo.2011.207.*

26. Casazza K., Allison D.B. *Stagnation in the clinical, community and public health domain of obesity: the need for probative research.* CLIN. OBES. (2012) 2: 83–5. *doi:10.1111/j.1758-8111.2012.00052.x.*

27. Casazza K., Fontaine K.R., Astrup A., Birch L.L., Brown A.W., Bohan Brown M.M., *et al. Myths, presumptions, and facts about obesity.* N. ENGL. J. MED. (2013) 368: 446–54. *doi:10.1056/NEJMsa1208051.*

28. Bohan Brown M.M., Brown A.W., Allison D.B. *Nutritional epidemiology in practice: learning from data or promulgating beliefs?* AM. J. CLIN. NUTR. (2013) 97: 5–6. *doi:10.3945/ajcn.112.052472.*

29. *PLoS Medicine* Editors. *Making sense of non-financial competing interests.* PLOS MED. (2008) 5: e199. *doi:10.1371/journal.pmed.0050199.*

30. Nosek B.A., Alter G., Banks G.C., Borsboom D., Bowman S.D., Breckler S.J., *et al. Promoting an open research culture.* SCIENCE (2015) 348: 1422–5. *doi:10.1126/science.aab2374.*

31. Archer E., Pavela G., Lavie C.J. *The inadmissibility of what we eat in America and NHANES dietary data in nutrition and obesity research and the scientific formulation of national dietary guidelines.* MAYO CLINIC PROCEEDINGS (2015) 90(7): 911–26. *doi:10.1016/j.mayocp.2015.04.009.*

32. Dhurandhar N.V., Schoeller D., Brown A.W., Heymsfield S.B., Thomas D., Sorensen T.I.A., *et al. Energy balance measurement: when something is not better than nothing.* INT. J. OBES. (Lond) (2014) 39(7): 1109–13. *doi:10.1038/ijo.2014.199.*

33. Schoeller D.A., Thomas D., Archer E., Heymsfield S.B., Blair S.N., Goran M.I., *et al. Self-report-based estimates of energy intake offer an inadequate basis for scientific conclusions.* AM. J. CLIN. NUTR. (2013) 97: 1413–5. *doi:10.3945/ajcn.113.062125.*

34. Dietary Guidelines Advisory Committee. *Scientific Report of the 2015 Dietary Guidelines Advisory Committee* (2015). Available from: *http://www.health.gov/dietaryguidelines/2015-scientific-report/PDFs/Scientific-Report-of-the-2015-Dietary-Guidelines-Advisory-Committee.pdf.*

35. Brown A.W., Bohan Brown M.M., Allison D.B. *Belief beyond the evidence: using the proposed effect of breakfast on obesity to show 2 practices that distort scientific evidence.* AM. J. CLIN. NUTR. (2013) 98: 1298–308. *doi:10.3945/ajcn.113.064410.*

36. Brown J., de Vos W.M., DiStefano P.S., Doré J., Huttenhower C., Knight R., *et al. Translating the human microbiome.* NAT. BIOTECHNOL. (2013) 31: 304–8. *doi:10.1038/nbt.2543.*

37. Mehta T., Allison D.B. *From measurement to analysis reporting: grand challenges in nutritional methodology.* FRONT. NUTR. (2014) 1. *doi:10.3389/fnut.2014.00006.*

38. Pavela G., Wiener H., Fontaine K.R., Fields D.A., Voss J.D., Allison D.B. *Packet randomized experiments for eliminating classes of confounders.* EUR. J. CLIN. INVEST. (2015) 45(1): 45–55. *doi:10.1111/eci.12378.*

39. Kussmann M., Van Bladeren P.J. *The extended nutrigenomics—understanding the interplay between the genomes of food, gut microbes, and human host.* FRONT. GENET. (2011) 2: 21. *doi:10.3389/fgene.2011.00021.*

40. van Ommen B., El-Sohemy A., Hesketh J., Kaput J., Fenech M., Evelo C.T., *et al. The Micronutrient Genomics Project: a community-driven knowledge base for micronutrient research.* GENES. NUTR. (2010) 5: 285–96. *doi:10.1007/s12263-010-0192-8.*

References—Continued

41. Kussmann M., Morine M.J., Hager J., Sonderegger B., Kaput J.. *Perspective: a systems approach to diabetes research.* Front. Genet. (2013) 4: 205. *doi:10.3389/fgene.2013.00205.*

42. Stumbo P.J., Weiss R., Newman J.W., Pennington J.A., Tucker K.L., Wiesenfeld P.L., *et al. Web-enabled and improved software tools and data are needed to measure nutrient intakes and physical activity for personalized health research.* J. Nutr. (2010) 140: 2104–15. *doi:10.3945/jn.110.128371.*

43. Nguyen T.-P., Scotti M., Morine M.J., Priami C. *Model-based clustering reveals vitamin D dependent multi-centrality hubs in a network of vitamin-related proteins.* BMC Syst. Biol. (2011) 5: 195. *doi:10.1186/1752-0509-5-195.*

44. Kussmann M., Fay L.B. *Nutrigenomics and personalized nutrition: science and concept.* Per. Med. (2008) 5: 447–55. *doi:10.2217/17410541.5.5.447.*

45. Viladomiu M., Hontecillas R., Yuan L., Lu P., Bassaganya-Riera J. *Nutritional protective mechanisms against gut inflammation.* J. Nutr. Biochem. (2013) 24: 929–39. *doi:10.1016/j.jnutbio.2013.01.006.*

46. Carbo A, Bassaganya-Riera J., Pedragosa M., Viladomiu M., Marathe M., Eubank S., *et al. Predictive computational modeling of the mucosal immune responses during **Helicobacter pylori** infection.* PLoS One (2013) 8: e73365. *doi:10.1371/journal.pone.0073365.*

47. Carbo A., Hontecillas R., Kronsteiner B., Viladomiu M., Pedragosa M., Lu P., *et al. Systems modeling of molecular mechanisms controlling cytokine-driven CD4+ T cell differentiation and phenotype plasticity.* PLoS Comput. Biol. (2013) 9: e1003027. *doi:10.1371/journal.pcbi.1003027.*

48. Carbo A., Olivares-Villagómez D., Hontecillas R., Bassaganya-Riera J., Chaturvedi R., Piazuelo M.B., *et al. Systems modeling of the role of interleukin-21 in the maintenance of effector CD4+ T cell responses during chronic Helicobacter pylori infection.* MBio. (2014) 5:e1243–1214. *doi:10.1128/mBio.01243-14.*

49. Mei Y., Abedi V., Carbo A., Zhang X., Lu P., Philipson C., *et al. Multiscale modeling of mucosal immune responses.* BMC Bioinformatics (2015) 16(Suppl. 12).

50. Leber A., Viladomiu M., Hontecillas R., Abedi V., Philipson C., Hoops S., *et al. Systems modeling of interactions between mucosal immunity and the gut microbiome during clostridium difficile infection.* PLoS One (2015) 10: e0134849. *doi:10.1371/journal.pone.0134849.*

51. Mc Auley M.T., Proctor C.J., Corfe B.M., Cuskelly G.C, Mooney K.M. *Nutrition research and the impact of computational systems biology.* J. Comput. Sci. Syst. Biol. (2013) 6: 271–85. *doi:10.4172/jcsb.1000122.*

52. Laney D. *3D Data Management: Controlling Data Volume, Velocity, and Variety. Application Delivery Strategies.* Stamford, CT: META Group Inc. (2001).

53. Einav L., Levin J. *Economics in the age of big data.* Science (2014) 346: 1243089. *doi:10.1126/science.1243089.*

54. Wallace P.J., Shah N.D., Dennen T., Bleicher P.A., Bleicher P.D., Crown W.H. *Optum labs: building a novel node in the learning health care system.* Health Aff. (Millwood) (2014) 33: 1187–94. *doi:10.1377/hlthaff.2014.0038.*

55. Schneeweiss S., Rassen J.A., Glynn R.J., Avorn J., Mogun H., Brookhart M.A. *High-dimensional propensity score adjustment in studies of treatment effects using health care claims data.* Epidemiology (2009) 20: 512–22. *doi:10.1097/EDE.0b013e3181a663cc.*

56. Rosenbaum P.R. *Using Differential Comparisons in Observational Studies* (2013). Available from: *http://amstat.tandfonline.com/doi/abs/10.1080/09332480.2013.845002* (accessed May 23, 2015).

57. Peters J., Bühlmann P., Meinshausen N. C*ausal Inference Using Invariant Prediction: Identification and Confidence Intervals* (2015). Available from: *http://arxiv.org/abs/1501.01332* (accessed May 23, 2015).

58. Bühlmann P., Peters J., Ernest J. *CAM: causal additive models, high-dimensional order search and penalized regression.* Ann. Stat. (2014) 42: 2526–56. *doi:10.1214/14-AOS1260.*

59. Roullier-Gall C., Witting M., Gougeon R.D., Schmitt-Kopplin P. *High precision mass measurements for wine metabolomics.* Front. Chem. (2014) 2: 102. *doi:10.3389/fchem.2014.00102.*

60. Leeman W.R., Krul L., Houben G.F. *Complex mixtures: relevance of combined exposure to substances at low dose levels.* Food Chem. Toxicol. (2013) 58: 141–8. *doi:10.1016/j.fct.2013.03.050.*

61. Meule A., Vögele C. *The psychology of eating.* Front. Psychol. (2013) 4:215. *doi:10.3389/fpsyg.2013.00215.*

62. Moubarac J.-C., Batal M., Martins A.P.B., Claro R., Levy R.B., Cannon G., *et al. Processed and ultra-processed food products: consumption trends in Canada from 1938 to 2011.* Can. J. Diet. Pract. Res. (2014) 75: 15–21. *doi:10.3148/75.1.2014.15.*

63. Poti J.M., Mendez M.A., Ng S.W., Popkin B.M. *Is the degree of food processing and convenience linked with the nutritional quality of foods purchased by U.S. households?* Am. J. Clin. Nutr. (2015) 101: 1251–62. *doi:10.3945/ajcn.114.100925.*

64. Davis C. *Evolutionary and neuropsychological perspectives on addictive behaviors and addictive substances: relevance to the "food addiction" construct.* Subst. Abuse. Rehabil. (2014) 5: 129–37. *doi:10.2147/SAR.S56835.*

65. Gearhardt A.N., Davis C., Kuschner R., Brownell K.D. *The addiction potential of hyperpalatable foods.* Curr. Drug Abuse Rev. (2011) 4: 140–5. *doi:10.2174/1874473711104030140.*

66. Davis C. *From passive overeating to "food addiction": a spectrum of compulsion and severity.* ISRN Obes. (2013) 2013: 435027. *doi:10.1155/2013/435027.*

67. Avena N.M., Gold M.S. *Food and addiction—sugars, fats and hedonic overeating.* Addiction (2011) 106: 1214–5. *doi:10.1111/j.1360-0443.2011.03373.x.*

68. Ahmed S.H., Guillem K., Vandaele Y.. *Sugar addiction: pushing the drug-sugar analogy to the limit.* Curr. Opin. Clin. Nutr. Metab. Care. (2013) 16: 434–9. *doi:10.1097/MCO.0b013e328361c8b8.*

69. Davis C., Carter J.C. *Compulsive overeating as an addiction disorder. A review of theory and evidence.* Appetite (2009) 53: 1–8. *doi:10.1016/j.appet.2009.05.018.*

70. Davis C., Carter J.C. *If certain foods are addictive, how might this change the treatment of compulsive overeating and obesity?* Curr. Addict. Rep. (2014) 1: 89–95. *doi:10.1007/s40429-014-0013-z.*

71. Krashes M.J., Kravitz A.V. *Optogenetic and chemogenetic insights into the food addiction hypothesis.* Front. Behav. Neurosci. (2014) 8: 57. *doi:10.3389/fnbeh.2014.00057.*

72. Meule A., Gearhardt A.N. *Five years of the Yale Food Addiction Scale: taking stock and moving forward.* Curr. Addict. Rep. (2014) 1: 193–205. *doi:10.1007/s40429-014-0021-z.*

73. Meule A., Gearhardt A.N. *Food addiction in the light of DSM–5.* Nutrients (2014) 6:3 653–71. *doi:10.3390/nu6093653.*

74. Rogers P.J. *Obesity—is food addiction to blame?* Addiction (2011) 106: 1213–4. *doi:10.1111/j.1360-0443.2011.03371.x.*

75. Benton D. *The plausibility of sugar addiction and its role in obesity and eating disorders.* Clin. Nutr. (2010) 29: 288–303. *doi:10.1016/j.clnu.2009.12.001.*

76. Wilson G.T. *Eating disorders, obesity and addiction.* Eur. Eat. Disord. Rev. (2010) 18: 341–51. *doi:10.1002/erv.1048.*

77. Ziauddeen H., Farooqi I.S., Fletcher P.C. *Obesity and the brain: how convincing is the addiction model?* Nat. Rev. Neurosci. (2012) 13: 279–86. *doi:10.1038/nrn3212.*

78. Ziauddeen H., Fletcher P.C. *Is food addiction a valid and useful concept?* Obes. Rev. (2013) 14: 19–28. *doi:10.1111/j.1467-789X.2012.01046.x.*

79. Hill J.O., Berridge K., Avena N.M., Ziauddeen H., Alonso-Alonso M., Allison D.B., *et al. Neurocognition: the food-brain connection.* Adv. Nutr. (2014) 5:5 44–6. *doi:10.3945/an.114.006437.*

80. Salamone J.D., Correa M. *Dopamine and food addiction: lexicon badly needed.* Biol. Psychiatry (2013) 73: e15–24. *doi:10.1016/j.biopsych.2012.09.027.*

81. Gearhardt A.N., Corbin W.R., Brownell K.D. *Food addiction: an examination of the diagnostic criteria for dependence.* J. Addict. Med. (2009) 3: 1–7. *doi:10.1097/ADM.0b013e318193c993.*

82. Gearhardt A.N., Brownell K.D. *Can food and addiction change the game?* Biol. Psychiatry (2013) 73: 802–3. *doi:10.1016/j.biopsych.2012.07.024.*

83. DePierre J.A., Puhl R.M., Luedicke J. *A new stigmatized identity? Comparisons of a "food addict" label with other stigmatized health conditions.* Basic Appl. Soc. Psych. (2013) 35: 10–21. *doi:10.1080/01973533.2012.746148.*

84. Latner J.D., Puhl R.M., Murakami J.M., O'Brien K.S. *Food addiction as a causal model of obesity. Effects on stigma, blame, and perceived psychopathology.* Appetite (2014) 77: 77–82. *doi:10.1016/j.appet.2014.03.004.*

References—Continued

85. Lee N.M., Hall W.D., Lucke J., Forlini C., Carter A. *Food addiction and its impact on weight-based stigma and the treatment of obese individuals in the U.S. and Australia.* Nutrients (2014) 6: 5312–26. *doi:10.3390/nu6115312.*

86. Avena N.M. *The study of food addiction using animal models of binge eating.* Appetite (2010) 55: 734–7. *doi:10.1016/j.appet.2010.09.010.*

87. Schulte E.M., Avena N.M., Gearhardt A.N. *Which foods may be addictive? The roles of processing, fat content, and glycemic load.* PLoS One (2015) 10: e0117959. *doi:10.1371/journal.pone.0117959.*

88. Hebebrand J., Albayrak O., Adan R., Antel J., Dieguez C., de Jong J., et al. *"Eating addiction", rather than "food addiction", better captures addictive-like eating behavior.* Neurosci. Biobehav. Rev. (2014) 47: 295–306. *doi:10.1016/j.neubiorev.2014.08.016.*

89. Wimo A., Prince, M. *World Alzheimer Report 2010* (2010). Available from: *http://www.alz.co.uk/research/files/WorldAlzheimerReport.pdf.*

90. Ohla K., Toepel U., le Coutre J., Hudry J. *Visual-gustatory interaction: orbitofrontal and insular cortices mediate the effect of high-calorie visual food cues on taste pleasantness.* PLoS One (2012) 7: e32434. *doi:10.1371/journal.pone.0032434.*

91. Crouzet S.M., Busch N.A., Ohla K. *Taste quality decoding parallels taste sensations.* Curr. Biol. (2015) 25: 890–6. *doi:10.1016/j.cub.2015.01.057.*

92. Deoni S.C.L., Dean D.C., Piryatinsky I., O'Muircheartaigh J., Waskiewicz N., Lehman K., et al. *Breastfeeding and early white matter development: a cross-sectional study.* Neuroimage (2013) 82: 77–86. *doi:10.1016/j.neuroimage.2013.05.090.*

93. Blundell J. *Making claims: functional foods for managing appetite and weight.* Nat. Rev. Endocrinol. (2010) 6: 53–6. *doi:10.1038/nrendo.2009.224.*

94. Mercer J.G., Johnstone A.M., Halford J.C.G. *Approaches to influencing food choice across the age groups: from children to the elderly.* Proc. Nutr. Soc. (2015) 74(2): 1–9. *doi:10.1017/S0029665114001712.*

95. Halford J.C.G., Harrold J.A. *Satiety-enhancing products for appetite control: science and regulation of functional foods for weight management.* Proc. Nutr. Soc. (2012) 71: 350–62. *doi:10.1017/S0029665112000134.*

96. Skibicka K.P., Dickson S.L. *Enteroendocrine hormones—central effects on behavior.* Curr. Opin. Pharmacol. (2013) 13: 977–82. *doi:10.1016/j.coph.2013.09.004.*

97. Egecioglu E., Skibicka K.P., Hansson C., Alvarez-Crespo M., Friberg P.A., Jerlhag E., et al. *Hedonic and incentive signals for body weight control.* Rev. Endocr. Metab. Disord. (2011) 12: 141–51. *doi:10.1007/s11154-011-9166-4.*

98. Gearhardt A.N., Corbin W.R., Brownell K.D. *Preliminary validation of the Yale Food Addiction Scale.* Appetite (2009) 52: 430–6. *doi:10.1016/j.appet.2008.12.003.*

99. Iozzo P., Guiducci L., Guzzardi M.A., Pagotto U. *Brain PET imaging in obesity and food addiction: current evidence and hypothesis.* Obes. Facts (2012) 5: 155–64. *doi:10.1159/000338328.*

100. Human Microbiome Project Consortium. *A framework for human microbiome research.* Nature (2012) 486: 215–21. *doi:10.1038/nature11209.*

101. Human Microbiome Project Consortium. *Structure, function and diversity of the healthy human microbiome.* Nature (2012) 486: 207–14. *doi:10.1038/nature11234.*

102. Ding T., Schloss P.D. *Dynamics and associations of microbial community types across the human body.* Nature (2014) 509: 357–60. *doi:10.1038/nature13178.*

103. Knorr D., Sinskey A.J. *Biotechnology in food production and processing.* Science (1985) 229: 1224–9. *doi:10.1126/science.229.4719.1224.*

104. Metchnikoff E. *The Prolongation of Life: Optimistic Studies.* New York, London: G.P. Putnam's Sons (1908).

105. Chung D. *It's a jungle in there.* New Sci. (2004) 182: 42–5.

106. Claesson M.J., Jeffery I.B., Conde S., Power S.E., O'Connor E.M., Cusack S., et al. *Gut microbiota composition correlates with diet and health in the elderly.* Nature (2012) 488: 178–84. *doi:10.1038/nature11319.*

107. Salonen A., Lahti L., Salojärvi J., Holtrop G., Korpela K., Duncan S.H., et al. *Impact of diet and individual variation on intestinal microbiota composition and ermentation products in obese men.* ISME J. (2014) 8: 2218–30. *doi:10.1038/ismej.2014.63.*

108. Ananta E., Birkeland S.-E., Corcoran B., Fitzgerald G., Hinz S., Klijn A., et al. *Processing effects on the nutritional advancement of probiotics and prebiotics.* Microb. Ecol. Health Dis. (2004) 16: 114–24. *doi:10.3402/mehd.v16i2-3.7933.*

109. Volkert M., Ananta E., Luscher C., Knorr D. *Effect of air freezing, spray freezing, and pressure shift freezing on membrane integrity and viability of* **Lactobacillus rhamnosus** *GG.* J. Food Eng. (2008) 87: 532–40. *doi:10.1016/j.jfoodeng.2008.01.008.*

110. Georgiou N.A., Garssen J., Witkamp R.F. *Pharma-nutrition interface: the gap is narrowing.* Eur. J. Pharmacol. (2011) 651: 1–8. *doi:10.1016/j.ejphar.2010.11.007.*

111. Gori A., Rizzardini G., Van't Land B., Amor K.B., van Schaik J., Torti C., et al. *Specific prebiotics modulate gut microbiota and immune activation in HAART-naive HIV-infected adults: results of the "COPA" pilot randomized trial.* Mucosal. Immunol. (2011) 4: 554–63. *doi:10.1038/mi.2011.15.*

112. Cahn P., Ruxrungtham K., Gazzard B., Diaz R.S., Gori A., Kotler D.P., et al. *The immunomodulatory nutritional intervention NR100157 reduced CD4+ T-cell decline and immune activation: a 1-year multicenter randomized controlled double-blind trial in HIV-infected persons not receiving antiretroviral therapy (The BITE Study).* Clin. Infect. Dis. (2013) 57: 139–46. *doi:10.1093/cid/cit171.*

113. Scheltens P., Twisk J.W.R., Blesa R., Scarpini E., von Arnim C.A.F., Bongers A., et al. *Efficacy of Souvenaid in mild Alzheimer's disease: results from a randomized, controlled trial.* J. Alzheimers Dis. (2012) 31: 225–36. *doi:10.3233/JAD-2012-121189.*

114. Faber J., Berkhout M., Fiedler U., Avlar M., Witteman B.J., Vos A.P., et al. *Rapid EPA and DHA incorporation and reduced PGE2 levels after one week intervention with a medical food in cancer patients receiving radiotherapy, a randomized trial.* Clin. Nutr. (2013) 32: 338–45. *doi:10.1016/j.clnu.2012.09.009.*

115. van Herwijnen M.J.C., Wieten L., van der Zee R., van Kooten P.J., Wagenaar-Hilbers J.P., Hoek A., et al. *Regulatory T cells that recognize a ubiquitous stress-inducible self-antigen are long-lived suppressors of autoimmune arthritis.* Proc. Natl. Acad. Sci. USA (2012) 109: 14134–9. *doi:10.1073/pnas.1206803109.*

116. Wieten L., van der Zee R., Spiering R., Wagenaar-Hilbers J., van Kooten P., Broere F., et al. *A novel heat-shock protein co-inducer boosts stress protein Hsp70 to activate T cell regulation of inflammation in autoimmune arthritis.* Arthritis Rheum. (2010) 62: 1026–35. *doi:10.1002/art.27344.*

117. Wieten L., van der Zee R., Goedemans R., Sijtsma J., Serafini M., Lubsen N.H., et al. *Hsp70 expression and induction as a readout for detection of immune modulatory components in food.* Cell Stress Chaperones (2010) 15: 25–37. *doi:10.1007/s12192-009-0119-8.*

118. Levitsky D.A., Brown A.W., Hansen B.C., Atkinson R.L., Byrne N., Cheskin L.J., et al. *An unjustified conclusion from self-report-based estimates of energy intake.* Am. J. Med. (2014) 127:e33. *doi:10.1016/j.amjmed.2014.08.029.*

119. Schoeller D., Archer E., Dawson J.A., Heymsfield S. *Implausible results from the use of invalid methods.* J. Nutr. (2015) 145: 150. *doi:10.3945/jn.114.199521.*

120. Keith S.W., Stommel M., Allison D.B., Schoenborn C.A. *Self-report corrections for BMI: comment on Keith, et al.* Int. J. Obes. (Lond) (2012) 36: 1591. *doi:10.1038/ijo.2011.277.*

121. Le A., Judd S.E., Allison D.B., Oza-Frank R., Affuso O., Safford M.M., et al. *The geographic distribution of obesity in the U.S. and the potential regional differences in misreporting of obesity.* Obesity (Silver Spring) (2014) 22: 300–6. *doi:10.1002/oby.20451.*

122. Keith S.W., Fontaine K.R., Pajewski N.M., Mehta T., Allison D.B. *Use of self-reported height and weight biases the body mass index-mortality association.* Int. J. Obes. (Lond) (2011) 35: 401–8. *doi:10.1038/ijo.2010.148.*

123. Tarro L., Llauradó E., Albaladejo R., Moriña D., Arija V., Solà R., et al. *A primary-school-based study to reduce the prevalence of childhood obesity—the EdAl (Educació en Alimentació) study: a randomized controlled trial.* Trials (2014) 15: 58. *doi:10.1186/1745-6215-15-58.*

124. Barr S.B., Wright J.C. *Postprandial energy expenditure in whole-food and processed-food meals: implications for daily energy expenditure.* Food Nutr. Res. (2010) 54: 5144. *doi:10.3402/fnr.v54i0.5144.*

125. Williams L.K., Abbott G., Thornton L.E., Worsley A., Ball K., Crawford D. *Improving perceptions of healthy food affordability: results from a pilot intervention.* Int. J. Behav. Nutr. Phys. Act. (2014) 11: 33. *doi:10.1186/1479-5868-11-33.*

References—Continued

126. Siontis G.C.M., Tzoulaki I., Castaldi P.J., Ioannidis J.P.A. *External validation of new risk prediction models is infrequent and reveals worse prognostic discrimination.* J. CLIN. EPIDEMIOL. (2015) 68: 25–34. *doi:10.1016/j.jclinepi.2014.09.007.*

127. Cassani R.S.L., Fassini P.G., Silvah J.H., Lima C.M., Marchini J.S. *Impact of weight loss diet associated with flaxseed on inflammatory markers in men with cardiovascular risk factors: a clinical study.* NUTR. J. (2015) 14: 5. *doi:10.1186/1475-2891-14-5.*

128. Bland J.M., Altman D.G. *Comparisons against baseline within randomised groups are often used and can be highly misleading.* TRIALS (2011) 12: 264. *doi:10.1186/1745-6215-12-264.*

129. Weerts S.E., Amoran A. *Pass the fruits and vegetables! A community—university—industry partnership promotes weight loss in African American women.* HEALTH PROMOT. PRACT. (2009) 12: 252–60. *doi:10.1177/1524839908330810.*

130. Kaiser K.A., Affuso O., Beasley T.M., Allison D.B. *Getting carried away: a note showing baseline observation carried forward (BOCF) results can be calculated from published complete-cases results.* INT. J. OBES. (2011) 36: 886–9. *doi:10.1038/ijo.2011.25.*

131. Elobeid M.A., Padilla M.A., McVie T., Thomas O., Brock D.W., Musser B., *et al. Missing data in randomized clinical trials for weight loss: scope of the problem, state of the field, and performance of statistical methods.* PLOS ONE (2009) 4: e6624. *doi:10.1371/journal.pone.0006624.*

132. Li P., Brown A., Oakes J.M., Allison D. *Comment on "Intervention effects of a school-based health promotion programme on obesity related behavioural outcomes".* J. OBES. (2015). *doi:10.1155/2015/708181.*

133. Li P., Brown A., Oakes J.M., Allison D. *School-based obesity prevention Intervention in Chilean children: effective in controlling, but not reducing obesity.* J. OBES. (2015). *doi:10.1155/2015/183528.*

134. Grydeland M., Bjelland M., Anderssen S.A., Klepp K.-I., Bergh I.H., Andersen L.F., *et al. Effects of a 20-month cluster randomised controlled school-based intervention trial on BMI of school-aged boys and girls: the HEIA study.* BR. J. SPORTS MED. (2014) 48: 768–73. *doi:10.1136/bjsports-2013-092284.*

135. Bere E., Klepp K.-I., Overby N. *Free school fruit: can an extra piece of fruit every school day contribute to the prevention of future weight gain? A cluster randomized trial.* FOOD NUTR. RES. (2014) 58: 23194. *doi:10.3402/fnr.v58.23194.*

136. Brown A.W., Li P.B., Bohan Brown M.M., Kaiser K.A., Keith S.W., Oakes J.M., *et al. Best (but oft forgotten) practices: designing, analyzing, and reporting cluster randomized controlled trials.* AM. J. CLIN. NUTR. (2015) 102: 1–8. *doi:10.3945/ajcn.114.105072.*

137. Lewis D.W., Fields D.A., Allison D.B. *Inconsistencies and inaccuracies in reporting on choice of endpoints and of statistical results in RCT of maternal diet.* PEDIATR. OBES. (2015). *doi:10.1111/ijpo.12030.*

138. Su C.-X., Han M., Ren J., Li W.-Y., Yue S.-J., Hao Y.-F., *et al. Empirical evidence for outcome reporting bias in randomized clinical trials of acupuncture: comparison of registered records and subsequent publications.* TRIALS (2015) 16:28. *doi:10.1186/s13063-014-0545-5.*

139. Simonsohn U., Nelson L.D., Simmons J.P. *P-curve: a key to the file-drawer.* J. EXP. PSYCHOL. GEN. (2014) 143: 534–47. *doi:10.1037/a0033242.*

140. Simmons J.P., Nelson L.D., Simonsohn U. *False-positive psychology: undisclosed flexibility in data collection and analysis allows presenting anything as significant.* PSYCHOL. SCI. (2011) 22: 1359–66. *doi:10.1177/0956797611417632.*

141. Gadbury G.L., Allison D.B. *Inappropriate fiddling with statistical analyses to obtain a desirable p-value: tests to detect its presence in published literature.* PLOS ONE (2012) 7: e46363. *doi:10.1371/journal.pone.0046363.*

142. Hernández-Cordero S., Barquera S., Rodríguez-Ramírez S., Villanueva-Borbolla M.A., González de Cossio T., Dommarco J.R., *et al. Substituting water for sugar-sweetened beverages reduces circulating triglycerides and the prevalence of metabolic syndrome in obese but not in overweight Mexican women in a randomized controlled trial.* J. NUTR. (2014) 144: 1742–52. *doi:10.3945/jn.114.193490.*

143. Brown A.W., Sievenpiper J.L., Kyle T.A., Kaiser K.A. *Communication of randomized controlled trial results must match the study focus.* J. NUTR. (2015) 145: 1027–9. *doi:10.3945/jn.114.207282.*

144. Katz T.J. *Propagation of errors in review articles.* SCIENCE (2006) 313: 1236. *doi:10.1126/science.313.5791.1236a.*

145. Cope M.B., Allison D.B. *Critical review of the World Health Organization's (WHO) 2007 report on "evidence of the long-term effects of breastfeeding: systematic reviews and meta-analysis" with respect to obesity.* OBES. REV. (2008) 9: 594–605. *doi:10.1111/j.1467-789X.2008.00504.x.*

146. Allison D.B., Faith M.S., Gorman B.S. *Publication bias in obesity treatment trials?* INT. J. OBES. RELAT. METAB. DISORD. (1996) 20: 931–7.

147. Boutron I., Dutton S., Ravaud P., Altman D.G. *Reporting and interpretation of randomized controlled trials with statistically nonsignificant results for primary outcomes.* JAMA (2010) 303: 2058–64. *doi:10.1001/jama.2010.651.*

148. Yavchitz A., Boutron I., Bafeta A., Marroun I., Charles P., Mantz J., *et al. Misrepresentation of randomized controlled trials in press releases and news coverage: a cohort study.* PLOS MED. (2012) 9:e1001308. *doi:10.1371/journal.pmed.1001308.*

149. Brown A.W., Hall K.D., Thomas D., Dhurandhar N.V., Heymsfield S.B., Allison D.B. *Order of magnitude misestimation of weight effects of children's meal policy proposals.* CHILD. OBES. (2014) 10: 542–4. *doi:10.1089/chi.2014.0081.*

150. Bohan Brown M.M., Brown A.W., Allison D.B. *Linear extrapolation results in erroneous overestimation of plausible stressor-related yearly weight changes.* BIOL. PSYCHIATRY (2014) 78(4): e10–1. *doi:10.1016/j.biopsych.2014.10.028.*

ATTACHMENT 5

Unintended Consequences of Obesity-Targeted Health Policy

Andrew W. Brown, Ph.D., and David B. Allison, Ph.D.

> *L'enfer est plein de bonnes volontés et désirs. [Hell is full of good wishes and desires.]*
>
> Saint Bernard of Clairvaux.[1]

The conflict between individual freedom of choice and a government's obligation to protect its citizenry from threats to public health is often at the center of health policy debates. This has played out in New York City, for instance, with freedom of choice being the rallying cry of those opposed to a citywide ban on large containers of beverages,[2] while saving lives through health-motivated policies is of-

fered as the justification for the regulations.[3] However, several other ethical concerns exist related to the creation or implementation of public policy. Herein, we will discuss a catalog of ethical concerns identified by M. ten Have, e*t al.*[4] related to policies intended to prevent or treat obesity.

We discuss these ethical concerns in light of two key issues: (1) Under which circumstances does obesity merit being considered a *public,* as opposed to simply a common, health concern? Whether or not obesity is considered a public health concern is important in deciding whether impinging on individuals' rights may be warranted. (2) How plausible is it that a given policy or program will have negative unintended consequences? These consequences are important to consider when deciding if a policy should be implemented. We then suggest strategies for minimizing ethical and other unintended adverse consequences of obesity-targeted health policies.

Ethical Concerns in Obesity-Targeted Health Policies

In "Ethics and Prevention of Overweight and Obesity: An Inventory," Marieke ten Have and colleagues identify ethical concerns posed by 60 actual or proposed public policies, corporate initiatives, and behavior recommendations intended to prevent or treat obesity.[4] One group of ethical concerns comprises direct negative consequences of a program, including physical and psychosocial harm, dissemination of inadequate information, and creation or exacerbation of inequalities. The other group of ethical concerns encompasses disrespect for individuals and their rights and values, including transgressing personal and cultural values of eating, invading privacy, assigning fault for obesity, and abridging freedom of choice. Typically, more than one of these concerns exist with varying degrees of severity for any proposed policy or recommendation, but often the debate is dichotomized as a desire to promote health *versus* a desire to preserve individual liberty.

The complexity of ethical considerations in obesity policymaking can be demonstrated by a policy that would allow the government to remove an obese child from his or her home (see *Table 1*). Note that the pros and cons listed in the table are not necessarily weighted by importance because importance is dependent on individual perspectives and specific situations. Here, the assumed benefit of the policy is that removing the child from the home will improve his or her weight and therefore health, though that assumption is itself contentious.[5] As the table shows, the ethical considerations are far more complex than health *vs.* freedom of choice. To add to the complexity, a given individual may consider one specific ethical concern more important than all others: for health advocates the physical health implications may outweigh all other concerns, while for the parents the sanctity of the parent-child relationship may be paramount.[6]

Table 1. Ethical Concerns of an Example Policy in Which the Government Is Allowed To Remove Obese Children From Homes. The Ethical Concerns Are Not Necessarily Equally Prevalent and Do Not Necessarily Carry Equal Weight

Ethical concern [4]	Pro-policy view	Anti-policy view
Physical health	Improved health if professionals can affect weight.	There may not be the resources or knowledge to improve the health of the removed child in the long term.
Psychosocial well-being	Obesity is associated with psychological disorders.	Removing children from parents may be more traumatic than the obesity.
Equality	All children have the right to a healthy childhood and life.	Obesity affects the poor and minorities to a greater extent, so this policy will disproportionately target these groups.
Informed choice		Parents are no longer able to make decisions for their child.
Social/cultural values	The social value placed on fitness and health is upheld.	The social value placed on parent-child relationships is violated.
Privacy		The family's and child's privacy may be compromised.
Attribution of responsibility	Responsibility for the child's obesity is shared among society and medical professionals.	The parents are directly or indirectly blamed for the obesity and stigmatized.

Table 1. Ethical Concerns of an Example Policy in Which the Government Is Allowed To Remove Obese Children From Homes. The Ethical Concerns Are Not Necessarily Equally Prevalent and Do Not Necessarily Carry Equal Weight—Continued

Ethical concern [4]	Pro-policy view	Anti-policy view
Liberty		The parent's and child's liberties are violated.

Under Which Circumstances Should Obesity Be Considered a Public Health Concern?

The example in *Table 1* has ramifications for specific individuals in specific circumstances and particularly focuses on minors, who are broadly considered not fully responsible for their own actions. The justifications and ramifications of broad health-targeted policies affecting ordinary adults are quite different.

Before proceeding, we must distinguish between two distinct uses of the phrase "public health" as a prefix to terms such as "problem," "concern," or "issue." The phrase is often used merely to convey that the problem affects a large number of people. The term "population health" is emerging to express this idea.[7] But in debates about policies that may impinge on individual rights and values, the phrase is used more specifically to denote health problems in which individuals' actions may not be sufficient to protect them from ill health and collective action may offer such protection. Examples of the latter definition include certain infectious diseases from which protection can be afforded by mass vaccination and toxins in public drinking water supplies, which can be minimized by a variety of government policies.

Using the more specific definition, it is not clear that obesity qualifies as a public health concern in all circumstances.[8] When considering some putative contributors to obesity, such as adenovirus 36 or environmental endocrine disruptors,[9] the definition does seem to apply: individuals generally cannot fully detect and protect themselves from exposure to these factors by their own action, and collective action at a societal level mandated by government policies might do so. However, when considering some other putative contributors to obesity such as ingesting excess energy or being insufficiently active, there generally are not external unavoidable *constraints,* as opposed to *influences,* on individuals. Thus, collective action to protect individuals from undetectable or unavoidable contributing factors is not required in such cases.

At this point, we should address a related argument. This is perhaps the most commonly used argument to justify policies about obesity: obesity is costly to society, largely through the healthcare system, and this justifies collectively infringing upon individual liberty to decrease obesity. We do not agree with this argument. Regardless of the cost of obesity, that cost itself does not necessarily justify society's imposing such policies. The fact that one party (society in this case) voluntarily takes on an obligation to cover some costly benefit to a second party (individual citizens in this case) does not necessarily give the first party the right to dictate the behaviors of the second party. There are several alternatives which include society's not volunteering to take on the obligation, society's taking on the obligation but distributing the costs equitably to its members (*e.g.,* charging obese persons more for health coverage), or society's voluntarily accepting the obligation and then simply agreeing to be "magnanimous" and bear the additional expense of costly behaviors in the interests of preserving individual liberty.

This is not to say that obesity is not a problem. Obesity is associated with many chronic diseases, decreased productivity, and psychosocial difficulties. But if a health policy targeting a putative cause of obesity does not address an issue in which individuals' actions are insufficient to protect themselves from obesity, then the policy may be unwarranted regardless of cost.

Good Intentions, Unintended Consequences

Various policy advocates insist that obesity needs to be addressed by public policy, either because they reject the definition of public health provided above or because they believe action must be taken despite obesity's not specifically being a public health concern. Innumerable policy recommendations have been proposed or enacted in an effort to reduce obesity, from "sin" taxes [10] and "psychic" taxes [11] to information campaigns [12] and alterations to the built environment.[13] In some cases, the scientific evidence demonstrates fairly clearly that the recommendation will not substantially reduce obesity, which means these policies not only raise ethical concerns

but may have no beneficial outcome; other recommendations are simply equivocal—the potential exists for benefits and harms—and the balance between ethical consequences and health benefits is thus uncertain.[14]

When the outcomes of a particular proposal are uncertain, especially for interventions grounded in "common sense," one could ask, "How could it hurt to try?" Some ways various policies could hurt, despite good intentions, were previously highlighted.[15] Such negative consequences include direct negative effects and encroachment on individual freedom like the list from ten Have, *et al.,* but also include direct costs of resources, damage to scientific and political credibility, and distraction from more promising efforts and policies. In fact, direct, unintended negative consequences of some policy proposals have been demonstrated (*Table 2*).

Table 2. Unintended Consequences of Actions Intended To Affect Obesity

Action	Good intention	Documented unintended consequence
Tax sugar-sweetened beverages (SSBs).	Decrease energy intake to decrease weight.	Increased consumption of beer beyond the decrease in sugar-sweetened beverages.[17]
Alert patients to their heavy weight status.	Make the patient aware of a problem as a first step in addressing it.	Patients may feel stigmatized, become depressed and eat more, and avoid future appointments.[16]
Labeling calories on vending machine beverages.	Awareness of calories will result in decreased consumption.	Purchases of SSBs increased in some settings.[18]
Label "unhealthful" foods with messages that encourage consuming fruits and vegetables.	Increase "healthful" behaviors and decrease "unhealthful" behaviors.	Increased selection of an "unhealthful" snack.[19]
Describe certain restaurants and foods as more "healthful" and "low-calorie."	Decrease caloric consumption and shift consumption toward "healthful" foods.	Consumers consumed more calories in side dishes and beverages, and underestimated total meal calories when choosing "healthy" restaurants or main dishes.[20]
Labeling calories and removing value pricing on menu items.	Awareness of calories and eliminating value pricing will decrease energy consumption.	Men ate more calories.[21]
Discourage chocolate consumption.	Decrease caloric consumption.	Chocolate consumption increased for some women in some circumstances.[22]
Encourage children to consume fruits by incorporating them into games.	Children prompted to eat fruits will increase consumption of "healthful" foods and decrease caloric consumption overall.	Children ate as many calories when prompted by fruit games as when prompted by energy-dense-snack games, did not increase fruit consumption, and ate more overall than when not prompted by food.[23]

For instance, the "common sense" impetus behind informing patients that they are obese may be the old maxim, "the first step in solving a problem is admitting you have one." Yet, there is evidence that clinically relevant words to describe a patient's weight (*e.g.,* morbidly obese and obese) are considered stigmatizing, which patients state may make them avoid future appointments.[16]

It is important to note that the good intentions and unintended consequences in the table represent hand-picked examples and these interventions may not be negative in all circumstances. For instance, there is some evidence that the effects of menu labeling on consumer choice can be inconsistent or even positive if delivered in specific ways, including whether or not educational information is included and whether the participants are male or female.[21, 24–25] Thus, the selected examples in *Table 2* bring up yet another ethical concern: if a policy intervention benefits one subset of the population but harms another, what action should be taken? One could argue against implementing a policy so as to do no harm to one group, while an-

other could argue that failing to act is tantamount to harming the group that stands to benefit.[26–27]

Minimizing Negative Ethical Consequences in Reversing Obesity

Marieke ten Have and colleagues raise an important complementary point to ethical concerns over policy recommendations: "The fact that objections are raised does not automatically imply that a programme should not be implemented".[4] When considering an obesity-targeted public health policy, we propose six recommendations:

1. Evaluate whether the proposed policy addresses an exposure that can truly be considered a public health concern.[8]

2. Be honest about the quality and quantity of evidence about the policy.[14]

3. Generate sufficient, high-quality evidence before implementing the policy and have plans in place to generate quality evidence about the effectiveness of the policy once instated.[28]

4. Do not assume there is negligible or no harm from the policy (see *Table 2*).

5. Do not assume that achieving a health benefit overrides respect for other values and ethical principles.[4, 29]

6. Given a choice between two or more plausible policies, choose the policy that least compromises ethical values.[29]

These guidelines should help prevent us from paving the roads to health with good wishes but unintended consequences.

References

1. Shapiro F.R., ed. *The Yale Book of Quotations.* New Haven, CT: Yale University Press; 2006: 319.
2. Grynbaum M.M.. *New York plans to ban sale of big sizes of sugary drinks.*NEW YORK TIMES. May 30, 2012. *http://www.nytimes.com/2012/05/31/nyregion/bloomberg-plans-a-ban-onlarge-sugared-drinks.html?pagewanted=all&_r=0.* Accessed January 3, 2013.
3. Levine S. *Supporters of Mayor Bloomberg's anti-obesity initiative* [news release]. New York: City of New York; September 13, 2012. *http://www.nyc.gov/html/om/html/2012b/support_for_soda_limits.html.* Accessed January 8, 2013.
4. ten Have M., de Beaufort I.D., Teixeira P.J., Mackenbach J.P., van der Heide A. *Ethics and prevention of overweight and obesity: an inventory.* OBES. REV. 2011; 12(9): 669–679.
5. Summar P. *Anamarie 4 years later: weight gain, size of child, 7, remain unexplained.* ALBUQUERQUE JOURNAL. March 13, 2005. *http://www.abqjournal.com/news/metro/320825metro03-13-05.htm.* Accessed January 4, 2013.
6. *Parents visit overweight child.* ABC News. August 31, 2000. *http://abcnews.go.com/US/story?id=95940&page=1.* Accessed January 4, 2013.
7. Kindig D., Stoddart G. *What is population health?* AM. J. PUBLIC HEALTH. 2003; 93(3): 380–383.
8. Anomaly J. *Is obesity a public health problem?* PUBLIC HEALTH ETHICS. 2012; 5(3): 216–221.
9. McAllister E.J., Dhurandhar N.V., Keith S.W., *et al. Ten putative contributors to the obesity epidemic.* CRIT. REV. FOOD. SCI. NUTR. 2009; 49(10): 868–913.
10. Chaufan C., Hong G.H., Fox P. *Taxing "sin foods"—obesity prevention and public health policy.* N. ENGL. J. MED. 2009; 361(24): e113.
11. Lucas, Jr. G. *Paternalism and psychic taxes: the government's use of negative emotions to save us from ourselves. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2150402.* Accessed March 20, 2013.
12. Puhl R., Peterson J.L., Luedicke J. *Fighting obesity or obese persons? Public perceptions of obesity-related health messages.* INT. J. OBES. (Lond). 2012. [Epub ahead of print]
13. White House Task Force on Childhood Obesity. *Solving the Problem of Obesity Within a Generation: White House Task Force on Childhood Obesity Report to the President.* 2010: 78–82. *http://www.letsmove.gov/sites/letsmove.gov/files/TaskForce_on_Childhood_Obesity_May2010_FullReport.pdf.* Accessed March 20, 2013.
14. Casazza K., Fontaine K.R., Astrup A., *et al. Myths, presumptions, and facts about obesity.* N. ENGL. J. MED. 2013; 368(5): 446–454.
15. Allison D.B. *Evidence, discourse and values in obesity-oriented policy: menu labeling as a conversation starter.* INT. J. OBES. (Lond). 2011; 35(4): 464–471.
16. Puhl R., Peterson J.L., Luedicke J. *Motivating or stigmatizing? Public perceptions of weight-related language used by health providers.* INT. J. OBES. (Lond). 2012. [Epub ahead of print]
17. Wansink B., Just D.R., Cawley J., *et al. From Coke to Coors: a field study of a sugar-sweetened beverage tax and its unintended consequences. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2079840.* Accessed March 20, 2013.
18. Jue J.J., Press M.J., McDonald D., *et al. The impact of price discounts and calorie messaging on beverage consumption: A multi-site field study.* PREV. MED. 2012; 55(6): 629–633.
19. Werle C.O.C., Cuny C. *The boomerang effect of mandatory sanitary messages to prevent obesity.* MARKETING LETTERS. 2012; 23(3): 883–891.
20. Chandon P., Wansink B. *The biasing health halos of fast-food restaurant health claims: lower calorie estimates and higher side-dish consumption intentions.* J. CONSUMER RES. 2007; 34(3): 301–314.
21. Harnack L.J., French S.A., Oakes J.M., Story M.T., Jeffery R.W., Rydell S.A. *Effects of calorie labeling and value size pricing on fast food meal choices: results from an experimental trial.* INT. J. BEHAV. NUTR. PHYS. ACT. 2008; 5: 63.
22. Durkin K., Hendry A., Stritzke W.G. *Mixed selection. Effects of body images, dietary restraint, and persuasive messages on females' orientations towards chocolate.* APPETITE. 2013; 60(1): 95–102.
23. Folkvord F., Anschutz D.J., Buijzen M., Valkenburg P.M. *The effect of playing advergames that promote energy-dense snacks or fruit on actual food intake among children.* AM. J. CLIN. NUTR. 2012; 97(2): 239–245.
24. Girz L., Polivy J., Herman C.P., Lee H. *The effects of calorie information on food selection and intake.* INT. J. OBES. (Lond). 2012; 36(10): 1340–1345.
25. Roberto C.A., Larsen P.D., Agnew H., Baik J., Brownell K.D. *Evaluating the impact of menu labeling on food choices and intake.* AM. J. PUBLIC HEALTH. 2010; 100(2): 312–318.
26. Vartanian L.R., Smyth J.M. **Primum non nocere:** *obesity stigma and public health.* J. BIOETH. INQ. 2013; 10(1): 49–57.
27. Gill T.P. *Key issues in the prevention of obesity.* BR. MED. BULL. 1997; 53(2): 359–388.
28. Landefeld C.S., Shojania K.G., Auerbach A.D. *Should we use large scale healthcare interventions without clear evidence that benefits outweigh costs and harms? No. BMJ.* 2008; 336(7656): 1277.
29. Have M.T., van der Heide A., Mackenbach J.P., de Beaufort I.D. *An ethical framework for the prevention of overweight and obesity: a tool for thinking through a programme's ethical aspects.* EUR. J. PUBLIC HEALTH. 2012. [Epub ahead of print]

Andrew W. Brown, Ph.D., is a postdoctoral trainee in the Office of Energetics and Nutrition Obesity Research Center at the University of Alabama at Birmingham. Trained in nutritional biochemistry and statistics, Dr. Brown's research focuses on establishing an evidence base for common assumptions about nutrition and health on such topics as organic agriculture, artificial sweeteners, and dietary supplements. His recent work relates to research reporting fidelity and its implications for science and policy.

David B. Allison, PhD, is distinguished professor, Quetelet Endowed Professor of Public Health, associate dean for science, director of the Office of Energetics, and director of the NIH-funded Nutrition Obesity Research Center at the University of Alabama at Birmingham. He has authored more than 450 scientific publications, received many awards for his research and mentoring, is an elected fellow of many academic societies, and in 2012 was elected to the Institute of Medicine of the National Academies.

The viewpoints expressed on this site are those of the authors and do not necessarily reflect the views and policies of the AMA.

ATTACHMENT 6

Evidence, Discourse, and Values in Obesity-Oriented Policy: Menu-Labeling as a Conversation Starter

Commentary

D.B. Allison.*

Departments of Biostatistics and Nutrition Sciences, Nutrition Obesity Research Center, University of Alabama at Birmingham, Birmingham, AL, USA.

The new study by Dr. Elbel and colleagues provides an opportunity to reflect on where we are with respect to menu labeling as a tool in our antiobesity arsenal and more generally to consider some issues surrounding policy-level proposals for stemming the obesity epidemic. By 'menu labeling', I refer to listing the calories of menu items on the menu. In this commentary, I address two aspects: evidence on menu labeling *per se;* and, at least as important, several scientific, social/political and epistemological issues that generally apply when considering obesity-related policies.

Elbel, *et al.*,[1] deserve praise for this interesting paper. Dr Elbel previously offered that menu labeling is a good idea and should be implemented, stating 'I see particular value in it when the options are this *versus* nothing at all . . . Given that the problem is so intense, I think we have to try things.'[2] Yet, despite his previous favorable view, he does not mince words upon completing his latest study: 'Our evaluation of New York City's labeling law suggests that . . . this public policy intervention had no significant effect on purchasing behavior within our study period for a low-income, racially and ethnically diverse population of parents and adolescents.' The authors' qualifying clauses are appropriate as their study cannot rule out any effect, in any period, for any population. Yet, it certainly is one more bit of evidence tipping the scales toward the conclusion that menu labeling does not have substantial or consistent beneficial effects on energy intake.

Strengths and Limitations of the Study by Elbel, *et al.*

The study had multiple strengths, including using Newark as a comparator city, acquisition of actual receipts, the real-world setting and a population of interest. There are also key limitations. First, it is an observational (non-experimental) study that, similar to all observational studies, is subjected to potential confounding and cannot alone justify conclusions about causation. Second, because no body mass index measurements were taken, we cannot discern whether a thinner or more obese clientele was buying food at these restaurants, which might affect our interpretation of the value of menu labeling or whether some body mass index categories increased and others decreased their calories purchased. Third, the statistical analyses did not account for potential clustering (potential non-independence) of observations within restaurants and families as it should have, although it seems unlikely

*Correspondence: Dr. D.B. Allison, Department of Biostatistics, Ryals Public Health Building, 1665 University Boulevard, University of Alabama at Birmingham, UAB Station, Birmingham, AL 35294–0022, USA.

E-mail: *DAllison@uab.edu*.

that this would make the nonsignificant results significant. Finally, and importantly, the study only looks at calories purchased at a single eating occasion. It does not tell us about calories actually consumed at that occasion (except perhaps the upper limit), about whether the knowledge of the calories one purchased on that occasion or simply being 'attuned to calories' might have affected energy intake throughout the day, nor about how menu labeling affected body weight or body fat over an extended time period, the ultimate goal of menu labeling. Although the fact that calories purchased did not differ before and after menu labeling makes a beneficial effect less plausible, one cannot rule out that, for example, patrons who realized how many calories were in their purchases chose to eat less of the total food they purchased or chose to indulge at the restaurant, but eat less later.

If we are to understand the value of any macro-environmental manipulation intended to reduce obesity levels, we must eventually measure body weight, fat or obesity levels because we know that people often compensate for perturbations in energy intake or expenditure (c.f. 3). For example, Anderson and Matsa4 showed that 'On average, when a given individual eats out, he consumes 238 more calories per meal than when he eats at home. . . . (However,) eating out increases intake over the entire day by only 35 calories . . . although individuals tend to eat more at restaurants, they compensate to a substantial degree by eating less throughout the rest of the day. Meal-level estimates therefore overestimate the net effect of restaurants on total caloric intake.'

Empirical Issues

What does the empirical literature show on the effects of menu labeling?

Although it is impossible to comprehensively summarize this literature herein (for an extensive tabulation through mid 2009, see ref. 5), the study by Elbel, *et al.,* accords with most literature in showing no clear and consistent benefit. Furthermore, to my knowledge, no study has assessed effects on weight, total energy balance or total energy intake for periods beyond 24 h. Thus, no studies are truly probative on the actual question of interest: whether menu labeling reduces obesity levels.

Of the extant studies, many are observational[6–7] and those that are experimental are typically, if not exclusively, in laboratory analog settings (for example, see ref. 8). Some studies show that menu labeling is associated with or affects reduced calories purchased, although among men the association appears less than among women, or is absent entirely.[9–10] Other studies show no association or effect,[7] and some even show statistically significant increases (adverse effects) in calories purchased with menu labeling among young men.[8, 11] One study suggests menu labeling may decrease calories that parents purchase for children, but not calories that they purchase for themselves.[12] Another study suggests that, when ingested calories (measured by self-report) after the eating occasion on the same day in which menu labeling is used are considered, there is a reduction in total energy intake if the menu labeling is accompanied by a statement that 'The recommended daily caloric intake for an average adult is 2,000 calories.'[13] As treatment-induced biases in self-report measures are well documented (for example, see ref. 14), it is unclear whether this statement affected actual intake or merely reporting. Finally, yet another study shows that calorie labeling may either increase or decrease energy consumed, depending on the food item labeled.[15] Thus, although under some circumstances there are hints of short-term (that is, within one eating occasion or day) benefits on energy purchased or consumed, overall the results do not offer compelling evidence for effectiveness. When we contrast these recent results with earlier literature offering statements such as '. . . we estimated that menu labeling would avert 40.6% of the 6.75 million pound average annual weight gain in the county population aged 5 years and older',[16] it seems that some initial expectations were overly optimistic.

Important Biases To Consider

In reviewing this literature, it is also important to note biases that may be present. One type is what Cope and Allison[17] called 'white hat bias,' the tendency to distort research information in the service of seemingly righteous ends. Cope and Allison[18] cited an example of the Food and Drug Administration in its proposed ruling on menu labeling, citing a study as supporting a favorable conclusion that its data did not actually support. As another example, consider an article that reported in the abstract 'Results were similar in most analyses conducted stratified by factors such as age, race and education level'.[8] Although not explicitly inaccurate, this seems to be a misleading statement given that in the article's body the authors report that 'Average energy intake was higher among males in the . . . (menu labeling) conditions compared with those who selected their meal from the control menu' with a P-value of 0.01 and no such effect was observed among females. In a similar

vein, a recent *New York Times* [19] article based on private e-mails from within the NY City Health Department shows that in their zeal to make consumers 'fear' soda as adiposity promoting, they were willing to knowingly 'oversimplify' messages and knowingly ignore some science.

Another form of bias is publication bias, whereby the probability that a paper is published or perhaps where it is published, and the resulting attention it receives, depends on its outcome, which is often a bias toward studies showing positive effects.[20] Notably, opinion pieces suggesting that policies, such as menu labeling, front-of-pack labeling and taxation of sugar-sweetened beverages, will be beneficial have appeared in the most prominent journals such as *JAMA* [21–22] or *New England Journal of Medicine*.[23–24] Yet, subsequent empirical reports stating that menu labeling, programs designed to reduce consumption of sugar-sweetened beverages and front-of-pack labeling do not seem to be very effective have been published in respectable but far less prominent journals and may receive less attention. Moreover, several dissertations and theses that have found no beneficial effects do not appear to be published as yet (see *Table* below). If these studies are not published and considered, the published literature may offer a misleadingly favorable view.

Reference	Design	Results
15	Randomized experiment	'. . . provision of calorie information does not alter food choice but does influence the amount people eat. Although the salad and pasta contained the same number of calories, calorie information decreased consumption of pasta, but increased consumption of salad.'
25	Randomized experiment	'There are no differences in total calorie . . . chosen across the three groups: price only, nutrition info only, and price + info groups.'
26	Randomized experiment	'No significant differences were found in the foods ordered among the various menu conditions.'.

Reporting quality?

The published research record should have the greatest precision possible and be reported in a way that helps readers understand the nature of the research, including its limitations, especially when the research has the potential to affect clinical care, public health practices or legislative policies. In part because of this, company-based clinical trials are held to rigorous scrutiny; hence, perhaps consequently, the reporting quality of industry-sponsored obesity trials seems to be at least as good as, and perhaps better than, non-industry-sponsored trials.[27] These same rigorous standards of reporting quality should be applied to all articles in peer-reviewed journals, especially those that may influence policy. In this light, consider that, although the paper by Elbel, *et al.,*[1] is subtitled 'A Natural Experiment', the design is not an experiment as defined in the scientific literature (for example, see ref. 28, p. 1) but a type of observational study sometimes referred to as a quasi-experiment.[29] Such quasi-experiments do not permit the strong inferences to causation that true experiments do. Hence, when the conclusion by Elbel, *et al.,*[1] states 'This study examines the *effects* (emphasis added) of menu labeling . . .', causal language is used without justification. Although this is a common slip,[30] it may nevertheless confuse readers, including mass media reporters or policy makers into thinking an effect (or lack thereof) has been shown when, in fact, only a lack of an association has been shown. Further, just as association does not necessarily imply causation, lack of association does not necessarily imply lack of causation. Similarly, Elbel, *et al.,*[1] discuss 'calories consumed', but the actual outcome of the study was calories purchased. This is an important distinction because the menu labeling could conceivably cause consumers to consume less of a perceived high-calorie item even if it is purchased. I state these points about precision, when I have made similar errors of imprecise language in my own papers, to point out that we should hold papers in the public health policy arena to every bit as rigorous a standard of reporting as we do big pharmaceutical randomized controlled trials (RCTs). Allowing ourselves to slip into imprecise language potentially creates misunderstandings among readers that can lead to erroneous public discourse about proposed policies.

Social and Philosophical Issues

Does it matter if it matters?

At a presentation on menu labeling at the 2009 Obesity Society meeting, Professor K.D. Brownell asked 'Does it matter if it matters?' That is, does it matter whether data show that menu labeling is beneficial in deciding whether to endorse it? He used the instructive analogy of tags that describe a garment's composition. We do not demand randomized experiments showing that such tags produce a benefit; we

simply take as given that people have a 'right' to know the composition of the fabrics they purchase. Can we extend this argument by analogy to menu labeling? Perhaps, but trying invites the question, who is 'we' in the preceding sentence? Is it society at large? Or is it we members of the scientific community acting in our role as scientists *per se* rather than as member of the general public who just happen to be scientists by profession? This is an important distinction, because if we are not predicating our endorsement of a policy based on empirical evidence or even expert scientific opinion on the policy's effects, then this does not seem to be a scientific issue at all but rather one of politics, morality or taste, and it is not obvious that scientists qua scientists have anything special to add here. And if not, is this even a relevant topic of discussion for our scientific conferences and journals? In fact, because there are potential costs and harms of all interventions, balancing risks and benefits is important. By analogy, consider what Food and Drug Administration wrote in its final ruling banning ephedra as a weight loss supplement and in determining whether there was a 'significant or unreasonable risk': 'There is no requirement that there be evidence proving . . . harm to specific individuals, only that scientific evidence supports the existence of risk. . . . 'Unreasonable risk,' thus, represents a relative weighing of . . . known and reasonably likely risks against its known and reasonably likely benefits.'[31] In this light, it does matter if it matters.

*Choice-Limiting **Versus** Choice-Promoting Strategies*

Obesity-related legislation is mushrooming. Between 2003 and 2005, in the United States, at least 717 bills and 134 legislative resolutions were proposed, of which 17% of bills and 53% of resolutions were adopted.[32] Proposals for policy-based approaches almost invariably meet resistance when the policies offend the moral or political sensibilities of some persons. This especially occurs when the proposed policy is seen as treading on the rights or autonomy of individuals in the interests of public health paternalism. Therefore, if we wish to minimize such resistance, we should aim to advance proposals that are freedom and choice promoting, rather than restricting. Consequently, many advocates of policy level approaches recognize the merit of 'opt-out' *versus* 'opt-in' approaches[33] that can be effective in promoting desired behavioral changes without compromising individual liberty. Unfortunately, not all public health advocates are sensitive to this issue. For example, proposals for taxing certain foods, such as sugar-sweetened beverages, limit individual freedom to negotiate a price for a desired product with the purveyor. By way of contrast, consider the experiments by experiments by Sharpe, *et al.*,[34] showing that consumers' extremity avoidance behavior (for example, not wanting to choose the smallest or largest item in a series) led to a potentially useful effect. Specifically, merely offering a smaller size drink in addition to (not instead of) the existing sizes led to an overall reduction in the amount of drink purchased. On the basis of these results, one could imagine a policy in which restaurants that offer multiple sizes of drinks would be required to offer an additional drink smaller than their current smallest size and, if effective, the principle might be extended to other foods that are sold in multiple distinct serving sizes. Such a policy would limit the freedom of corporations, but not of individuals, and hence presumably meet far less resistance from libertarians.

How might libertarian concerns relate to menu labeling? One benefit of menu labeling is that it provides more information for consumers to make more informed choices. As someone with libertarian leanings, I generally favor more and accurate information being made available to citizens[35] and, as an individual consumer, I enjoy learning about the foods I may choose to eat; therefore, in many settings such as fast-food restaurants, I would enjoy menus labeled with nutritional information. However, that is just a statement of my personal preferences and tastes, not a scientific statement, and other individuals may have other preferences and tastes. For example, in 2008, 'After students and parents raised concerns about displayed calorie counts leading to or worsening eating disorders, Harvard University Dining Services removed the index cards detailing nutritional information from dining halls'.[36] Regardless of the empirical basis for the Harvard parents' concerns, their feelings and preferences are real, and if we seek policies that allow choice, we will respect such feelings.

How might advocates of menu labeling minimize the resistance they receive if they try to move menu labeling into all restaurants, not just into fast-food chains? In this light, consider that this is not the first time in history that restaurant menu content has been subject to scrutiny and change. Years ago, it was common for restaurants to have 'blind menus' without prices listed so patrons could take out their guests without the mood of the dinner being affected by the guest seeing the prices.[37] Although such practice is now uncommon, many higher-end restaurants still provide such menus to patrons upon request. In this way, consumer choice is

enhanced. The price information is there for all who want it and hidden for those who do not (in an 'opt-out' manner). There is an analogy with respect to calorie information. In some circumstances, for example, when someone takes their special someone out for that romantic dinner to propose marriage or celebrate an anniversary, even the most health conscious among us may not wish to consider the calories in our food. This potential preference could be respected and choice enhanced if consumers had the option of viewing a menu with or without the calorie contents (in a 'opt-out' manner). In a full-service restaurant with printed menus, this can be easily accomplished, and if menu labeling advocates propose such a choice-promoting approach, they are likely to meet applause instead of resistance from libertarians.

Can we lead by example?

Mohandas Gandhi said, 'We must be the change we wish to see in the world. Change can only come from the roots upwards, never from the treetop down'.[38] Our more modern guru, Michael Jackson, sang 'I'm Starting With The Man In The Mirror. . . . If You Wanna Make The World A Better Place, Take A Look At Yourself And Then Make That Change!' In this light, an irony to the menu-labeling advocacy has occurred. According to Friedman,[39] 'Fast food is eaten disproportionately by low-income people, who are more likely to be overweight.' Further, meals eaten in full-service restaurants tend to be high in calories and fat as well,[40] maybe even higher than those in fast-food restaurants, especially in the case of children's and adolescents' meals.[41–42] Further, higher income people, who are more likely to patronize such restaurants, are not exempt from obesity. Yet, our early public health salvo at restaurants has not been aimed at those establishments likely frequented by the well-established senior academicians and high-ranking public health officials who propose the policies, but at those more frequented by people of lesser means. Other proposals that seem targeted more at persons of lesser means and that may seem restrictive or punitive have been made, such as restricting the provision of toys in children's fast-food meals, disallowing purchase of sugar-sweetened beverages with Supplemental Nutrition Assistance Program funds (food stamps), and restricting the location of fast-food outlets.

I do not doubt that the intentions of most policy advocates are sincerely beneficent, nor that the greater uniformity of chain restaurants offers a rationale for starting there within the category of restaurants. Nevertheless, incarnations of public health paternalism aimed more at changing unhealthy behaviors among members of less-powerful social classes than the equally unhealthy behaviors of the social classes proposing the policies cannot be seen as Gandhian and has likely provoked some of the pushback that has occurred. This sentiment is well illustrated by the feminist writer, Anna Kirkland.

> '. . . this environmental approach to obesity has been sold as a progressive, structurally focused alternative to stigmatization, but it actually embeds and reproduces a persistent tension in feminist approaches to social problems: well-meant efforts to improve poor women's living conditions at a collective level often end up as intrusive, moralizing, and punitive direction of their lives . . . good choice dominated by elite norms of consumption and movement'.[43]

As our field moves forward with the consideration of other public health policies that may have paternalistic aspects, perhaps we should start with the man in the mirror. Given the plausible weight-reducing effects of less heating and air conditioning and more sleep,[44] perhaps advocates of paternalistic public health policies should first demand that the use of heating and air conditioning be reduced in the buildings in which they and we work (which would also have an environmental and economic benefit) and take a pledge not to work on grant proposals, manuscripts or e-mail correspondence after 2200 hours. That would be leadership that walks the walk.

Majority rules?

An argument sometimes made in support of a proposed policy approach to obesity is that the general population desires the policy. Regarding menu labeling, a Robert Wood Johnson Foundation briefing states that survey and focus group research indicates that 'males and females of diverse educational backgrounds reacted favorably to the idea of labeling menu items with just calorie information or identifying healthier options with a uniform, commonly defined symbol to help them make better choices'.[5] Of course, public opinion should count. In the extreme case of a unanimous population opinion, the decision is easy.

However, in cases in which there is a majority view favoring a new policy, but not unanimity, should majority rule? There are reasons to question 'majority rules' as a justification for a new policy, and again we should be open in acknowledging

that subjective values in addition to scientific evidence come into play. First, one should view opinion poll results about proposed policies with healthy scientific skepticism. Research on survey methodology has repeatedly shown that seemingly minor variations in question wording can have major influences on responses.[45] For example, very different responses are obtained when people are asked whether the government should 'forbid' something as opposed to whether the government should 'allow' something, even though one question is just the complement of the other. Thus, we should perhaps only be persuaded by results of surveys purportedly showing popular support when such results are replicated with multiple differently worded questionnaires prepared by different parties.

Second, sometimes the public may desire a policy based on an erroneous view of its likely effects. Those advocates who accept paternalistic public health approaches could argue that one should act in accordance with the public's interests, not necessarily on the basis of their expressed views.

Finally, and most importantly from a libertarian view in which individual freedom is paramount, the desire of the majority is insufficient justification to tread upon the rights of the individual. Consider, for example, our response to a proposal that we have required prayer of a particular religious doctrine because the majority of the population thinks it is a desirable thing. The United States and many other democratic countries have already affirmed that, regardless of popular view, such a proposal is unacceptable. Clearly, most proposed obesity-related policies, including mandatory menu labeling, are not so extreme, and yet we should remember that multiple children in multiple countries (including the United States) have been removed from their parents' and homes by governmental actions on the basis of protecting them from their obesity-promoting environment,[46–47] and that in 2008 three Mississippi legislators proposed 'An Act To Prohibit Certain Food Establishments From Serving Food To Any Person Who Is Obese, Based On Criteria Prescribed By The State Department Of Health' (*http://billstatus.ls.state.ms.us/documents/2008/pdf/HB/0200-0299/HB0282IN.pdf*). Not surprisingly, the legislation was never enacted. Thus, we should be skeptical of majority public opinion as a justification for restrictive policies.

Epistemological Issues

What constitutes an adequate evidence base?

Consider that, after analyzing 38 policy documents from five European countries, authors found that 'Only 22% of the obesity statements were evidence based'.[48] We seem to have a dearth of evidence in the obesity policy domain. There is little (although not zero) debate that randomized experiments offer the highest quality evidence we can obtain about the effects of interventions, including policies. There is also little debate that results obtained from well-done randomized experiments, especially on long-term outcomes on variables such as body weight or fat, will not always be available when we wish to make a statement, conclusion or decision about a proposed policy. In such situations, what should the standard of evidence be and who gets to decide that standard? At present, there is no obvious consensus. Importantly, answering the question of what constitutes adequate evidence depends on the context in which the question is called and will not be the academic community's alone (or in some cases at all) to decide. For example, in deciding whether a particular piece of litigation is justifiable, the level of scientific evidence required will be determined by applicable law as interpreted by the judiciary, not by academics.

Second, in considering what constitutes adequate evidence, it is essential to distinguish between conclusion making and decision making. Scientists and public health advocates sometimes clash because they conflate this distinction. The advocate, who may be someone who is also sometimes a scientist, maligns the scientist *qua* scientist as trying to hold back progress and upholding an unreasonable standard, whereas the scientist maligns the advocate as playing 'fast and loose with' or even ignoring scientific evidence. The problem is rarely that the two parties disagree on what evidence exists or what it shows, but rather they are answering two different types of questions and fail to realize or acknowledge this. The scientist is concerned with questions about the truth of propositions and addresses questions such as 'By generally accepted scientific standards, can we reasonably conclude today to a reasonable degree of certainty that *A* causes *B?*' In contrast, the well-meaning public health advocate is concerned with questions about what we should do, such as 'Given what we know today, however limited, is it prudent to implement *A* in the hopes that *B* will happen in response?' If we recognize this, there is no contradiction between the scientist saying that the evidence for the benefit of a proposed policy is weak, limited, inconclusive, or even non-existent and the advocate saying that, despite the fact that there is insufficient evidence to conclude that the policy will be effective, we should give it a try to determine whether it might plau-

sibly work and whether the likely benefits outweigh the likely costs. Recognizing this, the honest advocate need not and should not try to inflate the evidence in support of a policy they wish to advance, as seems to be done now,[18–19] but can honestly acknowledge the degree of uncertainty, respect scientists for contributing discussions of evidence to promote an informed decision-making process, and then advocate for prudential decision making.

Are randomized studies needed and possible?

Some advocates of policy approaches are dismissive of the role of randomized trials. In arguing this position, several valid points are commonly noted. These are listed in the first column of *Table* below. Unfortunately, gaining acceptance of these points is often followed by a rhetorical sleight of hand, whereby they are replaced with the far stronger and fundamentally different points listed in the second column of the table below. Writings that cogently show the fallacies of these points are listed in the third column.

Valid points about which there is little if any debate	Invalid points often conflated with the valid ones by advocates of proposed actions	References disputing the invalid point
It is difficult to conduct randomized experiments to test the effects of public policies.	It is impossible and perhaps irrelevant to conduct randomized experiments to test the effects of public policies.	49
It is sometimes necessary to move forward and take actions even in the absence of the highest quality evidence that is practically obtainable.	Once we decide to move forward, there is no need to do so in a manner in which the highest quality evidence that is practically obtainable is indeed obtained.	50
In some situations (*e.g.,* when considering smoking as a cause of lung cancer), the scientific community has judged that it is appropriate to draw strong conclusions about causation in the absence of experimental evidence.	In general, it is appropriate to draw strong conclusions about causation in the absence of experimental evidence.	51–52

In conversation, a colleague who is a strong advocate of public policy interventions such as menu labeling and taxation of selected foods said, 'You know, David, we are never going to know for sure whether these policies work before we implement them.' I replied, 'You may be right, but the way we are going about it, we will never know afterward either.' It is unfortunate that, to date, all the evidence we have on menu labeling is either from short-term laboratory analog experiments or from non-experimental observational studies. Although practical complexities undoubtedly exist, it is certainly possible that as the Federal Government proceeds with national menu labeling[53] they could randomly introduce it in ½ of the states or counties in the United States and not in the other ½ for a year in a valid cluster-randomized trial. At year's end, they might plausibly have unequivocal evidence on the effects of menu labeling on food purchases. Such data could offer guidance about whether to then implement the program in the remaining locations or discontinue the requirement. Similarly, many major national fast-food restaurant chains, were they inclined to conduct such a study, would easily have the financial resources and computer recording infrastructure of purchases to conduct such a trial by randomly assigning labeled menus to some of restaurants and unlabeled menus to others and then comparing the sales figures. If such studies were conducted at the state or county level, one could even solicit participation from and enroll specific subjects who are known to be high fast-food consumers at baseline and go beyond merely examining the effects on purchases at the cluster level; instead, one could study the actual end point of interest, body weight or fat in individual persons. Remarkably, for all the passion that public policy advocates bring to the table to push policies forward, they have not used that passion to demand that such studies be carried out. If they did so, perhaps they would help us learn how effective the policies they advocate are.

Could it hurt?

An argument sometimes made by advocates of policies that seem intuitively sound to them but are not supported by strong evidence is that, even if ineffective, such policies will be harmless. This is fallacious reasoning. There are at least five types of harm, or more generically cost, that may accrue. The first is direct negative effects of the policies on collateral outcomes (concerns about economic impacts and stigmatization are sometimes raised) or on the outcomes that are themselves the targets of policy, such as the increase in calories purchased by males seen in some menu-labeling studies.[11, 35] The second is encroachment on individual freedom that

occurs with some policies as discussed earlier. The third is that if the scientific community advances a policy as very likely to be beneficial, which is then found not to be beneficial, our credibility may be damaged and, like the boy who cried wolf, our voices will carry less weight when we genuinely have important messages to convey. The fourth cost is distraction. When we focus our efforts on advocating and implementing methods that turn out to be ineffective, we are not spending those efforts on other approaches that might be better. Finally, there are direct resource costs. Every dollar our society spends implementing one policy is $1 less that we have available to support education, the arts, or any number of other things our citizens may find as equally deserving causes. This is not to say that these harms or costs will come to fruition in implementing any one policy, but they are plausible, should enter into society's decision analysis, and justify asking about evidence of benefit when considering proposed policy approaches to obesity.

Conclusion

The timely study by Elbel, *et al.,*[1] adds to the growing body of evidence suggesting, but not demonstrating, that menu labeling has no important effect on reducing calories purchased at a single dining occasion. Moreover, it highlights the frustrating truth that, as such policies are implemented, they are not implemented in a manner that allows the most rigorous assessments of their effects to be conducted. Like all other studies to date, the study by Elbel, *et al.,*[1] does not offer strong evidence about causation (or lack thereof), information about long-term effects, or effects on the variable that menu labeling is intended to affect, namely, obesity levels. As we move forward to consider this and other policy-level proposals for addressing obesity, as scientists we should hold high standards of discourse and of evidence and we should maintain a sense of humility about the accuracy of our predictions about the effects of our proposed policies. Society will sometimes be justified in moving forward even in the absence of strong evidence for the benefits of a proposed policy; yet, as scientists we should offer our most unbiased assessment of the current evidential base and ask that, as any new policies are implemented, rigorous evaluations of their effects should be conducted.

Conflict of Interest

Acknowledgements

Disclaimer

The opinions expressed are the author's and not necessarily those of any organization with which he is affiliated.

References

1. Elbel B., Gyafami J., Kersh R. *Child and adolescent fast food choice and the influence of calorie labeling: a natural experiment.* INT. J. OBESITY 2011; 35: 493–500.

2. Winerman L. *With menu labeling law, diners will soon know calorie counts, 2010, http://www.pbs.org/newshour/rundown/2010/03/with-menu-labeling-law-diners-will-soon-know-caloriecounts.html#.* Accessed 28 December 2010.

3. Faith M.S., Fontaine K.R., Baskin M.L., Allison D.B. *Toward the reduction of population obesity: macro-level environmental approaches to the problems of food, eating, and obesity.* PSYCHOL. BULL. 2007; 133: 205–226.

4. Anderson M.L., Matsa D.A. *Are restaurants really supersizing America?* AMER. ECON. J: APPL. ECON. (in press). *http://papers.ssrn.com/sol3/papers.cfm?abstract_id%1079584.* Accessed December 28, 2010.

5. Robert Wood Johnson Foundation. *Menu labeling: does providing nutrition information at the point of purchase affect consumer behavior?,* 2009, *http://www.rwjf.org/files/research/20090630hermenulabeling.pdf.* Accessed 26 December 2010.

6. Pulos E., Leng K. *Evaluation of a voluntary menu-labeling program in full-service restaurants.* AM. J. PUBLIC HEALTH 2010; 100: 1035–1039.

7. Elbel B., Kersh R., Brescoll V.L., Dixon L.B. *Calorie labeling and food choices: a first look at the effects on low-income people in New York City.* HEALTH AFF. (Millwood) 2009; 28: w1110–w1121.

8. Harnack L.J., French S.A., Oakes J.M., Story M.T., Jeffery R.W., Rydell S.A. *Effects of calorie labeling and value size pricing on fast food meal choices: Results from an experimental trial.* INT. J. BEHAV. NUTR. PHYS. ACT. 2009; 5: 63.

9. Bollinger B., Leslie P., Sorensen A. *Calorie Posting in Chain Restaurants.* Unpublished manuscript. *http://www.gsb.stanford.edu/news/StarbucksCaloriePostingStudy.pdf.* Accessed 29 December2010.

10. Gerend M.A. *Does calorie information promote lower calorie fast food choices among college students?* J. ADOLESC. HEALTH 2009; 44: 84–86.

11. Aaron J., Evans R., Mela D. *Paradoxical effect of a nutrition labeling 33. Scheme in a student cafeteria.* NUTR. RES. 1995; 15: 1251–1261.

12. Tandon P.S., Wright J., Zhou C., Rogers C.B., Christakis D.A. *Nutrition menu labeling may lead to lower-calorie restaurant meal choices for children.* PEDIATRICS 2010; 125: 244–248.

13. Roberto C.A., Larsen P.D., Agnew H., Baik J., Brownell K.D. *Evaluating the impact of menu labeling on food choices and intake.* AM. J. PUBLIC HEALTH 2010; 100: 312–318.

14. Taber D.R., Stevens J., Murray D.M., Elder J.P., Webber L.S., Jobe J.B., *et al. The effect of a physical activity intervention on bias in self-reported activity.* ANN. EPIDEMIOL. 2009; 19: 316–322.

15. Girz L.P.. *The Effects of Calorie Information on Food Selection and Intake* (Master's Thesis). University of Toronto: Toronto, Canada, 2009.

16. Kuo T., Jarosz C.J., Simon P., Fielding J.E. *Menu labeling as a potential strategy for combating the obesity epidemic: a health impact assessment.* AM. J. PUBLIC HEALTH 2009; 99: 1680–1686.

References—Continued

17. Cope M.B., Allison D.B. *White hat bias: examples of its presence in obesity research and a call for renewed commitment to faithfulness in research reporting.* INT. J. OBES. 2010; 34: 84–88.

18. Cope M., Allison D.B. *White hat bias: a threat to the integrity of scientific reporting.* ACTA. PAEDIATR. 2010; 99: 1615–1617.

19. Hartocollis A. *E-mails reveal dispute over city's ad against sodas.* NEW YORK TIMES 2010, e-pub ahead of print 29 October 2010.

20. Emerson G.B., Warme W.J., Wolf F.M., Heckman J.D., Brand R.A., Leopold S.S. *Testing for the presence of positive-outcome bias in peer review: a randomized controlled trial.* ARCH. INTERN. MED. 2010; 170: 1934–1939.

21. Ludwig D.S., Brownell K.D. *Public health action amid scientific uncertainty: the case of restaurant calorie labeling regulations.* JAMA 2009; 302: 434–435.

22. Nestle M., Ludwig D.S. *Front-of-package food labels: public health or propaganda?* JAMA 2010; 303: 771–772.

23. Brownell K.D., Farley T., Willett W.C., Popkin B.M., Chaloupka F.J., Thompson J.W., *et al. The public health and economic benefits of taxing sugar-sweetened beverages.* N. ENGL. J. MED. 2009; 361: 1599–1605.

24. Nestle M. *Health care reform in action-calorie labeling goes national.* N. ENGL. J. MED. 2010; 362: 2343–2345.

25. Read J.L. *The Effect of Point-of-Purchase Nutrition Information on Consumer Choice in Fast Food Restaurants* (Master's Thesis). University of Guelph: Ontario, Canada, 2008.

26. Platkin C.S. *Think Before You Eat: Calories and Exercise Equivalents Presented on Menus at Point-of-Choice* (Doctoral Dissertation). Florida International University: Miami, FL, 2009.

27. Thomas O., Thabane L., Douketis J., Chu R., Allison D.B. *Industry funding and the reporting quality of large long-term weight loss trials.* INT. J. OBES. 2008; 32: 1531–1536.

28. Cox D.R., Reid N. *The Theory of the Design of Experiments.* Chapman & Hall/CRC Press: Boca Raton, FL, 2000.

29. Campbell D.T., Stanley J.C. *Experimental and Quasi-Experimental Designs for Research.* Rand McNally: Chicago, 1963.

30. Cofield S.C., Corona R.V., Allison D.B. *Use of causal language in observational studies of obesity and nutrition.* OBES. FACTS 2010; 3: 353–356.

31. Food and Drug Administration. FEDERAL REGISTER Final Rule, FFR 696787 *Final Rule Declaring Dietary Supplements Containing Ephedrine Alkaloids Adulterated Because They Present an Unreasonable Risk,* 2004, *http://www.fda.gov/Food/DietarySupplements/GuidanceComplianceRegulatoryInformation/RegulationsLaws/ucm079733.htm*. Accessed 8 January 2011.

32. Boehmer T.K., Brownson R.C., Haire-Joshu D., Dreisinger M.L. *Patterns of childhood obesity prevention legislation in the United States.* PREV. CHRONIC DIS. 2007; 4: A56.

33. Yudin H. *Opt out, not opt in.* CAN. MED. ASSOC. J. 2003; 169: 279.

34. Sharpe K.M., Staelin R., Huber J. *Using extremeness aversion to fight obesity: policy implications of context dependent demand.* J. CONSUMER RES. 2008; 35: 406–422.

35. Allison D.B., Heshka S., Sepulveda D., Heymsfield S.B. *Counting calories—**caveat emptor.*** JAMA 1993; 270: 1454–1456.

36. Hu M.Y. *Calorie cards removed from dining halls.* HARVARD CRIMSON 2008, *http://www.thecrimson.com/article/2008/9/24/calorie-cards-removed-from-dining-halls/*.

37. Bruni F. *Disappearing Ink.* NEW YORK TIMES 2006, *http://dinersjournal.blogs.nytimes.com/2006/08/15/disappearing-ink/?apage%3*. Accessed 28 December 2010.

38. Quoted in Gandhi A. In: Einhorn L., Gandhi A. (eds). *Forgiveness and Child Abuse: Would YOU Forgive?,* Chapter 17. Robert Reed Publishers: Bandon, OR, 2006. p 71.

39. Friedman R.R. *Scientific Studies Related to Menu Labeling.* *http://www.cspinet.org/new/pdf/yale_rudd_ctr_menu_labeling_grouped_studies.pdf*. Accessed 29 December 2010.

40. Guthrie J.F., Lin B.H., Frazao E. *Role of food prepared away from home in the American diet, 1977–78 **versus** 1994–96: changes and consequences.* J. NUTR. EDUC. BEHAV. 2002; 34: 140–150.

41. Serrano E.L., Jedda V.B. *Comparison of fast-food and non-fast-food children's menu items.* J. NUTR. EDUC. BEHAV. 2009; 41: 132–137.

42. Yamamoto J.A., Yamamoto J.B., Yamamoto B.E., Yamamoto L.G. *Adolescent calorie/fat menu ordering at fast food restaurants compared to other restaurants.* HAWAII MED. J. 2006; 65: 231–236.

43. Kirkland A. *The environmental account of obesity: a case for feminist skepticism.* J. WOMEN CULTURE SOCIETY 2011; 36: 463–485.

44. McAllister E.J., Dhurandhar N.V., Keith S.W., Aronne L.J., Barger J., Baskin M., *et al. Ten putative contributors to the obesity epidemic.* CRIT. REV. FOOD SCI. NUTR. 2009; 49: 868–913.

45. Schwartz N., Groves R.N., Schuman H. *Survey Methods.* In: Gilbert D., Fiske S.T., Lindzey T. (eds). *The Handbook of Social Psychology.* vol. 1, 4th edn. Oxford University Press: New York, NY, 1998, pp. 143–179.

46. Faure G. *Should parents of obese kids lose custody?* TIME MAGAZINE 2009, *http://www.time.com/time/health/article/0,8599,1930772,00.html*. Accessed 26 December 2010.

47. Murtagh L. *Judicial interventions for morbidly obese children.* J. LAW MED. ETHICS 2007; 35: 497.

48. Martin-Bautista E., Campoy C., Decsi T., Bokor S., von Rosen-von Hoewel J., Laitinen K., *et al. Obesity related programming statements in infant feeding policies in five European countries.* ADV. EXP. MED. BIOL. 2009; 646: 169–173.

49. Rosen L., Manor O., Engelhard D., Zucker D. *In defense of the randomized controlled trial for health promotion research.* AM. J. PUBLIC HEALTH 2006; 96: 1181–1186.

50. Ayres I. *Government By Chance.* In: *Super Crunchers: Why Thinking-by-Numbers Is the New Way to Be Smart,* Chapter 3. Bantam Books, 2007.

51. Green M.D., Freedman D.M., Gordis L. *Reference Guide on Epidemiology.* In: *Reference Manual on Scientific Evidence,* 2nd edn. Federal Judicial Center, Washington, D.C., *http://www.fjc.gov/public/pdf.nsf/lookup/sciman06.pdf/$file/sciman06.pdf*. Accessed 27 December 2010.

52. Hill A.B. *The environment and disease: association or causation?* PROC. R. SOC. MED. 1965; 58: 295–300.

53. Food and Drug Administration. *Guidance for industry: Questions and Answers Regarding the Effect of Section 4205 of the Patient Protection and Affordable Care Act of 2010 on State and Local Menu and Vending Machine Labeling Laws.* FED. REG. 2010; 75: 164 *http://edocket.access.gpo.gov/2010/pdf/2010-21067.pdf*.

ATTACHMENT 7

The Development of Scientific Evidence for Health Policies for Obesity: Why and How

Molly B. Richardson,[1–2] Michelle S. Williams,[3] Kevin R. Fontaine,[2]–[3] David B. Allison.[2], *

[1]Department of Population Health Sciences, Virginia Polytechnic Institute and State University.

[2]Nutrition Obesity Research Center, University of Alabama at Birmingham (UAB).

[3]School of Nursing, Auburn University.

*Corresponding Author: School of Public Health, University of Alabama at Birmingham, Ryals Building, Room 140J, 1665 University Boulevard, Birmingham, Alabama 35294, Phone: (205) 975–9167, *dallison@uab.ed*.

342

Abstract

Potential obesity-related policy approaches have recently been receiving more attention. While some have been implemented and others only proposed, few have been formally evaluated. We discuss the relevance, and in some cases irrelevance, of some of the types of evidence that are often brought to bear in considering obesity-related policy decisions. We discuss major methods used to generate such evidence, emphasizing study design and the varying quality of the evidence obtained. Third, we consider what the standards of evidence should be in various contexts, who ought to set those standards, as well as the inherent subjectivity involved in making policy decisions. Finally, we suggest greater transparency from both academics and policymakers in the acknowledgment of subjectivities so they can distinguish and communicate the roles played by empirical evidence and subjective values in the formulation of policy.

Introduction

Proposals to use policy measures such as taxing persons with obesity as ways to raise revenue and discourage poor health behaviors, including high levels of consumption, existed at least as early as 1904.[1] However, it was largely in the mid-1990s that the academic and professional dialogue around obesity shifted from one dominated by basic science and clinical research to involve a third branch, namely, public health approaches. Inspired in part by the successful efforts to curtail cigarette smoking, potential obesity-related policy approaches began receiving more attention. A selection of such policies include, but are not limited to, providing information (*e.g.,* labeling restaurant menus with nutritional facts), marketing ideas to inspire behavior change (*e.g.,* placing public health posters in subway systems to discourage or encourage certain food or activity behaviors), mandating the measurement and reporting of the body mass index (BMI) of schoolchildren to parents, enacting worksite economic contingencies, changing food offerings for schoolchildren, zoning of allowable restaurants, banning the sale of certain portion sizes, taxing or subsidizing certain foods, and providing economic incentives and disincentives through insurance charges. Some of these have been implemented and some have only been proposed. Few have been rigorously evaluated and fewer still have unequivocal evidence demonstrating efficacy in stabilizing or reducing body weight.

Because the implementation of such policies typically involves at least some of the following: money, limitations on the freedom of businesses to engage in certain types of commerce, limitations on personal freedom, and opportunity cost with regard to time and attention; it is not surprising that obesity-related policy proposals often provoke heated debate. Moreover, the debate frequently focuses on moral issues, sometimes involving the balance between autonomy and beneficence or individual fairness and societal benefits. Because these issues revolve around morals and values, they are difficult to reconcile. As such, they are repeatedly deferred while the dialogue jumps to questions of judging the quality of evidence. Yet even here, disagreements abound as to the strength of evidence and whether it supports a particular position on a proposed policy. Equally important and sometimes debated, but often simply glossed over, are questions such as, (1) What type of evidence is needed and appropriate for a particular situation? (2) How can such evidence be generated? and (3) Is evidence even needed at all to justify the implementation or rejection of a particular proposed policy?

In this article, we address three macro-level questions. First, concerning evidence, we raise questions about the relevance of some types of evidence that are often brought to bear in policy dialogues. Second, we discuss the major methods used to generate such evidence, with particular focus on the fact that there are a range of study designs (*i.e.,* ordinary association tests to pure randomized controlled trials [RCTs]) that yield evidence of varying quality and varying ability to support causality. Third, we consider what the standards of evidence should be in various contexts, as well as who ought to set those standards, and emphasize the inherent subjectivities involved in making policy decisions. We conclude by noting that it

would be beneficial if both academics and policymakers were transparent in recognizing and conveying those subjectivities while taking care to both understand and distinguish the roles of empirical evidence and subjective values.

What Do We Want Evidence About?

Evidence Regarding Plausibility

When considering a potential policy, the first evidence-oriented question we might ask is, "Is there evidence that the policy will *plausibly* be effective?" That is, is there reason to speculate that the policy will work? Of course, beyond simply saying we cannot prove the contrary, the plausibility of a proposition is subjective, but one's reasons for declaring something plausible or implausible can be specified. At the most superficial level, many obesity policies can be deemed plausible on the basis of the simple concept of energy imbalance as a cause of obesity. Any policy directed at either increasing energy expenditure or decreasing energy intake might thus be assessed as plausible by some. In some cases, this general plausibility is all that is needed to initiate a policy. For example, when considering calorie-labeling of restaurant menus, U.S. District Judge Richard J. Holwell ruled that:

> "The Court agrees with Dr. Allison that one cannot conclude with scientific certainty from the available evidence that a regulation of this type will ultimately be successful in combating obesity. But even if there are no data demonstrating conclusively that Regulation 81.50 will be effective, conclusive proof is not required to establish a reasonable relationship between Regulation 81.50 and the City's interest in reducing obesity. Based on the evidence presented by the City, as well as common sense, it seems reasonable to expect that some consumers will use the information disclosed pursuant to Regulation 81.50 to select lower calorie meals when eating at covered restaurants and that these choices will lead to a lower incidence of obesity." [2]

In contrast, empiricists (or Bayesians) might state that the existing evidence indicates that no proposed public health approach to obesity has been convincingly shown to work or, at best, that no approach has more than very modest effects when it has been applied or tested.[3–4] Therefore, the *a priori* expectation is that the next proposed policy will have little to no effect. By analogy, this rationale is similar to the statistically minded high school guidance counselor who advises the basketball star to study academics because, while the counselor cannot rule out that this player will be the one to get drafted to the NBA or WNBA, it is unlikely.

Plausibility may also be low in some people's minds for policies that aim to affect one component of energy balance in one context while leaving other components of energy balance untouched. Such policies, even if effective in altering the one component of energy balance in the desired direction, will only be effective if this alteration is not compensated (or is at least incompletely compensated) for by alterations in other components of energy balance. Empirical, experimental evidence indicates that such compensation does indeed occur, although the compensation is usually incomplete.[5] This suggests that the plausible effects of policies that work through proposed alterations in one component of energy balance should not be based on models that assume no compensation (*c.f.,* The Caloric Calculator, which estimates average caloric impact, which predicts effect sizes for childhood obesity interventions),[6] as such models will likely markedly overestimate plausible effects.

The plausible benefit of many proposed policy approaches also rests of the assumption of additivity—a small effect coupled with several other slight effects will collectively produce a larger response in the outcome. This is particularly applicable to the category of "nudge," a term introduced by Thaler and Sunstein to describe multiple, minor, likely unnoticeable changes to alter one's behavior.[7] Rozin, *et al.,* showed that multiple modest changes, or nudges, affecting food accessibility (location of ingredients at a salad bar and size and type of serving utensils) in a cafeteria setting reduced the calories purchased during single meals without removing choices.[8] They predicted that the reduced purchasing would translate to a cumulative benefit of weight loss over 1 year. Again, this type of study relies on several assumptions: that fewer calories purchased translates to fewer calories consumed; that "all else is equal," *i.e.,* that no compensation occurs; that short-term effects persist in the long term; that multiple interventions have additive effects; and that effects of interventions work equally well when subjects are fully aware of the interventions (as in ordinary commerce) as when the interventions are not disclosed (as in many studies). Such a study also brings up questions of whether patrons would purchase fewer calories in an ordinary setting such as a store and that would result in weight loss. For example, Wansink. *et al.,* found that increasing the cost of soda resulted in reduced soda purchased but was associated with increased sales of beer.[9] These nudges also may elicit a different response when persons are made aware of

the interventions or with repeated long-term exposure (*i.e.,* daily or weekly grocery shopping).[10] The nudge approach has also been criticized on several other grounds,[11–12] and such criticism highlights that what seems plausible to one person may not seem so to another.

Evidence Regarding Postulated Intermediaries

Evidence of the effectiveness of obesity policy may also rest on evidence regarding presumed mediating variables. An example is a proposed policy for an action intended to increase fruit and vegetable consumption, with the main assumption being that increased intake of fruits and vegetables (the mediating factor) will decrease adiposity or promote less weight gain. Empirical support for the policy may include a demonstration that the proposed action does indeed lead to increased fruit and vegetable consumption. However, such support can only be suggestive because it does not necessarily follow that increases in fruit and vegetable intake will actually decrease or prevent adiposity or lessen weight gain, and the same argument applies for other postulated intermediaries.[13–14]

Evidence from Analogue Studies

Analogue studies attempt to represent key aspects of ordinary life while controlling or limiting external factors, which increases internal validity and can yield key insights [15] yet potentially decreases external validity.[16] An example of an analogue study was conducted by Epstein, *et al.,* to compare the effects of taxation *versus* subsidization on food purchases.[17] They found that using taxes on foods with low nutrient density but also high caloric content was successful at reducing caloric intake, whereas subsidizing low-calorie foods increased caloric intake. This type of evidence supports the plausibility, but not necessarily the effectiveness, of a policy for decreasing obesity. One area of opportunity is the use of pragmatic RCTs, which emphasize rigorous methods in real-world contexts.[18]

Direct Evidence Regarding Effectiveness

Of course, the key evidence desired is evidence of a policy's effectiveness on the ultimate outcome: decreased levels of obesity. Although optimal, such evidence is often difficult to obtain. Ultimately, an ideal study would bear direct evidence of effectiveness, under actual conditions of use, during extended periods of time, and would be of a nature to allow strong inference of cause and effect. These would be randomized studies of actual policy or of extremely close proximity. There is no question that these studies would be difficult, expensive, time-consuming, and in some cases potentially unethical. We do not advocate a lack of action without this type of evidence; however, there should be a clear understanding that without such evidence, statements about the effects of a policy remain speculative.

Evidence Regarding Unintended Consequences

It is important to keep in mind that implementation of any policy often brings with it unintended and undesirable consequences. Many of these consequences have been previously highlighted.[19–20] Such consequences can include, but are not limited to, inequitable distribution of the costs to implement the policy, encroaching on individual freedoms, over-consumption or increased purchasing of certain foods, stigmatization, depression, and avoidance of doctor appointments.[19–20] One author contends that the emphasis on body weight has led to weight-based bullying, increased disordered eating, body dissatisfaction, extreme dieting, and complications from obesity surgery, among others.[21] While some evidence exists on potential unintended and undesirable consequences, it is fairly limited as this field has not been fully investigated. Again, fear of unintended negative consequences should not paralyze us into inaction, but should lead us to practice humility about the potential value of our proposals, to think things through carefully, and to vigilantly monitor implemented policies for any potential unintended consequences.

Evidence Regarding Public Opinion

Reports of the results of public opinion surveys on the desirability of particular obesity-related policies have proliferated in recent years.[22] By implication, this suggests that if a large portion of the population supports a proposed policy, then implementing the proposal is merited. Is such a conclusion reasonable? Should evidence of public opinion about the desirability of policies be considered?

Suh, *et al.,* suggest that public opinion should be solicited to "better understand the public mindset about relevant policy strategies, and to identify attitudes among different subsets of the population towards specific legal measures that can increase protections for individuals affected by obesity."[23] Pollard, *et al.,* also contend that it is important to survey public opinion or community perception, especially when the policy in question involves what may be thought of as government "interference"

in issues concerning food (labeling, advertising, and supply of environmentally friendly food).[24] But are such opinions always important? When assessing public opinion is warranted, which methodologic issues are involved? And, are there actually circumstances when assessing public opinion would be quite inappropriate? Because this article is primarily about evidence for effectiveness, we consider these questions only briefly here.

Are scientific assessments of public opinions about policies always important? Throughout the history of the United States, political leaders have wrestled with the pursuit of what seems morally right based on fundamental principles and doing what is popular. One such example is the famous Lincoln-Douglas debates about slavery. In one of the debates, Lincoln famously said, "In this and like communities, public sentiment is everything. With public sentiment, nothing can fail; without it nothing can succeed. Consequently he who moulds public sentiment, goes deeper than he who enacts statutes or pronounces decisions. He makes statutes and decisions possible or impossible to be executed."[25] It is noteworthy that Lincoln, like some modern day authors interested in obesity policy,[26] is talking about "moulding" public opinion to enable what one has already determined is right and just, and not assessing public opinion to determine what is right and just.

If Lincoln had conducted a public opinion poll and found that most pre-Civil War Americans favored retaining slavery in the United States, would he have judged that pertinent evidence as to whether the practice should be abolished? Would we? The answer is evidently no. When something is judged to be morally wrong, it is wrong and should be "off the table" for discussion regardless of its popularity. Consider the recent posting from Ted Kyle on a "UK Proposal for Explicit Weight Discrimination in Healthcare."[27] Kyle argues that a proposed policy was a grossly unjust form of discrimination against persons with obesity in terms of health care access. Or, consider proposed policies that entail institutionalized "fat shaming"[28] or a failed/withdrawn Mississippi bill to limit access of persons with obesity to restaurants.[29] Many, including the current authors, would consider such proposals morally indefensible, and if one adopts such a position, then no public opinion polls are needed. If moral opinion has superior authority relative to public opinion, this invites important questions of who or how many determine the moral authority and on what basis.

When public opinion assessment is warranted, which methodologic issues are involved? The above notwithstanding, situations certainly exist where public opinion is important, such as to determine whether a policy which is neither morally indefensible nor a moral imperative is desired by the citizenry. In such situations, it will be important to rely on good principles of designing and interpreting opinion surveys and to keep in mind that who is surveyed[30] and how questions are worded[31] can both be used to manipulate the answers one receives. Extensive discussions on these and other methodologic points are covered in standard textbooks on survey and sampling methods.

Are there actually circumstances when assessing public opinion would be quite inappropriate? Finally, we suggest that in some circumstances, assessing public opinion is not only unnecessary, but inappropriate. Specifically, in situations where a proposed approach is morally indefensible, to admit the value of public opinion surveys on determining whether a policy should be enacted invites a "tyranny of the majority."[32–33] An interesting corollary of this is that empirical evidence on the harm or lack of benefit for some morally indefensible practice might also be seen as not only unnecessary, but counterproductive, because the very act of considering the empirical evidence implies that the practice under consideration might be worthy of adoption if the evidence came out a particular way. For example, consider this headline from an Internet posting: "Science Says Fat Shaming Backfires—So Can We Finally Stop It?"[34] The article seems to be referencing an observational study[35] that is interpreted to show that perceived weight discrimination leads to greater future obesity in the person experiencing the discrimination. The answer to the headline's rhetorical query, So Can We Finally Stop It?, in our opinion is that we unequivocally should stop fat shaming, but not because of this (or any other) study but rather because it is wrong. Even if one accepts our view that fat shaming is wrong *a priori,* might one ask where the harm is of buttressing the position with some empirical support. The harm is that the empirical support, like all empirical support, is subject to differential interpretation, criticism, and being overturned. In the observational study in this example, it would be easy to point out many limits, most notably that the study cannot show cause and effect. This may lead others to conclude, "Well, if the wrongness of fat shaming depended in part on the empirical evidence and the empirical evidence has holes in it, I guess fat-shaming may not be wrong after all." If this example is not stark enough, we can ask ourselves would we take seriously the need for studies to show deleterious effects of policies that in-

stitutionalized racial or religious discrimination as justifications for eliminating such heinous policies?

How Might Evidence for Obesity Policies Be Generated?

We now turn from the question of what evidence we want to the question of how such evidence can be generated. In doing so, we emphasize that we are focusing in this section on questions regarding the effects of potential policies on outcomes and do not consider questions about assessing other things such as public opinion about policies. In considering the generation of evidence regarding the effects of potential policies, we are considering questions of cause and effect and readers may find the videos available from an annual short course on this topic of interest (see: *http://www.norc.uab.edu/courses/shortcourse*).

Here, we divide the types of research to be considered into three categories: (1) research that can be determinative of the causal effects of policies; (2) research that can contribute to an overall assessment of the causal effects of policies, but cannot on its own determine causation; and (3) research that formally synthesizes multiple sources of information to estimate the causal effects of policies.

Research That Can Be Determinative of the Causal Effects of Policies

Role of Randomized Controlled Trials

Empirical evidence derived from RCTs aimed at identifying factors that increase or decrease the risk or magnitude of obesity can provide the strongest evidence to guide the development of obesity policies.[36] RCTs are regarded as the gold standard in the hierarchy of research designs because they are the most reliable method for determining causality.[37] Evidence generated from RCTs has been used to guide the development of several types of obesity policies such as dietary recommendations, sugar-sweetened beverage taxes, and food pricing.[38–40] Despite the acknowledgement that RCTs offer the strongest inferences about cause and effect, several arguments are commonly offered against reliance on RCTs for causal inference in policy research. We very briefly review these arguments here.

1. *RCTs are imperfect*. Some authors note that RCTs are imperfect. They can be designed and executed with flaws. Like all empirical studies, they are subject to stochastic variation. Finally, they often entail subject selection criteria and/or study conditions that limit generalizability of the results owing to the broader population and more "real-life" circumstances. These are all legitimate criticisms, but two things are noteworthy. First, these weaknesses are all surmountable. RCTs can be designed and executed well and can be executed in large enough samples and tested with small enough nominal type 1 error levels to minimize stochastic errors. Finally, pragmatic controlled trials offer investigators the ability to conduct a study that examines the effectiveness and efficacy of an intervention in the real world by allowing for the inclusion of a diverse sample of the population and by enabling the intervention to be adapted to local settings.[41] For example, the Moving to Opportunity study found that certain social programs involving housing vouchers providing the "opportunity to move from a neighborhood with a high level of poverty to one with a lower level of poverty was associated with [caused] modest but potentially important reductions in the prevalence of extreme obesity and diabetes."[42]

2. *RCTs are sometimes impractical or impossible*. We agree that RCTs are sometimes impractical or impossible, but this has no bearing on the extent to which RCTs and other designs can or cannot provide strong inferences or causation. The argument that (a) RCTs are sometimes impractical or impossible, (b) such that if we relied on only them for strong causal inferences we would not be able to make strong causal inferences in some situations in which we wished to make strong causal inferences, and (c) therefore we should not make strong causal inferences solely from RCTs is simply a special case of *Argumentum ad Consequentiam*.[43]

3. *There are no RCTs showing that parachutes work*. It is sometimes noted that we accept many propositions as true on the basis of some evidence and intuitive obviousness such as that smoking causes lung cancer or that parachutes save lives among skydivers.[44] This is an example of argument by analogy.[45] Arguments by analogy can be useful foils to provoke thought, but in and of themselves prove or disprove nothing.

4. *We cannot wait for perfect data*. It is sometimes argued that we cannot (or more aptly should not) wait for perfect data to take *certain actions,* such as enact certain policies. We agree with this proposition. However, the statement "we cannot (or more aptly should not) wait for perfect data *to take certain ac-*

tions" is not equivalent to "we cannot (or more aptly should not) wait for perfect data *to draw strong conclusions about causation.*" Taking actions and drawing causal conclusions are distinct processes and the need and justification to take prudent action in the face of uncertainty is not a justification for denying that the uncertainty exists.[19, 46–47]

5. *Inadvertently Promoting a False Dichotomy.* Majumdar and Soumerai [48] have cogently noted that "some contend that only randomized controlled trials produce trustworthy evidence. Unfortunately, such a position discounts valid nonrandomized or quasi-experimental study designs, even though health policy randomized controlled trials are rarely feasible. Such a constrained view inappropriately lumps together valid evidence from strong nonrandomized designs (that is, before-after studies with concurrent controls or the interrupted time series study in which a policy causes a sudden, visible change in trend) with evidence from weak designs that permit little causal inference (that is, the commonly conducted cross-sectional analysis that looks at outcomes only after a policy has been implemented)." We agree that there is a continuum of non-RCT designs that vary in the strength of causal inferences they justify. We also agree that the stronger designs are underutilized as we discuss later in this article. However, these recognitions do not affect the validity of propositions that randomization is key to valid causal inference.[49] If we accepted otherwise, we would again be engaging in *Argumentum ad Consequentiam.*[43]

Research That Can Contribute to an Overall Assessment of the Causal Effects of Policies

Having emphasized the critical role of RCTs in humans on the policy under question and for the outcomes under question in drawing strong causal inference, we also note that with such information often unavailable and sometimes unattainable, it is frequently necessary to make decisions about actions without drawing firm conclusions about causation. In doing so, we must commonly integrate multiple sources of information, none of which alone is unequivocally dispositive about a conclusion of causation, to make informed decisions about what might reasonably be expected to work. Several sources of evidence can contribute to such decisions.

Role of Model Organism Evidence

Model organisms are used to generate information regarding casual relationships that cannot be derived through human studies. For example, exposure to environmental obesogens, such as endocrine-disrupting chemicals, has been identified as a possible factor that increases the risk of obesity.[50–51] Such studies are vital in policy *decisions,* for example, to approve or disapprove use of a food additive, but cannot offer unequivocal conclusions about causation in humans because of the possible heterogeneity of effects across species.[52]

Role of Observational Evidence: of Ordinary Association Tests (OATs) and Extended Assoc[i]ation Tests (EATs)

Observational evidence generally plays a vital role in assessing the likely value of proposed policies. Observational studies are useful in generating hypotheses that can inform the conduct of more rigorous studies (*i.e.,* randomized trials) to begin to establish causality. With regard to policies developed to address the obesity epidemic, observational studies have been used to investigate associations between the initiations of policies and relevant outcomes. That said, not all observational evidence is of equal value. Here we distinguish between two broad classes of observational evidence which we will call Ordinary Association Tests (OATs) and Extended Association Tests (EATs).

Ordinary Association Tests. We define ordinary association tests (OATs) to be observational studies on samples of individuals in which the sole or primary means of controlling for potential confounding factors is inclusion of measures of some potential confounding factors as covariates in statistical models (or stratifying by measures of such factors). OATs are heavily relied upon in thinking about plausible effects of polices, but have also been heavily criticized in general [53–54] and in the obesity and nutrition domains in particular [55–57] for multiple reasons. We refer the reader to those references for details.

Extended Association Tests. Most dialogue and research in obesity does not consider the evidence continuum between OATs, which do not offer strong assessments of causal effects, and RCTs, which do offer strong inferences, but cannot be done in all circumstances. In contrast to this polarized view, there are techniques that we refer to as extended association tests (EATs) that lie intermediary between ordinary association tests and RCTs, including but not limited to quasi-experimental studies and natural experiments. Such designs are increasingly used, especially in

the disciplines of economics and genetics, but are rarely used in obesity research. However, the ability to draw causal inferences in obesity research could be strengthened by increased judicious use of such approaches. In-depth understanding and appropriate use of the full continuum of these methods requires input from disciplines including statistics, economics, psychology, epidemiology, mathematics, philosophy, and in some cases behavioral or statistical genetics. The application of these techniques, however, does not involve routine well-known "cookbook" approaches but requires understanding of underlying principles so the investigator can tailor approaches to specific and varying situations.

Some of the key methods in use for situations where standard RCTs may not be available include natural experiments, quasi-experiments, and experiments in which true randomization is used but subjects are not randomized directly to levels of the independent variable, as described with examples in *Table 1*.

Natural experiments are a useful type of observational study that can be used to investigate the impact of environmental changes on obesity, that is, changes that the investigator did not manipulate. In this case, investigators merely measure outcomes before and after the implementation of a new policy, regulation, or other factor that has changed. Within the context of efforts at obesity modification, natural experiments have been used to assess the effectiveness of new policies (*e.g.,* inclusion of calorie information on menus, implementation of environmental elements thought to promote physical activity [*i.e.,* parks, bike lanes, walking trails], use of school-based obesity screening and BMI report cards).[61, 68–70]

A prime example comes from the U.S. Food and Drug Administration, which implemented regulations requiring franchise restaurant chains with 20 or more locations to provide calorie information on their menus and menu boards. In a natural experiment conducted in New York City, receipts were collected from patrons of fast food restaurants before and after menu labeling was implemented. The investigators found that adding calorie information to the menus did not appear to influence the food choices of parents or adolescents.[61] Natural experiments such as this are a cost-effective way to evaluate the effects of obesity policies, as well as provide information that might inform modifications to existing policies.

The existence of EATs seems to be less well known to many investigators in public health, medicine, psychology, and related fields. We believe that many questions about behavioral, psychological, and economic influences on obesity-related variables and many applied questions about the effects of extant or proposed interventions can be addressed more informatively and more rigorously if more investigators availed themselves of these evolving methodologies related to causal inference from a basis of a sound understanding of fundamental principles.

Research That Formally Synthesizes Multiple Sources of Information To Estimate The Causal Effects of Policies

Apart from the need to embrace and use the range of potential design strategies available, it is also essential to "step back" and synthesize the multiple and varied sources of information to evaluate what they can tell us about the causal effects of policies.

Role of Systematic Reviews and Meta-Analysis

As a result of the growing rates of obesity around the world, the volume of evidence from obesity research has burgeoned. However, owing to variations in the quality and type of study design, implementation, and the outcomes measured, determining effects from various studies can be challenging. Debates on obesity policies are often fueled by the contradictory findings of empirical studies, such as those regarding the influence of sugar-sweetened beverage consumption on childhood obesity.[40] As such, high-quality systematic reviews and meta-analyses can be useful when attempting to evaluate the state of the evidence related to a particular intervention or policy with objective approaches to identifying and integrating evidence.[71] That said, as Ingram Olkin once wrote, "Doing a meta-analysis is easy. Doing one well is hard,"[72] and we have found that errors in obesity-related meta-analyses abound.[73] Hence, while meta-analyses are vital, our field needs to improve their execution, and meta-analyses should be as critically reviewed as are any other studies.

Role of Modelling

One drawback of RCTs, noted above, is that they often are not large enough to capture the entire spectrum of effects (both desired and undesired) that a policy may have.[74] Mathematical and computational models of health policies are tools that can be used to predict the outcomes of an obesity policy and to identify implementation barriers before the policy is adopted.[75] Moreover, the modelling of obesity policy enables policymakers to estimate the costs of implementing policies and to de-

termine the resource allocation required to implement a given policy.[76–78] For example, a dynamic weight loss model was used to estimate the effects of a tax on sugar-sweetened beverages on the prevalence of obesity in New York City.[79] The model suggested that there would be decreases in obesity prevalence over a 10 year period.[79] The model also estimated the magnitude of the projected reductions in obesity prevalence, allowing readers to better judge the potential public health impact of such a policy.[79]

Models are also valuable for monitoring the effects of policies over time. Evidence has shown that the effects of health policies can increase or diminish with the passage of time.[78] Therefore, new data concerning the effects of a policy should be continually generated to estimate its effects in order to allow policymakers to revise or even discontinue implementation of the policy if it is shown to be ineffective.[74]

Despite the benefits of using models in the development and refinement of health policies, some challenges and limitations must be recognized. For example, health policy modellers are not often integrated into the health policymaking process. Therefore, models are seen as "one-offs" rather than as tools that should be used during the lifecycle of the policy to ensure that it retains its value. Perhaps most importantly, models offer *projections* of effects, not *demonstrations* of effects. Such projections can be heavily dependent on the input parameters (*i.e.,* assumptions) of the model, and some published modelling activities (*e.g.,*[80]) are so heavy on assumptions of efficacy of the policies considered that the modelling can be seen as an instance of *petitio principii.*[81]

Standards for Evidence and Related Factors Influencing Policy Decisions

According to Donaldson and colleagues, most obesity prevention bills enacted between 2010 and 2013 were based on initiating strategies (*e.g.,* "initiated farmer[s'] markets, increased access to walking trails, local menu labeling") that had little to no evidence of benefit.[82] But is this wrong? A vital consideration, often not made explicit *a priori,* concerns the standards for evidence that will used to both generate a policy decision and to evaluate its effect once implemented. In general, the standards of evidence for a scientific conclusion are thought to be far more rigorous, because they are based on long-established methodologies that are considered to be objective, repeatable, and relatively immune to biases of the individuals conducting the study. In contrast, the evidence (if any) needed to reach a policy decision (which is distinct from reaching a scientific conclusion) depends on many factors and is not constant across circumstances. Opinions can also vary. For example, the Society for Prevention Research states, "To be ready for broad dissemination, a program must not only be of *proven* effectiveness, but it must also meet other criteria . . ." (emphasis added).[83] This stands in marked contrast to the statement of District Judge Richard J. Holwell quoted above that "even if there are no data demonstrating conclusively that Regulation 81.50 will be effective, conclusive proof is not required . . ." and in the context of the legal proceedings, his interpretation of law is what determined the evidence standard. There are yet other standards in different contexts and so no universal rule about how much evidence is or is not needed for policymaking can be given. This stands in contrast to occasional statements from academics that seem to state from no formal basis of authority that a particular amount of evidence is or is not needed to enact a policy.

The four quotations listed (see *Box 1*) are from discussions and presentations involving policies directed at curbing sugar intake in the public. They reflect the varying perspectives of differing standards of evidence among researchers. The first two [84–85] put rigor of evidence aside and instead emphasize that the decision to develop policy is the priority based on a decision that seems to have already been committed to based upon some combination of suggestive evidence or intuition. In contrast, the third and fourth statements progress from needing "a strong sense that it will be effective"[86] to confidently requiring "strong evidence" *prior* to any public policy decision.[87] Thus, disagreement on the amount and rigor or evidence needed to enact a policy exists even among researchers discussing a particular target (sugar) of public policy. They illustrate the subjectivity of the standards of evidence for decision making.

In Summation

In closing, our field will benefit from a greater emphasis on probative research. Probative research would meaningfully move us forward in our ability to state that a given treatment or prevention strategy does or does not have a particular effect.[88] This is in contrast to studies that merely continue to draw attention to the plausibility of some treatment having some effect but do not increase our knowledge that such an effect actually exists.[88] Finally, the quest for rigorous evidence and scrupulous truthfulness in reporting is fully compatible with the quest for beneficence

and passionate pursuit of action for the betterment of others. Recognizing these comparabilities (see *Box 2*) may pave the way for public health dialogue in obesity that is both more honest and more collegial.

References

1. *Taxation by weight*. BR. MED. J. 1904; I 1904: 1094.

2. Holwell R.J. Case 1:08–cv–01000–RJH. [*Memorandum Opinion and Order*]. Doc 42. 04/16/2008. 2008: 1–27.

3. Cawley J. *Does anything work to reduce obesity? (Yes, modestly)*. J. HEALTH POLIT. POLICY LAW. 2016; (Feb): 26.

4. Essington M., Hertelendy A.J. *Legislating weight loss: are antiobesity public health policies making an impact?* J. HEALTH POLIT. POLICY LAW. 2016; (Feb): 26.

5. Dhurandhar E.J., Kaiser K.A., Dawson J.A., Alcorn A.S., Keating K.D., Allison D.B. *Predicting adult weight change in the real world: a systematic review and meta-analysis accounting for compensatory changes in energy intake or expenditure*. INT. J. OBES. 2015; 39: 1181–1187.

6. Wang Y.C., Hsiao A., Orleans C.T., Gortmaker S.L. *The caloric calculator: average caloric impact of childhood obesity interventions*. AM. J. PREV. MED. 2013; 45: e3–e13.

7. Thaler R.H., Sunstein C.R. *Nudge: Improving Decisions About Health, Wealth, and Happiness*. Yale University Press: New Haven, CT, 2008.

8. Rozin R., Scott S., Dingley M., Urbanek J.K., Jiang H., Kaltenbach M. *Nudge to nobesity I: minor changes in the accessibility decrease food intake*. Judgement and Decision Making. 2011; 6: 323–332.

9. Hanks A., Wansink B., Just D., *et al. From Coke to Coors: a field study of a fat tax and its unintended consequences*. J. NUTR. EDUC. BEHAV. 2013; 45: S40.

10. Matjasko J.L., Cawley J.H., Baker-Goering M.M., Yokum D.V. *Applying Behavioral Economics to Public Health Policy: Illustrative Examples and Promising Directions*. AM. J. PREV. MED. 2016; 50 (5S1): S13–S19.

11. Howlett M. *Matching Policy Tools & Their Targets: Beyond Nudges and Utility Maximation in Policy Design*. Presented at: European Consortium for Political Research; April 24–28, 2016, 2016; Pisa, Italy.

12. Marlow M.L. *Market test or government guess? Are government efforts to "nudge" us to lose weight really based on science?* REGULATION. 2014; Winter 2014–2015: 48–54.

13. Kaiser K.A., Brown A.W., Bohan Brown M.M., Shikany J.M., Mattes R.D., Allison D.B. *Increased fruit and vegetable intake has no discernible effect on weight loss: a systematic review and meta-analysis*. AM. J. CLIN. NUTR. 2014; 100: 567–576.

14. Ledoux T.A., Hingle M.D., Baranowski T. *Relationship of fruit and vegetable intake with adiposity: a systematic review*. OBES. REV. 2011; 12: e143–150.

15. Mook D.G. *In defense of external invalidity*. AM. PSYCHOL. 1983; 38: 379–387.

16. Reynolds S., Streiner D. *Why we do not abstract analogue studies of treatment outcome and scale development*. EVID. BASED. MENT. HEALTH. 1998; 1: 101–102.

17. Epstein L.H., Dearing K.K., Roba L.G., Finkelstein E. *The influence of taxes and subsidies on energy purchased in an experimental purchasing study*. PSYCHOL. SCI. 2010; 21: 406–414.

18. Patsopoulos N.A. *A pragmatic view on pragmatic trials*. DIALOGUES CLIN. NEUROSCI. 2011; 13: 217–224.

19. Allison D.B. *Evidence, discourse and values in obesity-oriented policy: menu labeling as a conversation starter*. INT. J. OBES. 2011; 35: 464–471.

20. Brown A.W., Allison D.B. *Unintended consequences of obesity-targeted health policy*. VIRTUAL MENTOR. 2013; 15: 339–346.

21. Ramos Salas X. *The ineffectiveness and unintended consequences of the public health war on obesity*. CAN. J. PUBLIC HEALTH. 2015; 106: e79–81.

22. Gendall P., Hoek J., Taylor R., Mann J., Krebs J., Parry-Strong A. *Should support for obesity interventions or perceptions of their perceived effectiveness shape policy?* AUST N.Z.J. PUBLIC HEALTH. 2015; 39: 172–176.

23. Suh Y., Puhl R., Liu S., Milici F.F. *Support for laws to prohibit weight discrimination in the United States: public attitudes from 2011 to 2013*. OBESITY (Silver Spring). 2014; 22: 1872–1879.

24. Pollard C.M., Daly A., Moore M., Binns C.W. *Public say food regulatory policies to improve health in Western Australia are important: population survey results*. AUST. N.Z.J. PUBLIC HEALTH. 2013; 37: 475–482.

25. Zarefsky D. *"Public Sentiment Is Everything": Lincoln's View of Political Persuasion*. JOURNAL OF THE ABRAHAM LINCOLN ASSOCIATION. 1994; 15: 23–40.

26. Robbins R.N.J., Lundell H., Meyerson J. *Views of city, county, and state policy makers about childhood obesity in New York State, 2010–2011*. PREV. CHRONIC. DIS. 2013; 10: E195.

27. Kyle T. *UK Proposal for Explicit Weight Discrimination in Healthcare*. http://conscienhealth.org/2016/09/uk-proposal-explicit-weight-discrimination-healthcare/. Accessed 5 Sept. 2016.

28. Abrams L. *A Case for Shaming Obese People, Tastefully*. THE ATLANTIC. Published January 23, 2013. http://www.theatlantic.com/health/archive/2013/01/a-case-for-shaming-obese-people-tastefully/267446/. Accessed 8 Sept. 2016.

29. Obesity Action Coalition. *Obesity Action Coalition Calls on the State of Mississippi House of Representatives to Withdraw House Bill 282 Discriminating Against Those Affected by Obesity*. Published February 1, 2008. http://www.prnewswire.com/news-releases/obesity-action-coalition-calls-on-the-state-of-mississippi-house-of-representatives-to-withdraw-house-bill-282-discriminating-against-those-affected-by-obesity-56763767.html. Accessed 8 Sept. 2016.

30. Gelman A. *Tracking public opinion with biased polls*. THE WASHINGTON POST. Published April 8, 2014. https://www.washingtonpost.com/news/monkey-cage/wp/2014/04/09/tracking-public-opinion-with-biased-polls/. Accessed 8 Sept. 2016.

31. Newport F. *The Scientific Approach to Question Wording Differences*. GALLUP. Published September 5, 2003. http://www.gallup.com/poll/9193/scientific-approach-question-wording-differences.aspx. Accessed 8 Sept. 2016.

32. Adams J., American Imprint Collection (Library of Congress). *A Defence of the Constitutions of Government of the United States of America*. London printed, Boston re-printed and sold by Edmund Freeman, 1788.

33. Mill J.S. *On Liberty*. Vol. 25. 1909 ed. THE INTERNET WIRETAP: HARVARD CLASSICS, P.F. Collier & Son.

34. M.K. *Science Says Fat Shaming Backfires—So Can We Finally Stop It?* SELF. Published September 15, 2014. http://www.yourtango.com/2014225975/love-your-body-science-says-fat-shaming-backfires-so-can-we-finally-stop-it. Accessed 8 Sept. 2016.

35. Jackson S.E., Steptoe A., Beeken R.J., Croker H., Wardle J. *Perceived weight discrimination in England: a population-based study of adults aged 50 years*. INT. J. OBES. 2015; 39: 858–864.

36. Swinburn B.A., Caterson I., Seidell J.C., James W.P. *Diet, nutrition and the prevention of excess weight gain and obesity*. PUBLIC HEALTH NUTR. 2004; 7: 123–146.

37. Byar D.P., Simon R.M., Friedewald W.T., *et al. Randomized clinical trials. Perspectives on some recent ideas*. N. ENGL. J. MED. 1976; 295: 74–80.

38. Mozaffarian D., Ludwig D.S. *Why is the Federal Government afraid of fat?* NEW YORK TIMES. Published July 9, 2015. http://www.nytimes.com/2015/07/09/opinion/why-is-the-federal-government-afraid-of-fat.html?_r=0. Accessed 8 Sept. 2016.

39. Mozaffarian D., Ludwig D.S. *The 2015 U.S. Dietary Guidelines: lifting the ban on total dietary fat*. JAMA. 2015; 313: 2421–2422.

40. Keller A., Bucher Della Torre S. *Sugar-sweetened beverages and obesity among children and adolescents: a review of systematic literature reviews*. CHILD. OBES. 2015; 11: 338–346.

41. Peikes D., Geonnotti K., Wang W. *Using Pragmatic Clinical Trials to Test the Effectiveness of Patient-Centered Medical Home Model in Real-World Setting*. Rockville, MD: Agency for Healthcare Research and Quality; 2013.

42. Ludwig J., Sanbonmatsu L., Gennetian L., *et al. Neighborhoods, obesity, and diabetes—a randomized social experiment*. N. ENGL. J. MED. 2011; 365: 1509–1519.

43. Van Eemeren F.H., Grootendorst R. *Fallacies in pragma-dialectical perspective*. ARGUMENTATION. 1987; 1: 283–301.

44. Smith G.C., Pell J.P. *Parachute use to prevent death and major trauma related to gravitational challenge: systematic review of randomised controlled trials*. BMJ. 2003; 327: 1459–1461.

References—Continued

45. Cummings L. *Argument from Analogy. Reasoning and Public Health: New Ways of Coping with Uncertainty.* Springer International Publishing: Cham, Switzerland, 2015: 93–120.

46. Hill A.B. *The environment and disease: association or causation?* PROC. R. SOC. MED. 1965; 58: 295–300.

47. Grutters J.P., van Asselt M.B., Chalkidou K., Joore M.A. *Healthy decisions: towards uncertainty tolerance in healthcare policy.* PHARMACOECONOMICS. 2015; 33: 1–4.

48. Majumdar S.R., Soumerai S.B. *The unhealthy state of health policy research.* HEALTH AFF. (Millwood). 2009; 28: w900–w908.

49. Rubin D.B. *Practical implications of modes of statistical inference for causal effects and the critical role of the assignment mechanism.* BIOMETRICS. 1991; 47: 1213–1234.

50. Ouadah-Boussouf N., Babin P.J. *Pharmacological evaluation of the mechanisms involved in increased adiposity in zebrafish triggered by the environmental contaminant tributyltin.* TOXICOL. APPL. PHARMACOL. 2016; 294: 32–42.

51. Grun F., Blumberg B. *Environmental obesogens: organotins and endocrine disruption via nuclear receptor signaling.* ENDOCRINOLOGY. 2006; 147 (suppl.): S50–S55.

52. *Reference Manual on Scientific Evidence.* 3rd ed. The National Academies Press:Washington, D.C., 2011.

53. Albert R.K. *"Lies, damned lies . . ." and observational studies in comparative effectiveness research.* AM. J. RESPIR. CRIT. CARE MED. 2013; 187: 1173–1177.

54. Taubes G. *Epidemiology faces its limits.* SCIENCE. 1995; 269: 164–169.

55. Schoenfeld J.D.I.J., Ioannidis J.P. *Is everything we eat associated with cancer? A systematic cookbook review.* AM. J. CLIN. NUTR. 2013; 97: 127–134.

56. Bohan Brown M.M., Brown A.W., Allison D.B. *Nutritional epidemiology in practice: learning from data or promulgating beliefs?* AM. J. CLIN. NUTR. 2013; 97: 5–6.

57. Young S.S., Karr A. *Deming, data and observational studies: A process out of control and needing fixing.* SIGNIFICANCE. 2011; 8: 116–120.

58. Metzger M.W., McDade T.W. *Breastfeeding as obesity prevention in the United States: a sibling difference model.* AM. J. HUM. BIOL. 2010; 22: 291–296.

59. Nelson M.C., Gordon-Larsen P., Adair L.S. *Are adolescents who were breast-fed less likely to be overweight? Analyses of sibling pairs to reduce confounding.* EPIDEMIOLOGY. 2005; 16: 247–253.

60. Fontaine K.R., Robertson H.T., Holst C., *et al. Is socioeconomic status of the rearing environment causally related to obesity in the offspring?* PLoS ONE. 2011; 6: e27692.

61. Elbel B., Gyamfi J., Kersh R. *Child and adolescent fast-food choice and the influence of calorie labeling: a natural experiment.* INT. J. OBES. 2011; 35: 493–500.

62. Gibson J., McKenzie D., Stillman S. *What happens to diet and child health when migration splits households? Evidence from a migration lottery program.* FOOD POLICY. 2011; 36: 7–15.

63. Yakusheva O., Kapinos K., Weiss M. *Peer effects and the freshman 15: evidence from a natural experiment.* ECON. HUM. BIOL. 2011; 9: 119–132.

64. Braakmann N. *The causal relationship between education, health and health related behaviour: evidence from a natural experiment in England.* J. HEALTH ECON. 2011; 30: 753–763.

65. Jones-Smith J.C., Dow W.H., Chichlowska K. *Association between casino opening or expansion and risk of childhood overweight and obesity.* JAMA. 2014; 311: 929–936.

66. Voss J., Allison D.A., Webber B.J., Otto J.L., Clark L.L. *Lower obesity rate during residence at high altitude among a military population with frequent migration: a quasi experimental model for investigating spatial causation.* PLoS ONE. 2014; 9: e93493.

67. Allison D.B., Paultre F., Heymsfield S.B., Pi-Sunyer F.X. *Is the intra-uterine period really a critical period for the development of adiposity?* INT. J. OBES. RELAT. METAB. DISORD. 1995; 19: 397–402.

68. Naylor P.J., Olstad D.L., Therrien S. *An intervention to enhance the food environment in public recreation and sport settings: a natural experiment in British Columbia, Canada.* CHILD. OBES. 2015; e-pub ahead of print 19 May 2015.

69. Benjamin Neelon S.E., Namenek Brouwer R.J., Ostbye T., *et al. A community-based intervention increases physical activity and reduces obesity in school-age children in North Carolina.* CHILD. OBES. 2015; 11: 297–303.

70. Madsen K.A. *School-based body mass index screening and parent notification: a statewide natural experiment.* ARCH. PEDIATR. ADOLESC. MED. 2011; 165: 987–992.

71. Crombie I., Davies H. *What is Meta-Analysis?* HAYWORD MEDICAL COMMUNICATIONS: LONDON, 2009.

72. Shuster J.J., Gieser P.W. *Meta-analysis and prospective meta-analysis in childhood leukemia clinical research.* ANN. ONCOL. 1996; 7: 1009–1014.

73. George B.J., Beasley T.M., Brown A.W., *et al. Common scientific and statistical errors in obesity research.* OBESITY (Silver Spring). 2016; 24: 781–790.

74. Metcalf C.J., Edmunds W.J., Lessler J. *Six challenges in modelling for public health policy.* EPIDEMICS. 2015; 10: 93–96.

75. Hawkes C., Smith T.G., Jewell J., *et al. Smart food policies for obesity prevention.* LANCET. 2015; 385: 2410–2421.

76. Backholer K., Beauchamp A., Ball K., *et al. A framework for evaluating the impact of obesity prevention strategies on socioeconomic inequalities in weight.* AM. J. PUBLIC HEALTH. 2014; b: e43–e50.

77. Dietz W.H., Bland M.G., Gortmaker S.L., Molloy M., Schmid T.L. *Policy tools for the childhood obesity epidemic.* J. LAW MED. ETHICS. 2002; 30 (suppl.): 83–87.

78. Levy D.T., Mabry P.L., Wang Y.C., *et al. Simulation models of obesity: a review of the literature and implications for research and policy.* OBES. REV. 2011; 12: 378–394.

79. Ruff R.R., Zhen C. *Estimating the effects of a calorie-based sugar-sweetened beverage tax on weight and obesity in New York City adults using dynamic loss models.* ANN EPIDEMIOL. 2015; 25: 350–357.

80. Gortmaker S.L., Wang Y.C., Long M.W., *et al. Three interventions that reduce childhood obesity are projected to save more than they cost to implement.* HEALTH AFF. (Millwood). 2015; 34: 1932–1939.

81. Cummings L. *Informal fallacies as cognitive heuristics in public health reasoning.* INFORMAL LOG. 2014; 34: 1–37.

82. Donaldson E.A., Cohen J.E., Villanti A.C., Kanarek N.F., Barry C.L., Rutkow L. *Patterns and predictors of state adult obesity prevention legislation enactment in U.S. states: 2010–2013.* PREV. MED. 2015; 74: 117–122.

83. Society for Prevention Research. *Standards of Evidence. Criteria for Efficacy, Effectiveness, and Dissemination.* http://www.preventionresearch.org/StandardsofEvidencebook.pdf. Accessed 8 Sept. 2016.

84. National Public Radio (Producer). (2016, Dec. 19). *How Much Is Too Much? New Study Casts Doubts On Sugar Guidelines.* Retrieved from: http://www.npr.org/templates/transcript/transcript.php?storyId=505867535.

85. National Academy of Medicine (Panel). (2016, Oct 24). *2016 Annual Meeting Session 3 Question and Answer: Evidence of Preventing Obesity and Diabetes at the Population Level and Promising New Directions.* Retrieved from: https://www.youtube.com/watch?v=I8RyxGfQyWg&list=PLqRL5HO_hA8faH-DrOXZV7sAHuGMdktom&index=26.

86. Nancy Kass (Presenter). (2016, Nov. 8). *Obesity Prevention policies in the United States: which approaches make the most ethical sense?* UT Southwestern Health Sciences Digital Library and Learning Center. Retrieved from: https://repositories.tdl.org/utswmed-ir/handle/2152.5/3892.

87. Bradford Hill, Austin (Presenter). (1965, Jan. 14) *President's Address Section of Occupational Medicine: The Environment and Disease: Association or Causation?* 295–300. Retrieved from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1898525/pdf/procrsmed00196-0010.pdf.

88. Casazza K., Allison D.B. *Stagnation in the clinical, community and public health domain of obesity: the need for probative research.* CLIN. OBES. 2012; 2: 83–85.

89. Mehta T., Allison D.B. *From measurement to analysis reporting: grand challenges in nutritional methodology.* FRONT. NUTR. 2014; 1:6.

90. Allison D.B., Bassaganya-Riera J., Burlingame B., *et al. Goals in nutrition science 2015–2020.* FRONT. NUTR. 2015; 2: 26.

91. Allison D.B., Brown A.W., George B.J., Kaiser K.A. *Reproducibility: a tragedy of errors.* NATURE. 2016; 530: 27–29.

92. Dietz, T. *Bringing values and deliberation to science communication.* PNAS. 2013; 110: 14081–14087.

Table 1. Examples of Extended Association Tests (EATs) in Obesity Research

Topic Under Study	Design	Finding	Ref.
Effects of Breastfeeding on Offspring Obesity	Co-Sib Control	Mixed	58–59
Effects of Socioeconomic Status of Rearing Parents on Child BMI	Adoption Study	Consistent with a causal effect, but only ½ of ordinary association	60
Effects of Menu Labeling on Calories Purchased	Quasi-Experiment	No support	61
Effects of Migrating from Tonga to New Zealand	Natural Experiment	Some evidence for BMI increase in some ages	62
Effects of Roommate Characteristics on Freshman Weight Gain	Packet Randomized Experiment	Association suggesting that being assigned to higher BMI roommate leads to less weight gain	63
Effect of Education on Food Choice	Quasi-Experiment	No support	64
Effect of Casinos (as Economic Boosters) on Child Obesity	Quasi-Experiment	Association suggestive of beneficial effect	65
Effects of Altitude of Residence on Obesity	Quasi-Packet-Randomized Experiment	Association suggestive of beneficial effect	66
Effects of Environmental Factors Influencing Birthweight on Adult BMI	Co-Twin Control	No support	67

Box 1: Contrasting Ideas on the Amount and Rigor of Evidence Regarding Policies Targeted at Sugar Consumption

[emphases added below].

"It's a classic example. It's industry-funded authors saying that the dietary guidelines recommendations about sugar aren't based on science. **I'm laughing because what kind of evidence do you need?** Sugar is calories and no nutrients and everybody would be healthier eating less of it."—Marion Nestel [84]

"I would be very surprised if any one pot policy had any effect on obesity. And in some ways I think it's a trap to expect it to do that because so many things are driving the problem. So many things are affecting the food supply, levels of physical activity, and [. . .] structural things like poverty, education, and access to healthcare. **To expect any one policy to turn that around I think is wishful thinking. But it is certainly important that it be studied as much as it can so that you know at the end of the day, so that you know [. . .] where you get the biggest impact per dollar of policy change**" —Kelly Brownell [85]

"In public health, when someone is going to act, particularly for something that is a public policy my goodness, **we have to have some pretty strong sense that it's going to be effective.** Public policy cannot be enacted simply based on a good idea. There has to be reason that it's going to make a difference and a difference relative to public interest."—Nancy E. Kass [86]

"But **we should need very strong evidence** before we made people burn a fuel in their homes that they do not like or stop smoking the cigarettes and eating the fats and sugar that they do like."—Sir Austin Bradford Hill [87]

Box 2: Clarification Within Two Domains: Evidence for scientific conclusions and for Advocacy Of Policy Decisions

Evidence for Scientific Conclusions	• Greater candor in scientific presentations [89–92] • Acceptance by empirically minded scientists that action can sometimes legitimately precede without strong evidence • Articulating distinctions between our values and our assessments of empirical evidence [91]
Evidence for Advocacy of Policy Decisions	• Eschewing fallacious rhetorical arguments • Acceptance by advocates that advocacy neither requires nor justifies making evidence seem stronger than it is

ATTACHMENT 8

Will Reducing Sugar-Sweetened Beverage Consumption Reduce Obesity? Evidence Supporting Conjecture Is Strong, But Evidence When Testing Effect Is Weak

Pro *v.* Con Debate: Role of Sugar Sweetened Beverages in Obesity

K.A. Kaiser,[1] J.M. Shikany,[2] K.D. Keating,[1] and D.B. Allison [1]

Summary

We provide arguments to the debate question and update a previous meta-analysis with recently published studies on effects of sugar-sweetened beverages (SSBs) on body weight/composition indices (BWIs). We abstracted data from randomized controlled trials examining effects of consumption of SSBs on BWIs. Six new studies met these criteria: (i) human trials, (ii) ≥3 weeks duration, (iii) random assignment to conditions differing only in consumption of SSBs and (iv) including a BWI outcome. Updated meta-analysis of a total of seven studies that added SSBs to persons' diets showed dose-dependent increases in weight. Updated meta-analysis of eight studies attempting to reduce SSB consumption showed an equivocal effect on BWIs in all randomized subjects. When limited to subjects overweight at baseline, meta-analysis showed a significant effect of roughly 0.25 standard deviations (more weight loss/less weight gain) relative to controls. Evidence to date is equivocal in showing that decreasing SSB consumption will reduce the prevalence of obesity. Although new evidence suggests that an effect may yet be demonstrable in some populations, the integrated effect size estimate remains very small and of equivocal statistical significance. Problems in this research area and suggestions for future research are highlighted.

Introduction

The proposition we have been asked to address and for which we evaluate the available evidence is as follows:

> 'There is sufficient scientific evidence that decreasing sugar-sweetened beverage (SSB) consumption will reduce the prevalence of obesity and obesity-related diseases.'

What We Are Debating

In examining the proposition, it is useful to carefully consider several of its components as follows:

Sufficient Evidence

The word *sufficient* invites the question, sufficient for what? As the remainder of the proposition indicates, the answer is for drawing a *conclusion* that decreasing SSB consumption will reduce the prevalence of obesity and obesity-related diseases. This must be distinguished from the question of sufficiency for taking public health action or guiding public health policy. What constitutes sufficiency for actions (as opposed to drawing conclusions) is not a purely scientific question that can be answered objectively. Such decisions depend only in part on scientific evidence of the likely effects of those actions and also depend on other inputs including but not limited to legal authority, moral values and personal tastes, none of which are determined by empirical evidence. The question 'Is there sufficient evidence for action?' is inherently subjective and depends on which action, in which regulatory context and according to whose tastes and moral values. As Sir Austin Bradford Hill wrote, 'The evidence is there to be judged on its merits and the judgment . . . should be utterly independent of what hangs upon it—or who hangs because of it'.[1]

Scientific Evidence

We are not asked for conjecture, but rather whether empirical evidence exists *showing* that decreasing SSBs has the effects stated. We therefore examine the highest quality evidence available in the form of randomized controlled trials (RCTs). Because such trials are ethically possible and have been performed, we assert that this type of scientific evidence supersedes correlation or cohort studies.[2] When RCTs are not possible, other evidence must be amassed to attempt to inform causation. However, RCTs are possible to address this question and data are available. Hence, we rely on these results in the present case as they are *probative* (by *probative,* we mean studies which can generate evidence which settles questions by

[1] Office of Energetics, Dean's Office, School of Public Health, University of Alabama at Birmingham, Birmingham, Alabama, USA.
[2] Division of Preventive Medicine, School of Medicine, University of Alabama at Birmingham, Birmingham, Alabama, USA.

Address for correspondence: Dr. D.B. Allison, Ryals Public Health Building, Rm 140J, University of Alabama at Birmingham, 1665 University Boulevard, Birmingham, AL 35294, USA. E-mail: *Dallison@uab.edu*.

proving or disproving propositions, as opposed to simply influencing the strength of speculation) with respect to causation.[3]

Decreasing

We cannot assume that the effects of *decreasing* consumption are the opposite (direction and magnitude) of the effects of *increasing* consumption. Therefore, we provide examinations of available experimental reports that evaluate both interventions so as to quantify the observed effects in each case.

Reduce the Prevalence of Obesity and Obesity-Related Diseases

As to 'obesity-related diseases,' one must first demonstrate an effect on obesity to suggest an effect on obesity-related diseases. Else in what way can the diseases be said to be obesity-related? We therefore focus our present meta-analysis on studies of the effect on body weight or body composition.

What We Are Not Debating

Just as we have clarified the proposition being debated, it is equally important to not be distracted by questions that we have not been asked to address. For example, we have not been asked to address whether obesity is a crisis, if fructose is toxic, are some sugars worse than others, are food company marketing budgets too large, have portion sizes increased to absurd levels, do SSBs affect dental caries, are pictures of an average American's sugar consumption dramatic, is liberty better than paternalism (or *vice versa*), is food marketing like tobacco marketing, or do we sometimes need to take public health actions in the absence of strong evidence. Although these are provocative questions, they are not germane to the necessary evaluation of evidence regarding the question we have been asked to debate. Yet we mention them because they and similar questions are often introduced into such discussions and serve as emotion-raising distractions to an evaluation of the pertinent evidence.

There Is Evidence To Support Conjecture

We freely concede that there is evidence to support the conjecture that reducing SSB consumption might reduce obesity and obesity-related diseases. However, many of these data are not probative in terms of causation. Specifically, there are three forms of human evidence supporting this conjecture.

First, we address ecological correlation. SSB consumption has risen just as obesity rates have risen.[4] This is the weakest form of evidence available. Other beverage consumption patterns (*e.g.,* bottled water[5] depicted in *Fig. 1*) have also demonstrated a strong correlation with the obesity epidemic in the United States.[6–7]

Second, we note an association in some observational studies.[8–10] Whereas there is an ever-growing body of epidemiologic studies, some of which demonstrate statistically significant associations, it is well known that association does not establish causation. Moreover, the association is weak,[11] inconsistent[12–13] and biased,[14] as we will discuss later. Again, as Dr. Hu (our debate opponent) wrote, 'Although the overall results were not entirely consistent, the weight of epidemiologic and experimental evidence indicates greater consumption of sugar-sweetened beverages is associated with weight gain and obesity in children and adults. However, the existing studies suffer from many methodological limitations, including cross-sectional design, small sample size, short follow-up, inadequate dietary assessment, and a lack of repeated measures of diet and lifestyle. . . . any single dietary factor is unlikely to have a large effect on body weight'.[13]

For the third and final point which supports conjecture, we acknowledge that lesser compensation with liquid *versus* solid calories has been found in some in short-term feeding studies.[15–17] By *compensation,* we refer to the definition provided by Mattes[18] whereby later energy intake may be reduced to compensate for preloads or added calories from some other intervention. It must also be acknowledged that compensation for added intake may also take the form of altered energy expenditure, which can offset the intake component of energy balance. Few feeding studies examine this component. Additionally, short-term feeding effects are by no means equivalent to long-term weight effects.[19] Moreover, the short-term effects are inconsistent, with some studies showing near perfect compensation for liquid calories[11, 20–21] and others showing imperfect but equivalent (between forms) compensation to solid calories.[22] Finally, there is far more than zero compensation as implied by common and exaggerated public statements such as, 'When we drink sugary beverages, we simply do not compensate by eating less food'[23] or 'Liquid calories don't register with our appetite controls'.[24]

Figure 1
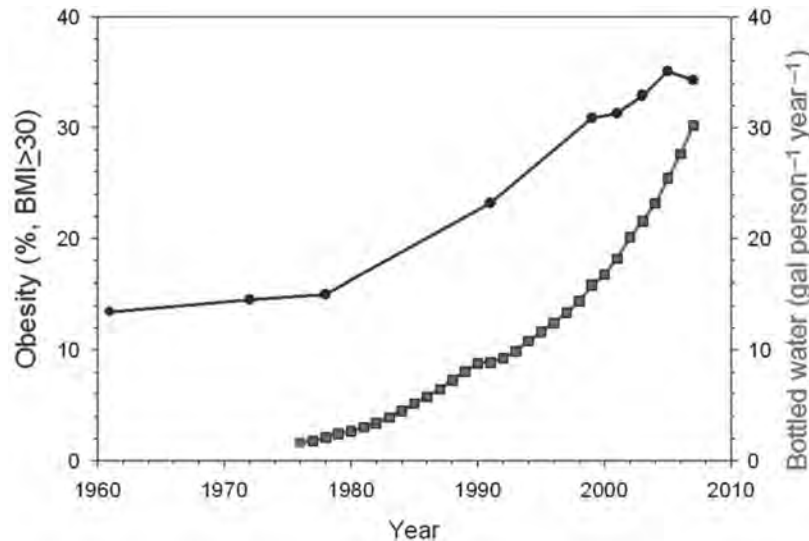
Rise in obesity rates[6] (round markers) and bottled water consumption[5] (square markers), United States. BMI, body mass index, $kg\ m^{-2}$.

We agree with Dr. Pan and Dr. Hu's statement in 2011 that '. . . the isolated tests in the laboratory may not be directly reproduced in real life because the effect of any food or food component on satiety could be influenced by other dietary factors. Thus, results from short-term, well-controlled interventions may not be representative of a real-life setting, and long-term clinical trials on different physical forms of carbohydrates on energy intake and weight management are still lacking'.[25] Later in this article, we provide even more compelling evidence from longer-term trials on weight that some compensation for added liquid calories indeed occurs.

Evaluation of Evidence To Draw Scientifically Supported Conclusions

When randomized trials can be performed ethically and safely (which they have been), these study results are the strongest level of evidence of independent effects. Many scientists who have gone on record on the question we now debate have acknowledged the limitations of association studies and the need for well-designed randomized trials.[13, 26–28] If these same scientists are calling for well-designed trials, it is curious that strong statements are then made about weaker forms of evidence. Use of Hill's guidelines[1] is irrelevant in the instance of the effects of SSBs on weight because randomized trials can be done (and have been done). In such situations, the 'totality' of the evidence, including evidence that is not probative, should not be relied upon for drawing conclusions of causation in favour of the probative studies. More recent trials have taken steps to reduce the level of bias[29–30] and future studies may advance this effort further.

Specific Questions We Address By Use of the Best Available Evidence

1. Does an *increase* in SSB intake *increase* body weight or body mass index (BMI) in humans?
2. Does *reduction* of SSB intake *reduce* body weight or BMI in humans?

We now evaluate and summarize the currently available evidence that could potentially be probative with respect to drawing conclusions about the effects of SSB reduction on weight or obesity.

Methods

See supporting information for details of the updated literature review, study selection and data extraction methods. As the present paper was in review, an additional study meeting our criteria became public as a conference abstract.[31] This trial tested the effects of home water delivery and an educational programme to reduce SSB consumption in overweight, adult, Mexican women as compared to the education-only control group. Based on the available information in the abstract, we

were unable to formally include this study result in our meta-analysis, but we discuss the possible effects on our conclusions using estimates from data reported in the abstract in the next section on results.

Results

The Extent of the Data Available: Studies Included and Excluded

Table 1 contains a brief listing and description of the six new studies [29–30, 32–36] added for meta-analysis. We provide more details of each study in the supporting information online. Supporting Information *Figure S1* contains a flow chart of the screening and selection of recently published studies.

In the three new studies in which SSBs were added [90 to 500 kcal day^{-1} to the diets of adults (30,34); 158 kcal day^{-1} in children [36]], statistically significant weight gain was observed in both adult trials, ranging from 0.39 to 1.14 kg (Supporting Information *Table S1*). No significant difference in weight gain was observed in the study in children between the treatment and control participants.[36] When we compared observed weight gain to theoretical weight gain from added SSBs in all RCTs published to date (*Fig. 2*), compensation appeared to occur in longer-term studies.

In the one new study of adults [35] and the two new studies of children [29, 32–33] in which participants who drank some amount of SSBs at baseline were asked to eliminate or reduce their SSB consumption, standardized mean differences (SMDs) in percentage weight loss or BMI reduction ranged from 0.13 to 0.33 (Supporting Information *Table S2*). The overall results for added SSBs (small but statistically significant weight gain; *Fig. 3*) or for reduced SSBs in subjects of all weight ranges (small and not statistically significant weight loss; *Fig. 4*) did not differ greatly from our earlier analysis.[37]

In new studies in which all participants were overweight or obese at baseline, SMDs ranged from 0.13 to 0.73 (Supporting Information *Table S3*). In combination with earlier studies or subgroup analysis of the effects of reducing SSBs on overweight subjects (*Fig. 5*), the overall SMD was 0.25 (95% confidence interval [CI]: 0.13 to 0.38 standard deviations, $P < 0.0001$).

In the newly published study by Hernández-Cordero, *et al.*,[31] the authors reported no significant effect with a *P*-value of 0.50. Assuming this is a two-tailed *P*-value, the reported sample size yields an effect size of either -0.086 or $+0.086$. The means were not reported so we cannot determine the direction. If the sample effect size were +0.086, then the summary statistic would not change at all from the summary estimate and CI shown in *Fig. 4*. Alternatively, if the sample effect size was -0.086, the summary estimate would be reduced towards zero (from 0.06 to 0.05) and remain statistically non-significant. Similarly, for the analysis shown in *Fig. 5* for subjects overweight at baseline, the addition of this study would shift the overall estimate from 0.25 to 0.21, or as low as 0.17 depending on direction of observed effect.

Assessment of Study-Level Risk of Bias

Supporting Information *Figure S2* summarizes our cumulative assessment of potential areas of bias of the pertinent studies to date. The most important areas for risk of bias overall come from lack of participant blinding and selective reporting. Some study designs failed to adequately isolate treatment effects from the attention researchers paid to some groups. Additionally, only two studies' protocols [29, 34] had an objective measure of participant compliance (returned containers, urinary sucralose measures), making cross comparisons and estimates of true effects difficult. Failure to mention whether assessors were blinded was common (ten out of 15 studies), further clouding assessment of potential sources of bias.

Assessment of Publication Bias

Supporting Information *Figures S3–S5* are funnel plots [38] for the assessment of potential publication bias from only the published studies and analyses for each of the three groups of designs or populations we analysed (excluding some analyses we performed on data not published but received upon request). We also evaluated potential publication bias by using the rank correlation test.[39] We found no present evidence of publication bias for studies on the effects of adding SSBs; [30, 34, 36, 40–42] $P = 0.805$), for studies on the effects of reducing SSBs in all weight categories; [29, 33, 35, 43–46] $P = 0.976$), or for studies on the effects of reducing SSBs in subjects who were overweight at baseline; [33, 35, 43, 44, 46] $P = 0.858$).

Sensitivity Analysis

Age differences. There was unequal representation of age groups among the types of trials. The added SSB studies were all on adults except one,[36] and the reducing

studies were predominantly in children with two exceptions.[35, 47] Therefore, we evaluated the overall summary effects by excluding the studies referenced above. The overall SMD for the added SSB studies (adults only) increased by 0.06 (to 0.34; 95% CI: 0.15 to 0.54). The overall SMD for the reduction of SSBs in children of all weight categories was reduced by 0.01 (to 0.07; 95% CI: −0.01 to 0.15). The overall SMD for the reduction studies in children only who were overweight or obese at baseline increased by 0.05 (to 0.30; 95% CI: 0.13 to 0.46). These results are not largely different from the combined analysis reported in *Figs 3–5*. Per the convention put forth by Cohen,[48] these standardized effects would all be categorized as 'small.'

Table 1   Studies Published Since January 2009 Meeting the Original Inclusion Criteria [37]

Reference	Question that can be addressed regarding the effects of SSBs on weight	How meta-analysed	Primary outcome(s) and analysis as stated in trials registry and paper
Njike, *et al.,* 2011 [30]	Added two servings per day of sugar-free cocoa, sugared cocoa, or placebo cocoa in obese adults in a crossover trial, 6 weeks each phase.	Meta-analysed all response data for all phases (author provided raw data on request)—combined both caloric groups (sugared cocoa and placebo cocoa) and subtracted sugar-free group.	**Trial registry:** NCT00538083 Primary—Endothelial function Secondary—Blood pressure, lipid profile, low-density lipoprotein (LDL) oxidation, lipid hydroperoxide, C-reactive protein (CRP), glucose, body weight, waist circumference, endothelin **Paper:** Primary—Endothelial function Secondary—Blood pressure, lipid profile and fasting glucose, food intake, endothelin, CRP, oxidized LDL, lipid hydroperoxide, anthropometric measures (body weight, body mass index (BMI), waist circumference) **Missing data handling:** Intention to treat analysis
Vaz, *et al.,* 2011 [36]	Added choco-malt beverage mix to water and gave one serving per day to children in a parallel trial.	Meta-analysed untreated control group *versus* unfortified group.*	**Trial registry:** NCT00876018 Primary—Physical fitness and performance Secondary—Nutritional status, muscle strength and endurance **Paper:** Primary—Within participant change in physical performance: whole-body endurance, aerobic capacity, speed and visual reaction time Secondary—Nutritional status, muscle strength, endurance in forearm flexor muscle group **Missing data handling:** Complete case analysis
Maersk, *et al.,* 2012 [34]	Added 1 litre per day of milk, regular cola, diet cola or water in overweight/obese adults in a parallel trial for 6 months.	Meta-analysed regular cola group *versus* diet group.	**Trial registry:** NCT00777647 Primary—Body weight, magnetic resonance spectroscopy, magnetic resonance imaging, dual-energy x-ray absorptiometry scan Secondary—Circulating metabolic parameters, blood pressure **Paper:** Primary—Intrahaepatic fat and intramyocellular fat Secondary—Fat mass, fat distribution, metabolic risk factors **Missing data handling:** Complete case analysis except for two cases who dropped out at 5 months, for whom last observation was carried forward
Ebbeling, *et al.,* 2012 [33]	Multicomponent programme to reduce/replace SSBs with non-caloric beverages in adolescents.	Meta-analysed weight change at end of 1 year intervention period.	**Trial registry:** NCT00381160 Primary—BMI change at 2 years Secondary—none stated **Paper:** Primary—Change in mean BMI at 2 years (1 year post-intervention) Secondary—Differences between ethnicities, change in body fat as a percentage of total weight **Missing data handling:** Imputed—baseline and last observation carried forward in separate analyses

Table 1   Studies Published Since January 2009 Meeting the Original Inclusion Criteria [37]—Continued

Reference	Question that can be addressed regarding the effects of SSBs on weight	How meta-analysed	Primary outcome(s) and analysis as stated in trials registry and paper
de Ruyter, *et al.,* 2012 [29]	Provided school children identically labelled SSB or non-caloric equivalent to consume one can day^{-1}.	Considered an SSB reduction study as inclusion criteria was current SSB consumers.	**Trial Registry: NCT00893529** Primary—BMI Z-score at 6, 12 and 18 months Secondary—Body composition using skinfolds, bioelectrical impedance analysis (BIA), waist-to-height ratio, dental health, sensory evaluation (satiety and liking of study drink) **Paper:** Primary—Z-score of BMI for age at 18 months. Secondary—(all pre-specified) waist-to-height ratio, sum of the four skinfold thickness measurements and fat mass (BIA). Additional outcomes were weight, height, z score for height, waist circumference and weight change adjusted for height change **Missing data handling:** Multiple imputation and complete case analysis
Tate, *et al.,* 2012 [35]	Substituted SSBs with artificially sweetened equivalent or water in obese adults who drink two or more servings per day at baseline.	Meta-analysed water and artificially sweetened groups together *versus* SSB group.	**Trial registry:** NCT01017783 Primary—Weight change at 3 and 6 months Secondary—Urine specific gravity, fasting glucose **Paper:** Primary—Weight change at 6 months. Secondary—Compare the non-caloric beverage groups with the control group on criterion measures of weight loss, waist circumference, blood pressure, glucose, and urine osmolality from 0 to 3 and 0 to 6 months **Missing data handling:** Multiple imputation for continuous variables, complete cases for 5% weight loss criterion analysis

*We originally excluded any types of beverages that had growth promotion as a function, but the unfortified beverage met our original inclusion criteria and is included in this analysis. SSB, Sugar-sweetened Beverage.

Figure 2
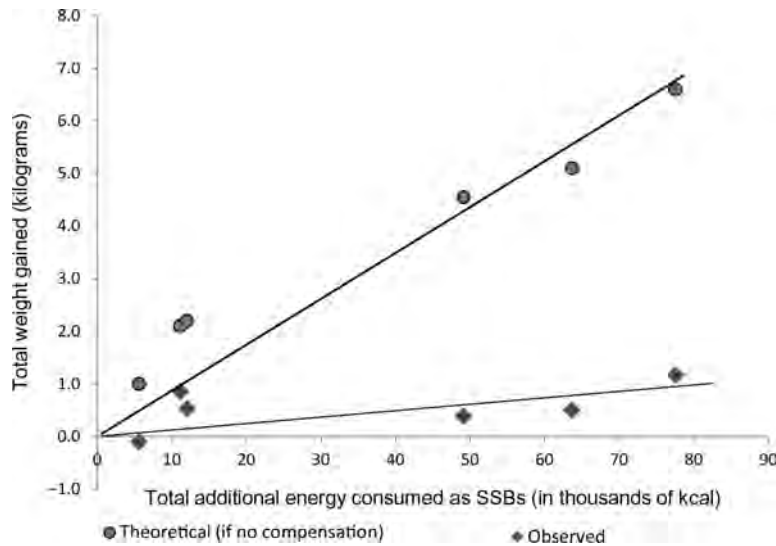
Observed [30, 34, 40–42, 62] *versus* theoretical [63] weight gain effect of mandatory sugar-sweetened beverage (SSB) consumption.

Notes: For observed values on the *Y* axis, weight change was determined by the change of those drinking more SSBs minus those drinking less. The *X* axis was determined by multiplying the added kcal per day times the duration of the study divided by 1,000. Fit lines were generated by setting the

origin to zero and by using the linear regression (least squares) options in Microsoft® Excel. The theoretical values (round markers) were generated by entering mean baseline values for each study sample into the NIDDK body weight simulator[63] and adding the same number of calories per day for the same number of days as reported in the studies.[30, 34, 40–42, 62] Activity settings in the simulator were at the lowest level of sedentary and no activity or dietary changes over the study duration were entered into the simulator. Observed data represent an average energy compensation rate of 85% (range = 57–110% compensation).

Figure 3
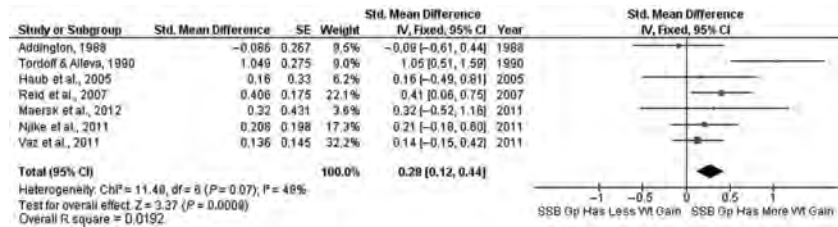
Forest plot comparing studies of added sugar-sweetened beverage (SSB) consumption.
Note: R square values were calculated from the overall standardized mean difference estimate (d) per the method found in.[64]

Study heterogeneity in reduction studies. Because the heterogeneity statistic was significant (*Fig. 4*) in the reduction studies in both weight groups, we evaluated which study exerted the most influence for its effects on the overall SMD.[46] Exclusion of this study resulted in a non-significant heterogeneity statistic ($\chi^{2 (6)} = 10.15$, $P = 0.12$, $I^2 = 41\%$) and an increased overall SMD of 0.13 (95% CI: 0.04 to 0.22). These analyses shifted the overall statistics by relatively small amounts when considering the observed shifts in body weight among the analysis groups.

Interpreting the magnitude of effects. At this juncture, it may be helpful to express the estimated effect sizes for SSB reduction on BMI in some additional metrics which may ease interpretation. One such metric is the probability that a randomly selected person from a hypothetical population in which SSB reduction was implemented will be better off (with respect to BMI) than a randomly selected person from a hypothetical population that is the same in all ways except that SSB reduction has not been implemented. Without intervention, the probability is 0.50 that a person from one population weighs more than a person from the other population. After the interventions included in our analysis, these probabilities would change slightly. The probability that a randomly selected person from the reduced SSB population will have lower BMI than a person randomly selected from the control population would be 0.52. The probability that a randomly selected overweight person from the reduced SSB population will have a lower BMI than an overweight person randomly selected from the control population would be 0.57.

Figure 4
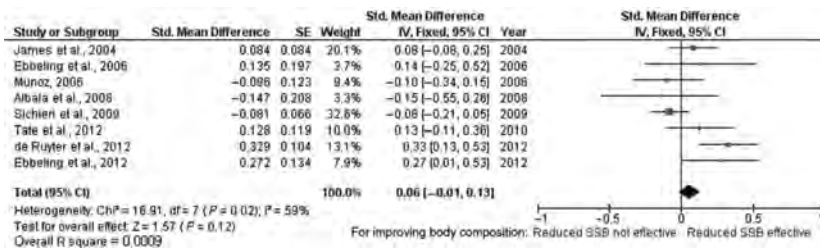
Forest plot comparing studies of reduced sugar-sweetened beverage (SSB) consumption; subjects in all weight categories included.
Note: R square values were calculated from the overall standardized mean difference estimate (d) per the method found in.[64]

Figure 5

Study or Subgroup	Std. Mean Difference	SE	Weight	Std. Mean Difference IV, Fixed, 95% CI	Year
Ebbeling et al., 2006	0.757	0.355	3.3%	0.76 [0.06, 1.45]	2006
Munoz, 2006	0.347	0.196	10.9%	0.35 [−0.04, 0.73]	2006
Albala et al., 2008	−0.147	0.208	9.7%	−0.15 [−0.55, 0.26]	2008
Sichieri et al., 2009	0.271	0.17	14.5%	0.27 [−0.06, 0.60]	2009
Tate et al., 2012	0.129	0.119	29.5%	0.13 [−0.11, 0.36]	2010
Ebbeling et al., 2012	0.272	0.134	23.3%	0.27 [0.01, 0.53]	2012
de Ruyter et al., 2012	0.727	0.217	9.9%	0.73 [0.30, 1.15]	2012
Total (95% CI)			**100.0%**	**0.25 [0.13, 0.38]**	

Heterogeneity: Chi² = 11.85, df = 6 (P = 0.07); I² = 49%
Test for overall effect: Z = 3.92 (P = 0.0001)
Overall R square = 0.0154

Forest plot comparing studies of reduced sugar sweetened beverage (SSB) consumption; only subjects overweight/obese at baseline included.

R square values were calculated from the overall standardized mean difference estimate (d) per the method found in.[64]

Another way to place the effect sizes in perspective is to consider the γ^2 metric shown in *Figs 3–5*. Increasing consumption of SSBs explains 1.92% of the variance in body weight or BMI change. Reducing consumption of SSBs in persons of all weight categories explains 0.09% of the variance in body weight or BMI change. Among persons who are overweight or obese at baseline, reducing the consumption of SSBs explains 1.54% of the variance in body weight or BMI change. It is possible to apply other methods such as risk analysis for evaluating potential effects on population levels of obesity,[49] but that is beyond the scope of the present analysis.

Additional Considerations

Having demonstrated that, although the conjecture that decreasing SSB consumption will decrease obesity and obesity-related diseases is reasonable, the pertinent data testing the hypothesis are equivocal (*i.e.,* the pooled results are nearly but not quite statistically significant), we now address several related questions.

If the data are as weak as we have shown, why do some members of the public and the scientific community seem to perceive that the proposition has been proven?

We suggest three major reasons for this confusion.

Emotion-Raising Language

Emotion-raising language has often been used in discussions of SSBs and obesity. Some authors have used words like 'plague',[50] 'toxic',[51–52] 'hazardous'[4, 53] and 'deadly'[4, 54] when describing SSBs or the sugars they contain and have tried to promote perceived connections between SSB marketers and the worst behaviour of tobacco marketers.[55] Although such words may help to advance an agenda,[56] they do not educate or inform the public. Moreover, they likely raise emotions and impair logical reasoning.[57] As Kersh and Morone[56] wrote, 'Scientific findings never carry the same political weight as does a villain threatening American youth. If critics successfully cast portions of the industry in this way, far-reaching political interventions are possible, even likely. When an industry becomes demonized, plausible counter-arguments (privacy, civil liberties, property rights, and the observation that "everyone does it") begin to totter.'

Figure 6
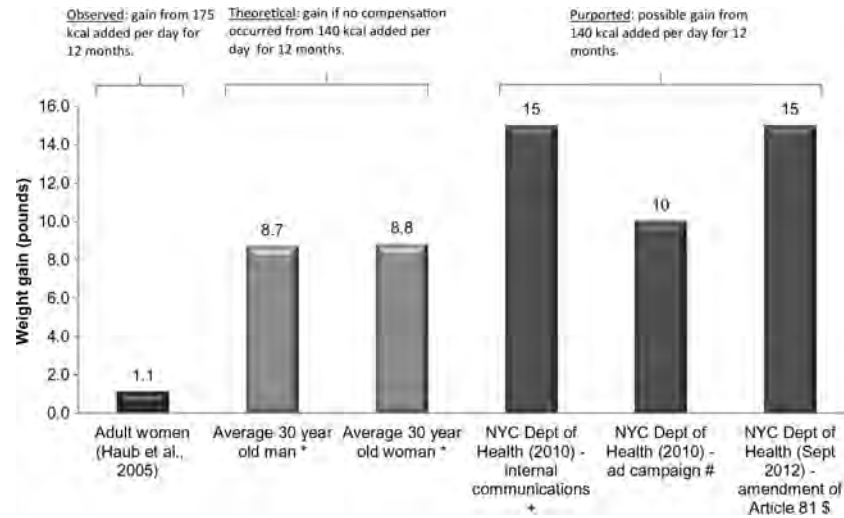
Comparison of weight gain attributed to consumption of sugar-sweetened beverages for 1 year from various sources.

Note: For the Haub study, the weight change shown above is adjusted by subtracting the control group weight change.

*Body mass index of 27.8 kg m^{-2} (NHANES 2010 50th percentile for both men and women in the United States[65] entered into NIDDK body weight simulator.[63]

+[66] #[67] $[68].

Distortion of Scientific Information

A second factor that has likely contributed to misperceptions in this area is the distortion of scientific information by some authors and commentators. *Table 2* lists some of the types of distortion that have occurred with quantitative or anecdotal documentation. *Figure 6* depicts disparities in projected *versus* actual outcomes of the effects of added SSBs over 1 year. Clearly, such practices mislead and have likely contributed to misperceptions in the scientific and lay communities about the strength of the evidence regarding the proposition debated here.

The Mere Exposure Effect

The final factor that we believe has led to the erroneous perception that the evidence showing that the proposition of this debate has been unequivocally proven is the 'mere exposure effect.' The mere exposure effect is the label psychologists use for the phenomenon that the more a person is exposed to an idea, the more they come to like and accept it. As the Nobel Prize-winning economist Daniel Kahneman described, 'A reliable way to make people believe in falsehood is frequent repetition, because familiarity is not easily distinguished from truth. Authoritarian institutions and marketers have always known this fact. But it was psychologists who discovered that you do not have to repeat the entire statement of a fact or idea to make it appear true'.[58]

The number of articles on SSBs and obesity and the number of statements that SSBs are especially problematic in obesity are extraordinary, especially in comparison to the modest amount of probative data.[3] Thus, opinions about SSBs may have been offered so often that these opinions have become accepted as fact by many in the scientific community, media and lay public.

Table 2   Some types of Distortion of Information that Have Occurred Regarding Sugar-Sweetened Beverages (SSBs) and Obesity

Type of distortion	Where it occurs	Documentation of occurrence	Comments
Papers citing original randomized controlled trials (RCTs) that investigated the effect of SSB reduction on weight exaggerated the extent of the evidence supporting a beneficial effect	In the scientific peer-reviewed literature	Cope and Allison[14] documented in a quantitative analysis of the literature that this exaggerated reporting was the norm rather than an exception.	This is not a criticism of the original RCTs, but rather the manner in which subsequent authors cite them.
Association studies are described by using language that indicates a cause and effect relationship has been found	In the scientific peer-reviewed literature [e.g.,[69]], in government-sponsored newsletters [e.g.,[70]], and in mass media articles[71–73]	'A new study . . . suggests a key way to reduce childhood obesity could be to limit your child's salt intake. The study looked at 4,000 children in Australia and found kids who ate more salt also had more cravings for sugary-sweetened drinks like soda and juice.'[72]	'Cravings' were not mentioned in the published study,[74] which did not overstate the findings, but were exaggerated in media coverage. This misleading practice is common in the obesity field overall.[75]
Public statements that contradict available evidence	Communications from public health agencies	In 2010, [The New York Times ran an article in which, through e-mails obtained under the Freedom of Information Act, they showed that the New York City (NYC) Department of Health was knowingly making exaggerated statements about the amount of weight gain expected from drinking SSBs. Even after this exposé (September 2012), the NYC Department of Health made even more exaggerated and evidence-contradicted statements about the amount of weight gain expected from drinking SSBs.	See *Figure 6* for details and specific references.
Changing what is considered the primary endpoint or analysis in an RCT	In the scientific peer-reviewed literature	An example[34] of this occurred in an RCT published in the *American Journal of Clinical Nutrition* (*AJCN*). In the paper, the authors state 'Our main aim was to test the hypothesis that sucrose-sweetened cola increases ectopic fat including VAT4, total body fataccumulation, and metabolic risk factors . . . ,' whereas the registration in *ClinicalTrials.gov* states 'Primary Outcome Measures: Body Weight; MR spectroscopy; MRI; DEXA scan.' Similarly, in *ClinicalTrials.gov*, the title of the trial is 'Effect of Carbonated Soft Drinks on the Body Weight,' whereas in the article the title is 'Sucrose-sweetened beverages increase fat storage in the liver, muscle, and visceral fat depot: a 6-mo randomized intervention study.' The fact that there was no significant effect on weight was not mentioned in the abstract of the paper.	This does not conform to the CONSORT guidelines for publishing RCTs to which authors publishing in *AJCN* are expected to adhere.
Conclusion statements from paper do not match the results	In peer-reviewed papers, press releases, and mass media interviews	An example from the peer-reviewed literature occurred in a paper in *AJCN* (35) in which the results section of the abstract stated 'Mean (±SEM) weight losses at 6 months were − 2.5 ±0.45% in the DB group, − 2.03 ±0.40% in the Water group, and − 1.76 ±0.35% in the AC group; there were no significant differences between groups.' Yet, the conclusion section of the abstract stated 'Replacement of caloric beverages with non-caloric beverages as a weight-loss strategy resulted in average weight losses of 2% to 2.5%.' Given the non-significant result, it does not seem justifiable to state there is any weight loss as a result of the treatment. Even if point estimates were being provided in a merely descriptive manner, the unbiased estimates of treatment effects in an RCT are the control-subtracted means, not the raw means in the treatment group. Examples from press releases and media interviews can be found in (14, 76) and in these sources.[77,78]	Although a trained scientist carefully reading the original papers will understand the results, journalists, regulators, clinicians and scientists who only rapidly read an abstract are likely to be misled.

| Publication bias | In the scientific peer-reviewed literature | Cope and Allison [14] showed that in observational epidemiologic studies of the association of SSB consumption and obesity, a standard test of publication bias was significant, suggesting that investigators are more likely to publish positive statistically significant findings than to publish null findings. | This is why we wrote earlier in this paper that the observed magnitude of association is likely biased upwards. Interestingly, Cope and Allison found that this publication bias seemed to occur among non-industry-funded authors and not among industry-funded authors. |

Table 3 Quotations Illustrating that Others Do Not Believe the Benefits of Interventions Aimed at SSB Reduction on Weight Have Been Established

Person(s) or body offering statement	Statement	Reference
United States Department of Agriculture Dietary Guidelines Advisory Committee	'Thus, there are mixed results on this topic. RCTs report that added sugars are not different from other calories in increasing energy intake or body weight. Prospective studies report some relationship with SSB and weight gain, but it is not possible to determine if these relationships are merely linked to additional calories, as opposed to added sugars per se. The systematic reviews in this area are also inconsistent, probably based on different measures used to determine added sugars intake or intake of SSB.' [We should] 'Conduct well-controlled and powered research studies testing interventions that are likely to improve energy balance in children at increased risk of childhood obesity, including dietary approaches that reduce . . . sugar-sweetened beverages' [because] 'very few solid data are available on interventions in children.'	(12)
European Food Safety Authority	'The Panel concludes that a cause and effect relationship has not been established between total sugar intake and body weight gain, and that a cause and effect relationship has not been established between the consumption of foods and beverages in which sugars have been replaced by intense sweeteners and contribution to the maintenance or achievement of a normal body weight.'	(79)
Lisa Te Morenga, Simonette Mallard, Jim Mann	'Trials in children, which involved recommendations to reduce intake of sugar sweetened foods and beverages, had low participant compliance to dietary advice; these trials showed no overall change in body weight.'	(80)
German Nutrition Society	'From two of the four available meta-analyses the conclusion is drawn that increased consumption of sugar-sweetened beverages in children and adolescents is associated with a higher risk of obesity. In contrast, another meta-analysis judges the effect as almost zero. The cohort studies published since then verify this risk-increasing effect only in part. The most recent meta-analysis concludes that the risk-increasing effect is limited to individuals with initially already increased BMI or existing overweight, respectively.'	(81)
Thomas Baranowski	'Another concern is the behavior or behaviors targeted for change. Many obesity prevention interventions have targeted increasing fruit and vegetable intake and decreasing sweetened beverage intake. Systematic reviews, however, showed no consistent evidence that increased fruit and vegetable intake protected against obesity or that sweetened beverage intake contributed to it.'	(82)
Joint statement from American Heart Association and the American Diabetes Association	'At this time, there are insufficient data to determine conclusively whether the use of NNS [non-nutritive sweeteners] to displace caloric sweeteners in beverages and foods reduces added sugars or carbohydrate intakes, or benefits appetite, energy balance, body weight, or cardiometabolic risk factors.'	(83)

Are we alone in the view that a beneficial effect of SSB reduction on obesity has not been demonstrated?

In a word, *no*. As the quotations in *Table 3* reveal, our views are concordant with those of other individual scientists and authoritative expert panels.

What would it take to shift the balance of evidence?

In a possibly apocryphal interchange, a devotee of Karl Popper's philosophy of science once challenged the great mathematical geneticist J.B.S. Haldane to specify what it would take to change his views about the validity of evolutionary theory. Haldane reportedly retorted 'Fossil rabbits in the Precambrian!' Although a poetic retort, Haldane was effectively specifying objective empirical evidence that would be sufficient for him to change his view, something any scientist addressing empirical questions should be prepared to do.

In the debate at The Obesity Society Meeting (September 20, 2012), the senior author [DBA] stated:

'The day that multiple RCTs are published that

- are well designed, executed, and analyzed;
- show statistically significant outcomes in preplanned analyses of the total randomized sample on measures of total body weight, BMI, or total body fat and clearly support the value of reducing SSBs; and
- are sufficient in inferential weight to outweigh the existing RCT data;

I will be delighted to modify my opinion.'

The day after the debate (September 21, 2012), two new RCTs were published.[29, 33] These two publications together met some (but not all) of the criteria specified above as we discussed earlier. Most notably, their collective evidential weight moved the integrated meta-analytic estimate for the effects of SSB reduction very close to the border of the conventional 0.05 level of statistical significance. For this reason, we believe that these two new studies can be described as 'tilting the needle' in the direction of demonstrating the obesity-reducing benefit of SSB reduction, but that the data remain equivocal. Nevertheless, we remain open-minded that future RCTs (and according to *ClinicalTrials.gov* some will be forthcoming) may fulfil the criteria above and offer unequivocal support for the proposition.

We also suggest that the following approaches can increase the transparency of, and confidence in, RCTs in this area: (i) registering all RCTs in advance in *ClinicalTrials.gov;* (ii) making the raw data from all RCTs publicly available for common and open analyses, regardless of the source of funding; (iii) providing documentation via *ClinicalTrials.gov* as to which analyses are (were) pre-planned; and (iv) publishing all results regardless of outcome. These are laudable practices in all situations, but especially important in an area that has become so contentious.

How does the strength of evidence for conclusions relate to support for actions?

As we mentioned earlier, we are not addressing whether any particular policy or programme should or should not be implemented. Rather, our sole purpose has been to present a synthesis of the currently available literature that provides an estimate of the degree of evidence for the debate proposition. Moreover, it is important to note that our paper assessed the evidence for effect of reducing SSB consumption, which should not be conflated with the effects of particular policies (*e.g.,* taxes, bans, advertising campaigns, *etc.*) intended to reduce SSB consumption. The effects of any such policies represent a different question and not one for which we have evaluated the evidence.

The question of whether the available evidence is sufficiently strong to justify a particular action is a subjective one subject to societal perceptions, values, goals and the plausibility of unintended consequences.[59–60] This is illustrated by quotations from two authoritative sources on this point as food for thought:

'Since taking office, the President has emphasized the need to use evidence and rigorous evaluation in budget, management, and policy decisions to make government work effectively. . . . Where evidence is strong, we should act on it. Where evidence is suggestive, we should consider it. Where evidence is weak, we should build the knowledge to support better decisions in the future.'[61]

'On fair evidence we might take action on what appears to be an occupational hazard, *e.g.,* we might change from probably carcinogenic oil to a non-carcinogenic oil in a limited environment and without too much injustice if we are wrong. But we should need very strong evidence before we made people burn a fuel in their homes that they do not like or stop smoking the cigarettes and eating the fats and sugar that they do like.'[1]

Conclusions

Our updated meta-analysis shows that the currently available randomized evidence for the effects of reducing SSB intake on obesity is equivocal. Even if statistical significance is ignored, the point estimates of effects on BMI reduction are small, accounting for only 1.5% of the variance observed in those who were overweight at baseline. Therefore, we conclude that the debate proposition cannot be supported at this time. Of course, absence of evidence is not evidence of absence. The lower limit of the confidence interval around the estimated effect of SSB reduction is very close to the border of statistical significance. It is certainly possible that additional, larger or otherwise stronger studies will in the future provide clear and convincing evidence that lowering SSB consumption will reduce obesity and obesity-related disease prevalence. We are certainly not arguing against the common-sense recommendation that for individuals who wish to lose weight and who presently drink large amounts of SSBs, reducing intake of these and other sources of energy seems wise.

We greatly respect our debate opponent, Dr. Hu, for addressing these issues in a manner that is both thoroughly scientific and equally collegial. We are hopeful that this debate may be seen not only as a careful consideration of the evidence regarding SSBs and obesity, but also as an exemplar of and call to a more informed, unexaggerated, open-minded, rational and civil dialogue on the many public health issues around obesity that, like SSB-related issues, have become so contentious.

Supporting Information

Additional Supporting Information may be found in the online version of this article, *http://dx.doi.org/10.1111/obr.12048*.
Figure S1. *Study screening and selection process of new studies added since the original meta-analysis* [21]
Figure S2. *Methodological quality summary; review authors' judgments about each methodological quality item for each included study* [1–6, 20, 25–32]
Figure S3. *Funnel plot of published studies of added sugar-sweetened beverage (SSB) consumption* [3–4, 6, 27, 30, 32]
Figure S4. *Funnel plot of published studies on reduced sugar-sweetened beverage (SSB) consumption in subjects of all weight categories* [1–2, 5, 20, 26, 28, 31]
Figure S5. *Funnel plot of published studies of reduced sugar-sweetened beverage (SSB) consumption in subjects overweight/obese at baseline* [2, 5, 20, 26, 31]
Table S1. *Unstandardized effect sizes of new studies assessing the effects of adding mandatory SSB consumption to persons diets*
Table S2. *Standardized effect sizes from new studies assessing the effect of attempting to get people to reduce or eliminate SSB consumption on body composition/adiposity indicators*
Table S3. *Standardized effect sizes from new studies assessing the effect of attempting to get people to reduce or eliminate SSB consumption on body mass index (BMI) only for subjects overweight/obese at baseline or above the top of tertile of baseline BMI*
Appendix S1. *Updated literature review, selection and data extraction methods*

References

1. Hill A.B. *The environment and disease: association or causation?* PROC. R. SOC. MED. 1965; 58: 295–300.
2. U.S. Preventive Services Task Force. *U.S. Preventive Services Task Force Procedure Manual*, 2008.
3. Casazza K., Allison D.B. *Stagnation in the clinical, community, and public health domain of obesity: the need for probative research.* CLIN. OBES. 2012; 2: 83–85.
4. Bray G.A. *Fructose: pure, white, and deadly? Fructose, by any other name, is a health hazard.* J. DIAB. SCI. TECHNOL. 2010; 4: 1003–1007.
5. Earth Policy Institute. *Bottled Water Consumption Per Person in the United States, 1976–2007.* Posted: 12–7–2007. [WWW document]. URL *http://www.earth-policy.org/index.php?/data_center/C21/* (accessed December 2012).
6. Ogden C.L., Carroll M.D. *Prevalence of Overweight, Obesity, and Extreme Obesity Among Adults: United States, Trends 1960–1962 Through 2007–2008.* Posted: 2010. [WWW document]. URL *http://www.cdc.gov/NCHS/data/hestat/obesity_adult_07_08/obesity_adult_07_08.pdf* (accessed December 2012).
7. Ogden C.L., Carroll M.D., Kit B.K., Flegal K.M. *Prevalence of obesity and trends in body mass index among U.S. children and adolescents, 1999–2010.* JAMA 2012; 307: 483–490.
8. Malik V.S., Willett W.C., Hu F.B. *Sugar-sweetened beverages and BMI in children and adolescents: reanalyses of a meta-analysis.* AM. J. CLIN. NUTR. 2009; 89: 438–439.

References—Continued

9. Malik V.S., Popkin B.M., Bray G.A., Despres J.P., Willett W.C., Hu F.B. *Sugar-sweetened beverages and risk of metabolic syndrome and type 2 diabetes: a meta-analysis.* DIABETES CARE 2010; 33: 2477–2483.

10. Mozaffarian D., Hao T., Rimm E.B., Willett W.C., Hu F.B. *Changes in diet and lifestyle and long-term weight gain in women and men.* N. ENGL. J. MED. 2011; 364: 2392–2404.

11. Drewnowski A., Bellisle F. *Liquid calories, sugar, and body weight.* AM. J. CLIN. NUTR. 2007; 85: 651–661.

12. Dietary Guidelines Advisory Committee. *Report of the DGAC on the Dietary Guidelines for Americans, 2010: Part D—Section 5: Carbohydrates.* Posted: 2010. [WWW document]. URL *http://www.cnpp.usda.gov/Publications/DietaryGuidelines/2010/DGAC/Report/D-5-Carbohydrates.pdf* (accessed December 2012).

13. Hu F.B. *Obesity Epidemiology.* Oxford University Press: New York, NY, 2008.

14. Cope M.B., Allison D.B. *White hat bias: examples of its presence in obesity research and a call for renewed commitment to faithfulness in research reporting.* INT. J. OBES. (Lond) 2010; 34: 84–88.

15. DiMeglio D.P., Mattes R.D. *Liquid **versus** solid carbohydrate: effects on food intake and body weight.* INT. J. OBES. RELAT. METAB. DISORD. 2000; 24: 794–800.

16. Tieken S.M., Leidy H.J., Stull A.J., Mattes R.D., Schuster R.A., Campbell W.W. *Effects of solid **versus** liquid meal-replacement products of similar energy content on hunger, satiety, and appetite-regulating hormones in older adults.* HORM. METAB. RES. 2007; 39: 389–394.

17. Cassady B.A., Considine R.V., Mattes R.D. *Beverage consumption, appetite, and energy intake: what did you expect?* AM. J. CLIN. NUTR. 2012; 95: 587–593.

18. Mattes R.D. *Dietary compensation by humans for supplemental energy provided as ethanol or carbohydrate in fluids.* PHYSIOL. BEHAV. 1996; 59: 179–187.

19. McKiernan F., Hollis J.H., Mattes R.D. *Short-term dietary compensation in free-living adults.* PHYSIOL. BEHAV. 2008; 93: 975–983.

20. Almiron-Roig E., Chen Y., Drewnowski A. *Liquid calories and the failure of satiety: how good is the evidence?* OBES. REV. 2003; 4: 201–212.

21. Almiron-Roig E., Flores S.Y., Drewnowski A. *No difference in satiety or in subsequent energy intakes between a beverage and a solid food.* PHYSIOL. BEHAV. 2004; 82: 671–677.

22. Houchins J.A., Burgess J.R., Campbell W.W., *et al. Beverage **vs.** solid fruits and vegetables: effects on energy intake and body weight.* OBESITY (Silver Spring) 2012; 20: 1844–1850.

23. Kulze A.G. *Eat Right for Life: Chapter 5—Drink the Right Beverages.* Posted: 2013. [WWW document]. URL *http://www.welcoa.org/store/resources/documents/er-sample-chapter.pdf* (accessed December 2012).

24. Liebman B. *Nutrition Action Healthletter: Pour Better or Pour Worse.* Posted: 6–1–2006. [WWW document]. URL *http://www.cspinet.org/nah/06_06/beverage.pdf* (accessed December 2012).

25. Pan A., Hu F.B. *Effects of carbohydrates on satiety: differences between liquid and solid food.* CURR. OPIN. CLIN. NUTR. METAB. CARE. 2011; 14: 385–390.

26. Bray G.A., Nielsen S.J., Popkin B.M. *Consumption of high fructose corn syrup in beverages may play a role in the epidemic of obesity.* AM. J. CLIN. NUTR. 2004; 79: 537–543.

27. Malik V.S., Schulze M.B., Hu F.B. *Intake of sugar-sweetened beverages and weight gain: a systematic review.* AM. J. CLIN. NUTR. 2006; 84: 274–288.

28. Vartanian L.R., Schwartz M.B., Brownell K.D. *Effects of soft drink consumption on nutrition and health: a systematic review and meta-analysis.* AM. J. PUBLIC HEALTH 2007; 97: 667–675.

29. de Ruyter J.C., Olthof M.R., Seidell J.C., Katan M.B. *A trial of sugar-free or sugar-sweetened beverages and body weight in children.* N. ENGL. J. MED. 2012; 367: 1397–1406.

30. Njike V.Y., Faridi Z., Shuval K., *et al. Effects of sugar-sweetened and sugar-free cocoa on endothelial function in overweight adults.* INT. J. CARDIOL. 2011; 149: 83–88.

31. Hernández-Cordero S., Barquera S., Rodriguez-Ramirez S., *et al. Water intake and metabolic syndrome risk: a randomized clinical trial.* Experimental Biology Conference, Boston. Abstract presented 4–22–2013.

32. de Ruyter J.C., Olthof M.R., Kuijper L.D., Katan M.B. *Effect of sugar-sweetened beverages on body weight in children: design and baseline characteristics of the Double-blind, Randomized INtervention study in Kids.* CONTEMP. CLIN. TRIALS 2012; 33: 247–257.

33. Ebbeling C.B., Feldman H.A., Chomitz V.R., *et al. A randomized trial of sugar-sweetened beverages and adolescent body weight.* N. ENGL. J. MED. 2012; 367: 1407–1416.

34. Maersk M., Belza A., Stodkilde-Jorgensen H., *et al. Sucrose-sweetened beverages increase fat storage in the liver, muscle, and visceral fat depot: a 6-mo randomized intervention study.* AM. J. CLIN. NUTR. 2012; 95: 283–289.

35. Tate D.F., Turner-McGrievy G., Lyons E., *et al. Replacing caloric beverages with water or diet beverages for weight loss in adults: main results of the Choose Healthy Options Consciously Everyday (CHOICE) randomized clinical trial.* AM. J. CLIN. NUTR. 2012; 95: 555–563.

36. Vaz M., Pauline M., Unni U.S., *et al. Micronutrient supplementation improves physical performance measures in Asian Indian school-age children.* J. NUTR. 2011; 141: 2017–2023.

37. Mattes R.D., Shikany J.M., Kaiser K.A., Allison D.B. *Nutritively sweetened beverage consumption and body weight: a systematic review and meta-analysis of randomized experiments.* OBES. REV. 2011; 12: 346–365.

38. Review Manager (RevMan) [Computer Program] Version 5.1.6. Copenhagen: The Nordic Cochrane Centre. The Cochrane Collaboration, 2011.

39. Begg C.B., Mazumdar M. *Operating characteristics of a rank correlation test for publication bias.* BIOMETRICS 1994; 50: 1088–1101.

40. Haub M.D., Simons T.R., Cook C.M., Remig V.M., Al-Tamimi E.K., Holcomb C.A. *Calcium-fortified beverage supplementation on body composition in postmenopausal women.* NUTR. J. 2005; 4: 21. e-pub 1–6 (DOI:10.1186/1475-2891-4-21).

41. Reid M., Hammersley R., Hill A.J., Skidmore P. *Long-term dietary compensation for added sugar: effects of supplementary sucrose drinks over a 4-week period.* BR. J. NUTR. 2007; 97: 193–203.

42. Tordoff M.G., Alleva A.M. *Effect of drinking soda sweetened with aspartame or high-fructose corn syrup on food intake and body weight.* AM. J. CLIN. NUTR. 1990; 51: 963–969.

43. Albala C., Ebbeling C.B., Cifuentes M., Lera L., Bustos N., Ludwig D.S. *Effects of replacing the habitual consumption of sugar-sweetened beverages with milk in Chilean children.* AM. J. CLIN. NUTR. 2008; 88: 605–611.

44. Ebbeling C.B., Feldman H.A., Osganian S.K., Chomitz V.R., Ellenbogen S.J., Ludwig D.S. *Effects of decreasing sugar-sweetened beverage consumption on body weight in adolescents: a randomized, controlled pilot study.* PEDIATRICS 2006; 117: 673–680.

45. James J., Thomas P., Cavan D., Kerr D. *Preventing childhood obesity by reducing consumption of carbonated drinks: cluster randomised controlled trial.* BMJ 2004; 328: 1237. e-pub 1–6 (DOI: 10.1136/bmj.38077.458438.EE).

46. Sichieri R., Paula T.A., de Souza R.A., Veiga G.V. *School randomised trial on prevention of excessive weight gain by discouraging students from drinking sodas.* PUBLIC HEALTH NUTR. 2009; 12: 197–202.

47. Munoz D. *The efficacy of two brief interventions to reduce soda consumption in a college population* (Doctoral dissertation). Albany, New York State University of New York. 2006.

48. Cohen J. *Statistical Power Analysis for the Behavioral Sciences.* Academic Press: New York, NY, 1988.

49. Forshee R.A., Storey M.L., Ginevan M.E. *A risk analysis model of the relationship between beverage consumption from school vending machines and risk of adolescent overweight.* RISK ANAL. 2005; 25: 1121–1135.

50. Popkin B.M. *Sugary beverages represent a threat to global health.* TRENDS ENDOCRINOL. METAB. 2012; 23: 591–593.

51. Lustig RH, Gupta S. *Is sugar toxic?* [WWW document]. URL *http://www.cbsnews.com/8301-18560_162-57407294/is-sugartoxic/* (accessed December 2012).

52. Lustig R.H., Schmidt L.A., Brindis C.D. *Public health: the toxic truth about sugar.* NATURE 2012; 482: 27–29.

53. Bray G.A. *Soft drink consumption and obesity: it is all about fructose.* CURR. OPIN. LIPIDOL. 2010; 21: 51–57.

54. Yudkin J.S. *Pure, White and Deadly.* Penguin Books: London, 1986.

References—Continued

55. Brownell K.D., Warner K.E. *The perils of ignoring history: Big Tobacco played dirty and millions died. How similar is Big Food?* MILBANK Q. 2009; 87: 259–294.
56. Kersh R., Morone J. *The politics of obesity: seven steps to government action.* HEALTH AFF. (Millwood) 2002; 21: 142–153.
57. Schmeichel B.J., Vohs K.D., Baumeister R.F. *Intellectual performance and ego depletion: role of the self in logical reasoning and other information processing.* J. PERS. SOC. PSYCHOL. 2003; 85: 33–46.
58. Kahneman D. *Thinking, Fast and Slow.* Farrar, Straus & Giroux: New York, NY, 2011.
59. Sharpe K.M., Staelin R., Huber J. *Using extremeness aversion to fight obesity: policy implications of context dependent demand.* J. CONSUM. RES. 2008; 35: 406–422.
60. Wansink B., Hanks D., Just D.R., *et al. From Coke to Coors: A Field Study of a Sugar-Sweetened Beverage Tax and its Unintended Consequences.* Posted: 5–26–2012. [WWW document]. URL *http://dx.doi.org/10.2139/ssrn.2079840* (accessed December 2012).
61. Zients J.D. *Memorandum to the Heads of Executive Departments and Agencies.* Posted: 2012. [WWW document]. URL *http://www.whitehouse.gov/sites/default/files/omb/memoranda/2012/m-12-14.pdf* (accessed December 2012).
62. Addington E.A. *Aspartame- or sugar-sweetened beverages. Effects on food appetites and mood in young adults* (Doctoral dissertation). Manhattan, Kansas: Kansas State University. 1998.
63. Hall K.D. *Body Weight Simulator.* Posted: 4–4–2012. [WWW document]. URL *http://bwsimulator.niddk.nih.gov/* (accessed December 2012).
64. Hedges L.V., Olkin I. *Statistical Methods for Meta-Analysis.* Academic Press: Orlando, FL, 1985.
65. Flegal K.M., Carroll M.D., Kit B.K., Ogden C.L. *Prevalence of obesity and trends in the distribution of body mass index among U.S. adults, 1999–2010.* JAMA 2012; 307: 491–497.
66. Hartocollis A. *E-Mails Reveal Dispute Over City's Ad Against Sodas.* Posted: 10–28–2010. [WWW document]. URL *http://www.nytimes.com/2010/10/29/nyregion/29fat.html?pagewanted=all* (accessed December 2012).
67. New York City Department of Health and Mental Hygiene. *Man Drinking Fat. NYC Health Anti-Soda Ad. Are You Pouring on the Pounds?* Posted: 12–14–2009. [WWW document]. URL *http://www.youtube.com/watch?v=-F4t8zL6F0c* (accessed December 2012).
68. Kansangra S. *Maximum Size For Sugary Drinks: Proposed Amendment of Article 81—Response to Comments.* Posted: 9–13–2012. [WWW document]. URL *http://www.nyc.gov/html/doh/downloads/pdf/boh/article81-response-to-comments-ppt.pdf* (accessed December 2012).
69. Davis J.N., Whaley S.E., Goran M.I. *Effects of breastfeeding and low sugar-sweetened beverage intake on obesity prevalence in Hispanic toddlers.* AM. J. CLIN. NUTR. 2012; 95: 3–8.
70. Norton A. *Could Kids' Salt Intake Affect Their Weight?* Posted: 2012. [WWW document]. URL *http://consumer.healthday.com/Article.asp?AID=671410* (accessed December 2012).
71. Azuz C. *Lots of salt means lots of soda.* Posted: 12–10–2012. [WWW document]. URL *http://www.cnn.com/video/?hpt=he_mid#/video/health/2012/12/10/hm-salt-and-soda.cnn* (accessed December 2012).
72. Mackey L. *Lowering salt intake may be key to lowering childhood obesity rates.* Posted: 12–10–2012. [WWW document]. URL *http://wtvr.com/2012/12/10/lowering-salt-intake-may-be-key-tolowering-childhood-obesity-rates/* (accessed December 2012).
73. McKenzie A. *Study says salt may be a catalyst for childhood obesity.* Posted: 12–13–2012. [WWW document]. URL *http://triad.news14.com/content/top_stories/676361/study-says-salt-may-be-a-catalyst-for-childhood-obesity* (accessed December 2012).
74. Grimes C.A., Riddell L.J., Campbell K.J., Nowson C.A. *Dietary Salt Intake, Sugar-Sweetened Beverage Consumption, and Obesity Risk.* PEDIATRICS 2012; 13: 14–21. e-pub (DOI: 10.1542/peds.2012–1805).
75. Cofield S.S., Corona R.V., Allison D.B. *Use of causal language in observational studies of obesity and nutrition.* OBES. FACTS 2010; 3: 353–356.
76. Cope M.B., Allison D.B. *White hat bias: a threat to the integrity of scientific reporting.* ACTA. PAEDIATR. 2010; 99: 1615–1617.
77. James G. *Are Diet Drinks The Key To Weight Loss?* Posted: 2–15–2012. [WWW document]. URL *http://www.huffingtonpost.co.uk/2012/02/15/diet-drinks-water-key-to-weightloss_n_1279488.html* (accessed December 2012).
78. Lane P. Press Release: *Weighing the difference: switching to water, diet beverages can tip the scales.* Posted: 2012. [WWW document]. URL *http://uncnews.unc.edu/content/view/5088/71* (accessed December 2012).
79. European Food Safety Authority. *Scientific Opinion on the substantiation of health claims related to intense sweeteners and contribution to the maintenance or achievement of a normal body weight.* Posted: 2012. [WWW document]. URL *http://www.efsa.europa.eu/en/efsajournal/doc/2229.pdf* (accessed December 2012).
80. Te Morenga L., Mallard S., Mann J. *Dietary sugars and body weight: systematic review and meta-analyses of randomised controlled trials and cohort studies.* BMJ 2013; 346: e7492.
81. Hauner H., Bechthold A., Boeing H., *et al. Evidence-based guideline of the German Nutrition Society: carbohydrate intake and prevention of nutrition-related diseases.* ANN. NUTR. METAB. 2012; 60 (Suppl. 1): 1–58.
82. Baranowski T. *School-based obesity-prevention interventions in low- and middle-income countries: do they really work?* AM. J. CLIN. NUTR. 2012; 96: 227–228.
83. Gardner C., Wylie-Rosett J., Gidding S.S., *et al. Nonnutritive sweeteners: current use and health perspectives: a scientific statement from the American Heart Association and the American Diabetes Association.* CIRCULATION 2012; 126: 509–519.

ATTACHMENT 9

Liquid Calories, Energy Compensation, and Weight: What We Know and What We Still Need To Learn

Roughly 10,000 years ago, sugar was first domesticated in New Guinea. Roughly 8,000 years ago, it was transplanted to India. Sometime around the seventh century, cultivation and some industrial production began in southern Europe, and the crusades subsequently acquainted more Europeans with sugar imported from Arab lands. Until the sixteenth century, sugar was often viewed by Europeans as having medicinal properties. Colonisation of the New World led to mass production and distribution of sugar as a major foodstuff.[1–5] By 1713, a writer in a scholarly journal was extolling the health virtues of high levels of sugar consumption, including in beverages.[6] In 1893, Harley[7] conducted self-experiments and concluded that con-

*Office of Energetics, Nutrition Obesity Research Center, University of Alabama at Birmingham, Birmingham, AL 35294–0022, USA, e-mail *dallison@uab.edu*.
doi:10.1017/S0007114513003309.

sumption of 250 g (approximately 4184 kJ or approximately 1000 kcal) of sugar greatly increased muscular work capacity. In 1899, a controlled trial involving soldiers reported that those given a ration of sugar were in better health, felt more vigorous and gained more weight (presumably judged to be a good thing at the time).[8] As the century turned, Gardner [9] described sugar as a nutritional necessity that increased the health and vigour of populations. Yet, the positive health halo of sugar could not last. A generation later, authors of scientific papers did write about 'The social problem growing out of the overconsumption of sugar' and described school-based programmes to teach children to consume less sugar.[10]

Sugar consumed in liquid form has come to be seen by some as especially deserving of scrutiny. In 1990, Tordoff & Alleva [11] published seminal trial results showing that persons required to consume additional sugar in the form of a beverage gained more weight than did a control group given a non-energetic beverage. After 13 years, suspicion was increasing that metabolisable energy, perhaps especially sugar, consumed as liquids promoted less satiety, less energy compensation and more weight gain than did the same energy consumed in solid form.[12] The topic has become controversial to say the least,[13] and there is substantial evidence that the strength of the supporting data has often been exaggerated and distorted.[14,15]

Newspaper articles offer statements such as 'People who drink sugary soft drinks do not appear to compensate by reducing calories somewhere else in their diets, so they tend to pack on extra pounds'[16] and 'Study after study has shown that like experimental animals, people do not compensate for extra liquid calories by eating less food'.[17] This concept that people do not adjust their energy intake (or expenditure) to compensate for energy consumed as liquids is at the heart of the matter. Yet, is it true? Although opinions on matters of energy compensation in response to various forms of sugar intake and/or liquid energy have been offered for over 70 years,[18,19] convincing data on these issues have been scarce.

In this issue of the *British Journal of Nutrition,* Reid, *et al.,*[20] offer a new and valuable piece of evidence on this question. In a study of obese adult women, those consuming sugar in liquid form at a level of 1,800 kJ (approximately 430 kcal) per d gained far less weight than expected and no more weight than did women in a control group drinking zero-energy beverages. The study has several strengths. It was a controlled trial that was run for long enough to observe weight changes and that was at least partially conducted in a blinded fashion. It also has several limitations, including a modest sample size, incomplete blinding and the fact that it was not strictly randomised. I will not belabour those points here as Reid and colleagues discuss them in their article. It should also be noted that the study concerns only adult women and cannot necessarily tell us about the effects in men or children.

What does the study show?

The study's essential finding concerns the question of compensation for liquid energy. The sucrose group gained no appreciable weight. This shows that over an extended period, at least in conditions similar to those of this study, women do compensate for additional energy consumed in the form of a sugar-sweetened beverage (SSB). Moreover, that the weight gained in the sucrose group was significantly less than that predicted by an established mathematical model based on the amount of energy consumed in the form of SSB further indicates that the vast majority of the energy consumed was compensated for. Reid, *et al.,* state that 'Obese women who received 1,800 kJ sucrose per day in soft drinks for 4 weeks gained a mean of 1.72 kg less than predicted by the model.' Interestingly, the model predicted a total weight gain for a woman with the average characteristics listed in Reid, *et al.,*'s *Table 1* of only about 1.8 kg.

Are the findings consistent with those of other studies?

Yes. Kaiser, *et al.,*[15] meta-analysed other studies in which adults were required to consume additional energy in SSB in randomised controlled trials (RCT), and found that, on average, such required SSB consumption did indeed cause weight gain, but that the amount of weight gained was far less than ½ the amount one would have predicted to be gained by use of the same mathematical model used by Reid, *et al.* (see Kaiser, *et al.,*'s *Fig. 2*). This indicates that, as Reid, *et al.,* found, over extended periods of time, the majority of the energy consumed as SSB is indeed compensated for.

Do the findings inform us about the effects of reducing sugar-sweetened beverage consumption among adult women?

No. Though tempting, we cannot necessarily infer the effects of reducing SSB consumption from studies of the effects of increasing SSB consumption. That said, as Kaiser, *et al.,*[15] reported, no RCT of adults reported to date has found a statistically significant effect of reducing SSB consumption on weight.

Do the findings inform us about the differential effects (if any) of consuming liquid *v.* solid energy on weight?

No. The results of Reid, *et al.*, only show what happens with SSB. From these data alone, we have no way of knowing whether the same results would have been obtained if the women were required to consume 1,800 kJ of food in some solid form. Returning to the literature at large, there is evidence from a recent meta-analysis that in short-term (typically single-day) studies with food intake as the outcome, liquid energy is less well compensated for than is solid energy.[21] Yet, we cannot assume that individuals will not adapt to dietary changes over time. Long-term effects on weight cannot be reliably inferred from short-term effects on food intake. Indeed, to my knowledge, there are only two human RCT comparing the effects of liquid *v.* solid foods on weight over an extended period of time, and neither found a statistically significant difference between the liquid and solid conditions when the entire samples were analysed.[22–23]

In conclusion, what we know from the overall literature is that when adults are required to consume additional energy in the form of SSB, on average, they gain some weight. What we also know from the overall literature and this new study is that, on average, adults gain far less weight than they would be expected to gain if they did not compensate. Thus, people clearly do compensate for liquid energy, although they do so incompletely. What we do not know, despite all the drama and vituperation surrounding SSB, is whether, over extended periods of time, people compensate any differently for liquid *v.* solid energy. It is high time we learned.

References

1. Anonymous (1853) *History of sugar.* THE ILLUSTRATED MAGAZINE OF ART, vol. 2, no. 2, p. 147. *http://www.jstor.org/stable/20538093* (accessed August 2013).

2. Baru S. (1987) *Sugar in history: sweetness and power. Review of Sweetness and Power: The Place of Sugar in Modern History* by Sidney W. Mintz. ECONOMIC AND POLITICAL WEEKLY vol. 22, no. 33 (15 August 1987), pp. 1391–1393. *http://www.jstor.org/stable/4377370* (accessed August 2013).

3. Levi L. (1864) *On the Sugar Trade and Sugar Duties.* A Lecture Delivered at King's College, London, February 29, 1864. London: Effingham Wilson, Royal Exchange. *http://www.jstor.org/stable/60101270* (accessed August 2013).

4. U.S. Department of Agriculture, Economic Research Service (1971) *A History of Sugar Marketing.* Agriculture Economic Report No. 197. Washington, D.C.: U.S. Government Printing Office.

5. Galloway J.H. (1977) The *Mediterranean sugar industry.* GEOGRAPHIC REV. 67, 177–194. *http://www.jstor.org/stable/214019* (accessed August 2013).

6. Slare F. (1713) Part of a letter from Dr. Fred Slare to Dr. Hans Sloane; concerning a person who had a new set of teeth after 80 years of age; with some observations upon the virtues and properties of sugar. *Phil. Trans. R. Soc.* (1683–1775) 28, 273–274.

7. Harley V. (1893) *Sugar as a food in the production of muscular work.* PROC. R. SOC. LOND. 54, 480–487.

8. Anonymous (1899) *Sugar as a ration.* BR. MED. J. 1, 105.

9. Gardner H.W. (1901) *The dietetic value of sugar.* BR. MED. J. 1, 1010–1013.

10. Sollins I.V. (1930) *Sugar in diet: an experiment in instruction in candy consumption.* J. EDUC. SOCIOL. 3, 546–555.

11. Tordoff M.G. & Alleva A.M. (1990) *Effect of drinking soda sweetened with aspartame or high-fructose corn syrup on food intake and body weight.* AM. J. CLIN. NUTR. 51, 963–969.

12. Almiron-Roig E., Chen Y. & Drewnowski A. (2003) *Liquid calories and the failure of satiety: how good is the evidence?* OBES. REV. 4, 201–212.

13. Slavin J. (2012) *Beverages and body weight: challenges in the evidence-based review process of the Carbohydrate Subcommittee from the 2010 Dietary Guidelines Advisory Committee.* NUTR. REV. 70, Suppl. 2, S111–S120.

14. Cope M.B. & Allison D.B. (2010) *White hat bias: examples of its presence in obesity research and a call for renewed commitment to faithfulness in research reporting.* INT. J. OBES. (Lond) 34, 84–88.

15. Kaiser K.A., Shikany J.M., Keating K.D., *et al.* (2013) *Will reducing sugar-sweetened beverage consumption reduce obesity? Evidence supporting conjecture is strong, but evidence when testing effect is weak.* OBES. REV. 14, 620–633.

16. Hellmich N. (2007) *Soda drinkers consume more calories.* USA TODAY. *http://usatoday30.usatoday.com/news/health/2007-03-25-soda-drinkers_N.htm* (accessed August 2013).

17. Brody J.E. (2010) *A tax to combat America's sugary diet.* NEW YORK TIMES. *http://www.nytimes.com/2010/04/06/health/06brod.html?_r%0* (accessed August 2013).

18. Anonymous (1942) *Sugar rationing called a "Godsend" to national health.* SCIENCE NEWS-LETTER vol. 41, no. 11 (14 March 1942), p. 164. *http://www.jstor.org/stable/3918542* (accessed August 2013).

19. Anonymous (1944) *Advice given to go easy on use of chocolate milk.* SCIENCE NEWS-LETTER vol. 45, no. 25 (17 June 1944), p. 398.

20. Reid M., Hammersley R., Duffy M., *et al.* (2014) *Effects on obese women of the sugar sucrose added to the diet over 28 days, a quasi-randomised, single-blind, controlled trial.* BR. J. NUTR. 111, 563–570.

21. Almiron-Roig E., Palla L., Guest K., *et al.* (2013) *Factors that determine energy compensation: a systematic review of preload studies.* NUTR. REV. 71, 458–473.

22. DiMeglio D.P. & Mattes R.D. (2000) *Liquid **versus** solid carbohydrate: effects on food intake and body weight.* INT. J. OBES. RELAT. METAB. DISORD. 24, 794–800.

23. Houchins J.A., Burgess J.R., Campbell W.W., *et al.* (2012) *Beverage vs. solid fruits and vegetables: effects on energy intake and body weight.* OBESITY (Silver Spring) 20, 1844–1850.

ATTACHMENT 10

Corporate Funding of Nutrition Research and Unjustified Conclusions

370

To the Editor In her Viewpoint about corporate funding of food and nutrition research, Dr Nestle criticizes the food industry and scientists who associate with it.[1]

Dr. Nestle claims that scientists who receive industry-derived research grants "often fail to realize that food-industry funding may affect their work.".[1 (p. 13)] She cites newspaper articles that "illustrate the concerns about biases introduced by industry funding."[1 (p. 13)] She also cites reports[2–3] showing that there are relatively few studies funded by industry whose results are contrary to the funders' interest and discusses her work on the subject including reference to her Food Politics blog.[4]

The study by Massougbodji, *et al.,*[2] also determined that the quality of the methods of the studies reviewed did not explain the orientation of the authors' conclusions, nor was there any relationship between the source of funding and the overall quality of the studies examined. The study by Lesser, *et al.,*[3] did not examine any aspect of the studies that were reviewed other than funding source. The newspaper stories did not describe any flaw in the research of the scientists profiled. In addition, the authors of a great number of the presumably tainted industry-sponsored studies discussed on the blog written by Dr. Nestle[4] explicitly stated that the funding source was not involved in the design, conduct, data analysis and interpretation, or manuscript preparation. Although Dr. Nestle also states that the quality of dietary advice is adversely affected by the source of research funds, many believe that the real problem is the overall poor quality of nutrition research.[5] Before guilt by association is established, criticisms by Dr. Nestle deserve much more analysis.

It would certainly be helpful, if not essential, for Dr. Nestle or others to show that industry-funded studies have more design flaws, inappropriate analyses, or unjustified conclusions relative to similar studies funded by other sources. Furthermore, in addition to financial conflicts of interest, there are nonfinancial conflicts resulting from career self-interest or unbounded intellectual passion that can be just as worrisome. Conflicts of interest in science can affect anyone, and are relevant to proponents of any point of view.

RICHARD KAHN, Ph.D.

Author Affiliation: Department of Medicine, University of North Carolina, School of Medicine, Chapel Hill, North Carolina.
Corresponding Author: Richard Kahn, PhD, Department of Medicine, University of North Carolina, School of Medicine, Chapel Hill, NC 27599–7005 (*rak6200@gmail.com*).
Conflict of Interest Disclosures: None reported.
Additional Information: Dr. Kahn served as the Chief Scientific and Medical Officer of the American Diabetes Association.

[References]

1. Nestle M. *Corporate funding of food and nutrition research: science or marketing.* JAMA INTERN. MED. 2016; 176(1): 13–14.
2. Massougbodji J., Le Bodo Y., Fratu R., DeWals P. *Reviews examining sugar-sweetened beverages and body weight: correlates of their quality and conclusions.* AM. J. CLIN. NUTR. 2014; 99(5): 1096–1104.
3. Lesser L.I., Ebbeling C.B., Goozner M., Wypij D., Ludwig D.S. *Relationshipbetween funding source and conclusion among nutrition-related scientific articles.* PLOS MED. 2007; 4(1): e5.
4. Nestle M. *Food Politics Blog. http://www.foodpolitics.com/.* Accessed March 2, 2016.
5. Ioannidis J.P. *Implausible results in human nutrition research.* BMJ. 2013; 347: f6698.

In Reply: Dr. Kahn requests evidence that nutrition research funded by food companies is of lesser quality than studies funded by independent agencies or performed by investigators with nonfinancial conflicts of interest. Concerns about such issues are relatively recent; few published studies address them directly. Instead, concerns about industry sponsorship of nutrition research derive from comparisons with the results of studies of funding by tobacco, chemical, drug, or medical device companies. This research typically finds industry-sponsored studies to report results more favorable to the products of the sponsor than studies not funded by industry. It identifies subtle rather than substantive differences in the quality of this research; industry-funded studies are more likely to underreport unfavorable results and interpret neutral results more positively.[1] When results are negative, they are less likely to be published.[2]

Between March 2015 and March 2016, I identified 166 industry-funded nutrition research studies and posted and discussed them on my blog.[3] Of these, 154 reported results favorable to the interest of the sponsor; only 12 reported contrary results. The few studies systematically examining the influence of industry funding on nutrition research tend to confirm results obtained from other industries. For example, a systematic review comparing industry-funded and nonindustry-funded trials of probiotics in infant formula reported no association of funding source with research quality. Industry-funded studies, however, seemed more likely to report favorable conclusions unsupported by the data.[4]

Dr. Kahn states that sponsored studies often specify that the funder had no role in the study. Only recently have some journals required such statements, and I am unaware of research on the extent of this practice or authors' adherence to it.

Among the 166 industry-funded studies that I reviewed, few disclosed involvement of a sponsor.

Dr. Kahn asks whether industry funding is any more biasing than career self-interest or intellectual passion. Unlike industry funding, self-interest and passions are intrinsic to every scientist who conducts research, are a matter of public record, cannot be eliminated, and have not been shown to consistently bias research results in the same ways as industry funding.[5] Fortunately, nutrition societies and research institutions are developing policies to manage financial relationships with industry.[6] Such policies hold promise for preventing financial conflicts of research in nutrition research.

MARION NESTLE, Ph.D., M.P.H.

Author Affiliation: New York University, Nutrition, Food Studies, and Public Health, New York, New York.
Corresponding Author: Marion Nestle, PhD, MPH, New York University, Nutrition, Food Studies, and Public Health, 411 Lafayette, 5th Floor, New York, NY 10003–7035 (*marion.nestle@nyu.edu*).

[References]

1. Lundh A., Sismondo S., Lexchin J., Busuioc O.A., Bero L. *Industry sponsorship and research outcome.* COCHRANE DATABASE SYST. REV. 2012; 12: MR000033.

2. Rising K., Bacchetti P., Bero L. *Reporting bias in drug trials submitted to the Food and Drug Administration: review of publication and presentation.* PLoS MED. 2008; 5(11): e217.

3. Nestle M. *Food Politics Blog. http://www.foodpolitics.com/.* Accessed March 2, 2016.

4. Mugambi M.N., Musekiwa A., Lombard M., Young T., Blaauw R. *Association between funding source, methodological quality and research outcomes in randomized controlled trials of synbiotics, probiotics and prebiotics added to infant formula: a systematic review.* BMC MED. RES. METHODOL. 2013; 13: 137.

5. Bero L. *What is in a name? Nonfinancial influences on the outcomes of systematic reviews and guidelines.* J. CLIN. EPIDEMIOL. 2014; 67(11): 1239–1241.

6. Charles Perkins Centre. *Engagement with Industry Guidelines 2015.* University of Sydney, 2015. *https://intranet.sydney.edu.au/perkins/research-support/engaging-with-industry.html.* Accessed March 2, 2016.

ATTACHMENT 11

The Limits of Sugar Guidelines

Is there a danger in governments offering too-specific advice on sugar consumption?

The Atlantic
Nina Teicholz
Jan. 17, 2017

Sugary drinks on display in New York City in 2012, at a news conference about a proposed ban on all soft drinks over 16 ounces in the city's restaurants and stores Andrew Burton/*Reuters.*

A firestorm recently erupted over *a paper in the **Annals of Internal Medicine*** (*https://www.ncbi.nlm.nih.gov/pubmed/27992898*) that found official advice limiting sugar in diets to be based on "low" or "very low" quality evidence. Because a food-industry group had funded the study, a slew of critics accused the authors of distorting the science to undermine nutrition guidelines and make sugar seem less harmful than it actually is. One prominent nutrition professor *called the paper* (*http://www.npr.org/sections/thesalt/2016/12/19/505867535/how-much-is-too-*

much-new-study-casts-doubts-on-sugar-guidelines) "shameful." "It was really an attempt to undermine the scientific process," *said another* (*http://www.npr.org/sections/thesalt/2016/12/19/505867535/how-much-is-too-much-new-study-casts-doubts-on-sugar-guidelines*).

Lost in this torrent of criticism was any significant discussion of the science itself. Regardless of its funding source, was the paper correct in saying that there is insufficient evidence to recommend limiting sugar? And do official guidelines even matter, since we pretty much know that sugar is bad for us?

The *Annals* paper examined a dozen guidelines on sugar passed by governments around the world since 2002, including the *Dietary Guidelines for Americans,* which last year recommended limiting sugar intake to ten percent of calories. One would assume that such advice is based on an ample body of rigorous research. But the *Annals* study, which included all the papers listed in the various guidelines' bibliographies themselves, claimed that reviews to date had overstated the evidence.

In the *most rigorous review on sugar and weight* (*http://www.bmj.com/content/bmj/346/bmj.e7492.full.pdf*), for instance, only five trials lasting 6 months or longer could be found, on a total of just 1,245 people. According to the *Annals* authors, this review portrayed the data as more consistent than it actually was and failed to adequately account for evidence indicating that studies in which sugar was shown to have no detrimental effect may have been suppressed from publication.

Moreover, less rigorous data from observational studies was widely found to be "inconsistent." Sometimes sugar was associated with health problems—weight gain, Type 2 diabetes, and tooth decay—but sometimes it wasn't.

"Overall, I would say the guidelines are not trustworthy," *Bradley Johnston* (*http://ihpme.utoronto.ca/faculty/bradley-c-johnston/*), the study's lead author and an assistant professor of clinical epidemiology and biostatistics at McMasters University told me.

The study's finding should come as a surprise to anyone who has been avoiding sugar for years already. Sugar is a potent source of glucose, which, over time, does appear to wreak havoc on one's metabolism and pave a direct path to obesity and diabetes. A large body of trial evidence *has shown* (*http://www.nytimes.com/2016/09/11/opinion/sunday/before-you-spend-26000-on-weight-loss-surgery-do-this.html?_r=0*) that when carbohydrate consumption is reduced, these diseases start to reverse themselves. Also, given all the recent headlines about sugar's ill effects, from Katie Couric's movie *Fed Up* to the passage of soda taxes in several cities, one could be forgiven for assuming that the evidence condemning sugar must be a done deal.

Clinical trials on sugar *are* possible; it's just that very few have been done.

Yet here were the *Annals* authors saying it's not. Reaction to the paper from nutrition experts and advocacy groups was swift, with criticism focused on the paper's Achilles heel: It had been paid for by the International Life Sciences Institute, which receives 60 percent of its funding from 400 industry members, including some, like Coca-Cola, PepsiCo, and Mars, that very much stand to benefit from a study questioning caps on sugar.

"This is a classic example of industry-funded research aimed at one purpose and one purpose only: to cast doubt on the science linking diets high in sugars to poor health," Marion Nestle, a prominent professor of nutrition at New York University, *told National Public Radio* (*http://www.npr.org/sections/thesalt/2016/12/19/505867535/how-much-is-too-much-new-study-casts-doubts-on-sugar-guidelines*).

Dean Schillinger, the chief of the division of general internal medicine at San Francisco General Hospital, *told the **New York Times*** (*http://www.nytimes.com/2016/12/19/well/eat/a-food-industry-study-tries-to-discredit-advice-about-sugar.html?_r=0*): "They're hijacking the scientific process in a disingenuous way to sow doubt and jeopardize public health."

Schillinger, with his colleague Cristin Kearns, also *penned an editorial in **Annals*** (*https://www.ncbi.nlm.nih.gov/pubmed/27992900*), which likened the sugar-review authors to lackeys hired by the tobacco industry to be "merchants of doubt" about the health hazards of smoking.

Industry manipulation of the science is obviously an ongoing, serious concern. It was, in part, why the editor-in-chief of *Annals,* Christine Laine, invited this editorial. "I wanted to show both sides of the issue," she told me, although she said that she considered the editorial to be unusually "strident and hostile" for an academic journal. Indeed, Schillinger and Kearns both part-time advocates against sugar; *they write articles* (*http://www.sugarscience.org/sugar-papers-reveal-industry-role-in-shifting-focus.html#.WGdB-M6PTyA*) and do other work for *Sugar Science* (*http://www.sugarscience.org/*), a group devoted to educating the public about sugar's health dangers. "It's shown me that conflicts of interest are not only financial but also intellectual," said Laine, who added disclosures about the authors' Sugar

Science affiliations to the editorial after a reader brought them to her attention, she says.

Ironically, undercutting a scientific paper by focusing on its funding source has mainly been used in the past to shoot *down* sugar skeptics. For instance, when the British nutrition professor John Yudkin suggested sugar as a dietary culprit in the early 1970s, the University of Minnesota researcher Ancel Keys, a key defender of the competing hypothesis, that dietary fat was responsible for chronic health issues, accused Yudkin of issuing "propaganda," linked to "commercial backers [who] are not deterred by the facts."

Now that the nation's top nutrition authority, the *U.S. Dietary Guidelines,* has backed off caps on total fat and begun to condemn sugar instead, the public debate is also increasingly focusing on the sugar industry—indeed, so much so that other industry actors are escaping scrutiny. One has to ask, for instance, why there was no similar outrage over *another recent paper* (*https://www.ncbi.nlm.nih.gov/pubmed/27881409*), in *The BMJ*, with favorable findings for vegetable oils, nearly ½ of whose authors were actual employees of the giant vegetable-oil manufacturer Unilever. This would be like workers at Mars, Inc. publishing a study on the health benefits of sugar. Yet this sizable conflict of interest largely got a pass by the many *journalists covering the story* (*https://pubpeer.com/publications/DF70B2D23429 0DF834A8F183BB6F8C#fb114267*).

To be clear, industry funding absolutely can deter good science; tobacco promotion will always be the epitome of that. But the influence of funding isn't invariable: While one meta-analysis found that *funding sources **do** influence the conclusions of nutrition papers* (*https://www.ncbi.nlm.nih.gov/pubmed/17214504*), another, by a *fierce critic of industry* (*http://www.smh.com.au/technology/sci-tech/cocacolas-secret-plan-to-monitor-sydney-university-academic-lisa-bero-20161020-gs6m4a.html*) funding, *paradoxically did **not*** (*https://www.ncbi.nlm.nih.gov/pubmed/27802480*). A healthy dose of skepticism over funding from all sources—including governments and other institutions, which may have their own pet hypotheses—is warranted, so long as it doesn't sideline the science or shut down legitimate debate.

Schillinger and Kearns were right to raise doubts. Sugar defenders have, since the early part of the 20th century, worked diligently to promote their product, such that President Franklin Roosevelt, in the mid-1930s, was quoted as saying the sugar lobby was "the most powerful pressure group that had descended on the national capitol" during his lifetime. The extent of industry manipulation, through ad campaigns and efforts to twist the science are described by the journalist Gary Taubes in his new book, *The Case Against Sugar.*

Yet Taubes believes that any industry with a PR budget has attempted pretty much the same. And he is up-front about the lack of rigorous evidence against sugar, stating in the introduction of his book, "I'm going to concede in advance a key point that those who defend the role of sugar in our diet will invariably make. . . . [I]t cannot be established definitively, with the science as it now stands, that sugar is uniquely harmful."

Clinical trials on sugar *are* possible; it's just that very few have been done. *Emerging evidence suggests* (*https://www.ncbi.nlm.nih.gov/pubmed/25756179*) that the sugar industry *may have stifled those inquiries* (*https://therussells.crossfit.com/ 2016/09/15/did-big-soda-derail-the-governments-cancer-research/*), but Taubes believes more evidence supports the explanation that for decades, a monolith of nutrition scientists has just genuinely and obsessively had a preoccupation with fat and cholesterol which simply blotted out everything else. The National Institutes of Health (NIH) spent *billions* of dollars on large clinical trials, all trying to pin chronic disease on dietary fat and cholesterol. In fact, sugar was such a non-suspect for so many years that the major, NIH-funded observational studies took few pains even to measure it.

While the evidence to date shows zero benefit from sugar and a clear signal of harm, there hasn't been enough time to fund and conduct definitive trials. Meanwhile, governments naturally feel they can't wait. Facing panic over the continued, relentless climb in obesity and diabetes rates with no solution in sight, they've gone ahead and passed sugar guidelines pinned to exact thresholds, of ten percent or five percent of calories. This advice is clearly well-intentioned. Yet if, as the *Annals* paper concludes, experts are skirting scientific norms by passing guidelines based on weak evidence, the whole process of guideline-making is effectively watered down. And the need for reliable guidance is no abstract question; indeed, everything from our waistlines to whether we might eat eggs for breakfast depends upon it.

As Americans well know, there have been many reversals in our guidelines in recent years—on dietary cholesterol, on total fat, on whether to eat breakfast to maintain a healthy weight. These were all official guidelines based on weak evidence that, when actually tested in clinical trials, were found to be unjustified. It turned

out that people had been avoiding egg yolks, lobster, and fat, generally, to no avail, and that *skipping breakfast altogether might actually be the best option* (*https://www.washingtonpost.com/news/wonk/wp/2015/08/10/the-science-of-skipping-breakfast-how-government-nutritionists-may-have-gotten-it-wrong/?utm_term=.ca4 bb87d6c30*) for weight loss.

It's worth at least considering criticism of the potentially "low" quality evidence behind existing nutrition advice.

Instances of flip-flopping on nutritional advice not only erode the public trust, but make people think that the basic science itself is flawed—which, for the most part, it's not. Instead, the central problem has been that experts and policy makers have passed judgment before that good science was done. And once a judgment is codified as policy, it's hard to repeal. This was the case, for instance, with the low-fat diet, which although adopted as a U.S. guideline in 1980, wasn't actually studied in trials for another decade-plus. This kind of mistake, at its very worst, is potentially deadly: Indeed, the low-fat advice, by shifting consumption to carbohydrates such as grains and sugar, is now regarded as a probable cause of the obesity and diabetes epidemics.

When the Senate first passed the government's warnings against fat and cholesterol in the late 1970s, officials argued that the urgency of responding to public-health crises overrode any concerns about insufficient scientific evidence. "Undoubtedly there will be people who have said we have not proven our point," said *Harvard's Mark Hegsted* (*https://naldc.nal.usda.gov/naldc/download.xhtml?id=1759 572&content=PDF*), an advisor to the report, at the time of its release. Yet, citing the epidemics of heart disease, cancer, diabetes, and hypertension, he stated, "We cannot afford to temporize. We have an obligation to assist the public in making correct food choices. . . . To do less is to avoid our responsibility."

These are the same arguments being made today, on sugar. It makes sense to have a strong hunch that sugar is bad. Sugar has no nutritional value. It's a direct shot of glucose to the blood stream and fructose to the liver. The historical evidence against it presented by Taubes in his book is compelling. Personally, I try hard to avoid it. But I also tend to avoid refined carbohydrates, such as white bread and cereals. Based on the existing data, I suspect that too much fructose from today's highly sweetened fruit crops is bad, and that the *40+ percent increase in our consumption of grains since 1970* (*https://www.ers.usda.gov/publications/pub-details/ ?pubid=44220*) have simply *overloaded us in carbohydrates altogether* (*http:// www.nutritionjrnl.com/article/S0899-9007%2815%2900077-5/abstract*).

The NIH should fund rigorous trials to sort out these issues. Meanwhile, in the absence of more definitive science, it's worth at least considering criticism of the potentially "low" quality evidence behind existing nutrition advice. Maybe the government should be issuing a strong cautionary note, based on the existing, emerging evidence, rather than a specific formal "Guideline"—since basing guidelines on hunches that are *probably* right unavoidably opens up the possibility for guidelines based on hunches that are wrong.

An educated guess is not enough, warned the late Senator Charles Percy, in objecting to the government's original dietary advice, 35 years ago. He thought it paved over limitations in the data with excessive confidence. "The best way to [provide dietary guidance] is to fully inform the public not only about what is known but also what remains controversial," he said.

He was talking about fat and cholesterol; today's *Annals* paper is talking about sucrose, glucose, fructose. We've been down this road before, with experts, pressed into urgency on behalf of the public health, convincing themselves that insufficient evidence could suffice. Therefore, in the matter of national guidelines, it's worth being cautious—and not immediately dismissing those who send up cautionary flags.

<div align="center">ATTACHMENT 12</div>

Do Financial Conflicts of Interest Bias Research? An Inquiry into the "Funding Effect" Hypothesis

Sheldon Krimsky[1]

---

[1]Department of Urban & Environmental Policy & Planning, Tufts University, Medford, MA, USA

Corresponding Author:

Sheldon Krimsky, Department of Urban & Environmental Policy & Planning, Tufts University, Medford, MA 02155, USA. E-mail: *sheldon.krimsky@tufts.edu*.

Abstract

In the mid-1980s, social scientists compared outcome measures of related drug studies, some funded by private companies and others by nonprofit organizations or government agencies. The concept of a "funding effect" was coined when it was discovered that study outcomes could be statistically correlated with funding sources, largely in drug safety and efficacy studies. Also identified in tobacco research and chemical toxicity studies, the "funding effect" is often attributed, implicitly or explicitly, to research bias. This article discusses the meaning of scientific bias in research, examines the strongest evidence for the "funding effect," and explores the question of whether the "funding effect" is an indicator of biased research that is driven by the financial interests of the for-profit sponsor. This article argues that the "funding effect" is merely a symptom of the factors that could be responsible for outcome disparities in product assessment. Social scientists should not suspend their skepticism and choose as a default hypothesis that bias is always or typically the cause.

Introduction

The philosopher Charles Sanders Peirce claimed that of all ways of fixing our beliefs, science is the most dependable. He wrote in 1877, "Scientific investigation has had the most wonderful triumphs in the way of settling opinion" (Peirce, 1877). Not only have we come to believe in the "dependability" of scientific claims, we have come to depend upon them for making important life decisions. It is generally understood that the production of scientific knowledge is accompanied by quality controls that are designed to filter out errors and bias. By errors I shall mean those assertions or calculations in a study that are factually incorrect and which would be recognized as such by anyone trained in the discipline. These can include errors in statistical analysis, citations, recording of data, or the application of measuring devices. Bias, on the other, is a more complex term.

As distinguished from error, bias is not as simple as an oversight or a mistake. Bias can be conscious or unconscious. It can be structural (by the choice of method) or nonstructural (by the interpretation of data). By "structural bias," I mean the adoption of certain norms or methods that would distort (over- or underreport) the effects being studied. This term has been used in media studies where a structural bias is said to be the result of a preference of journalists for some type of story or frame that leads them to pay more attention to some events over others (van Dalen, 2011).

Bias could involve proper or improper (scientific misconduct) behavior. In his book *The Bias of Science,* Brian Martin considers "biased" research as synonymous with "value-laden" research "conditioned by social and political forces and dependent on judgments and human choices" (Martin, 1979, 7). Under this definition, science, according to Martin, might never be unbiased or value-free. Resnik (1998, 85) argues that a bias is an invalid assumption: "The person who conducts biased research is more like the person who defends a hypothesis that is later proven wrong than a person who makes a mistake or attempts to deceive his audience."

I am using "bias" in a different sense. By research bias, I shall mean the use of a method, data collection, data analysis, or interpretation of results that, in the consensus view of scientists of a discipline, tends to yield results that distort the truth of a hypothesis under consideration, diminishing or negating the reliability of the knowledge claim. Bias must be viewed in terms of the current operating norms of science. Since "bias" distorts the truth, scientists must be aware of its presence and where possible prevent or diminish it. I leave open the question of whether research considered unbiased in one time period could be viewed as biased by scientists during another time period.

The function of our system of peer review is to identify error or bias before scientific studies are accepted for publication. After a study is published, it may still be criticized or corrected. Moreover, if an empirical finding cannot be replicated, the article may be withdrawn by the journal editors. Unlike other sources of establishing belief, science is considered to be a self-correcting enterprise where truth claims are kept open to new evidence. No one doubts, however, that bias can enter into published scientific work. While bias can be built into scientific methodology (structural), sometimes its subtlety can elude even the most careful reviewer and journal editor.

Only recently have government and journals turned their attention to Conflict of Interest (COI) as a source of bias. The first Federal guidelines on scientific COI,

issued simultaneously by the Department of Health and Human Services' (DHHS) Public Health Service (PHS) and the National Science Foundation were titled "Objectivity in Research." The stated purpose of the regulation was "to ensure that the design, conduct, or reporting of research funded under PHS grants, cooperative agreements or contracts will not be biased by any conflicting financial interest of those investigators responsible for the research" (DHHS, 1995). And while the DHHS focused on financial COIs (FCOIs), it is generally recognized that interests other than direct financial interests can also play a potentially biasing role in science (Levinsky, 2002). Writing in the journal *Cell Stem Cell* about the ethics of stem cells, Jeremy Sugarman (2008, 532) noted: "Both nonfinancial and financial conflicts of interest may adversely affect good judgment regarding stem cell research." But Sugarman also wrote that "financial conflicts of interest in research may be easier to identify, simply because financial interests can be measured and more easily described than those associated with nonfinancial interests, such as the advancement of scientific and professional concerns" (Sugarman 2008, 532).

Following the maxim "study what you can measure," social scientists began investigating the relationship between FCOIs and bias in the mid-1980s, when author disclosures of author FCOIs were still in their infancy. Most of the studies investigating a link between author FCOIs and private funding of science were carried out in the field of medicine, specifically medical pharmacology. The concept of a "funding effect" was coined after a body of research revealed that study outcomes were significantly different in privately funded *versus* publicly funded drug studies (Krimsky, 2006 2010). The funding effect was also identified in tobacco, pharmacoeconomic, and chemical toxicity research (Als-Nielsen, *et al.,* 2003). This article examines the strongest evidence for the "funding effect," and explores the question of whether the "funding effect" is an indicator of scientific research bias, based on a previously stated criterion of "bias." To begin, I shall discuss sources of evidence behind the "funding effect." I shall argue that the "funding effect" is a symptom of the factors that are responsible for outcome disparities in product assessments and that social scientists should not, without further investigation and the elimination of other explanations, chose bias as the default hypothesis.

Evidence of the "Funding Effect" in Science

Beginning in the mid-1980s, scientists began testing the hypothesis that the source of funding from for-profit companies compared to nonprofit institutions and government can be correlated with the outcome of research, such as safety and efficacy in drug studies. This has been called "the funding effect" in science (Krimsky, 2005). The assumption has been that where there is a "funding effect" there must be bias. I shall begin with the evidence for the "funding effect," largely from a group of studies in drug trials, and then discuss the possible causes of the effect.

Badil Als-Nielsen, *et al.* (2003) tested the hypothesis that industry-sponsored drug trials tend to draw pro-industry conclusions. The authors selected a random sample of 167 Cochrane reviews and found 25 with meta-analyses that met their criteria. From the meta-analyses, they studied 370 drug trials. After coding and numerically scoring the trials' conclusions and applying a logistic regression analysis, the authors found that "conclusions were significantly more likely to recommend the experimental drug as treatment of choice in trials funded by for-profit organizations alone compared with trials funded by nonprofit organizations" (Als-Nielsen, *et al.,* 2003, 925). The authors ruled out as an explanation of industry favored outcomes both the magnitude of the treatment effect and the occurrence of adverse events reported. They also noted that the clinical trial methods between for-profit and nonprofit organizations were not of the same quality. "Trials funded by for-profit organizations had better methodological quality than trials funded by nonprofit organizations regarding allocation concealment and double blinding" (Als-Nielsen, *et al.,* 2003, 925). The authors do not report on the sponsor involvement and influence on the conduct and reporting of a trial. Such information could help us understand whether the external funder influences the scientist running the trial. The effects they observed between funding and outcome occurred whether the sponsor's contribution was minimal (provided the drug) or maximal (funded the study).

The authors distinguish between potential biases in the empirical trial results (collection of data) and in the interpretation of those results, particularly in the recommendations they make about the experimental drug. As previously noted, bias can enter into any or all the stages of a study: the methodology, execution of the study, interpretation of results and recommendations (whether the experimental drug is better than the existing drug).

It is also possible that industry-funded studies, having been identified as being of higher quality, have gone through more internal (company-sponsored) study and analyses, than one would expect of a nonprofit organization. This study found statis-

tically significant outcome differences in a class of studies, but not necessarily bias—although systemic bias is one hypothesis.

John Yaphe, *et al.* (2001) selected for their study randomized controlled trials (RCTs) published between 1992 and 1994 of drugs or food products with therapeutic properties appearing in five journals: *Annals of Internal Medicine, BMJ, JAMA, Lancet,* and *NEJM.* A total of 314 articles met their inclusion criteria. Of the 209 industry-funded studies, 181 (87 percent) and 28 (13 percent) had positive and negative findings, respectively, while of 96 nonindustry-funded studies, 62 (65 percent) and 34 (35 percent) had positive and negative findings, respectively. What can account for this disparity in the outcomes of industry and nonindustry trials? Clearly, the bias of an investigator internalizing the financial interests of the sponsor is one potential hypothesis.

Paula Rochon, *et al.,* investigated the relationship between reported drug performance and manufacturer association. They adopted a broad definition of "manufacturer association," which included supplying the drug or sponsoring a journal supplement where the publication of the study appeared. The authors selected as their study sample randomized drug trials (identified in MEDLINE between 1997 and 1990) of nonsteroidal anti-inflammatory drugs used in the treatment of arthritis (Rochon, *et al.,* 1994). The authors found 1,008 articles published within that period but only 61 articles representing 69 individuals met their inclusion criteria. All the trials in their study had a "manufacturer association," because they reported there was a scarcity of nonmanufacturer-associated trials. Therefore, they could not compare trials funded/supported by private companies with those funded/supported by nonprofit organizations. The authors also used several rating systems to estimate drug efficacy. The critical outcome measure was whether the drug being tested was superior, the same, or inferior to a comparison drug.

The results of the study showed the "the manufacturer-associated drug is always reported as being either superior to or comparable with the comparison drug" and that "these claims of superiority, especially with regard to side-effect profiles, are often not supported by trial data" (Rochon, *et al.,* 1994, 158). It is logically possible that head-to-head testing of new *versus* old drugs always shows the new drug superior. After all, that is the impetus for developing new drugs. But in this case, the framing of the tests can bias the outcome. Marcia Angell explains the process with an illustration from statins—drugs that lower blood cholesterol levels. "There is little reason to think one is any better than another at comparable doses. But to get a toehold in the market, me-too statins were sometimes tested for slightly different outcomes in slightly different kinds of patients, and then promoted as especially effective for those uses" (Angell, 2004, 81).

In a study by Benjamin Djulbegovic, *et al.* (2000), the investigators explored whether the reports of pharmaceutical-industry sponsored randomized trials result in biased findings. They selected 113 articles published from 1996 to 1998 that described 136 randomized trials on multiple myeloma (Djulbegovic, *et al.,* 2000, 637). The authors compared the new therapy *versus* the standard therapy in the trials and then analyzed the outcome according to whether the sponsors were nonprofit or for-profit organizations. Nonprofit organizations showed a 53 percent *versus* 47 percent support for new therapies, but when the trials were sponsored by for-profit organizations the ratio was 74 percent to 26 percent, a statistically significant difference.

Friedman and Richer (2004) investigated whether sources of funding could be correlated to reported findings. The authors analyzed original contributions in *NEJM* and *JAMA* published in 2001. They classified the presentation of results as positive (statistically significant clinical benefit from a treatment or absence of suspected side effects), mixed (clinical benefits but adverse side effects), negative (absence of clinical benefits), or other (unclear significance). They located 193 original articles in *NEJM,* 76 (39.4 percent) with a COI and 205 articles in *JAMA,* 76 (37.1 percent) with COI. The authors found 119 studies that investigated drug treatments and 174 studies for all treatments. They observed a "strong association between positive results and COI among all treatment studies" with an odds ratio of 2.35 and for drug studies alone an odds ratio of 2.64. The odds ratio is the ratio of probability of an event occurring in one group to the probability of it occurring in another group. An odds ratio of 2.35 for the drug studies is the probability of a positive result in a drug treatment study conducted by individuals with a FCOI divided by the probability of a positive result from a similar drug treatment conducted by individuals without a financial conflict of interest. In other words, an odds ratio of 2.35 means that investigators with an FCOI are more than twice as likely to produce positive results in a drug treatment study.

Another interesting finding is that the probability of reporting negative results in cases where an author had a FCOI was very low. One negative study of the 60 drug

studies with FCOIs *versus* 21 negative studies of the 59 drug studies without FCOIs were reported. The authors conclude that "the odds are extremely small that negative results would be published by authors with COI" (Friedman and Richter, 2004, 53).

The authors cannot provide an explanation for their observed association between FCOI and reported findings in medical treatments. They can only theorize about the cause. "One could surmise that drug companies are selective and only want to invest in treatments proven to produce positive results and that early clinical trials filter out the most promising treatments, which could explain the small number of studies funded by private corporations presenting negative findings" (Friedman and Richter, 2004, 55). But they also consider the possibility of bias and "spin." The question arises as to whether an investigator with a conflict of interest may be more inclined to present findings in order to gain favor with the sponsor or achieve any other extraneous objective—for example, to "spin" (Friedman and Richter, 2004, 55). Notwithstanding the fact that the cause of the association is not apparent in their data, they state that:

> The observation that negative findings are less commonly reported among studies funded by private corporations raises troublesome ethical questions. Researchers appear to be failing to promote both the benefits and negative side effects of commercial products they review or simply failing to submit negative studies for publication because they are viewed as uninteresting. (Friedman and Richter, 2004, 55)

For social scientists studying the funding effect, the issue in this case is less a question of bias in the reported studies than it is an issue of bias in a failure of reporting negative studies, that is, in subverting the complete scientific record.

Not all studies testing a hypothesis that there is an association between trial outcome or study quality and funding source reached positive findings. Tammy Clifford, Barrowman, and Moher (2002) selected a convenience sample of RCTs published between 1999 and 2000 by hand-searching five high impact general medical journals—*Annals of Internal Medicine, BMJ, JAMA, The Lancet,* and *NEJM.* The quality of the trial report was evaluated according to the Jadad scale, which included randomization, allocation concealment, and withdrawals. The authors classified the trials according to funding source in four categories: entirely industry, entirely no[t]-for-profit, mixed, and not reported. Sixty-six of the hundred trials reviewed were funded in whole or in part by industry; six did not disclose their source of funding. Of the 100 trials, 67 favored the new therapy, six favored conventional treatments, 19 reported neutral findings, and for eight the outcome was unclear. Of the 67 trials that favored the new treatment, 30 came from "industry only," 15 came from "not-for-profit only," and 16 came from mixed sources; of the six trials that favored the conventional treatment, four came from "industry only," one came from "not-for-profit only," and one came from mixed sources.

The numbers for "favored conventional" were so low that statistical findings were not relevant. Also, this study only focused on funding and not on the financial ties of individual faculty associated with the trials. The authors noted limitations of their results. "Our failure to detect any significant association may result from a type 2 error that indicates inadequate statistical power. Although our results do not even hint at a trend . . . the potential for type 2 error is real" (Clifford, Barrowman, and Moher, 2002, 21). Perhaps one conclusion can be drawn: of the 100 trials, 66 percent were funded in whole or in part by industry and 67 percent favored the new therapy. Thus, it appears that industry trials are dominant and driving the advocacy of new drugs over old treatments even without adding author FCOI.

Finally, I shall summarize the first meta-analysis that explored the "funding effect." Bekelman, *et al.,* culled 1,664 original research articles and ended up with 37 studies that met their criteria. They concluded: "Although only 37 articles met [our] inclusion criteria, evidence suggests that the financial ties that intertwine industry, investigators, and academic institutions can influence the research process. Strong and consistent evidence shows that industry sponsored-research tends to draw proindustry conclusions" (Bekelman, Li, and Gross, 2003, 463). Bekelman, *et al.,* were convinced that the "funding effect" is real.

I shall now turn to the relationship between FCOI and pharmacoeconomics, defined as the discipline that evaluates the clinical, economic, and humanistic aspects of pharmaceutical products, services, and programs.

Pharmacoeconomic Studies

A few studies have examined whether the results of economic analyses of drugs are correlated with the funding source. Because there is greater discretion in developing the methodology for economic studies of drugs, any inferences of bias must

be addressed through the modeling, the stakeholder interests, and the specific parameters used in cost-benefit analysis rather than the omission or manipulation of clinical data. Johnson and Coons (1995, 165) note that "Many different guidelines have been proposed for conducting pharmacoeconomic studies. The differences among the various versions reflect the diverse and sometimes conflicting views of those who specialize in economic evaluations."

Mark Friedberg, *et al.* (2010) searched the Medline and Health Star databases for articles published between 1985 and 1998 on cost or cost-effectiveness analyses of six oncology drugs. The found forty-four eligible articles whose texts were analyzed for qualitative and quantitative conclusions and the funding source, based on predetermined criteria. Of the forty-four articles, twenty-four were funded by nonprofit organizations and twenty were funded by drug manufacturers. The authors found a statistically significant relationship between funding source and qualitative conclusions. Unfavorable conclusions were found in 38 percent (9/24) of the nonprofit-sponsored studies and five percent (1/20) of company-sponsored studies.

Studies funded by pharmaceutical companies were almost eight times less likely to reach unfavorable qualitative conclusions than nonprofit-funded studies and 1.4 times more likely to reach favorable qualitative conclusions.

C.M., Bell, *et al.* (2006) undertook a systematic review of published papers on cost-utility analyses. The authors found that industry-funded studies were more than twice as likely to report a cost-utility ratio below $20,000 per quality adjusted life year (QALY) as compared to studies sponsored by nonindustry sources. A similar study reported in the International *Journal of Technology Assessment in Health Care* assessed the relation between industry funding and findings of pharmacoeconomic analyses (Garattini, Rolova, and Casasdei, 2010). The authors searched *Pub Med* for articles on cost-effectiveness and cost utility, performed during 2004–2009 on single drug treatments. They found 200 articles that met their criteria. They divided the articles into two groups based on whether or not the authors had financial support from the pharmaceutical industry. "Studies co-signed by at least one author affiliated to a pharmaceutical company and/or studies that declared any type of company funding were considered sponsored" (Garattini, Rolova, and Casasdei, 2010, 331). The authors also classified the main conclusions as favorable, doubtful, or unfavorable toward the drug. Of the 200 articles, 138 (69 percent) were sponsored by a pharmaceutical company. Sponsored articles reported a favorable conclusion 95 percent of the time as against 50 percent of the time for nonsponsored articles. They claimed that "the presence of a pharmaceutical sponsorship is highly predictive of a positive conclusion" (Garattini, Rolova, and Casasdei, 2010, 331). According to Krimsky, 1999, 1475):

> The differences observed between [pharmacoeconomic] studies funded by industry and nonprofit organizations may be the result of methods chosen, prescreening, or bias due to the source of funding. By following the traditions of professional societies, such as those of engineering and psychiatry in setting guidelines of practice, pharmacoeconomists can attain a special role in the health care policy community in developing independent studies that are based on accepted canons that meet the highest standards of the profession. Canada and the United Kingdom have developed national guidelines for cost effectiveness studies.

K.S. Knox, *et al.* (2000) reported on data collected in Friedberg, *et al.,* in comparing practices of pharmaceutical-sponsored and nonprofit-sponsored pharmacoeconomic studies. They found that nonprofit studies more likely make an explicit statement of the significance of the findings (38 percent *vs.* 20 percent), provide a source of cost data (67 percent *vs.* 45 percent), and make a clear statement about the reproducibility of the findings in other settings (58 percent *vs.* 35 percent). As in Friedberg, *et al.,* Knox, *et al.,* considered only one type of economic relationship between industry and researchers, namely, direct funding of a study and omitted many other types of financial relationships. Had they broadened their criteria, some of the 42 pharmacoeconomic analyses they studied might be reclassified as "pharmaceutical associated" thus changing the statistical results.

Some of the authors who found a "funding effect" were cautious about inferring a bias from the data, although it was included in the list of hypotheses they considered. The next section explores alternative explanations.

Explanations of the "Funding Effect" Other than Bias

In Yaphe, *et al.,* the authors note that "the higher frequency of good outcomes in industry supported trials may stem from a decision to fund the testing of drugs at a more advanced stage of development" (Yaphe, *et al.,* 2001, 567). In other words, industry has already done a lot of internal studies weeding out ineffective drugs.

Thus, by the time a private company funds a trial, it would likely do better than a drug has not gone through its internal review. To fully understand this process, we need to know the extent to which companies test and reject drugs internally before funding a study by an academic group and whether the outcome results of "new drugs are always better" would be found in trials of the same drugs but funded by nonprofit organizations.

The methodologies of industry-funded as compared to nonprofit-funded trials may differ. For example, comparison of new drugs with a placebo may be more prevalent among industry-financed studies compared to nonindustry-financed studies. "Comparison with placebo may produce more positive results than comparison with alternative active treatment" (Yaphe, *et al.,* 2001, 567). Unless we have a profit organization and nonprofit organization using the same or very similar methods to test the same drugs, drawing an inference about bias can yield false conclusions. The appearance of low negative outcomes from private sponsors could be the result of company screening for low probability drugs before they sponsor the trial or the "reticence of investigators to submit negative findings for publication, fearing discontinuation of future funding" (Yaphe, *et al.,* 2001, 567). These caveats speak against a conclusion that bias can be inferred from the data that show outcome differences.

Some tests use different doses of the new drugs and compare them to lower doses of the old drugs. This is corroborated by Rochon, *et al.,* in their study. "When we evaluated the relative range of dosing of the manufacturer-associated drug and the comparison agents in the trials on the basis of the recommended dosage suggested in standard tests, there was a considerable mismatch. In the majority of cases where the doses were not equivalent, the drug given at the higher dose was that of the supporting manufacturer" (Rochon, *et al.,* 1994, 161).

The authors surmise that higher doses "bias the study results on efficacy in favor of the manufacturer-associated drug" (Rochon, *et al.,* 1994, 161). This illustrates that bias may enter into the "funding effect" in subtle and complex ways that deal with how the trial is organized.

Some authors try to explain the "funding effect" by maintaining that most industry studies use a placebo and as a result are more likely to show a positive outcome. Also, the method of drug delivery used by companies may have been different than that used in nonprofit sponsor trials.

Others have questioned whether industry trials are of lower quality and thus are likely to produce more favorable results. Djulbegovic, *et al.,* rated the trial quality and concluded that "trials funded solely or in part by commercial organizations had a trend toward higher quality . . . than those supported by the governmental or other nonprofit organizations" (Djulbegovic, *et al.,* 2000, 637). Thus, the outcome effect found in the industry-funded work of this group was not related to poor quality trials.

In Frieberg's pharmacoeconomic study, the authors offer several possible explanations for the "funding effect." First, for-profit companies are more likely than nonprofit companies to get "early looks" at the drugs, preliminary trial results, and economic data, weeding out those that would fail a cost-effectiveness standard. Companies might censor unfavorable studies by not funding them. Second, they surmise that funded studies with unfavorable results are less likely to be submitted for peer review and published. A third explanation for the disproportionate favorable results could arise from "unconscious bias that could influence study conclusions" from scientists who have a financial conflict of interest—such as being paid by the company or holding an equity interest in the drug. As previously noted, the economists engaged in the study may internalize the values of the study sponsor, which could translate into a methodology that is more likely to yield a positive economic analysis.

And the final explanation suggested by the authors is that "the pharmaceutical companies can collaborate directly with investigators in devising protocols for economic analyses and indirectly shape the economic evaluation criteria" (Friedberg, *et al.,* 2010, 1475). The assessment of bias requires a standard or norm for pharmacoeconomic analysis against which one can compare different outcomes (Krimsky, 1999). Several studies have addressed the quality of pharmacoeconomic analysis of drugs (Sacristan, Soto, and Galende, 1993; Jefferson, *et al.,* 1988). Currently, no standardization or best practice for pharmacoeconomic analyses exists. Because the choice of method can have a significant effect on outcome, a method that systematically yields outcomes consistent with the private sponsor's financialinterest may be biased.

Single Product Assessment: Tobacco

The studies of funding effects in pharmaceutical products include many types of drugs in order to develop aggregate statistics. Companies may do in-house studies

before sponsoring extramural studies. The type of drug studied is generally considered not relevant to the findings of a funding effect. However, investigators may have different histories with the products they are testing. Nonprofit investigators may have seen the product for the first time. By eliminating product variability, investigators of the funding effect can more precisely judge the possible linkage between the source of funding and outcome findings such as product quality, safety, or economic efficiency. Two product studies for a funding effect meet these criteria: tobacco and the chemical bisphenol A (BPA). I shall begin with a discussion of tobacco research.

Turner and Spilich (1997) investigated whether there was a relationship between tobacco industry support of basic research and the conclusions reached by authors of the study. They utilized a comprehensive review of the literature on tobacco and cognitive development and used that to obtain their reference studies. Beginning with 171 citations, the authors selected 91 studies fulfilling their selection criteria that investigated the effects of tobacco and nicotine upon cognitive performance. They coded the conclusions of the papers as positive, negative, or neutral on the question of whether tobacco enhances performance and segmented the papers into those that acknowledged corporate sponsorship and those that did not. When one or more of the authors was an employee of a tobacco company, the article was coded as industry-supported. All other articles were coded as "noncorporate sponsorship," even in cases where one or more of the authors had previously received industry support.

For those papers reporting a negative relationship between tobacco and cognitive performance, sixteen were coded "nonindustry supported," and one was coded "industry-supported." For those reporting a positive relationship, twenty-nine came from nonindustry supported papers and twenty-seven from tobacco industry-supported papers. Among those papers reporting a neutral effect, eleven were from nonindustry studies and seven from industry-supported studies. In this study, the industry/nonindustry demarcation in the papers shows a disparity in negative results compared to positive results. Why did so few studies funded by the tobacco industry report negative effects on performance from tobacco use? Because the study methodologies were different, we cannot say that investigator bias played a role. It may just be that the industry-funded studies used a method that yielded fewer negative outcomes compared with an alternative method(s) used by the nonindustry-funded studies. There is a phenomenon known as "bias in the study design," but that was not examined in the study. As previously mentioned, systematic bias in a study design seeking to test the toxicity of a chemical would be introduced by animal models that are inherently insensitive to the chemical in question (Bailar, 2006).

Deborah Barnes and Lisa Bero (1998) investigated whether review articles on the health effects of passive smoking reached conclusions that are correlated with the authors' affiliations with the tobacco companies. Since tobacco is a relatively homogenous product, differences in outcome cannot be attributed to product variability or company pre-testing. Just as in pharmacoeconomic studies, there is no canonical method in undertaking a review article. Authors make a selection of articles that become part of the review. Some reviewers make their selection algorithm transparent. Others may not. Any two studies may use a different selection algorithm and they may weigh studies differently. "Ultimately, the conclusion of any review article must be based on the judgment and interpretation of the author" (Barnes and Bero, 1998, 1570).

For this study, the authors adopted a search strategy use by the Cochrane Collaboration to select review articles from 1980 to 1995 on the health effects of passive smoking from the databases MEDLINE and EMBASE. They located additional review articles from a database of symposium articles on passive smoking. Articles were evaluated on quality and were classified as concluding that passive smoking was either harmful or not harmful. The authors found that 94 percent ($^{29}/_{31}$) of reviews by tobacco-industry affiliated authors concluded that passive smoking is not harmful compared with 13 percent ($^{10}/_{75}$) of reviews without tobacco industry affiliations. The influence of tobacco-industry affiliation on the finding of "safety of passive smoking" was very strong. "The odds that a review article with tobacco industry-affiliated authors would conclude that passive smoking is not harmful were 88.4 times higher than the odds for a review article with nontobacco affiliated authors, when controlling for article quality, peer review status, article topic, and year of publication" (Barnes and Bero, 1998, 1569). The authors reported that the "only factor that predicted a review article's conclusion was whether its author was affiliated with the tobacco industry" (Barnes and Bero, 1998, 1570). In this study, the authors had no alternative hypotheses other than the inherent bias of authors with industry affiliation. Because there is a great deal of discrepancy among authors in how a review is carried out, including the selection and weighting of arti-

cles that form the basis of the review, there are a number of ways that the conclusion can be made to favor the funder's interests, not the least of which is to set a high bar for establishing evidence of causality. The authors impute conscious intentionality of bias to the funders in their statement that "the tobacco industry may be attempting to influence scientific opinion by flooding the scientific literature with large numbers of review articles supporting its position [which they paid for] that passive smoking is not harmful to health" (Barnes and Bero, 1998, 1569). From tobacco, I shall now turn to an industrial chemical used in many products—bisphenol A.

Single Product Assessment: BPA

While there are different variants of tobacco that depend on where the tobacco plant is grown, and even greater variation in cigarettes because of chemicals added to the tobacco and the paper, there is still greater homogeneity in studying tobacco than in studying different types of drugs. BPA, on the other hand, is a synthetic chemical that has a precise chemical structure. It was first reported synthesized in 1905 by a German chemist. In 1953, scientists in Germany and the United States developed new manufacturing processes for a plastic material, polycarbonate, using BPA as the starting material. In the 1990s, scientists began studying the toxicological effects of BPA leaching from plastic food and water containers. Despite the fact that some scientists claimed there was extensive evidence that BPA can disrupt mouse, rat, and human cell function at low part per trillion doses and that disruption at the same low doses is also found in snails [and] has profound implications for human health (vom Saal, *et al.*, 2005, 249), other scientists disagreed. Vom Saal and Welshons (2006, 61) divided the studies into those funded by industry and those funded by nonprofit organizations. Of the 119 studies funded by the Federal Government, 109 showed harmful toxicological outcomes while ten had outcomes which showed no harm. Of the studies funded by the chemical companies, there were zero with outcomes showing harm and 11 with outcomes of no harm.

The authors write: "Evidence of bias in industry-funded research on BPA." Is it systematic bias and if so what form does it take? Is industry using a different methodology than most of the federally-supported studies? If so, is their methodology sound or is it designed to get a "no harm" outcome?

vom Saal and Welshons argue that industry-funded studies have a built in bias [what I have referred to as structural bias] against finding positive effects of BPA. They maintain that "To interpret whether there is a positive or negative effect of a test chemical, such as BPA, appropriate negative and positive controls also have to be examined" (vom Saal and Welshons, 2006, 62). Vom Saal argues that the industry-supported tests omitted a positive control and without positive control findings, one cannot interpret a reason for purely negative results. The authors also noted that some industry-funded BPA studies used test animals that had very low sensitivity to exogenous estradiol and thus would not be expected to exhibit effects from BPA. Other industry-funded investigators used a type of animal feed, which because of its estrogenic activity, would give a false result. "Inclusion of an appropriate positive control . . . would have allowed a determination of whether the failure to find effects of BPA was due to the lack of activity of BPA or to a lack of sensitivity of the animal model and/or estrogenic contamination of the feed that was used" (vom Saal and Welshons, 2006, 63).

In his classic work, *The Logic of Scientific Discovery,* Karl Popper (1968) developed the philosophical foundations of scientific methodology. Science, Popper argued, is not an inductivist enterprise, where truth is built up from data that are consistent with a hypothesis. Scientists must seek to falsify a hypothesis, and only when a hypothesis is recalcitrant against a rigorous attempt at falsification can it be accepted as truth. The critical point is that deduction and not induction is the logical grounding of empirical science. In the latter case, scientists would be given: A_1 is B, A_2 is B . . . A_n is B therefore All A is B. In the former case, scientists seek to falsify "All A is B" by trying to find a disconfirming instance (A_x is not B).

For example, one can reach the conclusion that "all crows are black" by observing crops in certain parts of Africa. Or you could imagine a geographical location that would most likely nurture a nonblack crow—such as the North or South Pole. If after all the seeking for a falsifying instance none appears, then, under the Popperian program, you can claim that the hypothesis "all crows are black" is confirmed. vom Saal and Welshons illustrate this point in the toxicology of BPA.

> . . . it is a common event in toxicological studies conducted by the chemical industry for purposes of reporting about chemical safety to regulatory agencies to provide only negative results from a study in which no positive control was included but from which positive conclusions of safety of the test chemical are drawn. (von Saal and Welshons 2006, 63)

As Peirce noted, "We are, doubtless, in the main logical animals, but are not perfectly so" (Peirce, 1877). Both he and Popper understood that knowledge claims drawn inductively can be easily distorted by the social context of scientists. This is most notably the case in the field of toxicology, which is composed of academic scientists and contract toxicologists working on behalf of for-profit companies. These scientists are usually paid by chemical companies to fulfill the information needs of their regulatory requirements. The standards for doing toxicological research may vary, especially in new subfields like low-dose, endocrine toxicology. Thus, until the norms of good scientific practices are adopted across the subfield and by the government regulators, contract toxicologists may perform studies that have structural biases because they are more likely than not to produce false negatives. This is the take-home message from the criticism by vom Saal and Welshons of private-company-sponsored studies. They are looking to confirm the null (no effect) hypothesis rather than trying to falsify the null hypothesis, which would provide more confidence in the claim that the chemical is not harmful.

Conclusion

This analytical review of studies of studies that investigate an association between funding source and study conclusions has revealed several important results. First, there is sufficient evidence in drug efficacy and safety studies to conclude that the funding effect is real. Industry-sponsored trials are more likely than trials sponsored by nonprofit organizations, including government agencies, to yield results that are consistent with the sponsor's commercial interests. Second, there is some circumstantial evidence that this effect arises from two possible causes. Either the drugs sponsored by industry have gone through more internal testing and less-effective drugs are screened out, or the methods used in industry-sponsored drug testing have a structural bias that is more likely to yield positive outcomes.

Third, a small number of pharmacoeconomic studies also show evidence of a funding effect. Without standardization of economic studies or the use of third-party "economic auditors" who have no economic ties to a company, it is difficult to account for the factors that explain this effect.

A person who files his income tax is likely to use whatever discretionary decisions at his disposal to reduce his tax obligation. Similarly, a company that performs its own economic analysis of a new drug is likely to choose a model and use inputs that are advantageous to it. When a company hires an independent agent to undertake the economic analysis, little is known about what influence the company has in shaping the study. Also, little is known about drugs that are kept out of the testing pool by companies because they have already done the economic analysis.

When we turn to studies of the funding effect on individualized commodities, the results are less ambiguous. There is an extensive body of research on tobacco, both primary (smokers) and secondary (secondhand smoke) exposures. This research shows a clear demarcation between studies funded by the cigarette industry and studies funded by nonprofit and governmental organizations. From this body of research, it is reasonable to conclude that the tobacco industry hired scientists to play a similar role as their contracted lawyers, namely, to develop a brief, in this case a scientific argument, that provides the best case or their interest. If that interpretation of tobacco-funded research is correct, it could explain the funding effect in tobacco studies.

The second homogenous product discussed in this article is BPA. However, with only one study of this compound found that addresses the funding effect, a generalization cannot be drawn. But the scientists who published the study help the reader understand why a funding effect is a probable outcome. They show the systemic bias involved in the industry-funded studies that ordinarily do not appear in studies funded by nonprofit organizations.

What I have argued in this article is that the "funding effect," namely the correlation between research outcome and funding source, is not definitive evidence of bias, but is *prima facie* evidence that bias may exist. Additional analyses of the methodology of the studies, interpretation of the data, interviews with investigators, and comparison of the products studied can resolve whether the existence of a funding effect is driven by scientific bias. Social scientists should follow Robert Merton's norm of "organized skepticism" when they frame an initial hypothesis about the cause behind the "funding effect" phenomenon (Merton, 1968, 608). The notion of bias based on possessing a financial conflict of interest is certainly one viable hypothesis. But there are others. Social scientists must be equipped to compare the methods used across a cluster of studies funded by for-profit and not-for-profit companies to determine whether a particular method biases the results toward "no detectable outcome" while other more sensitive methods yield positive results. Certain chemical effects may show up in animal fetuses and not on the adult animals.

In addition, social scientists must gain an understanding of the entities being tested across a series of studies to determine whether the differences in the entities can account for the "funding effect." Calcium channel blockers represent a class of drugs. It is important to understand whether the partition of studies between for-profit and not-for-profit funders coincides with a random distribution of the entities being studied. Drugs that have passed a prescreening test are more likely to show more favorable outcomes than similar drugs that have not. This potential confounder can be eliminated when the entities are relatively homogenous, like tobacco or a chemical like BPA.

In some cases, ethnographic studies can determine whether for-profit companies have made internal decisions about drugs before they send them out to academic laboratories for study and how that compares with drug studies funded by not-for-profit organizations. Ethnography can also help social scientists ascertain when investigators reach beyond the data when they interpret results and whether the frequency of such overinterpretation (claiming benefits not found in the data) is more likely in studies funded by for-profit funders. Interviews with academic investigators, who are funded by private for-profit companies, and company executives, can reveal whether and how the funding organization helps frame the study, contributes to the interpretation of the data, and plays a role in deciding whether the results get sent for publication. The "funding effect" is merely a symptom of the factors that could be driving outcome disparities. Social scientists should not suspend skepticism and choose as the default hypothesis that "bias" is always the cause.

References

Als-Nielsen, B., W. Chen, C. Gluud, and L. L. Kjaergard. 2003. "Association of Funding and Conclusions in Randomized Drug Trials: A Reflection of Treatment Effect or Adverse Events?" *The Journal of the American Medical Association* 290 (4): 921–28.

Angell, Marcia. 2004. *The Truth about the Drug Companies.* New York, NY: Random House.

Bailar, J.C. 2006. "How to Distort the Scientific Record without Actually Lying: Truth and the Arts of Science." *European Journal of Oncology* 11 (4): 217–24.

Barnes, D.E., and L.A. Bero. 1998. "Why Review Articles on the Health Effects of Passive Smoking Reach Different Conclusions." *The Journal of American Medical Association* 279 (19): 1566–570.

Bekelman, J.E., Yan Li, and C.P. Gross. 2003. "Scope and Impact of Financial Conflicts of Interest in Biomedical Research: A Systematic Review." *The Journal of American Medical Association* 289: 454–65.

Bell, C.M., D.R. Urbach, J.G. Ray, A. Bayoumi, A.B. Rosen, D. Greenberg, and P.J. Neumann . 2006. "Bias in Published Cost Effectiveness Studies: Systematic Review." *British Medical Journal* 332 (7543): 699–703.

Clifford, T. J., N.J. Barrowman, and D. Moher. 2002. "Funding Source, Trial Outcome and Reporting Quality: Are they Related? Results of a Pilot Study." *BMC Health Services Research* 2 (18): 1–6.

DHHS (Department of Health and Human Services, Public Health Service). 1995. "Objectivity in Research." *Federal Register* s60: 35810–823.

Djulbegovic, B., M. Lacevic, A. Cantor, K.K. Fields, C.L. Bennett, J.R. Adams, N.M. Kuderer, and G.H. Lyman. 2000. "The Uncertainty Principle and Industry-sponsored Research." *Lancet* 356 (9230): 635–8.

Friedberg, M., B. Saffran, T.J. Stinson, W. Nelson and C.L. Bennett. 1999. "Evaluation of Conflict of Interest in Economic Analyses of New Drugs used in Oncology". *Journal of the American Medical Association* 282 (15): 1453–7.

Friedman, L.S., and E.D. Richter. 2004. "Relationship between Conflict of Interest and Research Results." *Journal of General Internal Medicine* 19 (1): 51–56.

Garattini, L., D. Rolova, and G. Casasdei. 2010. "Modeling in Pharamacoeconomic Studies: Funding Sources and Outcomes." *International Journal of Technology Assessment Health Care* 26 (3): 330–33.

Jefferson, T., R. Smith, Y. Yee, M. Drummond, M. Pratt, and R. Gale 1998. "Evaluating the BMJ Guidelines for Economic Submissions." *The Journal of the American Medical Association* 280 (3): 275–77.

Johnson, J.A., and S.J. Coons. 1995. *Evaluation in Published Pharmacoeconomic Studies.* JOURNAL OF PHARMACY PRACTICE 8 (8): 156–66.

Knox, K.S., J.R. Adams, B. Djulbegovic, T.J. Stinson, C. Tomor, and C.L. Bennett. 2000. "Reporting and Dissemination of Industry *versus* Non-profit Sponsored Economic Analyses of Six Novel Drugs used in Oncology." *Annals of Oncology* 11 (12): 1591–95.

Krimsky, Sheldon. 1999. "Conflict of Interest and Cost Effectiveness Analysis." *The Journal of American Medical Association* 282 (10): 1474–75.

____. 2005. "The Funding Effect in Science and its Implications for the Judiciary." *Journal of Law and Policy* 23 (1): 43–68.

____. 2006. "Publication Bias, Data Ownership, and the Funding Effect in Science: Threats to the Integrity of Biomedical Research." In *Rescuing Science from Politics: Regulation and the Distortion of Scientific Research,* edited by W. Wagner and R. Steinzor, 61–85. New York: Cambridge University Press.

____. 2010. "Combating the Funding Effect in Science: What's Beyond Transparency?" *Stanford Law & Policy Review* 21: 101–23.

Levinsky, N.G. 2002. "Nonfinancial Conflicts of Interest in Research." *The New England Journal of Medicine* 347: 759–61.

Martin, Brian. 1979. *The Bias of Science.* Canberra, Australia: Society for Social Responsibility in Science.

Merton, Robert K. 1968. *Social Theory and Social Structure.* New York, NY: The Free Press.

Peirce, Charles S. 1877. "The Fixation of Belief." *Popular Science Monthly* 12 (11): 1–15. Accessed October 1, 2010. *http://www.peirce.org/writings/p.107.html*.

Popper, Karl. 1968. *The Logic of Scientific Discovery.* New York, NY: Harper &Row.

Resnik, David B. 1998. *The Ethics of Science.* London, England: Routledge.

Rochon, P.A., J.H. Gurwitz, R.W. Simms, P.R. Fortin, D.T. Felson, K.L. Minaker, and T.C. Chalmers. 1994. "A Study of Manufacture-supported Trials of Nonsteroidal Anti-inflammatory Drugs in the Treatment of Arthritis." *Archives of Internal Medicine* 154 (2): 157–63.

References—Continued

Sacristan, J.A., J. Soto, and I. Galende. 1988. "Evaluation of Pharmacoeconomic Studies: Utilization of a Checklist." *The Annals of Pharmacotherapy* 27: 1126–33.

Sugarman, Jeremy. 2008. "Human Stem Cell Ethics: Beyond the Embryo." *Cell Stem Cell* 2 (7): 529–33.

Turner, Christina, and George J. Spilich. 1997. "Research into Smoking or Nicotine and Human Cognitive Performance: Does the Source of Funding make a Difference?" *Addiction* 92 (11): 1423–426.

Van Dalen, Arjen. 2012. "Structural Bias in Cross-National Perspective: How Political Systems and Journalism Cultures Influence Government Dominance in the News." *The International Journal of Press/Politics* 17 (1): 32–55.

vom Saal, F.S., S.C. Nagel, B.G. Timms, and W.V. Welshons. 2005. "Implications for Human Health of the Extensive Bisphenol A Literature Showing Adverse Effects at Low Doses: A Response to Attempts to Mislead the Public." *Toxicology* 212 (2–3): 244–252.

vom Saal, F.S., and W.V. Welshons. 2006. "Large Effects from Small Exposures." *Environmental Research* 100 (1): 50–76.

Yaphe, J., R. Edman, B. Knishkowy, and J. Herman. 2001. "The Association Between Funding by Commercial Interests and Study Outcome in Randomized Controlled Drug Trials." *Family Practice* 18 (12): 565–68.

Author Biography

Sheldon Krimsky is the Lenore Stern Professor of Humanities and Social Sciences at Tufts University and the Carol Zicklin Visiting Professor at Brooklyn College. He is author of *Science in the Private Interest*.

ATTACHMENT 13

Judge the Science, Not the Funding Source
Editorial

Medical research has long been engaged in debate over the influences of corporate sponsorship on research findings. These discussions are a necessary element of our scientific process. However, recently the issue of 'funding source' has taken on a life of its own, particularly in the realm of obesity research. Discussions about the merit and objectivity of the underlying science frequently take a back seat to *ad hominem* attacks on researchers or accusations of malicious corporate intent in the absence of any objective scientific appraisal of the research.

These discussions are based on the faulty logic that somehow direct corporate funding is inherently bias-producing in otherwise ethical researchers and that, by implication, public (for example, NIH, USDA) and/or philanthropic (for example, RWJ, AHA) funding, by way of the intervening agency, ensures objectivity. A recent controlled study of over 500 board-certified internists found that the participant's perception of methodological quality was lower if they believed a trial was corporate sponsored even when no actual methodological difference was present.[1] This suggests a bias against scientifically valid studies based solely on funding source, which could in fact negatively impact public health through out-of-hand dismissal of relevant, high-quality research.

Conversely, the implied bias favoring noncorporate trial objectivity is equally concerning as it may lead us to overlook very real potential bias from publicly funded trials. For example, it could be argued that a scientist who is funded by USDA is at similar risk for being biased in favor of sugar, corn and other agriculture-based products *vs.* artificial sweeteners. Moreover, an often overlooked threat to objectivity is the pressure to find statistically significant results. This has been found in both corporate- and noncorporate-sponsored research. A recent examination of over 4,600 scientific papers from all disciplines published internationally between 1990 and 2007 found that the frequency of positive support for hypotheses has increased 22%. The author notes that this bias toward publishing positive results may influence the objectivity of the research literature both directly and also more subtly by discouraging more innovative (higher-risk) projects.[2]

Assuming that the well-intentioned yet misguided goal of those leveling these *ad hominem* attacks is to keep scientists in check and to help us avoid moral and scientific pitfalls, there is a far better model available. When the model works, the public is protected, scientific discovery and rigor supported, and advances in our knowledge achieved. At the core of the model is a safe environment that allows for transparency. This includes full disclosure of all potential conflicts of interest without fear of judgment or reprisal and peer-reviewed publication of findings with appropriate methodological detail to allow for objective analysis and scientific scrutiny. Beyond these commonly and universally held practices, more consistent application of additional tools may be useful. For example, a requirement for all research to be

---

[1] Kesselheim A.S., Robertson C.T., Myers J.A., Rose S.L., Gillet V., Ross K.M., *et al. A randomized study of how physicians interpret research funding disclosures.* N. Engl. J. Med. 2012; 367: 1119–1127.

[2] Fanelli D. *Negative results are disappearing from most disciplines and countries.* Scientometrics 2012; 90: 891–904.

preregistered in *Clinicaltrials.gov* or a similar database. Reviewers and journal editors can be encouraged to ensure that final manuscripts are consistent with the stated *a priori* objectives before final acceptance of manuscripts, which could further add to our protection of scientific integrity. Finally, we should all aspire to solve the intellectual property and other barriers that limit our ability to review and replicate studies on the basis of lack of access to primary data sources in some corporate trials. Although these barriers are complex and beyond the scope of this paper, we need to begin to find solutions that will enhance the ways scientific process can be used to be the judge of all science.

In summary, what are the best practices for ensuring a strong, unbiased body of obesity research? Certainly not refusing funding from those who wish to collaborate with scientists in becoming part of the solution; absolutely not by launching unsubstantiated attacks on reputable scientists with longstanding records of ethical conduct and meaningful scientific contribution; rather, it is first by giving funding source its proper position among many possible and equally important threats to objectivity and implementing safeguards to protect against such bias (and worse yet malfeasance). Second, we need to redouble our efforts to adhere to the basic principles of good science like reproducibility, replicability and other core evaluative procedures that ensure objective and reliable scientific reporting. Finally, we need to work toward open access to data regardless of its source. This will require the cooperation of those in the scientific community and among potential sources of funding. Ultimately, this type of transparency regardless of funding source will deliver a more robust and complete body of evidence. In short, scientists need to practice good science, sponsors must commit to transparency and noninfluence, media needs to practice responsible scientific journalism, and we all need to base our evaluations on scientific data and not on predetermined opinions rooted in our own emotion-laden bias for or against specific funding sources.

Conflict of Interest

ATTACHMENT 14

The Obesity Society Encourages Science-Industry Collaborations to Support Obesity Science, Public Health

New Position Statement Condemns *Ad Hominem* Attacks on Researchers
Mar. 26, 2014, 11:00 ET from The Obesity Society

The Obesity Society Logo. (PRNewsFoto/The Obesity Society)

Silver Spring, Md., March 26, 2014—PRNewswire-USNewswire—Collaborations between scientists and industries, including food and pharmaceuticals, have a strong history of aiding in new scientific discoveries and supporting public health. For example, earlier this year, food industry corporations announced success in cutting 1.5 trillion calories from food products, which *The Obesity Society referred to* (*http://www.obesity.org/news-center/cutting-trillions-of-calories-from-food-products-can-have-a-significant-impact-on-the-nations-health.htm*) as an effort that could "make a significant difference in our nation's weight and health, helping to reverse the obesity epidemic."

"It's clear, efforts to combat obesity cannot succeed without the engagement of the many industries that have the power to positively impact the health of billions of people," said TOS President Steven Smith, M.D.

However, in recent years, nutrition and obesity researchers have frequently endured *ad hominem* attacks, or inappropriate criticisms of character and ethics on the sole basis of collaborative relationships and/or funding from Industry. Today, The Obesity Society (TOS) issued a position statement supporting and encouraging

[1] Department of Nutritional Sciences, Texas Tech University, Lubbock, TX, USA.
[2] Binks Behavioral Health, PLLC, Hillsborough, NC, USA, E-mail: *m.binks@ttu.edu*.

collaborative relationships between scientists and Industry in the interest of scientific discovery and public health. The position goes further to condemn these character attacks against credible and ethical professionals providing transparency and full disclosure about these collaborations.

"Many of our members are the obesity and nutrition scientists that offer valuable insight and spark meaningful dialogue with Industry leaders, and they deserve to be treated and recognized as the credible and ethical professionals that they are," said Dr. Smith. "Discrediting the scientific opinions of these professionals based on their working relationships has no place in the scientific process."

The position statement, "Acceptance of Financial Support from Industry for Research, Education and Consulting," authored by members of TOS leadership, including Advocacy Chair Emily Dhurandhar, Ph.D., President-elect Nikhil Dhurandhar, Ph.D., Secretary-Treasurer Martin Binks, Ph.D., and Advocacy Advisor Ted Kyle, RPh, discourages the practice of "dismissing the contributions of individual scientists and attempting to discredit individuals based on funding source."

"We have seen too many scientists with long-standing records of scientific excellence and ethical conduct dragged into the spotlight of public criticism based solely on a funding source, and despite full disclosure and transparency," said Dr. Dhurandhar, who led the development of the statement. "Scientists serve a clear role in these relationships and must operate with the ability to do their work to advance public health by engaging in free and open dialogue, offering expert opinion, and conducting meaningful research to support obesity treatment and prevention, and advance public health."

In the new position statement, TOS recognizes that individual motivations can sometimes create a risk of bias, which can come in many forms outside of funding source. However, from advisory panels to scientific publications, policies are in place to ensure transparency and disclosure of all potential sources of bias, which is common practice.

"Scientists are very familiar with the importance of making relevant disclosures and ensuring funding sources do not influence the design, analysis, interpretation, and publication of the scientific process," said Dr. Dhurandhar.

The Obesity Society has a long-standing commitment to ensuring ethical and transparent relationships between science and Industry, and the organization hopes to advance the science behind obesity research, treatment and prevention through ongoing dialogue on this issue.

Read the full position statement *here (http://www.obesity.org/publications/acceptance-of-financial-support-from-industry-for-research-education-a-consulting.htm)*.

About *The Obesity Society (http://www.obesityweek.com/)*

The Obesity Society (TOS) is the leading professional society dedicated to better understanding, preventing and treating obesity. Through research, education and advocacy, TOS is committed to improving the lives of those affected by the disease. For more information visit: *www.Obesity.org*.

ATTACHMENT 15

White Hat Bias: A Threat to the Integrity of Scientific Reporting
A Different View

Mark B. Cope,[1] David B. Allison (*dallison@uab.edu*)[2]

[1] Solae LLC, St Louis, MO, USA.
[2] Biostatistics and Nutrition & Obesity Research Center, University of Alabama at Birmingham, Birmingham, AL, USA.
Correspondence: David B. Allison, Biostatistics and Nutrition & Obesity Research Center, University of Alabama at Birmingham, Birmingham, AL, USA. Tel: 205–975–9169, Fax: 205–975–2540, E-mail: *dallison@uab.edu*

*Articles in the series **A Different View** are edited by Alan Leviton (**alan.leviton@childrens.harvard.edu**) We encourage you to offer your own different view either in response to **A Different View** you do not fully agree with, or on an unrelated topic.*

Background

Like other people, scientific researchers have their own motivations. Such motivations include, but are not limited to, direct financial gain, interests in recruiting financial resources to their institutions, fame, social dominance, being perceived as righteous and upstanding, and a genuine interest in beneficence and improving the human condition. Pursuing these motivations may at times suggest behaviours on the part of scientists that accord with the behaviours that are generally accepted as sound and honest scientific practice. Yet in other situations, such motives may conflict with the precepts of scientific research.

Although the potential for financial conflicts of interests (COIs) to bias research and research reporting is widely recognized,[1] far less attention has been devoted to other factors that may contribute to bias in research. Some people within the research and lay communities appear to think that direct financial COIs resulting from industry connections are the only factors of significant concern. For example, Lesser, *et al.,* wrote 'We agree that financial conflict is not the only cause of bias. . . . long-standing scientific viewpoints, career considerations, and even political opinions might color study design or interpretation. However, these types of individual bias tend to cancel themselves out among large groups of scientists over the long term. While one investigator's career may rise on a cherished theory, another's may rise by debunking that theory. We contend that financial conflict of interest is qualitatively different, producing selective bias that acts consistently in one direction over time'.[2]

Another report, evaluating the possible financial competing interest among researchers who had published clinical studies in the *British Medical Journal,* concluded that 'authors' conclusions were positively associated with financial competing interests. Other competing interests such as personal or academic were not significantly associated with authors' conclusions'.[3] This study had low power—only 19 trial reports listed 'other competing interests—for instance, personal, academic, or political.' Also, the reporting of nonfinancial interests is by no means standard or covered by most guidelines, so most nonfinancial interests probably go unreported.

Recently, we published a paper describing 'White hat bias (WHB),' which we defined as bias leading to distortion of information in the service of what may be perceived to be righteous ends.[4] Using quantitative evidence, we showed, at least in some areas of investigation, that WHBs that do not stem from financial connections to industry, clearly do not 'cancel out' over the long run as Lesser, *et al.,*[2] hypothesized they would. Rather, WHB seemed to be consistently pushing conclusions in a single direction and systematically distorting the research record.

In the remainder of this paper, we summarize the results of our previously reported investigation into WHB, offer a few additional examples of apparent WHB, often anecdotal, and finally close with some suggestions to reduce the influence of biases, including WHBs, in research.

Summary of Our Previous Findings Related to Breastfeeding and Obesity

Some reports that do not agree with main stream opinion (*e.g.,* a report that sugar-sweetened beverages (SSBs)[1] are not associated with obesity in children or a report that breastfeeding is not protective against childhood weight gain) may never be published. Other reports contain secondary references to support a current position, but incompletely or inaccurately describe the overall results from the secondary reference cited[4] [also labelled as 'unbalanced citations' by Atkinson and Macdonald].[5]

One area in which we documented WHB involved the question of the beneficial effect (or lack thereof) of breastfeeding on the development of obesity.[4] In a review commissioned and published by the World Health Organization (WHO) on the health benefits related to breastfeeding, specifically for obesity in the breastfed offspring, the authors presented evidence about whether breastfeeding protects against obesity and whether there is evidence of publication bias (PB).[6] PB occurs when

---

[1] The term sugar-sweetened beverages (SSBs) is used for consistency with common use in the literature to denote any beverage, which has been sweetened by the addition of a substance containing a nontrivial amount of metabolizable energy. Thus, SSBs do not include beverages sweetened with high-intensity 'noncaloric' sweeteners such as sucralose or aspartame, but may include beverages sweetened with substances not conventionally termed sugar.

the probability of publication depends on the results of the study.[7–8] For example, positive (statistically significant) results are much more likely to be reported than statistically insignificant (null) findings.[9]

Within the WHO-commissioned report, the authors presented a graph showing clear evidence consistent with PB, suggesting that the probability a study was published was positively related to the degree it showed a statistically significant protective association of breastfeeding on obesity. To evaluate the impact of industry funding on such PB, we retrieved and reviewed the papers summarized in this graph. None of the papers reported any industry funding or were written by employees of the infant formula industry. Thus, the strong PB in the literature pertaining to breastfeeding and its relationship to obesity seems because of the behaviour of nonindustry funded scientists and does not appear to be fuelled by industry interests.

Research can also be reported in a misleading manner when authors choose to include incorrect or questionable material and exclude otherwise pertinent information in their reviews or meta-analyses. In our review of the WHO report on breastfeeding,[4] we cited several examples where careful study of some of the original papers revealed that WHO authors selectively included some values from certain primary papers and thereby generated stronger associations of breastfeeding with reduced obesity risk and excluded less impressive values from the same papers without explanation. Misleading reports (or unexplained exclusion of data) can also occur in other areas of research.

Some Additional Examples and Evidence

'Spin,' defined as distorted presentation of data, was identified in reports of randomized clinical trials.[10] In each, the primary outcome was statistically nonsignificant, yet somewhere in the report (title, abstract, *etc.*), the experimental treatment was 'spun' in a way to mislead the reader. In an evaluation of reports of 102 randomized clinical trials (122 published journal articles), 62% of them added a new outcome, had at least one of the primary outcomes changed, or simply omitted the findings.[11]

Recently, the Food and Drug Administration of the U.S. Government issued a docket describing how menu labelling in restaurants would give people the opportunity to make healthier diet choices when eating out.[12] The docket stated that 'the availability of nutritional information through menu labeling would provide Americans the opportunity to exercise personal responsibility and make informed choices about their diets. Studies show that providing nutrition information at restaurants can help people make healthier choices [[13], *Journal of Consumer Research* 2009 36(3): 494–503]' (14) This cited study actually reported that parents will choose slightly lower calorie food options for their children in a restaurant setting; however, the parents did not choose lower calorie foods for themselves (13). This is an example of an unbalanced citation. Rather than stating 'Studies show that providing nutrition information at restaurants can help people make healthier choices,' an accurate statement from that study would have been 'A single study (but not all studies) showed that providing nutrition information at restaurants can help people make healthier choices when they choose food for other people, but not when they choose food for themselves.'

What Can We Do?

Faithful reporting, acknowledging study limitations and evaluating bodies of evidence without selectively excluding information on the basis of its desirability are a few examples of how paediatricians can become committed to scientific truthfulness. They are also encouraged to be sensitive to the possibility of WHB.

Publication bias and exclusion of pertinent data for no apparent reason are examples of WHB and according to Atkinson and Macdonald[5] 'all scientists should strive to have the 'spin' stop with them'. 'Science itself is the antidote to the poison of bias in research'.[15] We need to encourage, and perhaps require the publication of reports that minimize publication bias, and to require that trials and their protocols be registered to enable identification of omissions or distortions of any key procedures, which would affect interpretation of results. These and other ways of shoring up the integrity of the scientific process are not easy steps, will not solve all problems, will create some new challenges and cannot be implemented overnight. Yet we should not make the perfect the enemy of the good and should make the development and implementation of such procedures a priority.

Conclusion

To reduce the influence of bias in research and in general media reporting of scientific findings, there will need to be a concerted effort at all levels from scientist-authors to editors and journalists. We do not yet know how much of WHB is inad-

vertent and how much it results from an anti-industry sentiment, feelings of righteous indignation, a passionate interest in justifying public health actions, or yet other factors. Yet regardless of the root of the WHB, medical professionals, reporters, government policy makers and the public should be aware of such biases and view scientific literature with a critical eye.

Drs. Allison and Cope have received grants, book royalties, honoraria, donations and consulting fees from numerous food, beverage, dietary supplement, pharmaceutical companies, litigators and other commercial, government and nonprofit entities with interests in obesity and nutrition, including interests in breastfeeding and SSBs. Dr. Cope recently accepted a position with Solae LLC (St Louis, MO, USA).

References

1. Friedman L.S., Richter E.D. *Relationship between conflicts of interest and research results.* J. GEN. INTERN. MED. 2004; 19: 51–6.

2. Lesser L.I., Ebbeling C.B., Goozner M., Wypij D., Ludwig D.S. *Relationship between funding source and conclusion among nutrition-related scientific articles.* PLoS MED. 2007; 4: e5.

3. Kjaergard L.L., Als-Nielsen B. *Association between competing interests and authors' conclusions: epidemiological study of randomised clinical trials published in the BMJ.* BMJ 2002; 325: 249.

4. Cope M.B., Allison D.B. *White hat bias: examples of its presence in obesity research and a call for renewed commitment to faithfulness in research reporting.* INT. J. OBES. (Lond) 2010; 34: 84–8; discussion 3.

5. Atkinson R.L., Macdonald I. *White hat bias: the need for authors to have the spin stop with them.* INT. J. OBES. (Lond) 2010; 34: 83.

6. Horta B., Bahl R., Martines J., Victora C. *Evidence of the Long-Term Effects of Breastfeeding: Systematic Reviews and Meta-Analysis.* WHO, Geneva, Switzerland, 2007.

7. Riechelmann R.P., Wang L., O'Carroll A., Krzyzanowska M.K. *Disclosure of conflicts of interest by authors of clinical trials and editorials in oncology.* J. CLIN. ONCOL. 2007; 25: 4642–7.

8. Friedman C.P., Wyatt J.C. *Publication bias in medical informatics.* J. AM. MED. INFORM. ASSOC. 2001; 8: 189–91.

9. Rosenthal R.H. *The "File Drawer Problem" and Tolerance for Null Results.* PSYCHOL. BULL. 1979; 86: 638–41.

10. Boutron I., Dutton S., Ravaud P., Altman D.G. *Reporting and interpretation of randomized controlled trials with statistically nonsignificant results for primary outcomes.* JAMA 2010; 303: 2058–64.

11. Chan A.W., Hrobjartsson A., Haahr M.T., Gotzsche P.C., Altman D.G. *Empirical evidence for selective reporting of outcomes in randomized trials: comparison of protocols to published articles.* JAMA 2004; 291: 2457–65.

12. *Registry F.* FDA Docket. 2010; 75: 39026–8.

13. Tandon P.S., Wright J., Zhou C., Rogers C.B., Christakis D.A. *Nutrition menu labeling may lead to lower-calorie restaurant meal choices for children.* PEDIATRICS 2010; 125: 244–8.

14. Howlett E.A., Burton S., Bates K. and Huggins K. *Coming to a Restaurant Near You? Potential Consumer Responses to Nutrition Information Disclosure on Menus.* JOURNAL OF CONSUMER RESEARCH 2009; 36: 494–503.

15. Allison D.B. *The antidote to bias in research.* SCIENCE 2009; 326: 522–3.

ATTACHMENT 16

White Hat Bias: Examples of Its Presence in Obesity Research and a Call for Renewed Commitment to Faithfulness in Research Reporting

Commentary

M.B. Cope [1] and D.B. Allison [2]

'White hat bias' (WHB) (bias leading to distortion of information in the service of what may be perceived to be righteous ends) is documented through quantitative data and anecdotal evidence from the research record regarding the postulated predisposing and protective effects of nutritively sweetened beverages and breastfeeding, respectively, on obesity. Evidence of an apparent WHB is found in a degree sufficient to mislead readers. WHB bias may be conjectured to be fuelled by feelings of righteous zeal, indignation toward certain aspects of industry or other factors. Readers should beware of WHB, and our field should seek methods to minimize it.

Introduction

Scientific dialogue is dependent on fair and open presentation of data and evidence, yet concerns have been raised in recent years about bias in research practice. We present data and examples pertinent to a particular bias, a 'white hat bias' (WHB), which we define to be bias leading to distortion of research-based information in the service of what may be perceived as righteous ends. We evaluate WHB in the context of two illustrative obesity topics, nutritively sweetened beverage

[1] Department of Pharmacology and Toxicology, School of Medicine, University of Alabama at Birmingham, Birmingham, AL, USA.

[2] Section of Statistical Genetics, Department of Biostatistics, School of Public Health, and Clinical Nutrition Research Center, University of Alabama at Birmingham, Birmingham, AL, USA.

Correspondence: Professor D.B. Allison, Section of Statistical Genetics, Department of Biostatistics, School of Public Health, University of Alabama at Birmingham, Ryals Public Health Building, 1530 3rd Avenue S, RPHB 327, Birmingham, AL 35294–0022, USA. E-mail: *Dallison@uab.edu*.

(NSB) consumption as a postulated risk factor [1] and breastfeeding as a postulated protective factor.[2]

Example 1—Data on citation bias

If secondary reportings of original research misleadingly cite papers with statements that inaccurately describe available evidence, then inaccurate beliefs may inappropriately influence clinical practice, public policy or future research. Previously,[3] we observed that two papers [4–5] had both statistically and non-statistically significant results on body weight, body mass index (BMI) or overweight/obesity status, which allowed future writers to potentially choose which results to cite, and were also widely cited, permitting a quantitative analysis of citations.

*Cited **Versus** Citing Papers*

A Web of Science search (through to October 2008) yielded 195 and 45 papers citing James, *et al.,*[4] and Ebbeling, *et al.,*[5] respectively. We analyzed those in English (165 and 41, respectively).

James, *et al.,*[4] studied an intervention to decrease NSB consumption and adiposity among children. Dichotomized (overweight or obese *versus* neither overweight nor obese) and continuous (change in BMI) data were analyzed for statistical significance. The authors wrote:

> 'After 12 months there was no significant change in the difference in body mass index (mean difference 0.13, −0.08–0.34) or z score (0.04, −0.04–0.12). At 12 months the mean percentage of overweight and obese children increased in the control clusters by 7.5%, compared with a decrease in the intervention group of 0.2% (mean difference 7.7%, 2.2–13.1%).'

Ebbeling, *et al.,*[5] described a randomized controlled trial of a 25 week NSB reduction program in adolescents and wrote:

> 'The net difference (in BMI), 0.14 ± 0.21 kg/m^2, was not significant overall.'

They then report a subgroup finding:

> 'Among the subjects in the upper baseline—BMI tertile, BMI change differed significantly between the intervention . . . and control . . . groups, a net effect of 0.75 ± 0.34 kg/m^2.'

Ebbeling, *et al.* (p. 676) label the analysis in the total sample as the 'primary analysis.'

Table 1   Categorization of 165 Papers Citing James, *et al.*[2]

Score	A	B	C	D	E	F	G	H
No. of references in each category	14	74	2	21	2	1	1	50
Proportion (exact CIs)[a]	0.127 (0.071–0.199)	0.644 (0.548–0.729)	0.017 (0.003–0.068)	0.183 (0.119–0.268)	0.017 (0.003–0.068)	0.009 (0.001–0.055)	0.009 (0.001–0.055)	

Abbreviations: BMI, body mass index; CI, confidence interval.
[a] Proportions and CIs are calculated with only categories A through to G in the denominator. Scoring key: (A) Accurate—described the non-significant result on continuous outcome (change in BMI) and described the significant result on the dichotomous outcome (overweight *versus* non-overweight). (B) Mildly misleading (positively)—Described the result of the intervention study as showing efficacy, benefit or statistical significance for the dichotomous outcome of overweight status, without mentioning the non-significant result on the continuous outcome. (C) Moderately misleading (positively)—Described the result of the intervention study as showing efficacy, benefit or statistical significance on some weight-related outcome without explicitly stating that it was on the proportion overweight *per se*. (D) Explicitly misleading (positively)—Described, with a factually incorrect statement, that the result of the intervention for a continuous weight-related outcome was significant or showed effectiveness. (E) Mildly misleading (negatively)—Described the result of the intervention study as not showing efficacy, benefit or statistical significance on the continuous measure of BMI, without mentioning the significant result on the dichotomous outcome. (F) Moderately misleading (negatively)—Described the result of the intervention study as not showing efficacy, benefit or statistical significance on some weight-related outcome without explicitly stating that it was on the continuous measure of BMI. (G) Explicitly misleading (negatively)—Described, with a factually incorrect statement, that the result for the dichotomous outcome was not significant or that a lack of effectiveness was shown for the dichotomous outcome. (H) Unscorable—Did not make explicit statements about the effects of the study, made statements that were too ambiguous to code or made statements that were self-contradictory.

Data Coding and Analysis

Each paper citing either James, *et al.,*[4] or Ebbeling, *et al.,*[5] was categorized (see *Tables 1* and *2*) on the basis of how authors cited results related to body weight, BMI or overweight/obesity outcomes from these two papers in their report. Papers citing James, *et al.,* were independently coded by the authors of this paper (DBA or MBC). Any discrepancies were resolved by discussion. Papers citing Ebbeling, *et al.,* were scored by DBA and cross-checked by MBC. Proportions (with confidence intervals) were calculated (*Tables 1* and *2*). Exact binomial calculation tested the null hypothesis that the proportion citing papers in a misleading manner that exaggerated the strength of evidence was equal to the proportion citing papers in a mis-

leading manner that diminished the strength of evidence; as such an equal proportion would suggest a lack of bias in the overall literature, even if not in any one paper.

Citation Analysis Results

Results were quite consistent across papers citing either James, *et al.,*[4] or Ebbeling, *et al.,*[5] The majority, 84.3% for James, *et al.,*[4] and 66.7% for Ebbeling, *et al.,*[5] described results in a misleadingly positive manner to varying degrees (that is, exaggerating the strength of the evidence that NSB reduction showed beneficial effects on obesity outcomes). Some were blatantly factually incorrect in their misleading statements, describing the result as showing an effect for a continuous obesity outcome, when no statistically significant effect for continuous obesity outcomes was observed. In contrast, only four papers (3.5%) were negatively misleading (that is, underplayed the strength of evidence) for James, *et al.,*[4] and none were negatively misleading for Ebbeling, *et al.*[5] Only 12.7 and 33% of papers accurately described complete overall findings related to obesity outcomes from James, *et al.,*[4] and Ebbeling, *et al.,*[5] respectively.

To test whether the proportion of misleading reporting in the positive direction was equal to the proportion in the negative direction, we calculated the confidence interval on the proportion of misleading reportings in either direction that was positively misleading. This yields a proportion of 0.96 (95% CI: 0.903–0.985) for those citing James, *et al.,*[4] and 1.00 (95% CI: .832–1.000) for those citing Ebbeling, *et al.,*[5] and is significantly different from $\frac{1}{2}$ for each (*P*<0.0001), indicating a clear bias and potential for readers of the secondary literature to be deceived.

Example 2—Data on publication bias

NSB Consumption

A meta-analysis on NSB consumption and obesity[6] found that estimated adverse associations were significantly smaller (that is, less adverse) among industry-funded than among non-industry-funded studies. One troubling conceivable explanation for this is that industry does something to bias results to make NSBs seem less harmful, but this is not the only conceivable explanation.

To examine this further, we requested, and Dr. Vartanian[6] graciously provided, his meta-analysis data file. Focusing on cross-sectional studies, because a large number had adiposity indicators as outcomes, we conducted publication bias (PB) detection analyses.[7] PB causes the sample of studies published to not constitute a representative sample of the relevant studies that hypothetically could have been published. With PB, the probability of a study being published depends on its outcome. Typically, PB involves statistically significant studies having a higher likelihood of being published than non-statistically significant ones. Our analysis (*Figure 1*) shows a clear inverse association between study precision and association magnitude. This PB hallmark suggests that studies with statistically significant NSB findings are more likely to be published than are nonstatistically significant ones. Interestingly, this bias seems to be present only for non-industry-funded research, suggesting that non-industry-funded scientists tend not to publish their non-significant associations in this area. Contrarily, all industry-funded studies seem to exceed a minimal level of precision. Thus, much of the reason for the smaller associations detected by Vartanian, *et al.,*[6] for industry-funded research seems to be because of PB in non-industry-funded research. However, even after accounting for precision, the mean difference between the association magnitudes of industry and non-industry-funded studies is reduced by 33%, but not eliminated, suggesting that there may be competing biases operating in industry-funded research.

Table 2   Categorization of 41 Papers Citing Ebbeling, *et al.*[3]

Score	A	B	C	D	E	F	G
No. of references in each category	10	9	11	0	0	7	4
Proportion (exact CIs)[a]	0.333	0.300	0.367	0.000	0.000		
	(0.173–0.528)	(0.147–0.494)	(0.199–0.561)	(0.000–0.116)	(0.000–0.116)		

Abbreviations: BMI, body mass index; CI, confidence interval.

[a] Proportions and CIs are calculated with only categories A through to E in the denominator. Scoring key: (A) Accurate—Described both the non-significant result in the total sample and the significant result in the heaviest subgroup. (B) Patently misleading overpositive—Described as positive on weight without mentioning anything about the result only being in heaviest children. (C) Mildly misleading overpositive—Described as positive among the heaviest children without explicitly mentioning that there was no significant result in the total sample. (D) Mildly misleading over-negative—Described the null result in the total sample without explicitly mentioning the significant result in the heaviest subgroup. (E) Patently misleading over-negative—Described as negative in a way that explicitly indicated that there were no significant effects even in sub-groups. (F) Not directly relevant—Did not make clear and explicit statements about the effects of the study. (G) Ambiguous as to whether category A or E applies.

Figure 1
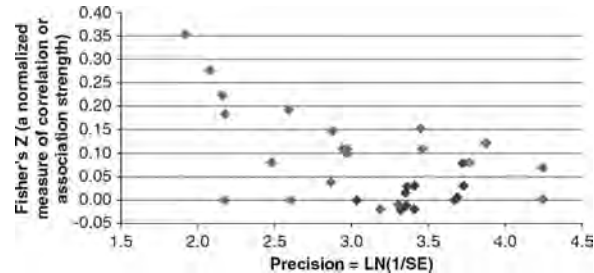
Plot of sample effect sizes from cross-sectional studies of the association between sugar-sweetened beverage consumption and obesity indexes indicating publication bias among non-industry-funded studies (Blue diamonds—industry funded; Red diamonds—non-industry funded).

Breastfeeding

The World Health Organization (WHO;[8]) published a meta-analysis on whether breastfeeding protects against obesity and also found evidence of PB. *Figure 2* indicates this strikingly. We retrieved all papers from which data were obtained for *Figure 2* to evaluate the impact of industry funding on this PB. None of the papers reported any industry funding or were obviously authored by authors employed by the infant formula industry. Thus, as with the NSB literature, there seems to be a strong PB that is not apparently fueled by industry interests.

Figure 2
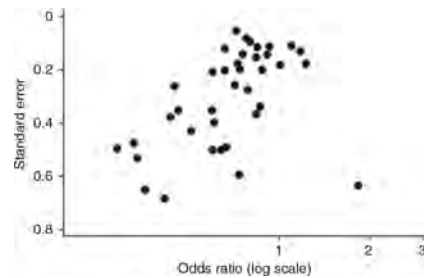
Plot of the relationship between association magnitude and study precision indicating publication bias in studies of breastfeeding and obesity (from Horta, *et al.*[8]).

Example 3—Anecdotal Examples of Miscommunications in Press Releases

Evidence suggests that 'Press releases from academic medical centers often promote research that has uncertain relevance to human health and do not provide key facts or acknowledge important limitations'.[9] This is also occurring in the obesity field. For example, the paper by Ebbeling, *et al.,*[5] states, 'change in body mass index (BMI) was the primary end point. The net difference, 0.14 ± 0.21 kg/m^2, was not significant overall,' and then reports the subgroup finding, 'Among the subjects in the upper baseline-BMI tertile, BMI change differed significantly between the intervention . . . and control . . . groups.' Contrast this modest finding in a sample subset and the circumspect presentation in the original paper with the presentation in the press release issued by the authors' institution (*http://www.childrenshospital.org/ newsroom/Site1339/mainpageS1339P1sublevel192.html* (accessed on 31 October 2008)), which states 'In randomized trial, a simple beverage-focused intervention led to weight loss' and never states that the primary analysis was not statistically significant.

When the paper by James, *et al.,*[4] was released, the press release issued on the *BMJ* website (*http://www.bmj.com/content/vol328/issue7446/press_release.shtml* (accessed on 20 September 2009)) stated 'Discouraging children from drinking fizzy drinks can prevent excessive weight gain, according to new research available on *bmj.com*,' despite the facts that no analysis of weight change *per se* was reported

and that there was no significant effect on BMI change. Neither of these facts was mentioned in the press release.

Finally, in 2009, describing an observational epidemiological study, UCLA issued a press release (*http://www.healthpolicy.ucla.edu/NewsReleaseDetails.aspx?id%35* (accessed on 20 September 2009)) stating '. . . research released today provides the first scientific evidence of the potent role soda and other sugar-sweetened beverages play in fueling California's expanding girth' One of the study authors was quoted in a subsequent news story stating 'For the first time, we have strong scientific evidence that soda is one of the—if not the largest—contributors to the obesity epidemic' (*http://www.drcutler.com/poor-diet/study-soda-making-californians-fat-19373657/* (accessed on 25 September 2009)). These statements are inaccurate and also unfair to all authors of observational studies who published such research years before. The press release further stated 'The science is clear and *conclusive* [emphasis added],' despite the fact that this was a correlational research, and offered no statement to the reader to interpret the results as indicative of correlation and not necessarily causation.

Example 4—Inappropriate Or Questionable Inclusion of Information

Research may also be misleadingly presented by inclusion of incorrect or questionable material in reviews. In our critical review of the WHO report on breastfeeding, we noted several examples (see, Cope and Allison,[2] p. 597) in which an inspection of the original papers reviewed revealed that the authors of the WHO report selectively included some values from certain primary papers that led to stronger associations of breastfeeding with reduced obesity risk and excluded less impressive values from the same papers without explanation.

Similarly, Mattes, *et al.,*[3] noted that several reviews of NSB consumption and obesity inappropriately included a study[10] that was actually neither a test of nutritive sweetener-containing solid food *versus* beverage nor of NSB consumption *versus* non-NSB consumption. Sweeteners were presented in both solid and beverage food forms. The original authors[10] wrote, '. . . subjects who were given supplemental *drinks and foods* [emphasis added] containing sucrose for 10 wk experienced increases in . . . body weight', and thus the study should never have been considered as evaluative of NSB effects. Mattes, *et al.,*[3] provide other examples of papers being inappropriately included in past reviews of NSB consumption and obesity.

Conclusion

Finding effective methods to reduce obesity is an important goal, and appropriate evaluations of the strength of the evidence supporting the procedures under consideration are vital. Sound evaluations critically depend on evidence being presented in non-misleading ways. Alarms have been sounded about dramatic rises in obesity levels, not without justification. And yet, these alarms may also have aroused passions. Certain postulated causes have come to be demonized (for example, fast food, NSBs, formula feeding of infants) and certain postulated palliatives (for example, consumption of fruits and vegetables, building of sidewalks and walking trails) seem to have been sanctified. Such demonization and sanctification may come at a cost. Such casting may ignite feelings of righteous zeal.

Some authors compare NSBs, fast foods and other food and restaurant industry offerings to the tobacco industry (for example, see Browne[11] and Warner[11]), suggesting, for example, comparisons between 'Joe Camel' and 'Ronald McDonald' (*http://www.time.com/time/magazine/article/0,9171,1187241,00.html*). To the extent that such comparisons inform us about important causes of obesity and how to reduce them, this is all to the good. But to the extent that such comparisons and other appeals to passions inflame rather than inform, they may cloud judgment and decrease inhibitions against breaching ordinary rules of conduct. Historians indicate that during times of war, propagandists demonize (that is, dehumanize) the enemy to inflame spirits and this facilitates some breaches of codes of conduct such as massacres.[12] Although inflaming the passions of scientists interested in public health is unlikely to provoke bloodshed, we scientists have, as a discipline, our own code of conduct. Central to it is a commitment to faithful reporting, to acknowledging our study limitations, to evaluating bodies of evidence without selectively excluding information on the basis of its desirability—in short, a commitment to truthfulness. The demonization of some aspects and sanctification of others, although perhaps helpful in spurring social action, may be more harmful to us in the long run by giving unconscious permission to breach that code, thereby eroding the foundation of scientific discipline.

Evidence presented herein suggests that at least one aspect has been demonized (NSB consumption) and another sanctified (breastfeeding), leading to bias in the presentation of research literature to other scientists and to the public at large, a

bias sufficient to misguide readers. Interestingly, although many papers point out what seem to be biases resulting from industry funding, we have identified here, perhaps for the first time, clear evidence that WHBs can also exist in opposition to industry interests.

Whether WHB is intentional or unintentional, and whether it stems from a bias toward anti-industry results, significant findings, feelings of righteous indignation, results that may justify public health actions, or yet other factors, is unclear. Future research should study approaches to minimize such distortions in the research record. We suggest that authors be more attentive to reporting primary results from earlier studies rather than selectively including only a part of the results, to avoiding PB, as well as to ensuring that their institutional press releases are commensurate with the studies described. Journal editors and peer reviewers should also be vigilant and seek to minimize WHB. Clinicians, media, public health policy makers and the public should also be cognizant of such biases and view the literature on NSBs, breastfeeding and other obesity-related topics more critically.

References

1. Allison D.B., Mattes R.D. *Nutritively sweetened beverage consumption and obesity: the need for solid evidence on a fluid issue.* JAMA 2009; 301: 318–320.

2. Cope M.B., Allison D.B. *Critical review of the World Health Organization's (WHO) 2007 report on 'evidence of the long-term effects of breastfeeding: systematic reviews and meta-analysis' with respect to obesity.* OBES. REV. 2008; 9: 594–605.

3. Mattes R.D., Shikany J.M., Allison B.D. *What is the demonstrated value of moderating nutritively sweetened beverage consumption in reducing weight gain or promoting weight loss? An evidence-based review and meta-analysis of randomized studies.* (Submitted for publication).

4. James J., Thomas J.T., Cavan D., Kerr D. *Preventing childhood obesity by reducing consumption of carbonated drinks: cluster randomised controlled trial.* BMJ 2004; 328: 123743.

5. Ebbeling C.B., Feldman H.A., Osganian S.K., Chomitz V.R., Ellenbogen S.J., Ludwig D.S. *Effects of decreasing sugar-sweetened beverage consumption on body weight in adolescents: a randomized, controlled pilot study.* PEDIATRICS 2006; 117: 673–680.

6. Vartanian L.R., Schwartz M.B., Brownell K.D. *Effects of soft drink consumption on nutrition and health: a systematic review and meta-analysis.* AM. J. PUBLIC HEALTH 2007; 97: 667–675.

7. Sterne J.A.C., Egger M. *Regression methods to detect publication and other bias in meta-analysis.* In: Rothstein H.R., Sutton A.J., Borenstein M. (eds). *Publication Bias in Meta-Analysis.* John Wiley & Sons Ltd: West Sussex, UK, 2005.

8. Horta B., Bahl R., Martines J., Victora C. *Evidence of the Long-Term Effects of Breastfeeding: Systematic Reviews and Meta-Analysis.* World Health Organization Publication: Geneva, Switzerland, 2007.

9. Woloshin S., Schwartz L.M., Casella S.L., Kennedy A.T., Larson R.J. *Press releases by academic medical centers: not so academic?* ANN. INTERN. MED. 2009; 150: 613–618.

10. Raben A., Vasilaras T.H., Moller A.C., Astrup A. *Sucrose compared with artificial sweeteners: different effects on **ad libitum** food intake and body weight after 10 wk of supplementation in overweight subjects.* AM. J. CLIN. NUTR. 2002; 76: 721–729.

11. Brownell K.D., Warner K.E. *The perils of ignoring history: big tobacco played dirty and millions died. How similar is Big Food?* MILBANK Q. 2009; 87: 259–294.

12. Levene M., Roberts P. (eds). *The Massacre in History (Studies on War and Genocide).* Berghahn Books: Oxford, UK, 1999.

————

SUBMITTED QUESTION

Response from Diane Whitmore Schanzenbach, Ph.D., Director and Senior Fellow, Economic Studies, Brookings Institution; Professor of Social Policy, and of Economics, The Hamilton Project, Northwestern University*

Question Submitted by Hon. David Scott, a Representative in Congress from Georgia

Question. I have a question for you about the potential effects of adopting WIC restrictions as SNAP restrictions. As you know, WIC is meant to ensure low-income women have access to foods that meet the nutrient needs of pregnancy, infancy and developing young children. The purpose of SNAP, however, is meant to ensure that our low-income people are not hungry. WIC food packages are extremely restrictive, even when it comes to healthy foods, and vary widely by state. For example, currently only $10 is allowed per month on fruits and vegetables. In some states, frozen and canned fruits and vegetables are not allowed to be purchased with WIC benefits. Many states don't even offer yogurt, and when they do, they offer only the large size, certain brands and certain flavors. Many of us, no matter the income level, have dealt with a picky eater in our family, and we've had to find little solutions

————

*There was no response from the witness by the time this hearing was published.

to getting them to eat healthy foods. Maybe they hate strawberry yogurt, but they'll eat blueberry! Maybe they won't eat raw broccoli, but they'll eat steamed frozen broccoli with a little cheese on top. It begs the question, are we trying to make it harder or easier for Americans to feed our families?

Some states are considering asking for a waiver from USDA to restrict SNAP purchases to the preexisting and restrictive list of foods under WIC. Could you please describe what implementation would look like, health outcomes and any unintended negative consequences of states restricting SNAP benefits to those foods offered through the WIC program? Would it further the program's goal of reducing hunger?

Answer.

○