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SECOND EDITION

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SELECT COMMITTEE ON NUTRITION AND HUMAN NEEDS

UNITED STATES SENATE

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FOREWORD

The purpose of this report is to point out that the eating patterns of this century represent as critical a public health concern as any now before us.

We must acknowledge and recognize that the public is confused about what to eat to maximize health. If we as a Government want to reduce health costs and maximize the quality of life for all Americans, we have an obligation to provide practical guides to the individual consumer as well as set national dietary goals for the country as a whole.

These recommendations, based on current scientific evidence, provide guidance for making personal decisions about one's diet. They are not a legislative initiative. Rather, they simply provide nutrition knowledge with which Americans can begin to take responsibility for maintaining their health and reducing their risk of illness.

As with the first edition, this second edition of "Dietary Goals" is a continuation of a process for which the Select Committee hopes the nutrition community, both within the Government and outside, will take over responsibility.

In addition to thanking the Select Committee staff and the original four consultants who have continued to advise the Select Committee on this report—Drs. Mark Hegsted, Philip Lee, Sheldon Margen and Beverly Winikoff—I want to thank Dr. George Bray for his special work on the new obesity goal, and Dr. Lenora Moragne, R.D.

GEORGE MCGOVERN, *Chairman.*

SUPPLEMENTAL FOREWORD BY SENATORS PERCY, SCHWEIKER, AND ZORINSKY

In my Foreword to the first edition of "Dietary Goals for the United States," I stated that Government and industry have a responsibility to respond to the findings of the report. They have done just that. The response has been vigorous and constructive. The original "Dietary Goals" report, though controversial, has helped focus public and professional attention on the need for continuous assessment of the current state of the art in the nutrition field. Furthermore, the report has stimulated debate and research on unresolved issues, and has helped us progress toward the formulation of a national nutrition policy based on sound dietary practices.

The second edition of "Dietary Goals," the product of commendable staff work, greatly improves upon earlier efforts by refining some of the original dietary goals, by adding sections on obesity and alcohol consumption and by more fully representing the scientific controversies which exist both with respect to the setting of dietary guidelines and to the substance of the goals themselves. I am most grateful for the help we have received in connection with this edition. I have long believed in the merits of dietary moderation, maintaining ideal body weight and avoiding excess, especially so called empty calories. To me this emphasis, taken together with regular physical exercise, are as sound public health measures as I know.

Despite the many improvements reflected in this second edition, however, I have serious reservations about certain aspects of the report. After hearing additional testimony from witnesses, discussing these goals with a number of experts and reading rather convincing correspondence from a variety of informed sources, I have become increasingly aware of the lack of consensus among nutrition scientists and other health professionals regarding (1) the question of whether advocating a specific restriction of dietary cholesterol intake to the general public is warranted at this time, (2) the question of what would be the demonstrable benefits to the individual and the general public, especially in regard to coronary heart disease, from implementing the dietary practices recommended in this report and (3) the accuracy of some of the goals and recommendations given the inadequacy of current food intake data.

The record clearly reflects extreme diversity of scientific opinion on these questions. Many such conflicting opinions are included in the Committee's recent publication, "Dietary Goals for the United States—Supplemental Views." Since it is possible that this diversity might be overlooked simply because few people will be able to take the time to read through the voluminous (869 pages) "Supplemental Views" pub-

lication, I have selected a few opinions representative of both viewpoints on the issues in controversy.

On the question of whether or not a restriction of dietary cholesterol intake for the general populace is a wise thing to recommend at this time, the Inter-Society Commission for Heart Disease Resources (1972), the American Heart Association (1973), and several other expert panels suggest a reduction of dietary cholesterol to less than 300 mg per day.

Yet, in October 1977 the Canadian Department of National Health and Welfare reversed its earlier position and concluded in a National Dietary Position that:

> **Evidence is mounting that dietary cholesterol may not be important to the great majority of people. . . . Thus, a diet restricted in cholesterol would not be necessary for the general population.**

A similar conclusion was drawn in 1974 by the Committee on Medical Aspects of Food in its report to Great Britain's Department of Health and Social Security.

Between these points of view are groups such as the New Zealand Heart Foundation which recommends a range of daily cholesterol intake, the maximum of which roughly equals the current average American intake.

Because of these divergent viewpoints, it is clear that science has not progressed to the point where we can recommend to the general public that cholesterol intake be limited to a specified amount. The variances between different individuals are simply too great.

A similar divergence of scientific opinion on the question of whether dietary change can help the heart illustrates that science can not yet verify with any certainty that coronary heart disease will be prevented or delayed by the diet recommended in this report.

For example, Dr. Jeremiah Stamler, chairman of the Department of Preventive Medicine, Northwestern School of Medicine, strongly believes thousands of premature coronary heart disease deaths can "probably be prevented annually through dietary change." However, Dr. E. H. Ahrens, Jr., Professor of Medicine at Rockefeller University, told the Select Committee in March:

> **Advice to the public on changing its dietary habits in hope of reducing the rate of new events of coronary heart disease is premature, hence unwise.**

The same polarity is evidenced when one compares the view of William Kannel, Framingham Heart Study's Director, that Dietary Goals "could have a substantial effect in reducing" coronary heart disease, with the opinion of Vanderbilt University's Dr. George Mann that "no diet therapy has been shown effective for the prevention or treatment" of that disease.

The American Medical Association in an April 18, 1977, letter to the Nutrition Committee states:

> **The evidence for assuming that benefits to be derived from the adoption of such universal dietary goals as set forth in the report is not conclusive and . . . potential for harmful effects . . . would occur through adoption of the proposed national goals.**

This impressive lack of agreement among scientists on the efficacy of dietary change was also noted by the National Heart, Blood and Lung Institute's Dr. Robert Levy, when he observed that there are "bona fide scientific people coming out on both sides of the issue," and by

Health Undersecretary Theodore Cooper's remarks last year to the Committee that a "great deal more nutrition work (is needed) . . . before one can speak with greater certainty concerning large-scale application" of dietary change. Because of this continuing debate, I feel great care must be taken to accurately inform the public about the benefits of the diet proposed in this report.

In fact, because I recognize many will read or hear only about the Dietary Goals and Food Selection pages (pp. 4 and 5) of this Second Edition, I feel the American public would be in a better position to exercise freedom of dietary choice if it were stated in bold print on the Goals and Food Selection pages that *the value of dietary change remains controversial and that science cannot at this time insure that an altered diet will provide improved protection from certain killer diseases such as heart disease and cancer.*

Finally, I want to emphasize the limitations, acknowledged in this edition, in setting goals and food selection recommendations on the basis of food disappearance data, because of the difference between disappearance data, household food consumption data and intake data, which are discussed in the Preface. These data were used because they are the best available at this time. However, in some cases they may not accurately reflect actual food intake. For example, the recommendations to reduce animal fat intake from the present level shown by food disappearance data must be viewed with some reservation because food disappearance data does not adjust for fat loss from retail preparation of meat, fat trimming before and after cooking, fat loss during cooking and tablewaste. The same case could be made for vegetable fat because many vegetable oils used in cooking are discarded and not consumed. Better food intake information, expected shortly, may produce more reliable and perhaps altered recommendations.

In conclusion, I recognize the desirability of providing dietary guidance to the public and in helping the consumer become more responsible for his every day health status. In my judgment, however, the best way to do this is to fully inform the public not only about what is known. but also about what remains controversial regarding cholesterol, the benefits of dietary change, and the reliability of current food intake data. Only then, will it be possible for the individual consumer to respond optimally to the Dietary Goals in this report.

After the Nutrition Committee staff is transferred to the Senate Agriculture Committee's Subcommittee on Nutrition, I hope they will, in cooperation with the Human Resources Subcommittee on Health and Scientific Research continue to review the science and revise Dietary Goals in order that we may continue to progress toward the formulation of national dietary guidelines based on sound dietary practices.

CHARLES H. PERCY,
Ranking Minority Member.
RICHARD SCHWEIKER.
EDWARD ZORINSKY.

SUPPLEMENTAL FOREWORD BY SENATOR DOLE

I wish to underscore the importance of the initiative taken by the Select Committee in the field of human nutrition. More than ever I am coming to believe that preventive medicine in the long run will prove to be the cheapest, most desirable route to good health, maximum productivity and lowered medical and health costs for the consumer and the taxpayer.

Our initiatives, of course, mark only the beginning of a broad scale involvement in nutrition. Indeed, because absolute answers for preventing today's leading killer diseases remain largely unknown, I am encouraged that our work will continue under the Nutrition Subcommittee of the Senate Agriculture, Nutrition and Forestry Committee.

I am also encouraged that under the Food and Agriculture Act of 1977, which I supported, human nutrition research and education will become matters of high priority at the USDA. Of special importance is the act's promotion of better information on human nutrition research requirements, nutrient composition of foods, and factors, affecting food selection. With better information in these areas, the effort we have made thus far will be of increased benefit.

As I reflect on past hearings, personal readings, and discussions about nutrition with staff and constituents alike, I am concerned about certain gaps in our knowledge. For example, more precise information is needed about what people really eat. The question of the exact amounts and kinds of foods Americans consume suffers from an absence of highly refined research tools. The Goals report recommends a reduction in overall fat consumption from approximately 40 percent of energy intake or total calories to 30 percent from fat; and goes on to suggest that this recommendation be met by a mix of lean meats, fish, and poultry.

In the Preface a range of 27 to 33 percent energy intake from fat is recommended. Review of research, including the 15 expert panels appearing on page 75 of the Report suggest a goal of 25 to 35 percent intake from fat.

I am pleased that the second edition deletes language from the first edition recommending "eat less meat" and is not meant to recommend a reduction in intake of nutritious protein foods.

Information about our current level of food intake, including fat are arrived at from USDA "food disappearance data." As this Report states, this guide to food consumption may not be the most accurate research approach, but it is the best data base available at this time. In lieu of this I feel that in the future we need to examine carefully the exact numbers and ranges that we have chosen for the "Dietary Goals." Values presented here should be used as a basis for further consideration and discussion.

Finally I would like to note that the relationship of cholesterol and lipoproteins is a very recent example of how nutrition research can uncover important correlations between diet and health that had previously not been known. We need to examine this lipoprotein concept more thoroughly and expand such basic research. Such research may help clarify the relationship of ingested cholesterol to plasma cholesterol and thereby improve protection against heart disease.

I am confident that this second edition of "Dietary Goals" is indicative of the need for long-term, coordinated research to provide more appropriate and adequate information with which our citizens may assess their particular diets and take individual steps to improve them.

In the future I would like to see the Subcommittee on Nutrition and the Congress support the following:

—Oversight hearings on the implementation of research authorities of the Food and Agriculture Act of 1977.

—Assistance in improving the data base from which dietary goals are developed, especially in the areas of food actually eaten by individuals instead of household intake or commodity disappearance.

—Investigation into on-going research into trace elements, their food sources, and their necessity for health body functions and longevity.

—The significance of high density lipoproteins, their relation to cholesterol, and how this information correlates with what we currently know about risk factors for heart disease.

—Methods for identifying high risk people who are most likely to benefit from following special diet guidelines in order to maintain their health and prevent disease.

—Effectiveness of current government and non-government efforts to inform people about appropriate diets and to motivate people to select such diets.

I add these remarks to highlight the fact that while much remains unknown or controversial in matters of diet and health, much can and is being done to define and resolve the issues before us and to generate and communicate to the American public the information it needs to select a healthy diet. In the interim, interpretation of the "Dietary Goals" should be carefully assessed according to individual needs and desires.

ROBERT DOLE.

[Press Conference, Friday, January 14, 1977, Room 457, Dirksen Senate Office Building]

STATEMENT OF SENATOR GEORGE McGOVERN ON THE PUBLICATION OF DIETARY GOALS FOR THE UNITED STATES

Good morning.

The purpose of this press conference is to release a Nutrition Committee study entitled *Dietary Goals for the United States*, and to explain why we need such a report.

I should note from the outset that this is the first comprehensive statement by any branch of the Federal Government on risk factors in the American diet.

The simple fact is that our diets have changed radically within the last 50 years, with great and often very harmful effects on our health. These dietary changes represent as great a threat to public health as smoking. Too much fat, too much sugar or salt, can be and are linked directly to heart disease, cancer, obesity, and stroke, among other killer diseases. In all, six of the ten leading causes of death in the United States have been linked to our diet.

Those of us within Government have an obligation to acknowledge this. The public wants some guidance, wants to know the truth, and hopefully today we can lay the cornerstone for the building of better health for all Americans, through better nutrition.

Last year every man, woman and child in the United States consumed 125 pounds of fat, and 100 pounds of sugar. As you can see from our displays, that's a formidable quantity of fat and sugar.

The consumption of soft drinks has more than doubled since 1960—displacing milk as the second most consumed beverage. In 1975, we drank on the average of 295, 12 oz. cans of soda.

In the early 1900's, almost 40 percent of our caloric intake came from fruit, vegetables and grain products. Today only a little more than 20 percent of calories comes from these sources.

My hope is that this report will perform a function similar to that of the Surgeon General's Report on Smoking. Since that report, we haven't eliminated the hazards of smoking, nor have people stopped smoking because of it. But the cigarette industry has modified its products to reduce risk factors, and many people who would otherwise be smoking have stopped because of it.

The same progress can and must be made in matters of nutritional health, and this report sets forth the necessary plan of action:

1. Six basic goals are set for changes in our national diet;
2. Simple buying guides are recommended to help consumers attain these goals; and

3. Recommendations are also made for action within Government and industry to better maximize nutritional health.

I hope this report will be useful to millions of Americans. In addition to providing simple and meaningful guidance in matters of diet, it should also encourage all those involved with growing, preparing, and processing food to give new consideration to the impact of their decisions on the nation's health. There needs to be less confusion about what to eat and how our diet affects us.

With me this morning are three of the country's leading thinkers in the area of nutritional health. They have very graciously assisted the staff of the Select Committee in the preparation of this report. They will explain in greater detail its purpose and goals.

First, Dr. Mark Hegsted, Professor of Nutrition from the Harvard School of Public Health. Dr. Hegsted has a long and distinguished career in science, bringing conscience as well as great expertise to his work. Dr. Hegsted has worked very closely and patiently with the committee staff on this report, devoting many hours to review and counseling. He feels very strongly about the need for public education in nutrition and the need to alert the public to the consequences of our dietary trends. He will discuss these trends and their connection with our most killing diseases.

Following his presentation, Dr. Beverly Winikoff of the Rockefeller Foundation will discuss the changes necessary in food marketing and advertising practices if the consumer is to make more healthful food choices. Dr. Winikoff, who with Dr. Hegsted and Dr. Lee testified at our hearings in July, has also been extremely helpful in assisting the committee staff in preparing this report.

Dr. Philip Lee, the Director of the Health Policy Program at the University of California in San Francico, and and a former Assistant Secretary for Health, will conclude our presentation with a discussion of the costs of our current dietary trends. Dr. Lee has also consulted with the committee staff on this report and has offered much encouragement.

Before Dr. Hegsted begins, I would also like to note that the staff has also received valuable assistance from Dr. Sheldon Margen, a nutritionist with the University of California in Berkeley, who is traveling outside the country today.

I want to thank each of these people personally for their help and their spirted concern for the public interest.

The Committee will continue its investigation into the connection between diet and health on February 1 and 2, when hearings will be held concentrating on problems of diet and heart disease and obesity.

After the presentation today we will be glad to answer questions.

[Press Conference, Friday, January 14, 1977, Room 457, Dirksen Senate Office Building]

STATEMENT OF DR. D. M. HEGSTED, PROFESSOR OF NUTRITION, HARVARD SCHOOL OF PUBLIC HEALTH, BOSTON, MASS.

The diet of the American people has become increasingly rich—rich in meat, other sources of saturated fat and cholesterol, and in sugar. There will be people who will contest this statement. It has been pointed out repeatedly that total sugar use has remained relatively constant for a number of years. We would emphasize, however, that our total food consumption has fallen even though we still eat too much relative to our needs. Thus, the proportion of the total diet contributed by fatty and cholesterol-rich foods and by refined foods has risen. We might be better able to tolerate this diet if we were much more active physically, but we are a sedentary people.

It should be emphasized that this diet which affluent people generally consume is everywhere associated with a similar disease pattern—high rates of ischemic heart disease, certain forms of cancer, diabetes, and obesity. These are the major causes of death and disability in the United States. These so-called degenerative diseases obviously become more important now that infectious diseases are, relatively speaking, under good control. I wish to emphasize that these diseases undoubtedly have a compléx etiology. It is not correct, strictly speaking, to say that they are caused by malnutrition but rather that an inappropriate diet contributes to their causation. Our genetic make-up contributes—not all people are equally susceptible. Yet those who are genetically susceptible, most of us, are those who would profit most from an appropriate diet. Diet is one of the things that we can change if we want to.

There will undoubtedly be many people who will say we have not proven our point; we have not demonstrated that the dietary modifications we recommend will yield the dividends expected. We would point out to those people that the diet we eat today was not planned or developed for any particular purpose. It is a happenstance related to our affluence, the productivity of our farmers and the activities of our food industry. The risks associated with eating this diet are demonstrably large. The question to be asked, therefore, is not why should we change our diet but why not? What are the risks associated with eating less meat, less fat, less saturated fat, less cholesterol, less sugar, less salt, and more fruits, vegetables, unsaturated fat and cereal products—especially whole grain cereals. There are none that can be identified and important benefits can be expected.

Ischemic heart disease, cancer, diabetes and hypertension are the diseases that kill us. They are epidemic in our population. We cannot afford to temporize. We have an obligation to inform the public of the current state of knowledge and to assist the public in making the correct food choices. To do less is to avoid our responsibility.

[Press Conference, Friday, January 14, 1977, Room 457, Dirksen Senate Office Building]

STATEMENT OF DR. BEVERLY WINIKOFF, ROCKEFELLER FOUNDATION, NEW YORK, N.Y.

What are the implications of these dietary goals?

The fact that the goals can be stated in nutritional terms first and then mirrored in a set of behavioral changes impels a closer look at why Americans eat the way they do. What people eat is affected not only by what scientists know, or by what doctors tell them, or even by what they themselves understand. It is affected by Government decisions in the area of agricultural policy, economic and tax policy, export and import policy, and involves questions of good production, transportation, processing, marketing, consumer choice, income and education, as well as food availability and palatability. Nutrition, then, is the end result of pushes and pulls in many directions, a response to the multiple forces creating the "national nutrition environment."

Even "personal dietary preferences" are not immutable but interact with other forces in the environment and are influenced by them. People learn the patterns of their diet not only from the family and its sociocultural background, but from what is available in the marketplace and what is promoted both formally through advertising and informally through general availability in schools, restaurants, supermarkets, work places, airports, and so forth.

It is generally recognized with regard to the overall economic climate that both what the Government does do and what it does not do shape the arena in which other forces interact. This is also true with regard to nutrition. In determining the parameters of the socioeconomic system, Government also determines the nature of the national buffet. Government policy, then, must be made with full awareness of this responsibility.

It is increasingly obvious that if new knowledge is to result in new behaviors then people must be able to act, without undue obstacles, in accordance with the information that they learn. The problem of education for health as it has been practiced is that it has been in isolation, not to say oblivion, of the real pressures, expectations, and norms of society which mold and constrain individual behavior. There must be some coordination between what people are taught to do and what they can do. Part of the responsibility for this coordination rests with the Government's evaluation and coordination of its own activities. Effective education must be accompanied by Government policies which make it easier, indeed likely, that an individual will change his or her lifestyle in accordance with the information offered.

At present, we see a situation in which the opposite is often the case. Nutrition and health education are offered at the same time as barrages of commercials for soft drinks, sugary snacks, high-fat foods, cigarettes and alcohol. We put candy machines in our schools, serve high-

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fat lunches to our children, and place cigarette machines in our work places. The American marketplace provides easy access to sweet soft drinks, high-sugar cereals, candies, cakes, and high-fat beef, and more difficult access to foods likely to improve national nutritional health.

This trend can be reversed by specific agricultural policies, pricing policies, and marketing policies, as well as the recommendations outlined in these "Dietary Goals for the United States."

In general, Americans have quite accurate perceptions of sound nutritional principles, as was demonstrated recently by a Harris poll conducted for the Mount Sinai Hospital in Chicago. However, people do lack understanding of the consequences of nutrition-related diseases. There is a widespread and unfounded confidence in the ability of medical science to cure or mitigate the effects of such diseases once they occur. Appropriate public education must emphasize the unfortunate but clear limitations of current medical practice in curing the common killing diseases. Once hypertension, diabetes, arteriosclerosis of heart disease are manifest, there is, in reality, very little that medical science can do to return a patient to normal physiological function. As awareness of this limitation increases, the importance of prevention will become all the more obvious.

But prevention is not possible solely through medical interventions. It is the responsibility of government at all levels to take the initiative in creating for Americans an appropriate nutritional atmosphere—one conducive to improvement in the health and quality of life of the American people.

[Press Conference, Friday, January 14, 1977, Room 457, Dirksen Senate Office Building]

STATEMENT OF DR. PHILIP LEE, PROFESSOR OF SOCIAL MEDICINE AND DIRECTOR, HEALTH POLICY PROGRAM, UNIVERSITY OF CALIFORNIA, SAN FRANCISCO, CALIF.

The publication of *Dietary Goals for the United States* by the Senate Select Committee on Nutrition and Human Needs is a major step forward in the development of a rational national health policy. The public health problems related to what we eat are pointed out in *Dietary Goals*. More important, the steps that can and should be taken by individuals, families, educators, health professions, industry and Government are made clear.

As a Nation we have come to believe that medicine and medical technology can solve our major health problems. The role of such important factors as diet in cancer and heart disease has long been obscured by the emphasis on the conquest of these diseases through the miracles of modern medicine. Treatment not prevention, has been the order of the day.

The problems can never be solved merely by more and more medical care. The health of individuals and the health of the population is determined by a variety of biological (host), behavioral, sociocultural and environmental factors. None of these is more important than the food we eat. This simple fact and the importance of diet in health and disease is clearly recognized in *Dietary Goals for the United States.*

The Senate Select Committee on Nutrition and Human Needs has made four recommendations to encourage the achievement of the very sound dietary goals incorporated in the report. These are:

1. a large scale public nutrition education program involving the schools, food assistance programs, the Extension Service of the Department of Agriculture and the mass media;
2. mandatory food labeling for all foods;
3. the development of improved food processing methods for institutional and home use; and
4. expanded federal support for research in human nutrition.

It is important that *Dietary Goals for the United States* be made widely available because it is the only publication of its kind and it will be an invaluable resource for parents, school teachers, public health nurses, health educators, nutritionists, physicians and others who are involved in providing people with information about the food they eat.

The recommendations, if acted upon promptly by the Congress, can help individuals, families and those responsible for institutional food services (schools, hospitals) be better informed about the consequences of present dietary habits and practices. Moreover, they provide a practical guide for action to improve the unhealthy situation that exists.

The effective implementation of the Senate Select Committee recommendations and the proposed dietary goals could have profound health and economic benefits. Not only would many people lead longer and healthier lives but the reduced burden of illness during the working lives of men and women would reduce the cost of medical care and increase productivity.

What can be done to assure sustained and effective action on these recommendations? First, the Congress can act to appropriate the needed funds for the proposed programs. In some instances, such as mandatory food labeling, it must also enact the authorizing legislation. Second, the new Secretaries of Agriculture and Health, Education, and Welfare can act as soon as they take office to create a joint policy committee to address the issues raised by the Senate Select Committee and provide a means to assure that health considerations will no longer take a back seat to economic considerations in our food and agriculture policies. Finally, our greatest bulwark against the interests that have helped to create the present problems is an informed public.

PREFACE

Dietary Goals for the United States—Second Edition is intended to update and elaborate upon *Dietary Goals for the United States*,[1] published in February 1977. This edition, like the first, is written primarily for use by consumers. It represents the Senate Select Committee on Nutrition and Human Needs' best judgment as to prudent dietary recommendations based on current scientific knowledge.

Since the publication of the 1st Edition of *Dietary Goals for the United States*, the Select Committee has continued to solicit the opinions of many of our leading experts on human nutrition, as well as concerned health and industry groups. Numerous comments were received. With the issuance of this edition, the Select Committee further addresses the on-going scientific controversies which exist, both with respect to the setting of dietary guidelines, and the substance of the *Dietary Goals*.

The actual comments received ranged from the general to the specific, and have been printed in full either in hearing records or in *Dietary Goals for the United States—Supplemental Views*.[2] Many of the points raised are discussed in this Preface.

The Select Committee and Dietary Goals

The Senate Select Committee on Nutrition and Human Needs came into existence in 1968 as a bridge between the food and farm interests in the Agriculture Committee, and the health, welfare, and research interests in the then Labor and Public Welfare Committee. It was provided with oversight responsibilities in nutrition which it actively pursued through investigations, hearings, reports, and the drafting of legislation. The legislation was then sent to the appropriate standing Committee for consideration, and in most cases, eventual passage.

In the early years, the Select Committee focused its attention on programs designed to eliminate hunger, as this was the most pressing nutrition concern. But during those years, more and more evidence was building to provide a basis on which the Select Committee could expand to its full scope—the investigation and oversight of nutrition as it relates to the health of all Americans.

Two years ago, the Select Committee began to respond to the growing need expressed by consumers, researchers and health professionals to address the accumulation of scientific data linking diet and many of the Nation's major killer diseases. Issues other than hunger re-

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[1] Dietary Goals for the United States, February 1977, U.S. Government Printing Office, Washington, D.C., Stock No. 052–070–03913–2, Price—95¢.

[2] Dietary Goals for the United States—Supplemental Views, November 1977, U.S. Government Printing Office, Washington, D.C., Stock No. 052–070–04294–0, Price—$5.75.

quired attention. Both sides of malnutrition—overconsumption as well as underconsumption—demanded evaluation.

In expanding the scope of its work, the Select Committee more clearly recognized the necessity of trying to reduce the Nation's staggering medical care costs by promoting health maintenance and preventive medicine. In examining the problem of medical care cost inflation, the Select Committee concluded that improved nutrition was a key part of the solution.

Furthermore, a concerted action to improve the Nation's health through better nutrition was viewed as a means to fill the policy vacuum which was keeping the Nation from redressing the balance between curative and preventive medicine.

Members of the medical care industry and of Government had been studying how best to address this imbalance. In Canada, some direction was provided when the Minister of Health, Marc LaLonde, issued a document in 1974 entitled, *A New Perspective on the Health of Canadians.*[3] This report acknowledged and analyzed the need for greater emphasis on preventive health care measures, in conjunction with the necessity of greater self-reliance and conservation by the Canadian people. The issuance of the LaLonde report presented a common ground for discussion on how to proceed with the new direction Canada had set for itself.

In a similar way, *Dietary Goals for the United States* provided a potential catalyst for action and guidelines everyone could address, whether they agreed on its substance or not.

The 2nd Edition of *Dietary Goals for the United States* continues to provide a common ground for discussion, and a basis for considering changes required to improve our food and health systems.

And, although not specifically addressed in this report, there are also potentially enormous non-health benefits to be gained by following a basically prudent diet, and by asserting more overall control over our health. For example, approximately one-fifth of the energy consumed in the United States goes into food production and processing. Perhaps the kind of basic prudent dietary recommendations made in this report will help to provide not only a framework for reducing dietary risk but also for more prudent use of energy.

Food production and processing is America's number one industry and medical care ranks number three. Nutrition is the common link between the two. Nutrition is a spectrum which runs from food production at one end to health at the other.

By recognizing this connection, this report has helped to begin a process of weaving into whole cloth many separate threads. Hopefully, as one result, nutrition will become a major priority of this Nation's agriculture policy. Demands for better nutrition could bring a halt to the expansion and/or use of less nutritious or so-called "empty calorie" or "junk" foods in the American diet, as well as make nutrition the rallying point of public demands for *better* health, as opposed to *more* medical care. Human nutrition research may become the

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[3] *A New Perspective on the Health of Canadians,* a working document, April 1974, Marc LaLonde, Minister of National Health and Welfare, Government of Canada.

cutting edge in many areas of bio-medical science. Most importantly, nutrition knowledge will become a means by which Americans can begin to take responsibility for maintaining their health and reducing their risk of illness.

Risk Factors, Diet and Health

The Concept

The objective of this report, improved health through informed diet selection by every American, is best served if the reader fully understands the idea of "risk factors," and what this phrase means in terms of diet and health.

In general, "risk factors" refers to specific characteristics—age, lifestyle, diet, income, habits such as smoking or excessive use of alcohol, or even where people live or work— that are associated with a higher than average incidence of a specific health problem. Risk factors are usually identified by nutritionists, statisticians, epidemiologists, and those health professionals who look carefully at the reports describing the incidence of various diseases in various population groups. If it is determined that one group of people who have something in common also have a higher incidence of a certain disease, they begin to study the possibility that the common factor among these people may either cause, or help cause, the disease.

Risk factors, therefore, are warning flags. They suggest that, if a characteristic describes a person, the chances are greater that he or she may now or in the future have the same health problem of the other people who have the same characteristic, be it a habit, an age, or a dietary pattern.

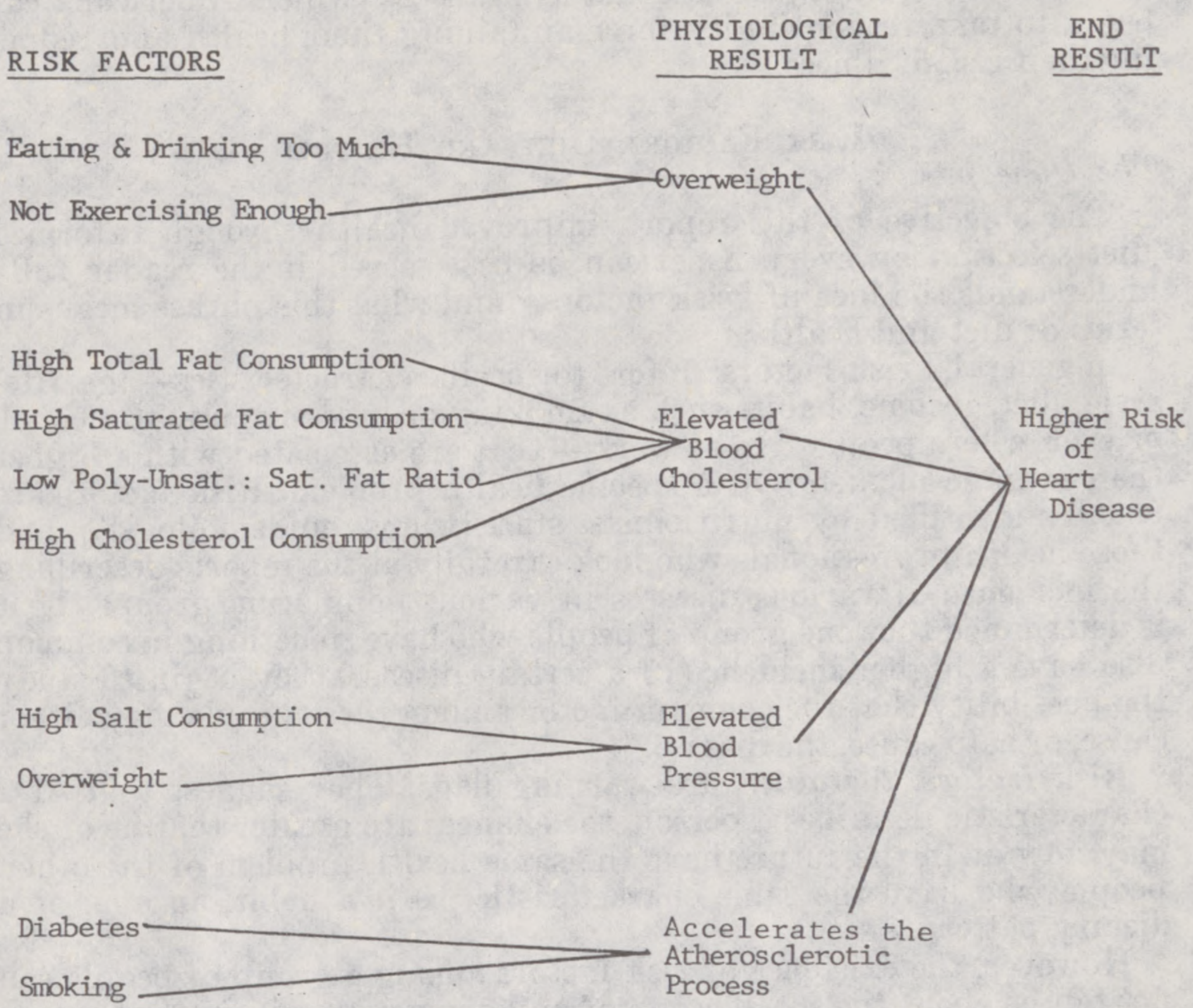
However, the existence of risk factors among a group of people can not tell us about the specific fate of any one person within that group. Risk factors can only tell us the probability of an event occurring. As a result, altering a risk factor or group of risk factors changes the probability of an event occurring. but does not guarantee for a specific individual that an event will or will not occur to him or her.

Finally, on the one hand, there are some risk factors that a person has no control over—age, sex, and genetics or diseases that are common in their family. On the other are those controllable risk factors such as smoking, exercising, abusing alcoholic beverages, regularly brushing one's teeth, maintaining a reasonable pattern of work and rest, and, of course, selecting the most appropriate diet.

Specificity of Risk Factors

It is important to know which risk factors are associated with which specific health problems. In some cases, several risk factors are associated with one disease. For instance, smoking, lack of exercise, diet and several other characteristics are considered risk factors for heart disease. On the other hand, one risk factor may be associated with several diseases. For example, obesity is associated with an increased risk of heart disease, the severity of hypertension, and makes it much more difficult for a diabetic to control the ups and downs of his/her blood glucose and related problems. The following diagram illustrates the interrelationship of some risk factors associated with heart disease.

Some Risk Factors Associated with Heart Disease



Targeting and Variations Among People

The specific goals in this report provide dietary guidelines for the general population. However, each person differs with respect to energy needs, and the thousands of food products available differ in their nutrient and energy value. Nutrient requirements differ during certain periods of the normal life cycle, as during the growth and development of children, and during pregnancy and lactation. They also differ among different sex and age groups.

Targeting the food recommendations for specific age groups with special needs, is only partially addressed in this edition of *Dietary Goals*. For example, the low-fat dairy products recommendation should not be applied to young children.

Also, persons with physical and/or mental ailments who have reason to believe that they should not follow guidelines for the general population should consult with a health professional having expertise in nutrition, regarding their individual case.

The reader will be in a better position to use the *Dietary Goals* for planning his or her own diet if the following is kept in mind:

(1) Foods are made up of various combinations or "natural packages" of macro-nutrients and micro-nutrients. Macro-nutrients are proteins, carbohydrates, fats and alcohol. Energy (which is

measured in calories) is provided by macro-nutrients. Micro-nutrients are vitamins and minerals. These are needed to release the energy of macro-nutrients so that they can be used for the body. Micro-nutrients are also needed for other purposes such as maintaining the body's normal functions.

(2) The amount of energy-producing macro-nutrients that a person should eat depends on the amount of energy needed by that person's body. A person needs more energy if he or she is active and gets a lot of exercise than if he or she is inactive and does not exercise. Another consideration regarding how much of the macro-nutrients a person should eat is that people who want to gain weight should consume more macro-nutrients whereas people who want to lose weight should consume less macro-nutrients.

(3) The amount of energy provided by a food depends on how much protein (4 calories/gm), carbohydrates (4 calories/gm), fats (9 calories/gm) and/or alcohol (7 calories/gm) are in a serving of that food.

(4) The proper place in the diet—the amount and the frequency of use—of a food for any one person depends on many factors including: that individual's need for energy, and specific vitamins or minerals, which is based primarily on age, sex and energy expenditure; that person's health and lifestyle; and the nutrient composition of other foods that make up that person's total diet.

(5) The appropriateness of a food for any one person also depends on personal factors such as taste preference, financial means, religious persuasion, family traditions, and other personal values.

Recommended Dietary Allowances and the Dietary Goals

Setting Recommended Dietary Allowances

The concept of setting dietary guidelines has been well established since 1943 when the Food and Nutrition Board of the National Academy of Sciences (NAS, FNB) set forth "Recommended Dietary Allowances" (RDA)[4] for the first time. The RDA, which focus on micro-nutrients, protein and total energy in the diet, are now in their eighth edition and were most recently revised in 1974. As stated in that edition:

> The Recommended Dietary Allowances are the levels of intake of essential nutrients considered, in the judgment of the Food and Nutrition Board on the basis of available scientific knowledge, to be adequate to meet the known nutritional needs of practically all healthy persons.

The RDA are continually up-dated and published with the objective of providing standards for good nutrition, and to encourage the development of food use practices by the American people that will allow for maximum dividends in the maintenance and promotion of health. The RDA have come to serve as a guide in such areas as the interpretation of food consumption records, the establishment of standards for public assistance programs, the evaluation of the ade-

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[4] *Recommended Dietary Allowances,* 8th Ed., 1974, Committee on Interpretation of the Recommended Dietary Allowances, Food and Nutrition Board, National Research Council, National Academy of Sciences, Washington, D.C.

quacy of food supplies in meeting natural nutrient needs, and the establishment of guidelines for nutrition labeling of foods.

The Food and Nutrition Board realizes and acknowledges that the present knowledge of nutritional needs is incomplete, and that the human requirements for many nutrients have not been established. In fact, since the essentiality of many nutrients is still unknown, they recommend that a person should obtain his or her nutrients from as varied a selection of foods as is practicable. In addition, the RDA should not be confused with requirements, because differences in the nutrient requirements of individuals that derive from differences in their genetic make-up are ordinarily unknown. Finally, the RDA are intakes of nutrients that meet the needs of healthy people, and do not take into account special needs arising from infections, metabolic disorders, chronic diseases, or other abnormalities that require special dietary treatment.

Setting Dietary Goals

Setting *Dietary Goals* extends the concept of the "Recommended Dietary Allowances" to include macro-nutrients, as well as sodium and cholesterol. By having dietary guidance for both micro- and macro-nutrients, the American people will be in an even better position to develop food use practices that will increase the probability for maximum dividends in the maintenance and promotion of health.

The *Dietary Goals* are stated in terms of specific levels. However, each level represents a conclusion based on the scientific evidence and the levels recommended by the thirteen panels of scientific experts whose recommendations are summarized in Appendix B. Therefore, each specific level should be considered as the center of a range. The ranges are:

Total Carbohydrate (55–61%)
Complex Carbohydrates and "Naturally Occurring" [5] Sugars (45–51%)
Refined and Processed [5] Sugars (8–12%)
Total Fat (27–33%)
Poly-unsaturated (8–12%)
Mono-unsaturated (8–12%)
Saturated (8–12%)
Protein (10–14%)
Cholesterol (250–350 mg)
Salt (4–6 gms)

Finally, because changing one's dietary pattern is normally a slow process of adjustment, the *Dietary Goals* should initially be viewed as indicating a direction and general magnitude for the change recommended. Once the *Dietary Goals* are achieved, one must approach food consumption as an average to be reached over a period of a few days, and, therefore, not expect to consume each day the exact recommended proportion of calories from fats, carbohydrates and protein, or the exact amount of salt and cholesterol.

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[5] "Naturally occurring" sugars are those which are indigenous to a food, as opposed to refined (cane and beet) and processed (corn sugar, syrups, molasses and honey) sugars which may be added to a food product.

Differences Between the RDA and the Dietary Goals

There is a major distinction between the RDA and the *Dietary Goals*. The RDA are determined from basic research on animals and metabolic studies in humans which examine the particular micro-nutrients presently considered to be essential to normal human development. Because of the current state of nutrition research, nutritionists have greater confidence in their conclusions concerning micro-nutrients than in their observations about macro-nutrients.

The *Dietary Goals*, which primarily examine macro-nutrients, are derived from basic research on animals, metabolic studies and clinical trials with humans, and epidemiological investigations. In addition, and unlike the RDA, the *Dietary Goals* depend on using food consumption patterns from one or more of three data bases which include:

(1) Food Disappearance: Food that disappears into civilian food consumption, sometimes referred to as the U.S. per capita food supply. The data are collected annually by the Economic Research Service of the United States Department of Agriculture (USDA). The nutritive value of these amounts of foods is estimated by the Agricultural Research Service of USDA.

(2) Household Food Consumption: These food consumption data are collected every ten years or so from representative samples of households across the country by the Agricultural Research Service. These data are food used by households over a seven-day period in terms of food brought into the kitchen—as purchased, or obtained from home gardens, or as gift or pay. Nutritive values of these amounts of foods are estimated and compared to the RDA's for family members.

(3) Food Intake or Food Actually Eaten by Individuals: These data are usually collected by recall methods for a day or a period of a few days. They include amounts of food eaten at home and away from home.

The percentages of the energy provided by the macro-nutrients (fat, protein and carbohydrate) in the current American diet, as depicted in the first and second editions of *Dietary Goals for the United States*, are based on 1974 food disappearance data from USDA.

Food disappearance was chosen as the best data base available, because the alternative, the most recent USDA Household Food Consumption Survey, was completed over ten years ago. While there is debate within nutrition circles as to which survey method is most accurate, clearly food disappearance, food purchased for use in the home and food in-take data are all interrelated, and have been found to be comparable with respect to the percent of caloric intake from carbohydrates, fats and protein.

To be as accurate and helpful as possible for the user it is important that the Dietary Goals be based on the data which most closely reflects actual food intake. Therefore, in the future serious consideration should be given to altering the dietary guidelines to reflect either the 1977–78 USDA Household Food Consumption Survey data,[6] or the

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[6] Published data unavailable until 1979.

Health and Nutrition Examination Survey (HANES) food intake data,[7] whose analyses have not yet been completed.

The First Edition of Dietary Goals for the United States

The First Edition of *Dietary Goals* was drafted in response to an ominous fact pattern which associates certain dietary patterns and factors with six of the ten leading causes of death. The first two hearings in July 1976 in the "Diet Related to Killer Diseases" series ("Diet and Preventive Medicine" and "Diet and Cancer") [8] helped make the Select Committee more aware of a very sobering epidemiological information base. The following represent some of the epidemiological observations presented at the Diet and Cancer hearing:

- Deaths from colon and breast cancer are uncommon in countries with diets low in animal and dairy fats;
- Groups whose diets are low in fat and high in dietary fiber have much lower rates of cancers of the colon, rectum, breast and uterus than comparable groups of Americans who consume more fat and less dietary fiber;
- Japanese who migrate to the United States and change to a Western diet from their traditional Japanese diet which contains little animal fat and almost no dairy products, dramatically increase their incidence of breast and colon cancer;
- Compared with persons of normal weight, obese people have a higher risk of developing cancer, especially cancers of the uterus, breast, and gall bladder.

The first witness in the "Diet Related to Killer Diseases" series, Dr. Ted Cooper, then Assistant Secretary for Health, HEW, told the Committee that:

> While scientists do not yet agree on the specific causal relationships, evidence is mounting and there appears to be general agreement that the kinds and amounts of food and beverages we consume and the style of living common in our generally affluent, sedentary society may be the major factors associated with the cause of cancer, cardiovascular disease, and other chronic illnesses.

He agreed that malnutrition in the United States is associated with six of the ten leading causes of death, including heart disease, some cancers, stroke and hypertension, arteriosclerosis, diabetes, and cirrhosis of the liver.

Dr. Gio Gori, Deputy Director of the National Cancer Institute, told the Committee that:

> In the United States the number of cancer cases a year that appear to be related to diet are estimated to be 40 percent of the total incidence for males and about 60 percent of the total incidence for females. The forms of cancer that appear to be dependent on nutrition as shown by epidemio-

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[7] Dietary Intake Findings, United States, 1971–74. DHEW No. (HRA) 77–1647. Series 11, No. 22. U.S. Government Printing Office, July 1977. Stock No. 017–022–00564–6.

[8] "Diet Related to Killer Diseases," July 27 and 28, 1976, U.S. Government Printing Office, Washington, D.C., Stock No. 052–070–03872–1, Price $3.40.

logic studies include: Stomach, liver, breast, prostate, large intestine, small intestine, and colon. There are other forms of cancer for which evidence is being collected, but as yet, strong evidence is not available.

Again, I want to emphasize we are not saying that there is a direct relationship between diet and cancer. We do have strong clues that dietary factors play a preponderant role in the development of these tumors.

Dr. Ernst L. Wynder, President and Medical Director of the American Health Foundation in New York, agreed. He testified:

> Breast cancer, the biggest killer of all cancers in women, has a geographic distribution similar to that of colon cancer and is also associated worldwide with the consumption of a high fat diet. Again, the disease is relatively rare in Japan, but increases among Japanese migrants to the United States. Like colon cancer, it is relatively uncommon among Puerto Ricans who have a relatively low intake of cholesterol and fat in their diet.

The Select Committee reviewed a wide variety of scientific data and testimony in developing the recommended guidelines. The information received came from dietitians, nutritionists, research scientists, and the highest health officials of this country. In addition, consideration was given to recommendations of various professional panels in the United States and other countries, which are summarized in Appendix B.

Finally, during the report's development the Select Committee continually consulted with nutritionists, including Dr. Mark Hegsted who was the first president of the National Nutrition Consortium and a past president of the Food and Nutrition Board of the National Academy of Sciences; and health policymakers, including Dr. Philip Lee who was the first Assistant Secretary for Health, HEW.

The Second Edition of Dietary Goals for the United States

As the first publication by the Federal Government to set guidelines for the macro-nutrients in our diet, this report has generated a great deal of interest, debate, and even controversy among consumers, scientists, and industry representatives.

Two industries—meat and egg producers—requested additional hearings to express their views. These were held on March 24 [9] and July 26 [10] respectively.

In addition, the National Live Stock and Meat Board sent the Select Committee the names of 24 experts, "whose professional backgrounds and experience in recent years suggest intimate knowledge of the fact, fallacies and controversy which surround the concepts or hypotheses

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[9] "Diet Related to Killer Diseases, Vol. III, Response to Dietary Goals for the U.S.—Re Meat". March 24, 1977, U.S. Government Printing Office, Washington, D.C., Stock No. 052–070–04277–0, Price $3.

[10] "Diet Related to Killer Diseases, Vol. VI, Response to Dietary Goals for the U.S.—Re Eggs", July 26, 1977, U.S. Government Printing Office, Washington, D.C., Stock No. 050–070–04280–0, Price $2.75.

of diet as a precursor to atherosclerosis and other of the degenerative diseases in America and elsewhere." Their responses and others solicited by the Select Committee were immediately sought, and those received are printed in their entirety in *Dietary Goals for the United States—Supplemental Views.*[11]

Also, since the release of the 1st Edition, Senator Kennedy, Chairman of the Subcommittee on Health and Scientific Research, released a survey conducted by Dr. Kaare Norum of the University of Oslo, involving over 200 scientists from 23 countries, on the relationship between diet and health. The survey, reported in the Journal of The American Medical Association, June 13, 1977, found that 99.9 percent believed that there is a connection between diet and the development of heart disease, with 91.9 percent believing that our knowledge in the area is sufficient to recommend a moderate change in diet. Specifically, the scientists recommended, in order of priority:

1. Fewer total calories.
2. Less fat.
3. Less saturated fat.
4. Less cholesterol.
5. More poly-unsaturated fat.
6. Less sugar.
7. Less salt.
8. More fiber.
9. More starchy foods.

It has been correctly pointed out that this kind of "survey" has certain inherent limitations. For example, Dr. David Kritchevsky, in his letter printed in the Supplemental Views report, thought the survey would have been more useful if the respondents had been asked to weigh, on a 1–5 scale, the relative importance of each dietary factor, rather than simply indicating whether or not it was associated with heart disease.

However, the findings of this survey do indicate very substantial agreement among nutrition researchers as to the association between diet and heart disease, based on their own research and that of their colleagues as reported in scientific journals. Use of this survey is illustrative of a greater question. That is, at what point should generally agreed upon opinions be shared with the public as scientifically endorsed recommendations. Important advice in this area was given to the Select Committee at the February 1977 heart disease hearing[12] by Dr. Antonio Gotto, Chairman of the Department of Medicine at Baylor College of Medicine, in Houston, Texas:

> I wish to reiterate one extremely important point that is explicitly and implicitly contained in these goals. That point is that medical practice often must be based on the best available existing evidence, even though it falls short of final scientific proof. Certainly all of the scientific evidence concern-

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[11] "Dietary Goals for the United States—Supplemental Views," November 1977. U.S. Government Printing Office, Washington. D.C. Stock No. 052–070–04294–0. Price $5.75.

[12] "Diet Related to Killer Diseases. Vol. II, Part 1. Cardiovascular Disease." February 1, 1977, U.S. Government Printing Office, Washington, D.C., Stock No. 052–070–03987–6, Price $6.15.

ing diet and its relationship to the major killer diseases is not in, but even when much more evidence accumulates from surveys, epidemiological studies and basic research, there will continue to be honest professional disagreement concerning the basic dietary path to good health.

However, because there already is much evidence which points in a general direction and because health problems in our country are now enormously pressing, in my opinion, it is critical to take some action now.

Further Evolution of Dietary Goals

The 1st Edition of *Dietary Goals for the United States* was intended as that first step. This 2nd Edition is a further evolution of a continuous, on-going process for which the Select Committee hopes the nutrition community will take over responsibility.

The diet we eat today, while loosely tied to the RDA and the concept of four or seven food groups, was not planned or developed for any particular purpose. It isn't the result of a planned policy. The Secretary of Agriculture, Robert Bergland, indicated as much when he recently told the Select Committee:

> We think this country must develop a policy around human nutrition, around which we build a food policy for this country and as much of this world as is interested. And in that framework we have to fashion a more rational farm policy. We've been going at it from the wrong end in the past.

Dietary Goals is a report in pursuit of the Secretary of Agriculture's stated ideal. Nutrition and health considerations must be in the forefront of the development of this Nation's agriculture and food policy. In accepting such a policy position, instead of ignoring or clouding the scientific facts in order to prevent any shift in the economic status quo, we must be willing to make economic and market adjustments to meet the scientific requirements that will, or probably will provide improved health benefits for the Nation.

Since the release of the 1st Edition of *Dietary Goals*, eight more hearings have been held in the series, "Diet Related to Killer Diseases." They are: "Diet and Cardiovascular Disease," [13] "Obesity," [14] "Dietary Goals for the U.S.—Re: Meat," [15] "Dietary Fiber and Health," [16] "Nutrition: Mental Health and Mental Development," [17] "Dietary Goals for the U.S.—Re: Eggs," [18] "Nutrition: Aging and the El-

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[13] "Diet Related to Killer Diseases, Vol. II, Part 1, Diet and Cardiovascular Disease," February 1, 1977, U.S. Government Printing Office, Washington, D.C., Stock No. 052–070–03987–6, Price $6.15.

[14] "Diet Related to Killer Diseases, Vol. II, Part 2, Obesity," February 2, 1977, U.S. Government Printing Office, Washington, D.C., Stock No. 052–070–04275–3, Price $3.25.

[15] "Diet Related to Killer Diseases, Vol. III, Response to Dietary Goals for the U.S.—Re Meat." March 24, 1977, U.S. Government Printing Office, Washington, D.C., Stock No. 052–070–04256–1, Price $4.

[16] "Diet Related to Killer Diseases, Vol. IV, Dietary Fiber and Health," March 31, 1977, U.S. Government Printing Office, Washington, D.C., Stock No. 052–070–04277–0. Price $3.

[17] "Diet Related to Killer Diseases, Vol. V, Nutrition: Mental Health and Mental Development," June 22, 1977, U.S. Government Printing Office, Washington, D.C., Stock No. 052–070–04278–8. Price $3.75.

[18] "Diet Related to Killer Diseases, Vol. VI, Response to Dietary Goals for the U.S.—Re Eggs," July 26, 1977, U.S. Government Printing Office, Washington, D.C., Stock No. 052–070–04280–0, Price $2.75.

derly,"[19] and "Nutrition at HEW: Policy, Research, and Regulation."[20]

These hearings, which have included dozens of independent researchers and numerous governmental health officials, have brought to light more evidence from epidemiological studies, and basic clinical research, and have highlighted further the areas of controversy. For example, Dr. Robert Levy, Director, National Heart, Lung, and Blood Institute, National Institutes of Health, testifying at the February 1977 Diet and Cardiovascular Disease hearing, stated that:

> The major question, we might call it the $64 million question, is . . . whether aggressive treatment of risk factors delays or prevents atherosclerosis and its sequelae.
>
> With some of these risk factors we think the answer is in. With cigarette smoking we have shown with prospective and retrospective studies, that there is no doubt that if one stops smoking, one's risk decreases.
>
> With blood pressure, we do not know that treating blood pressure will prevent heart attacks; but we have evidence it will prevent renal failure, heart failure, and stroke; so we treat it aggressively.
>
> With cholesterol, the issue is a little more murky. We have no doubt from the vast amount of epidemiological data available that elevated cholesterol is associated with an increased risk of heart attack, especially some specific types of high cholesterol.
>
> We have no doubt that [blood] cholesterol can be lowered by diet and/or medication in most patients.
>
> Where the doubt exists is the question of whether lowering [blood] cholesterol will result in a reduced incidence of heart attack; that is still presumptive. It is unproven, but there is a tremendous amount of circumstantial evidence. Not only is there circumstantial epidemiologic data, but there is very exciting animal data. * * * Here * * * is one of many studies that have been done over the last decade with nonhuman primates. It shows that not only can we prevent atherosclerosis from progressing by making dietary changes, but that regression actually occurrs. Atherosclerosis will lessen if we lower [blood] cholesterol levels in animals through diet. The probblem is we can't do these kinds of studies in man; it is not ethical. * * *
>
> There is no doubt that [blood] cholesterol can be lowered by diet in free-living populations. It can be lowered by 10 to 15 percent.
>
> The problem with all of these [clinical] trials is that none of them have showed a difference in heart attack or death rate in the treated group. Only when soft-end points were used in fact was there any subjective difference, and this was only in studies that were not blinded.

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[19] "Diet Related to Killer Diseases. Vol. VII. Nutrition: Aging and the Elderly," September 23, 1977, U.S. Government Printing Office, Washington, D.C., in press.

[20] "Diet Related to Killer Diseases. Vol. VIII, Nutrition at HEW: Policy, Research and Regulation," October 17, 1977, U.S. Government Printing Office, Washington, D.C., in press.

> Does this mean that [blood] cholesterol lowering is not effective [in reducing the risk of heart disease]? We think not. We think it means that investigators up until the early 1970's did not appreciate the difficulty of demonstrating the efficacy of lipid lowering. * * *
>
> We are convinced, as clearly as in this Committee, that prevention is not only the most cost-effective, but the best scientific strategy in our conquest of cardiovascular disease.

Some witnesses have claimed that physical harm could result from the diet modifications recommended in this report. The concern centers on mineral deficiencies which might occur primarily because of the increase in consumption of foods from the complex carbohydrate group. However, after further review, the Select Committee still finds that no physical or mental harm could result from the dietary guidelines recommended for the general public—excluding of course the special nutrient requirements of certain target groups, such as pregnant and lactating women. This matter is discussed further under Goal 2 in the text of the report.

The intense discussion and debate which prompted the issuance of this 2nd Edition are good signs. The sense of immediacy has not lessened, nor has the concern among those charged with developing the Nation's health policy. No better indication of this exists than remarks made by Assistant Secretary of Health, Julius B. Richmond, M.D., who said at our hearing in October, 1977:

> Many experts now believe that we have entered a new era in nutrition, when the lack of essential nutrients no longer is the major nutritional problem facing most American people. Evidence suggests that the major problems of heart disease, hypertension, cancer, diabetes, and other chronic disease are significantly related to diet. Although improved nutrition alone will not prevent these diseases, more attention is being focused on the underlying dietary habits which may be antecedent or contributing causes of these conditions. We view this as a positive sign of the progress that has been made thus far and that undoubtedly will continue. . . . We believe it is essential to convey to the public the current state of knowledge about the potential benefits of modifying dietary habits, without overstating the benefits that could possibly result from the adoption of alternative dietary practices, such as reducing excessive caloric intake and eating less fat, less sugar, and less salt.

Additions and Changes

New Goal Added

The 2nd Edition of *Dietary Goals* includes a new goal: To avoid overweight, consume only as much energy (calories) as is expended; if overweight, decrease energy intake and increase energy expenditure.

Of all the comments received on *Dietary Goals*, perhaps the one heard most often was that there should be a goal addressing total energy (caloric) consumption. The specific *Dietary Goals* of the 1st Edition were not intended to minimize the importance of monitoring total energy intake.

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The alarming prevalence of obesity in the United States is partly attributable to the fact that the energy requirements of Americans have decreased steadily over recent decades. This decline in energy expenditure has not been paralleled by a decline in energy intake. The physical activity of people in the United States is generally considered to be light to sedentary rather than heavy as was true earlier in the century.

Obesity resulting from the over-consumption of calories is a major risk factor in many killer diseases. Therefore, it is extremely important either to maintain an optimal weight, or to alter one's weight to reach an optimal level. Altering one's calorie consumption is not the only way to control weight and thus lessen the risk factors associated with obesity. Exercise can and should play an important and integral role as well. Even if dietary patterns remain the same, the influence of an increasingly sedentary lifestyle may turn what was previously a diet very adequate in calories into one with too many calories.

Finally, in adding this new goal which stresses the risk of being overweight, the reader should also be aware of an important but much smaller part of the American population which is underweight. Although being marginally underweight is apparently not harmful and even may be beneficial, underweight may be accompanied by vitamin-mineral deficiencies. This possibility is of concern particularly among the very young and elderly Americans.

Preschool age children, and pregnant and lactating women, require special attention to ensure that they receive enough calories, as well as enough protein, vitamins and minerals, for full physical and mental development. Older Americans, whose overall caloric needs are generally reduced with age, must be especially attentive about their diet in order to prevent any nutrient deficiencies from occuring.

Alcohol

Many comments, including the "Review of Dietary Goals of the United States" published by The Lancet [21] on April 23, 1977, pointed out that the *Dietary Goals* would be more helpful if they had taken into account the usage of alcoholic beverages.

As with the monitoring of total energy intake, there was no intent to minimize the intake of alcohol in the diet. The amount of calories obtained from alcohol should be a factor in diet planning. Alcohol, which supplies 7 calories per gram, but no vitamins and minerals, is a toxic substance that uses other nutrients in the diet in its metabolism process, and excessive alcohol consumption is the primary factor in cirrhosis of the liver—the ninth leading killer of Americans. Also, recent studies indicate that pregnant women should abstain from alcohol intake in order to protect the health of the fetus.

Although surveys have rarely calculated alcohol intake, estimates can be made on a basis of data similar to USDA "disappearance data" for food. In 1971, the average annual consumption of absolute alcohol from spirits, wine and beer among the drinking-age U.S. population was 2.6 gallons per person. The energy value of this amount of alcohol (excluding the energy from sugars in some alcoholic beverages) equals an average intake of approximately 210 Calories per person per day.

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[21] An editorial in a British medical journal reprinted in "Dietary Goals for the U.S.—Supplemental Views," pp. 1–3.

Alcohol consumption varies among individuals probably more than does the intake of any other energy source. A large percentage of the population abstains from alcohol consumption whereas many persons drink far more than 200 calories of alcohol daily. But on the average, adult females obtain 10 percent of their RDA for calories from alcohol and adult males 7½ percent. In order to acknowledge the intake of alcohol in American diets, footnotes have been added to the chart accompanying the Goals (page 5) to remind readers of the energy contribution of alcoholic beverages.

Goal No. 2

Change: "Increase carbohydrate consumption to account for 55–60 percent of the energy (caloric) intake."

To: "Increase the consumption of complex carbohydrates and 'naturally occurring' sugars from about 28 percent of energy intake to about 48 percent of energy intake."

The intent of this goal is primarily to increase the consumption of complex carbohydrates as indicated in the food selection recommendation, "Increase consumption of fruits, vegetables and whole grains." In addition, "naturally occurring" sugars are obtained from fruits, vegetables and whole grains, as well as from milk products. The wording of the goal has been altered to provide greater accuracy and clarity.

Goal No. 3

Change: "Reduce sugar consumption by about 40 percent to account for about 15 percent of total energy intake."

To: "Reduce the consumption of refined and processed sugars by about 45 percent to account for about 10 percent of total energy intake."

In reviewing the responses pertaining to the sugar recommendation in this report, it was clear to the Select Committee that there needed to be more preciseness provided to the consumer than was available by solely using the generic term, sugar. In particular, while the text described the various sugars, the graph on page 12 in the 1st Edition comparing the current American diet with the recommended dietary goals lumped all sugars together under the generic term sugar.

The new graph (p. 5) will break down the current consumption of 24 percent of total caloric intake from sugars into: (1) 6 percent occurring naturally in fruits, vegetables and milk products; and (2) 18 percent refined (cane and beet) and processed (corn sugar, syrups, molasses and honey).

The recommended dietary goal is adjusted to 10 percent of total caloric intake from refined and processed sugars. The specific amount of sugars occurring naturally in foods that a person consumes will be dependent on his or her selection of foods in the category of complex carbohydrates and "naturally occurring" sugars.

Goal No. 6. Reduce cholesterol consumption to about 300 mg a day

The role of dietary and plasma cholesterol in the development of heart disease has probably received more attention than any other nu-

tritional research issue. Many important findings have resulted from this on-going research effort.

Cholesterol is a fat soluble substance which is only synthesized by animal organisms. It does not supply energy, but is essential for normal cell function, and as a building block for hormones. It is not chemically related to either triglycerides or phospholipids, which are the two important fats from a nutritional point of view (see the text of Goal 5 for further discussion of fats).

The amount of plasma cholesterol,[22] that is the cholesterol in the blood stream, has been shown to be a good indicator of risk of heart disease. That is, the higher one's plasma cholesterol, the higher one's risk of having heart disease. Likewise, the lower one's plasma cholesterol, the lower one's risk of having heart disease.

Research indicates that diets high in cholesterol and/or high in saturated fats raise the total plasma cholesterol level. Conversely, a low cholesterol diet and/or one high in polyunsaturated fat tends to lower total plasma cholesterol.

This research indicates that altering the saturated fat intake has a larger impact on the level of plasma cholesterol than does altering the intake of cholesterol.

In the United States, plasma cholesterol levels are considered normal by many physicians in the range of 200–300 mgs. However, normal is not optimal, nor does it imply any protection from heart disease. In fact, a plasma cholesterol level of 260 mgs or higher carries with it five times the risk for heart disease as compared to a level of 220 mg or lower (see the text of Goal 6 for more information). Only in societies where the level of the plasma cholesterol is under 150 or 160 mgs do we find virtually no deaths from heart disease. Interestingly, babies all over the world have plasma cholesterol levels of about 70–90 mgs at birth.

In examining the complex biochemical mechanisms which cause the development of arterial disease leading to heart attacks and hardening of the arteries scientists discovered that cholesterol deposited in the wall of the artery forms a plaque. These plaques continue to build up in the arteries, reducing the blood flow. This partial or full blockage in the coronary arteries eventually leads to reduced function, incapacity such as severe chest pain (angina pectoris), heart attacks and death.

One of the most significant research concerns has been the investigation of lipoproteins which are the carriers of cholesterol and other fatty substances in the blood stream. Two lipoproteins have been found to be of particular interest: LDL or low density lipoprotein, and HDL or high density lipoprotein.

The level of LDL is directly related to the consumption of dietary cholesterol and fat, and high levels of LDL have been directly correlated with heart dsease.

Whereas LDL is the most common carrier of cholesterol in the blood, HDL carries much less. In addition, HDL appears to be protective with respect to heart disease. That is the higher one's HDL level, the less risk of having heart disease. Furthermore, unlike LDL, the level

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[22] Plasma cholesterol is replacing serum cholesterol as the preferred method of analyzing cholesterol in the blood stream. However, for the purposes of this report, both terms, as well as blood cholesterol, are used and can be considered interchangeable.

of HDL is not greatly affected by the fat in one's diet; it seems to be altered (increased) by exercise, nicotinic acid and estrogens.

In addition to dietary determinants, there are also metabolic factors. Cholesterol is so essential to human bodily functions that it is naturally synthesized. Most of the plasma cholesterol is synthesized in the liver and to a lesser extent in the intestine. Thus, whether or not we consume dietary cholesterol, the normal human body can and will produce all the cholesterol it requires.

However, because most people consume some dietary cholesterol, there is a feedback regulation of cholesterol synthesis. This biological mechanism inhibits the synthesis of cholesterol in the liver when the dietary intake of cholesterol is increased. Conversely, with a low intake of dietary cholesterol, there is an increase in cholesterol synthesis in the liver.

In trying to better understand the feedback regulation mechanism for cholesterol synthesis, researchers have found that significant alterations in plasma cholesterol can result from dietary modification. Therefore, they have concluded that the feedback mechanism is not completely effective in compensating for the dietary intake of cholesterol.

It is impossible to cover all the cholesterol research findings in this report. In the appendix of the hearing of July 26, 1977, there is an extensive review of the controversy. In addition, much of the 900 pages in the report *Dietary Goals for the United States—Supplementary Views* [23] is addressed to the fat and cholesterol debate.

This report also cannot begin to discuss the many unanswered research questions. Nevertheless, some of the important questions which are currently being investigated include:

(1) Does lowering the plasma cholesterol level through dietary modification prevent or delay heart disease in man?
(2) What is the *exact* relationship between dietary cholesterol and plasma cholesterol?
(3) Does consumption of a low fat (under 20 percent), low animal protein and high complex carbohydrate diet reduce the risks associated with the intake of dietary cholesterol at current American levels?
(4) Is hydrogenation of vegetable oils a factor in the development of heart disease?
(5) How do the various lipoproteins interact, and why does HDL apparently protect against heart disease?

With regard to the cholesterol issue, the Select Committee has received countless comments and questions generally focusing on two areas:

(1) Is the cholesterol recommendation for the general population, or for people at high risk of heart disease?
(2) What does this mean for egg consumption, which is the single largest source of cholesterol in the American diet?

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[23] Dietary Goals for the U.S.—Supplemental Views, November 1977, U.S. Government Printing Office, Washington, D.C. Stock No. 052–070–04294–0. Price $5.75.

The 300 mg per day recommendation does not mean eliminating egg consumption. Nor does it imply that one should replace eggs with one of the highly processed egg-substitutes or imitation egg products.

Eggs are an excellent, inexpensive source of protein, vitamins and minerals. The 250 mgs of cholesterol in an average egg, as well as the bulk of the calories, is contained in the yolk. As a result, some researchers advocate using in one's diet only egg whites, which have most of the protein.

Finally, one should view cholesterol as only one component of a total diet. We recommend a general level of cholesterol consumption, and leave the ultimate source of that dietary component up to the consumer. Since eggs are only one source of dietary cholesterol, a specific recommendation as to the number of eggs necessary to meet the goal is inappropriate.

Keeping in mind that the risk of heart disease is significantly lower among women until they reach menopause, and that young children and the elderly need particularly good sources of high quality protein, vitamins and minerals, it may be advisable for persons in these groups to include more eggs in their diet—even to the point of easing the cholesterol recommendation in order to increase egg consumption.

It is not possible to say exactly how much to ease the recommendation since no scientific panels have specifically set cholesterol intake levels for population sub-groups. In suggesting that the cholesterol might be eased for young children, pre-menopausal women and the elderly in order to obtain the nutritional benefits of additional eggs, the Select Committee does remain concerned as to what happens when the period of reduced risk is over and possible cumulative effects from the diet take place.

In summary, the Select Committee understands that there is still controversy surrounding the exact relationship of dietary cholesterol to heart disease, and that we must aggressively continue research in order to bring resolution to the current dispute. However, over the last 25 years, there has been a steady and mounting accumulation of basic research and epidemiological evidence which indicates that a high plasma cholesterol level is a major risk factor in heart disease and that dietary cholesterol is one of a number of factors which affects plasma cholesterol. As one result, ten national and international panels have recommended the restriction of dietary cholesterol for the general population (see Appendix B).

This past year, Dr. Robert Levy, Director, National Heart, Lung and Blood Institute, National Institutes of Health, announced that recent surveys suggest that the average American's plasma cholesterol level has dropped five to ten percent since the early 1960's, which may have contributed to the sharp decline in deaths from heart and blood vessel diseases over the last several years.

As public policymakers, the members of the Select Committee cannot ignore the known findings which indicate the high probability that cholesterol intake contributes to the development of cardiovascular disease. The Select Committee cannot ignore the fact that 850,000

Americans die each year from heart and blood vessel disease, that 50 percent of all deaths are related to cardiovascular illness, which, either directly or indirectly, costs the Nation over $50 billion annually. Heart disease is America's number one killer.

It therefore seems that the only prudent course of action to take in the best interest of the health of the Nation is to recommend that cholesterol consumption be reduced to about 300 mg a day.

Goal No. 7

Change: "Reduce salt consumption by about 50 to 85 percent to approximately 3 gms a day."

To: "Limit the intake of sodium by reducing the intake of salt (sodium chloride) to about 5 grams a day."

Upon further review of the evidence concerning sodium intake, the Select Committee believes that, while a 3 gram or even a 2 gram dietary goal for salt (sodium chloride) intake is probably justified for a high risk population having hypertension, 5 grams a day is a more appropriate level of salt intake to recommend at this time for the general population.

Furthermore, it is important to understand that sodium occurs naturally in foods. Therefore, the daily sodium requirement for the average person will normally be met without consuming salt or sodium salts, which may be obtained from either processed foods or home food preparation.

Food Selection Suggestion No. 3

Change: "decrease consumption of meat and increase consumption of poultry and fish."

To: "decrease consumption of animal fat, and choose meats, poultry and fish which will reduce saturated fat intake."

The recommendation in the 1st Edition that consumers "decrease consumption of meat and increase consumption of poultry and fish," was intended to help implement the goals of reducing overall fat consumption from approximately 40 percent to 30 percent of our energy intake, and of reducing saturated fat consumption to account for about 10 percent of total caloric intake.

PROTEIN

In setting the dietary goal of 30 percent of total calories from fat, the Select Committee examined both the research on fats and on protein because the majority of fat in the American diet is obtained through the consumption of foods of animal origin, which are also our primary source of protein.

In the 1st Edition, the Select Committee neither recommended a decrease in overall protein intake, nor indicated a preference for vegetable protein over animal protein. In fact, meat, poultry and fish are an excellent source of essential amino acids, vitamins and minerals. With respect to minerals, for example, meat is a good source of iron

and thus helps to reduce the probability of iron deficiency anemia, a nutritional disorder which can occur among groups such as teenagers and pre-menopausal women.

The Select Committee does not believe that there is sufficient scientific evidence to recommend a reduction in overall protein intake. However, by following the Report's recommendation to increase the consumption of whole grains, fruits and vegetables, while maintaining the same level of overall protein intake, an alteration in the ratio between animal and vegetable proteins will occur.

Some other points also need to be considered. First, the average American eats daily almost twice as much protein as the Food and Nutrition Board of the National Academy of Sciences recommends for meeting the needs of most healthy people. There is no known nutritional need for our current high level of protein intake.

Second, while the protein level of the American diet, based on USDA disappearance data, has remained at about 12 percent of calories since 1909, the ratio of animal protein to vegetable protein has steadily changed from 1.06 to 2.26. This means that, whereas the per capita level of calories from protein in the American diet in 1909 was 12 percent, of which 6 percent was of animal origin and 6 percent was of vegetable origin; today, the mix is greater than 8 percent of calories from animal protein and less than 4 percent from vegetable protein.

Third, there is basic research which raises some questions about overall protein intake, as well as the ratio of animal and vegetable proteins. One series of investigations found that diets that derive their protein from animal sources elevate plasma cholesterol levels to a much greater extent than do diets that derive their protein from vegetable sources. Another line of basic research demonstrated that, in almost all cases, high protein diets are more atherosclerotic than are low protein diets. Therefore, two important questions for future consideration are: (1) should protein intake be reduced? and (2) is the ratio of animal to vegetable protein important?

FAT

With respect to total fat consumption, there is increasing scientific research that suggests some day a dietary fat intake of 20 percent to 25 percent might be recomemnded; and even less for those people who already have heart disease. The basic research is strongly corroborated by epidemiological studies of populations throughout the world who live quite well on a diet containing as little as 10 percent calories from fat. In summary, the goal of limiting fat consumption to 30 percent of total calories has not been a major point of contention and is derived from the recommendations of expert panels from around the world (see Appendix B).

Along with consuming less animal fat by eating smaller portions of meat, it would also be possible to reduce fat consumption by eating the least fatty cuts of meats, by reducing the fat content of meat, or by some combination of both.

Animal fat is not the only source of saturated fat in the diet. Of the 56 grams of saturated fat consumed per person per day, based on 1977 USDA disappearance data, 16 grams, or 28 percent, are from a vegetable source. Hydrogenated vegetable oils, which are found in vege-

table shortenings, many margarines and numerous other processed food products, provide the majority of the saturated fats obtained from vegetable sources.

It is important to recognize all the sources of fat in the diet. For example, the fats in meats, chicken, butter, lard, margarine, vegetable shortenings, salad dressings and oils, and home fried foods are visible to the consumer. But there are also fats in the diet which are not apparent, such as those found in fish, ground meats, eggs, milk, cheese, ice cream, nuts, peanut butter, bakery products, potato chips, and many highly processed food products.

In changing to, "decrease consumption of animal fat, and choose meat, poultry and fish which will reduce saturated fat intake," the Select Committee suggests that tables 11, 12, and 13 in the text be especially utilized in order to best implement *Dietary Goals* 4 and 5.

PART I

DIETARY GOALS FOR THE UNITED STATES—SECOND EDITION

INTRODUCTION

During this century, the composition of the average diet in the United States has changed radically. Foods containing complex carbohydrates and "naturally occurring" [1] sugars—fruit, vegetables and grain products—which were the mainstay of the diet, now play a minority role. At the same time, the consumption of fats and refined and processed sugars has risen to the point where these two macronutrients alone now comprise at least 60 percent of total caloric intake, an increase of 20 percent since the early 1900s.[2]

In the view of doctors and nutritionists consulted by the Select Committee, these and other changes in the diet amount to a wave of malnutrition—of both over- and under-consumption—that may be as profoundly damaging to the Nation's health as the widespread contagious diseases of the early part of the century.

The over-consumption of foods high in fat, generally, and saturated fat in particular, as well as cholesterol, refined and processed sugars, salt and/or alcohol has been associated with the development of one or more of six to ten leading causes of death: heart disease, some cancers, stroke and hypertension, diabetes, arteriosclerosis and cirrhosis of the liver. The associations are discussed more fully later in this report.

In his testimony at the Select Committee's July 1976 hearings on the relationship of diet to disease, Dr. Mark Hegsted of the Harvard School of Public Health, said:

> I wish to stress that there is a great deal of evidence and it continues to accumulate, which strongly implicates and, in some instances, proves that the major causes of death and disability in the United States are related to the diet we eat. I include coronary artery disease which accounts for nearly half of the deaths in the United States, several of the most important forms of cancer, hypertension, diabetes and obesity as well as other chronic diseases.

The over-consumption of food in general, combined with our more sedentary lifestyle, has become a major public health problem. In testimony at the same hearings, Dr. Theodore Cooper, Assistant Secretary for Health, estimated that about 20 percent of all adults in the United

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[1] "Naturally occurring": Sugars which are indigenous to a food, as opposed to refined (cane and beet) and processed (corn sugar, syrups, molasses and honey) sugars which may be added to a food product.

[2] The food supply estimates are based on United States Department of Agriculture data showing the amounts of food that "disappear" into civilian channels.

States "are overweight to a degree that may interfere with optimal health and longevity."

At the same time, current dietary trends may also be leading to malnutrition through undernourishment. Fats are relatively low in vitamins and minerals, and refined sugar (cane and beet) and most processed sugars have no vitamins and minerals. Consequently, diets with reduced caloric intake to control weight and/or save money, but which are high in fats and refined and processed sugars, may lead to vitamin and mineral deficiencies. As will be discussed later, low-income people may be particularly susceptible to inducements to consume diets high in fats, and refined and processed sugars.

The Department of Health, Education, and Welfare reported that health care expenditures in the United States in Fiscal Year 1976 totaled about $139.4 billion and predicted the cost could exceed $230 billion by Fiscal Year 1980. In testimony before the Select Committee in 1972, Dr. George Briggs, professor of nutrition at the University of California, Berkeley, estimated, based on a study by the Department of Agriculture, that improved nutrition might cut the Nation's health bill by one-third.

More recently, in an October 1977 letter to the Select Committee, Dr. Briggs provided an analysis of the cost of poor nutritional status which contributes to some of the diseases in the United States. The potential annual savings in nutrition related costs, "based on the more conservative end of the range of current scientific opinion," were as follows:

	Billion
Dental diseases	$3
Diabetes	4
Cardiovascular disease	10
Alcohol	20
Digestive diseases	3
Total	$40

It should be noted that this analysis does not include cancer, kidney disease due to mismanagement of hypertension, or the long-term costs associated with low birthweight babies due to maternal malnutrition.

Beyond the monetary savings, it is obvious then that improved nutrition also offers the potential for prevention of vast suffering and loss of productivity and creativity.

One in three men in the United States can be expected to die of heart disease or stroke before age 60 and one in six women. It is estimated that 25 million suffer from high blood pressure and that about 5 million are afflicted by diabetes mellitus.[3]

Given the wide impact on health that has been traced to the dietary trends outlined, it is imperative, as a matter of public health policy, that consumers be provided with dietary guidelines or goals for macro-nutrients that will encourage the most healthful selection of foods.

Based on (1) testimony presented to the Select Committee in the ten days of hearings entitled "Diet Related to Killer Diseases" which

[3] Statistics from reports and testimony presented to the Select Committee's National Nutrition Policy hearings. June 1974, appearing in National Nutrition Policy Study, 1974, Part 6, June 21, 1974, Heart disease, p. 2633; high blood pressure, p. 2529, diabetes, p. 2523.

began in July 1976 and ended in October 1977; (2) the Select Committee's 1974 National Nutrition Policy hearings; (3) guidelines established by governmental and professional bodies in the United States and at least eight other nations (Appendix B); and (4) a variety of expert opinion, the following Dietary Goals are recommended for the United States. Although genetic and other individual differences among health individuals exist, there is substantial evidence indicating that following these guidelines may be generally beneficial.

U.S. DIETARY GOALS

1. To avoid overweight, consume only as much energy (calories) as is expended; if overweight, decrease energy intake and increase energy expenditure. (See pages xxxiii–xxxxiv, 7–10, 15, 38.)
2. Increase the consumption of complex carbohydrates and "naturally occurring" sugars from about 28 percent of energy intake to about 48 percent of energy intake. (See pages xxxv, 11–16.)
3. Reduce the consumption of refined and processed sugars by about 45 percent to account for about 10 percent of total energy intake. (See pages xxxv, 27–33.)
4. Reduce overall fat consumption from approximately 40 percent to about 30 percent of energy intake. (See pages 35–38.)
5. Reduce saturated fat consumption to account for about 10 percent of total energy intake; and balance that with poly-unsaturated and mono-unsaturated fats, which should account for about 10 percent of energy intake each. (See pages 39–41.)
6. Reduce cholesterol consumption to about 300 mg. a day. (See pages xxxv–xxxix, 42, 43.)
7. Limit the intake of sodium by reducing the intake of salt to about 5 gram a day. (Pages xxxix, 49–51.)

The Goals Suggest the Following Changes in Food Selection and Preparation:

1. Increase consumption of fruits and vegetables and whole grains. (See pages 17–26.)
2. Decrease consumption of refined and other processed sugars and foods high in such sugars. (See pages 33, 34.)
3. Decrease consumption of foods high in total fat, and partially replace saturated fats, whether obtained from animal or vegetable sources, with poly-unsaturated fats. (See pages 43–48.)
4. Decrease consumption of animal fat, and choose meats, poultry and fish which will reduce saturated fat intake. (See pages xxxix–xli, 43–48, and use particularly, tables 11–13, pp. 45–48.
5. Except for young children, substitute low-fat and non-fat milk for whole milk, and low-fat dairy products for high fat dairy products. (See pages 43–48.)
6. Decrease consumption of butterfat, eggs and other high cholesterol sources. Some consideration should be given to easing the cholesterol goal for pre-menopausal women, young children and the elderly in order to obtain the nutritional benefits of eggs in the diet. (See pages xxxvii–xxxix for more details concerning eggs and cholesterol, pp. 43–48.)
7. Decrease consumption of salt and foods high in salt content. (See page 51 and Appendix E.)

Persons with physical and/or mental ailments who have reason to believe that they should not follow guidelines for the general population should consult with a health professional having expertise in nutrition, regarding their individual case.

Although the Dietary Goals are stated in terms of specific levels, each specific level should be considered as the center of a range (see p. xxvi in the Preface for details.)

While there may be a tendency to read only the summaries provided on these two pages, the Select Committee recommends that, whenever possible, the entire report be read in order to obtain a more complete perspective of the relationship between diet and health.

The question of whether dietary changes alone such as those suggested in these goals can reduce the leading causes of death in the United States remains controversial. Individuals, in exercising freedom of dietary choice, should recognize that these dietary recommendations do not *guarantee* improved protection from the killer diseases. They do, however, increase the *probability* of improved protection.

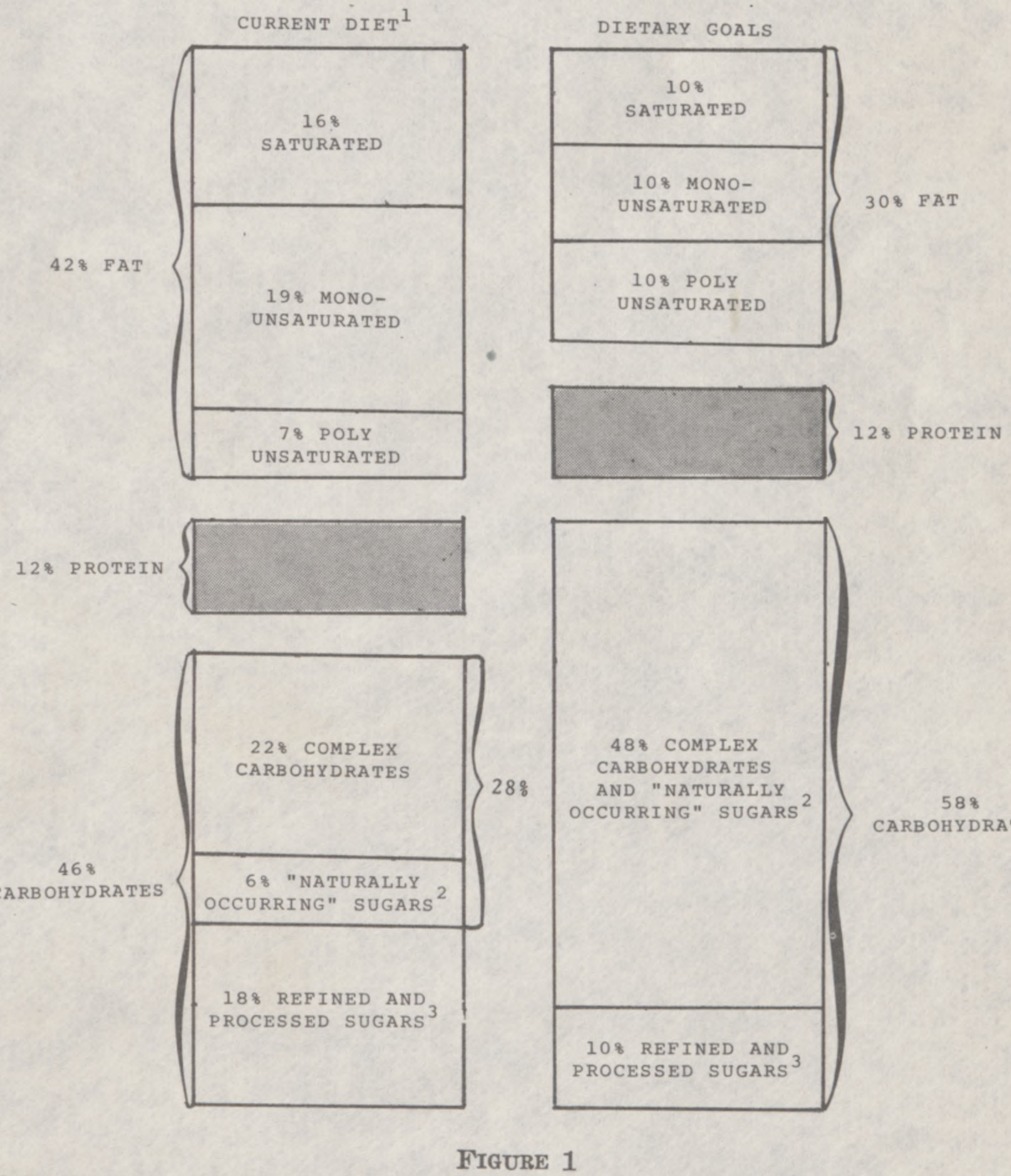

FIGURE 1

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[1] These percentages are based on calories from food and nonalcoholic beverages. Alcohol adds approximately another 210 calories per day to the average diet of drinking-age Americans.

[2] "Naturally occurring": Sugars which are indigenous to a food, as opposed to refined (cane and beet) and processed (corn sugar, syrups, molasses and honey) sugars which may be added to a food product.

[3] In many ways alcoholic beverages affect the diet in the same way as refined and other processed sugars. Both add calories (energy) to the total diet but contribute little or no vitamins or minerals.

Sources for current diet: *Changes in Nutrients in the U.S. Diet Caused by Alternations in Food Intake Patterns.* B. Friend. Agricultural Research Service. U.S. Department of Agriculture. 1974. Proportions of saturated versus unsaturated fats based on unpublished Agricultural Research Service data.

EXPLANATION OF GOALS

GOAL 1. TO AVOID OVERWEIGHT, CONSUME ONLY AS MUCH ENERGY (CALORIES) AS IS EXPENDED; IF OVERWEIGHT, DECREASE ENERGY INTAKE AND INCREASE ENERGY EXPENDITURE

Fifteen million Americans are obese to an extent which seriously raises their risk of ill health. Obesity is associated with the onset and clinical progression of diseases such as hypertension, diabetes mellitus, heart disease and gall bladder disease. It may also modify the quality of one's life.

There is strong evidence suggesting that, for those overweight, the best protection against heart disease is weight reduction. A study by Drs. Franz Ashley and William Kannel, *Relation of Weight Change to Changes in Atherogenic Trains: The Framingham Study*, discussed the importance of obesity on heart disease.

> The clinical and preventive implications seem clear. Weight gain is accompanied by atherogenic alterations in blood, lipids, and blood pressure, uric acid and carbohydrate tolerance. It is uncertain whether the nutrient composition of excess calories, derived largely from saturated calories accompanied by cholesterol and simple carbohydrates, or the positive energy balance per se, is important. But whatever the cause, development of ordinary . . . obesity encountered in the general population is associated with excess development of coronary heart disease.

As told to the Committee by Dr. Beverly Winikoff of the Rockefeller Foundation in July 1976, at the first hearing in the "Diet Related to Killer Diseases" series:

> With increasing affluence, we have also increased our body weights. Obesity is probably the most common and one of the most serious nutritional problems affecting the American public today.
>
> Over 30 percent of all men between 50–59 are 20 percent overweight, and fully 60 percent are over 10 percent overweight. About one-third of the population is overweight to a degree which has been shown to diminish life expectancy. For unknown reasons, in the United States, this type of malnutrition is a more common burden among the poor than among the more wealthy.
>
> Obesity has the effect of increasing blood cholesterol, blood pressure and blood glucose levels. Through these effects, it is an important risk factor for coronary disease.
>
> Reductions in obesity improve the condition of hypertensives and diabetics, and thereby reduces the risk of heart disease and stroke. Data from the Framingham study examined by Ashley and Kannel in 1973 indicate that each 10 percent reduction in weight in men 35–55 years old would result in about a 20 percent decrease in incidence of coronary disease.
>
> Conversely, each 10 percent increase in weight would result in a 30 percent increase in coronary disease.
>
> In light of the fact that close to 700,000 Americans die of coronary disease every year, the staggering implications of these figures become apparent: if a 20 percent decrease in incidence did occur throughout the population and were reflected in a 20 percent decrease in overall mortality, about 140,000 lives would be saved per year. Since at least one-half the coronary deaths—about one-third of a million—occur before reaching a hospital, prevention is not only cheaper, but clearly more effective than cure.

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Dr. Ted Cooper, then Assistant Secretary for Health, concurred:

When I was Director of the National Heart and Lung Institute we instituted several studies in order to find ways to give specific guidance to the public about what kinds of nutritional information would be of particular help in reducing that relationship between the proneness, particularly of the middle-aged American male to coronary artery disease. So I do feel that particularly excessive weight, which is a form of malnutrition, obesity, that is not from a deficiency but an excess or a disbalance of intake, can substantially contribute to coronary artery disease.

We must * * * move much further in utilizing optimal nutrition as a preventive health measure. In many instances our knowledge is already adequate to permit us to utilize education as an important tool to prevent disease and to improve the well-being and longevity of our citizens by fostering more healthful food consumption practices. Here I am particularly referring to obesity, a widespread and most important nutritional disease and a public health problem of constantly growing proportions in the United States. . .

The energy needs of an individual vary from day to day depending upon the amount of physical activity. However, our society is clearly less active than during the early parts of this century, or even just 20 years ago.

As one result, more adult Americans are putting on more body weight and body fat than ever before, and this trend is appearing earlier and more often during childhood and adolescence.

Dr. Ted Van Itallie, Director of the Obesity Research Center, St. Luke's Hospital Center, New York, N.Y., testifying at the February 2, 1977, Obesity hearing, stated that:

The data on weight by height and age of adults reported in 1966 by the National Center for Health Statistics indicate that, in this country, the average weight of men 68 inches tall increases by about 16 pounds between the ages of 21 and 49. For women 64 inches tall, the increment between the ages of 21 and 59 is 27 pounds. . . . In view of the disposition among physicians, actuaries and public health workers to regard increases in body weight after the age of 25 as being undesirable, it is not surprising that the proportion of individuals classified as obese increases markedly with age.

Studies of body composition in subjects within various age categories have demonstrated that the increase in body weight associated with aging is usually due entirely to an increase in body fat content. Indeed, in sedentary men, age 55, the increment in total body fat may be one-third greater than the increment in body weight. It is also worth mentioning that, with advancing age, the proportion of fat in the body increases in sedentary individuals even if body weight does not increase.

At that same hearing, Dr. Johanna Dwyer, Director of the Frances Stern Nutrition Center, New England Medical Center Hospital, Boston, in discussing obesity in childhood and adolescence stated that:

There is some limited evidence that obesity in childhood affects morbidity at least with respect to respiratory illness and that it may give rise to psychological problems, although infant or child mortality does not seem to be affected. In later childhood and adolescence, obesity is associated with a number of handicaps, including physical health, constraints on eating imposed by low energy needs, body image and its effects on sense of worth, social status and future social mobility, college admissions, parent-child relations, and adverse therapogenic effects of misdirected or ineffective treatments. But these are all relatively short range problems. The most important set of difficulties resulting from obesity are more long range in nature and involve their impact on adult health status. Assuming that obesity in early life is likely to continue into adult life, which is a legitimate generalization (although the exact proportions affected by this

type of predestination are difficult to arrive at) we must also consider risks of adult obesity which may be generated over the longer term. These include increased incidence of heart disease, hypertension, post-surgical complications, hypoventilation, insulin antagonism, gynecological irregularities and toxemia of pregnancy . . .

Although the exact mechanisms leading to obesity are often unclear, the fact remains that for an individual to add fat to his body stores requires that he ingest more calories than he is expending in his daily activities. This can occur for several reasons: (1) Because food intake is excessive; (2) because energy (caloric) expenditure is lower than normal; (3) because minimum caloric needs are reduced as people grow older; or (4) for any combination of these reasons.

Thus, the basic goals which underlie the treatment of obesity are: (1) to decrease energy intake and (2) to increase energy expenditure.

Guide to Reducing Energy (Caloric) Intake

The factors which influence eating patterns are complex and diverse, and the treatments for obesity are almost as numerous as the factors. At the February 2, Obesity hearing, George Bray of Los Angeles County Harbor General Hospital, in commenting on the success of weight loss treatments, said:

What can we say about the long term effectiveness of these various approaches to treating the overweight? We have little firm data. We do know that treatment of the overweight individual is often transient. Dr. Mayer has labelled this the "rhythm method of girth control". In long term follow-up studies, it is apparent that every program has some success, but that for most, less than 10 to 20 percent of the individuals who enter a treatment program other than surgery will solve their problems.

The evergrowing list of diets are an affirmation of the fact that no diet yet described is by itself a solution to the problem of obesity. The truth of this statement is reflected in the fact that new diets appear yearly, each claiming to be the "ultimate solution." The list of diets include low carbohydrate diets, high protein diets, high fat diets, and diets which contain mainly a single food. Yet there is no substantive argument with the statement that "calories do count" in the development of obesity, and that diet, properly used, is a mainstay in the medical management of overweight people. For unless caloric intake is reduced below caloric needs, the extra calories which have been stored in adipose tissue will not be burned. There is a large and convincing body of information which shows that if caloric restriction is sufficiently severe, and is maintained for a sufficiently long period of time, body weight will decline.

Obesity experts differ as to the reasons for the general failure of many obese people to maintain weight loss. However, the obesity treatments which are the most successful over time tend to modify the total diet in a balanced manner.

The dietary pattern set forth in this report is a balanced approach that addresses the interrelated nature of all the components which make up a total diet. The *Dietary Goals* should be of assistance in achieving success with respect to individual weight loss (as described in other sections of the report) and reducing the prevalence of obesity in America.

To facilitate the use of the *Dietary Goals* and to ascertain to what degree one is over optimal weight, we suggest use of Table 1 on page 10.

TABLE 1.—FOGARTY INTERNATIONAL CENTER CONFERENCE ON OBESITY RECOMMENDED WEIGHT IN RELATION TO HEIGHT [1]

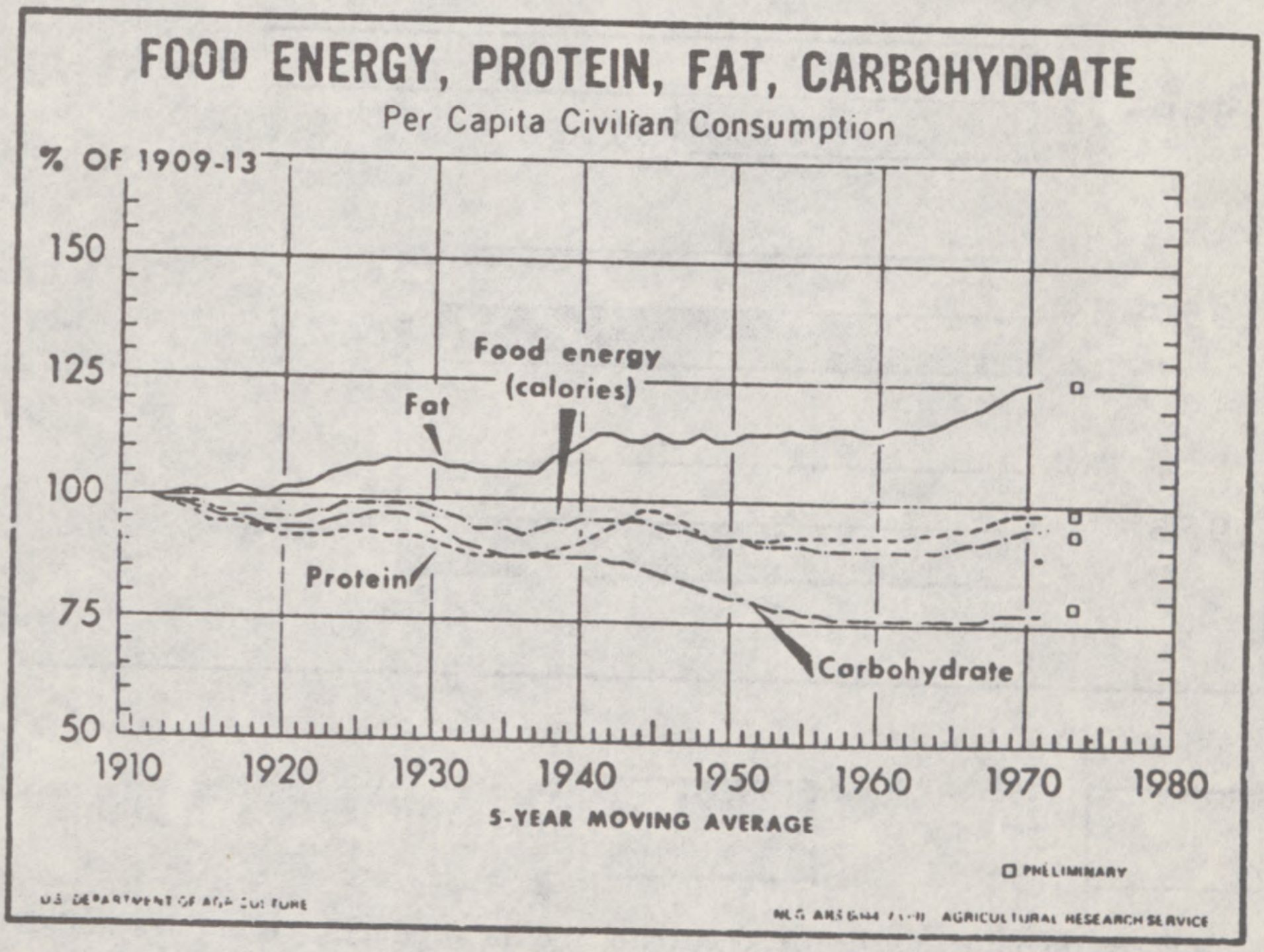
Height	Men		Women	
	Average	Range	Average	Range
4 ft 10 in			102	92–119
4 ft 11 in			104	94–122
5 ft 0 in			107	96–125
5 ft 1 in			110	99–128
5 ft 2 in	123	112–141	113	102–131
5 ft 3 ih	127	115–144	116	105–134
5 ft 4 in	130	118–148	120	108–138
5 ft 5 in	133	121–152	123	111–142
5 ft 6 in	136	124–156	128	114–146
5 ft 7 in	140	128–161	132	118–150
5 ft 8 in	145	132–166	136	122–154
5 ft 9 in	149	136–170	140	126–158
5 ft 10 in	153	140–174	144	130–163
5 ft 11 in	158	144–179	148	134–168
6 ft 0 in	162	148–184	512	138–173
6 ft 1 in	166	152–189		
6 ft 2 in	171	156–194		
6 ft 3 in	176	160–199		
6 ft 4 in	181	164–204		

[1] Height without shoes, weight without clothes. Adapted from the Table of the Metropolitan Life Insurance Co. (Courtesy of the Metropolitan Life Insurance Co.)

GOAL 2. INCREASE THE CONSUMPTION OF COMPLEX CARBOHYDRATES AND "NATURALLY OCCURRING"[1] SUGARS FROM ABOUT 28 PERCENT OF ENERGY INTAKE TO ABOUT 48 PERCENT OF ENERGY INTAKE.

As discussed in the Preface, energy is provided by the carbohydrates, fats, protein and/or alcohol in food. Until the turn of the century, carbohydrates were the principal source of energy in the American diet. Figure 2 shows that since 1910 there has been a decrease in carbohydrate and an increase in fat as energy sources in the U.S. diet. Figure 3 indicates that sugars (simple carbohydrates) have replaced starch (a complex carbohydrate) as the primary form of carbohydrate in the diet. Figure 4 depicts the changes in the consumption of foods containing complex carbohydrates and "naturally occurring" sugars.

FIGURE 2



Source: "Changes in Nutrients in the U.S. Diet Caused by Alterations in Food Intake Patterns," B. Friend. Agricultural Research Service. U.S. Department of Agriculture.

There are several possible reasons for the decreasing consumption of foods containing complex carbohydrates. A key factor may be the rise in real income, permitting a movement away from diets high in

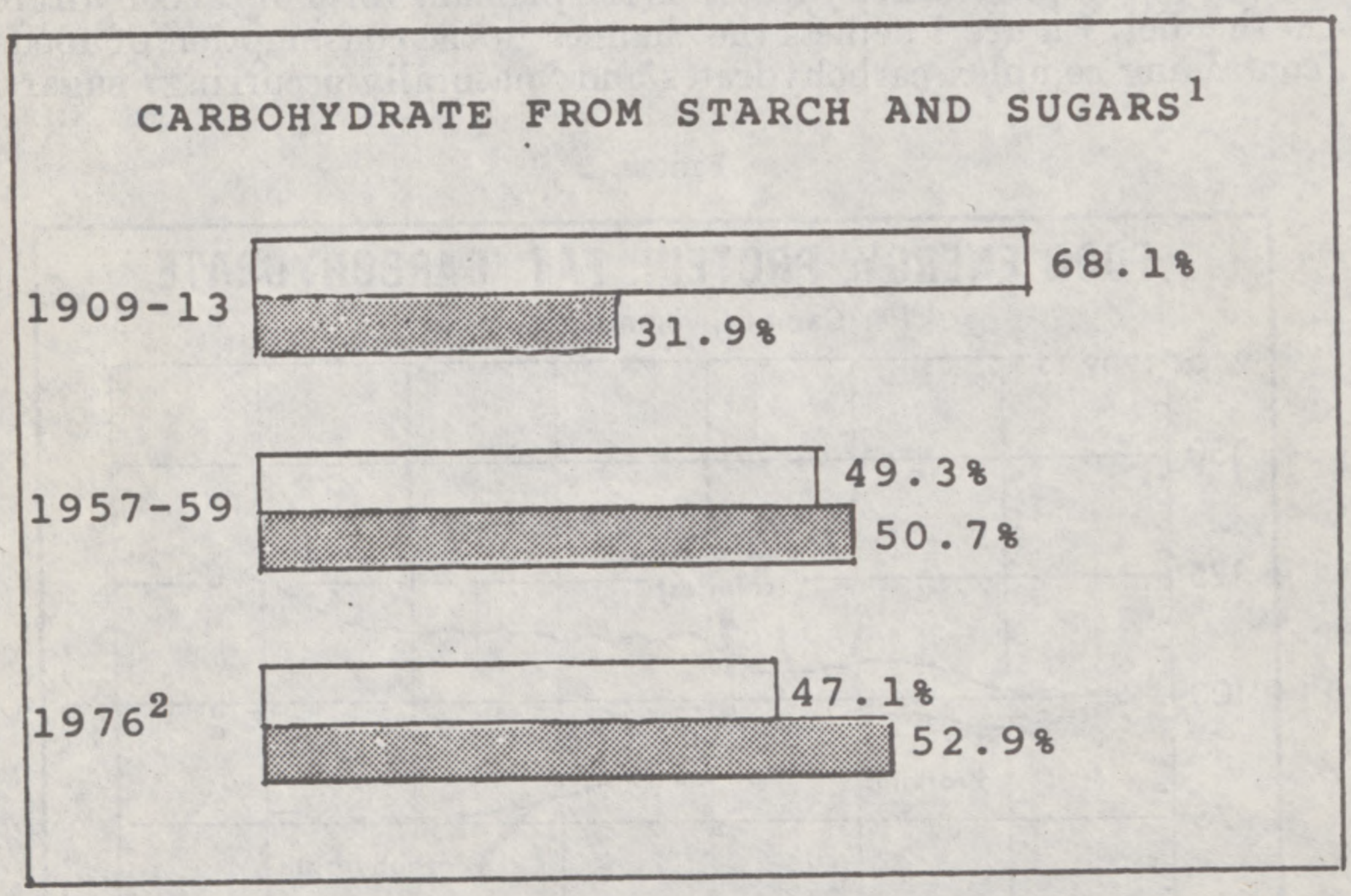
[1] "Naturally occurring": Sugars which are indigenous to a food, as opposed to refined (cane and beet) and processed (corn sugar, syrups, molasses and honey), sugars which may be added to a food product.

inexpensive foods, such as greens, beans and whole grains. Another related factor might be the prestige value associated with more expensive foods.

In addition, there is a relatively small amount of advertising of fruits, vegetables and whole grains. This point was raised by Dr. Joan Gussow, chairperson of the Program in Nutrition at Teachers College, Columbia University, at the Select Committee hearings in 1974 on National Nutrition Policy.

> . . . No amount of information about the nutritive or non-nutritive qualities of the foods advertised will compensate for the total imbalance in the nature of the foods advertised on television. The nature of the foods advertised is largely highly processed foods, many of them snack foods, highly sugared, highly salted. . . . We should have advertising of fruits and vegetables. They should be public service announcements selling people on those components of the diet which, in fact, they are not currently being sold on—dairy products, beans and rice and grains, and other forms of protein foods. . . . And all these foods don't get sold because they do not have a high enough mark-up.

FIGURE 3

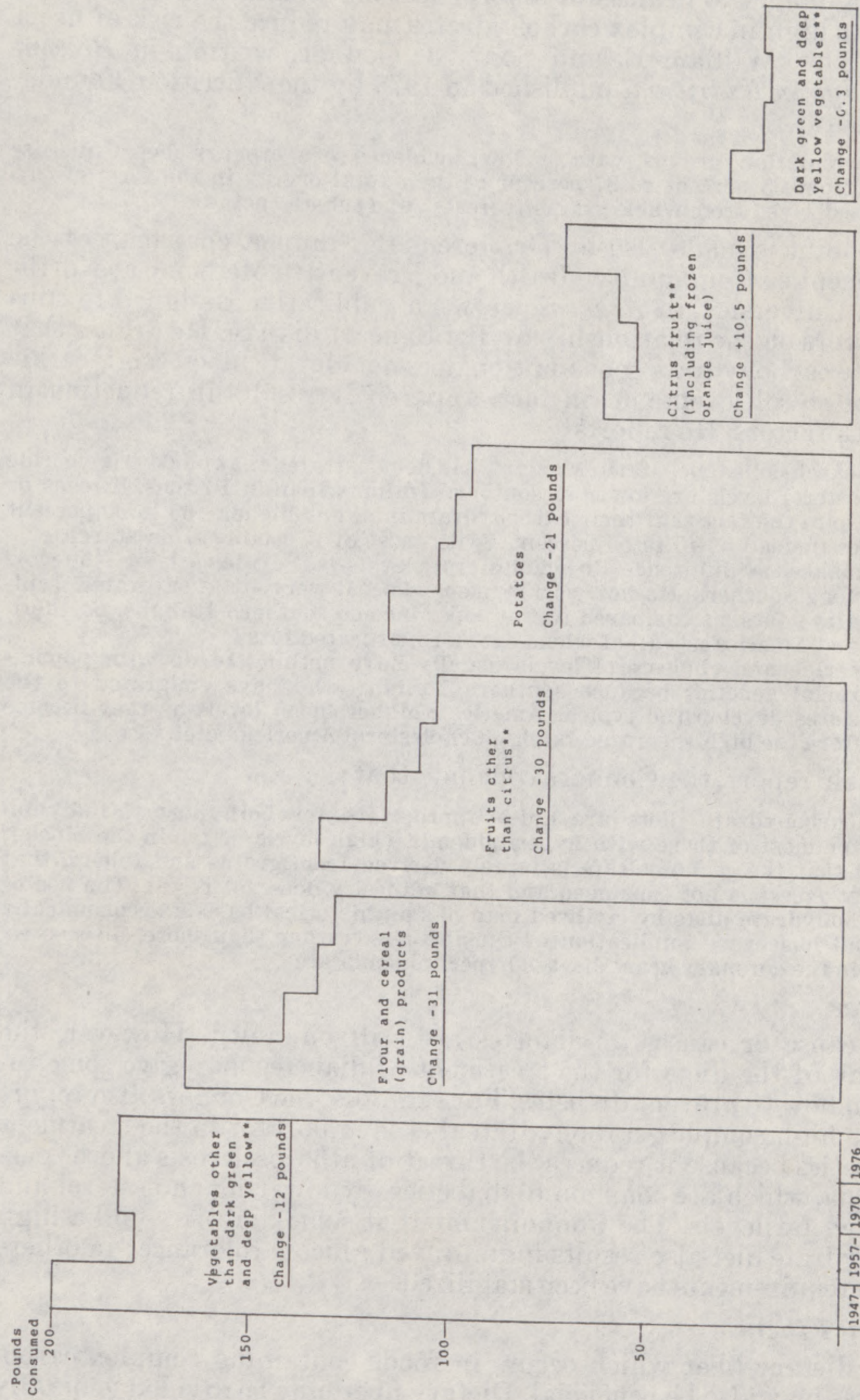


[1] Sugars include: 'naturally occurring' (milk products, vegetables and fruit), syrups, molasses, honey, cane and beet.
[2] Preliminary.

Source: *Nutritional Review*, National Food Situation, CFE (Adm.) 299–9, January 1975. Preliminary data for 1976 unpublished. Agricultural Research Service, U.S. Department of Agriculture.

The emphasis of food advertising is discussed in detail in Part II of this report.

FIGURE 4.—Changes in pounds (per capita, per year) of foods containing complex carbohydrates and "naturally occurring" sugars consumed between 1947–49 and 1976



*Estimate.
**Fresh plus processed.

Source: Based on statistics in Nutritional Reviews CFE (Adm.) 299–11. January 1977. Agricultural Research Service, U.S. Department of Agriculture.

Heart Disease

The displacement of foods containing complex carbohydrates, and "naturally occurring" sugars—fruit, vegetables and whole grains—may be a danger to health for several reasons. First, there is evidence that diets high in complex carbohydrates may reduce the risk of heart disease. Drs. William E. and Sonja J. Connor, writing in *Present Knowledge in Nutrition*, published in 1976 by the Nutrition Foundation, report:

> Most population groups with a low incidence of coronary heart disease consume from 65 percent to 85 percent of their total energy in the form of carbohydrate derived from whole grains (cereals) and tubers (potatoes).

This point is made also by Dr. Jeremiah Stamler, chairman of the Department of Community Health and Preventive Medicine at Northwestern University, in *Atherosclerosis*, a publication designed to educate doctors on the relationship of diet to heart disease. He argues that moderate carbohydrate consumption does not elevate blood triglyceride and cholesterol levels but, in fact, apparently results in reduction in these risk factors. He reports:

> My research colleague, Mario Mancini, has demonstrated that blood triglyceride and cholesterol levels are lower in southern Italians than in Britons, Swedes or Swiss despite the fact that their carbohydrate intake is higher—55 to 60 percent of calories instead of 40 to 55 percent—with most of it coming from starch.
>
> Diet makes a difference in cholesterol levels as evidenced by the low levels among southern Italian workingmen who eat very little saturated (animal or dairy) fats, as compared to the upper-income southern Italians, northern Italians and Americans—all of whom eat more saturated fats.
>
> Triglyceride and cholesterol levels usually have nothing to do with population or racial genetics because southern Italians who have emigrated to the United States develop the typical American higher blood levels as they become able to afford the high-saturated fat, high-cholesterol American diet.

In their report, the Connors conclude that:

> High carbohydrate diets are quite appropriate for both normal individuals and for most of those with hyperlipidemia (high levels of fat in the blood), provided that the carbohydrate is largely derived from grains and tubers, that an energy excess is not consumed and that adiposity does not result. The use of high carbohydrate diets by civilized man has an historical basis, is economically sound and has every implication of causing less. rather than more, disease especially in the coronary heart disease-hyperlipidemia area.

Diabetes

The cause or causes of diabetes are still unknown. However, the handling of the diets for the treatment of diabetes may give some insight on how to prevent diabetes. For example, the Connors also report that the high complex carbohydrate diet is important in the treatment of diabetics because it reduces the threat of atherosclerosis and hyperlipidemia, which are common to diabetics, by lowering cholesterol and saturated fat levels. The Connors note that some diabetics find a high carbohydrate diet also results in improved glucose tolerance; in others insulin requirements have been stabilized.

Dietary Fiber

The dietary fiber which occurs in foods containing complex carbohydrates may also be beneficial. Dietary fiber may be divided generally into two categories, according to Dr. P. J. Van Soest, of the Department of Animal Science at Cornell University, the more mature, less fermentable and digestible bran fiber from grains, and the less mature

more fermentable and digestible fiber from fruits and vegetables. It is probable, he says, that both kinds of dietary fiber are important to nutrition, but relatively little is known about the properties of dietary fiber and its role in nutrition.

Dr. Denis P. Burkitt, among the first advocates of the high fiber diet, has postulated that an increase in fiber consumption, preferably natural fiber rather than fiber added to refined products such as white bread, will markedly reduce the incidence of bowel cancer and other diseases, primarily those of the intestine.

Dietary fiber and/or phytate, which occurs in foods that also contain dietary fiber, bind certain minerals (iron, zinc, copper, magnesium, calcium and chromium) and therefore, may reduce their absorption. This possibility and the fact that relatively little is known about the properties of dietary fiber, suggest that an extreme increase in complex carbohydrate consumption should be avoided in order to reduce the possibility of mineral deficiencies or other health problems from occurring. However, if a person consumes a balanced mix of foods when increasing his or her consumption of complex carbohydrates to attain this Dietary Goal, then there appears to be no likelihood of any mineral deficiency or other health problems occurring.

Vitamin and Mineral Sources

Increased consumption of fruit, vegetables and whole grains is also important with respect to supplying adequate amounts of micro-nutrients, vitamins and minerals. This is particularly important for those who are limiting their food intake to control weight or save money. For many people consumption may be reaching a critical level below which it may be difficult to obtain adequate levels of micro-nutrients from the volumes of food consumed. Under these circumstances, it is essential to eat foods that maximize the potential for consuming a broad range of micro-nutrients.

Fats and refined and processed sugars, the principal macro-nutrients that have displaced complex carbohydrates, are, as Table 2 shows, relatively poor sources of micro-nutrients, particularly in view of the levels of calories they induce.

It is important to note that knowledge of the full range of micro-nutrients has not been developed. For example, inquiry is only beginning into the function of elements such as chromium, selenium, vanadium and others, which appear to have important regulatory functions in and between cells. Furthermore, there is only limited knowledge of human requirements for most nutrients, as shown in Appendix C, prepared by the Department of Agriculture.

Consequently, although vitamin and mineral supplements and nutrient fortification may improve chances for obtaining micro-nutrients, they cannot be seen as substitutes for food. Nor can it be assumed that taking supplements and/or eating fortified foods, while continuing to eat a diet high in fats and refined and processed sugars, will meet one's nutrient needs.

Obesity

Finally, an increase in the consumption of complex carbohydrates is likely to ease the problem of weight control. As suggested above, displacing fats and refined and processed sugars reduces the risk of obesity. Furthermore, the high water content and bulk of fruits and vegetables and bulk of whole grain can bring a longer lasting satisfaction of appetite more quickly than do foods high in fats and refined and processed sugars.

TABLE. 2.—NUTRIENT LEVELS IN FATS AND SUGARS

[Nutrients in edible portion of 1 pound of food as purchased]

	Food energy (calories)	Proteins (grams)	Fat (grams)	Carbohydrates (grams)	Calcium (milligrams)	Phosphorus (milligrams)	Iron (milligrams)	Sodium (milligrams)	Potassium (milligrams)	Vitamin A (I.U.)	Thiamine (milligrams)	Riboflavin (milligrams)	Niacin (milligrams)	Asorbic acid (milligrams)
Fats:														
Butter	3,248	2.7	367.0	1.8	91	73	0	4,477	104	15,000				0
Lard	4,091	0	454.0	0	0	0	0	0	0	0	0	0	0	0
Cooking and salad oils	4,010	0	454.0	0	0	0	0	0	0		0	0	0	0
Sugars:														
Beet or cane, brown	1,692	0	0	437.3	386	86	15.4	136	1,560	0	0.05	0.15	0.8	0
Granulated	1,746	0	0	451.3	0	0	.5	5	14	0	0	0	0	0
Powdered	1,746	0	0	451.3	0	0	.5	5	14	0	0	0	0	0
Dextrose crystallized	1,520	0	0	413.0			Trace			0	0	0	0	0
Maple	1,579			408.0	649	50	6.4	64	1,098					16
Apple (fresh)	252	.8	2.5	60.5	29	42	1.3	4	459	380	.12	.08	.3	319
Orange (fresh)	180	5.8	1.3	69.6	314	99	3.6	9	880	1,120	.45	.22	2.2	

Source: U.S. Department of Agriculture, Handbook 8.

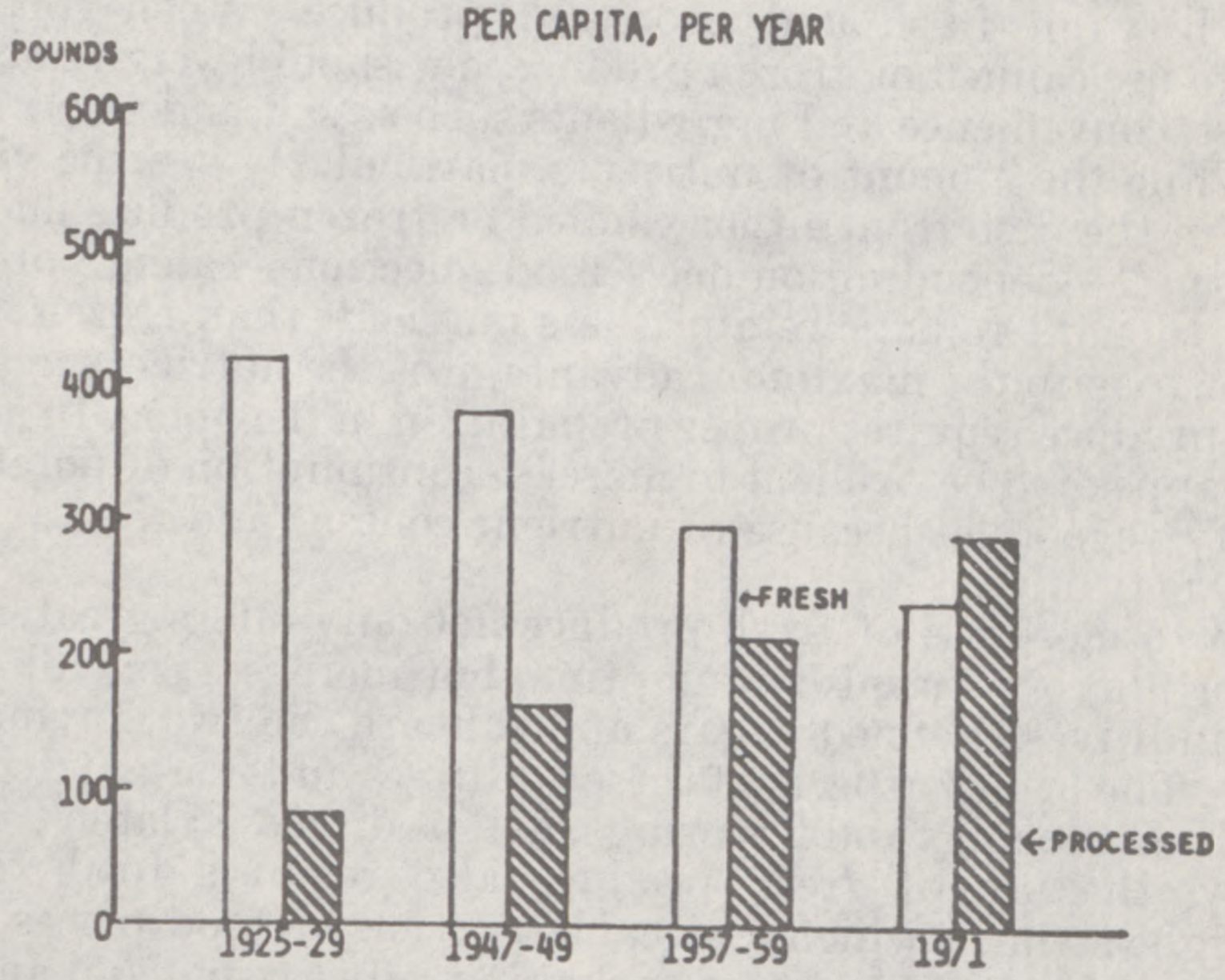
Guide to Increasing Complex Carbohydrate Consumption

1. FRUITS AND VEGETABLES

A Department of Agriculture report published in 1972 found that nutrient availability from fruits and vegetables had declined with increased use of canned, frozen and dried produce and shifts in consumption away from such vegetables as white and sweet potatoes, dark green and yellow vegetables, dry beans and dry peas, and grain products. The report, entitled *Trends in Fresh Fruit and Vegetable Consumption and Their Nutritional Implications*, said:

> The shift from the uses of fresh fruits and vegetables to processed (shown in figure 5), as well as changes in selection among different fruits and vegetables, have resulted in some significant trends in nutrients obtained from this food group. The amount of vitamin A obtained from fruits and vegetables has declined 11 percent since 1925–29, and 18 percent since 1947–49. Vitamin B_6 and magnesium declined by nearly 20 percent since 1925–29, while the amount of thiamin obtained from fruits and vegetables declined almost 10 percent.
>
> It appears that increased consumption of fresh fruits and vegetables, particularly the high nutrient forms, would be beneficial for many persons in need of dietary improvement. Educating consumers, particularly those of low incomes, to the greater advantage of the most economical and most nutritious fruits and vegetables, would offer a great potential for dietary improvement.

FIGURE 5.—Trends in consumption of fresh and processed fruits and vegetables.[1]



[1] Includes potatoes and sweet potatoes.

Source: "Trends in Fresh Fruit and Vegetable Consumption, Nutritional Qualities of Fresh Fruits and Vegetables," Futura Publishing Co., Mount Kisco, N.Y., 1974.

Although canned and frozen fruits and vegetables are normally processed within hours of harvesting, if fruits and vegetables are used directly from the garden, it is likely that their nutrient content will exceed that of their processed counterparts, as indicated in a report by Dr. Owen Fennema, professor of Food Chemistry at Northwestern University, appearing in *Nutritional Evaluation of Food Processing.*[2] However, he and other experts say that fresh fruits and vegetables in the supermarket may have undergone nutrient-depletion in shipping and storage, and consequently frozen varieties may provide equivalent or better nutritional values. A similar position is taken in *Diet and Exercise*, published by the Swedish government to promote its nutrition and physical fitness program, which says: "Deep frozen and fresh vegetables are of equal value from a nutritional point of view."

On the other hand, it is also true that although considerable knowledge has been gathered about the nutritional impact of freezing, canning and other processing, this knowledge is not held for all nutrients, all foods or all processes. Furthermore, it is important to understand the degree of our ignorance about what constitutes food value. Out of more than 50 known nutrients, Recommended Dietary Allowances have been established for only 17. In addition, there is no definitive evidence that food composition described solely in terms of all known nutrients would be an accurate measure of total food value.

Consequently, it would seem advisable to create at least a balance in the diet between fresh and processed produce. When considering whether to use canned or frozen produce, one should weigh nutritional value, cost, convenience and ingredients such as salt and sugar that are added. While the amount of nutrients, particularly specific vitamins, obtained in the diet from either canned or frozen produce may be relatively small—depending on one's food selection—canned produce is generally thought to have retained less nutrients than frozen or fresh. Of course, to gain the maximum advantage of the nutrients in all three forms of produce requires proper preparation in the home. In addition, it would appear to be prudent to increase consumption of potatoes and dark leafy vegetables because of nutrient content and the varieties of fiber they may offer.

A shift to more use of fresh produce not only offers greater opportunity for micro-nutrient consumption, but increases control over use of food additives. Refined sugars and salt are the two foremost food additives. The health aspects of these additives and non-nutritive additives such as colorings and flavorings, will be discussed later.

Finally, the use of fresh produce also removes food from the processing system in which a sizeable portion of food prices may result from nonfood costs such as packaging, advertising and any added cost that may accrue to imperfect competition in food manufacturing, a condition which has been discussed in a variety of reports including that of the Food Marketing Commission in 1965 and more recently at hearings of the Select Committee in October 1975.

Refinement

Highly-refined fruits and vegetables generally should not be viewed as nutritional equivalents or substitutes for the same food in its fresh

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[2] *Nutritional Evaluation of Food Processing,* 1975. Nutritional Aspects of Food Processing Methods, pp. 11–15; Effects of Freeze-Preservation on Nutrients, pp. 244–288.

form. For example, Table 3 shows that potato chips and dehydrated potatoes should not be thought of as the nutritional equivalent of fresh, baked potatoes. In addition, it is apparent that potato chips carry significantly more fat than the baked or mashed form: potato chips are 40 percent fat compared to 0.1 percent fat in baked potatoes.

Although it would be possible to restore vitamin C and certain other nutrients through fortification, it is doubtful that the numbers and balance of nutrients in the fresh form could ever be duplicated. In addition, it is not known how processing may affect fiber composition.

Several nutritionists and food technologists interviewed in preparation of this report said that the decline in nutrient content in various individual food items may not be important because the nutrients needed for optimal health are likely to be readily available in the great abundance of food in the marketplace.

TABLE 3.—NUTRITIVE VALUES FOR VARIOUS FORMS OF POTATOES

Fresh	Grams	Water (percent)	Food energy (calories)	Protein (grams)	Carbo-hydrate (grams)	Fat (grams)	Iron (milligrams)	Thiamin (milligrams)	Riboflavin (milligrams)	Niacin (milligrams)	Vitamin C (milligrams)
Baked (1 potato)	202	75.1	145	4.0	32.8	0.2	1.1	0.15	0.07	2.7	31
Mashed (1 cup, milk added)	210	82.8	137	4.4	27.3	1.5	.8	.17	.11	2.1	21
French fries (10 strips, frozen, oven heated.)	78	52.9	172	2.8	26.3	6.6	1.4	.11	.02	2.0	16
Dehydrated:											
(a) Flakes (1 cup, dry form)	45	5.2	164	3.2	37.8	.3	.8	.10	.03	2.4	14
(b) Flakes (1 cup, prepared with milk, water, table fat, salt.)	210	79.3	195	4.0	30.5	6.7	.6	.08	.08	1.9	11
Potato chips (10 chips)	20	1.8	114	1.1	10.0	8.0	.4	.04	.01	1.0	3

1 teaspoon of margarine = 5 gms of fat

Source: "Nutritive Value of American Foods in Common Units; Agriculture Handbook No. 456," Agricultural, Research Service. U.S. Department of Agriculture.

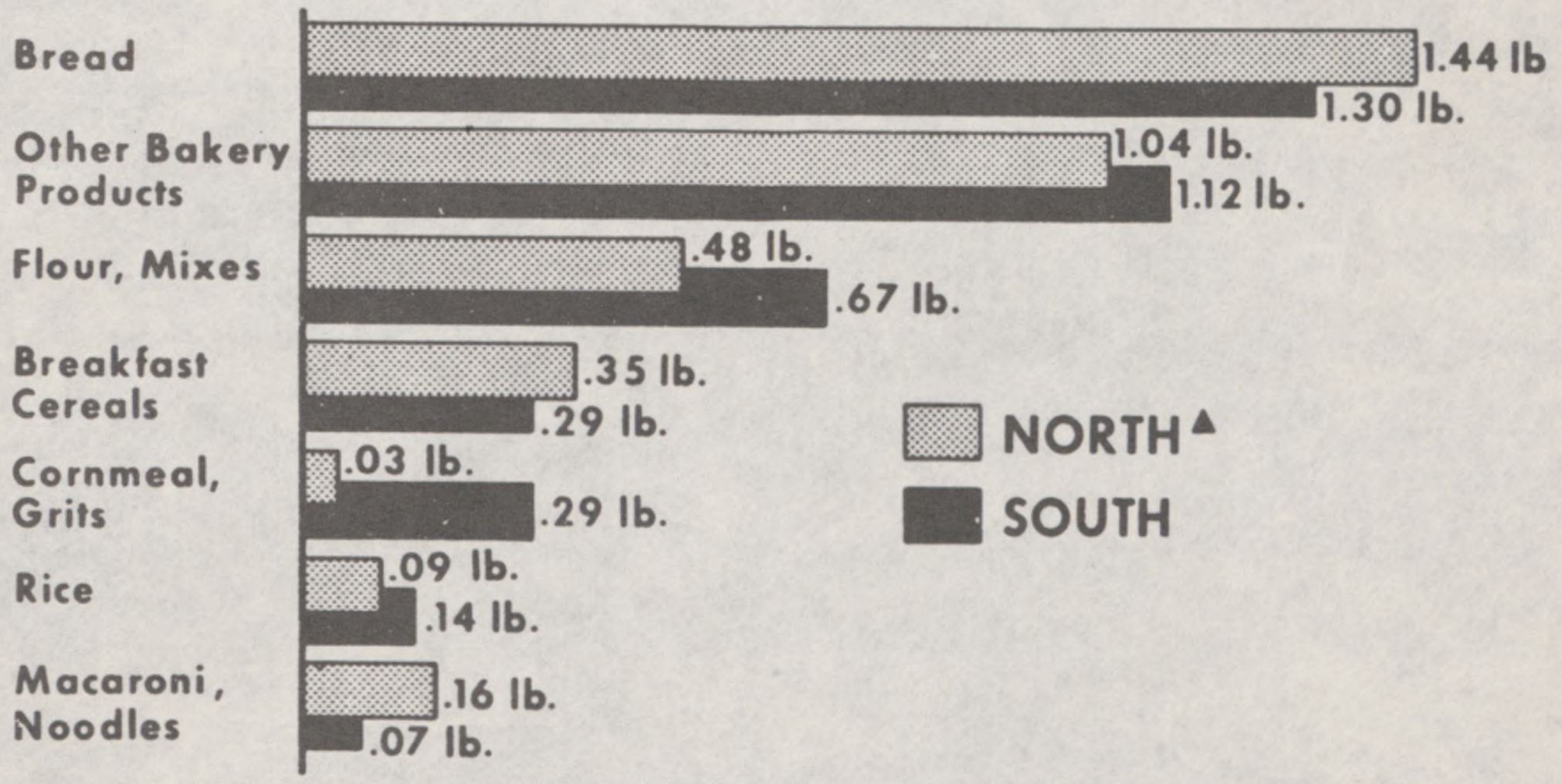
It is important to understand, however, that several studies suggest that more than 50 percent of the United States diet undergoes some form of processing before it enters the home.[3] Given the need to maximize micro-nutrient availability for those on reduced diets; the need to ensure adequate nutrient availability to those who do not widely vary their diets; and the need to maximize the nutritional power of the food supply; it would seem prudent not only to increase use of fresh foods but also those undergoing the least processing.

2. GRAIN PRODUCTS

Of the grain products, bread is the most widely consumed (Fig. 6). However, bread consumption has been declining in the United States, in part perhaps because it has been viewed, incorrectly, as fattening. Bread is of intermediate caloric density, and a relatively good protein source. Professor Olaf Mickelsen of Michigan State University, reports in *Cereal Foods World*, of July 1975:

> Contrary to what most people think, bread in large amounts is an ideal food in a weight reducing regimen. Recent work in our laboratory indicates that slightly overweight young men lost weight in a painless and practically effortless manner when they included 12 slices of bread per day in their program. That bread was eaten with their meals. As a result, they became satisfied before they consumed their usual quota of calories. The subjects were admonished to restrict those foods that were concentrated sources of energy: otherwise, they were free to eat as much as they desired. In eight weeks, the average weight loss for each subject was 12.7 pounds.

FIGURE 6



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[3] *Human Nutrition,* Jean Mayer, 1972. pg. 657. *Total Consumer Buying of Fresh Versus Processed Foods Remains Stable.* Alden C. Manchester. Economic Research Service, U.S. Department of Agriculture, NFS–144, May 1973 (Unpublished 1975 figures show trend stable.) *Anticipating Public Policy Issues: Nutrition, Diet, Health and Food Quality.* Graham T. T. Molitor. Unpublished report prepared for the General Accounting Office. July 1976. pg. 164.

Another study by Mickelsen found that 12 young men could obtain 90 to 95 percent of their protein needs from white enriched bread. In some countries bread may contribute as much as 80 percent of protein needs.

There are also arguments, though somewhat less conclusive, suggesting not only that increased bread consumption is warranted but that more whole wheat bread should be eaten. There have been no studies that have found whole wheat flour to be superior nutritionally to white flour when consumed in a normal diet, and surprisingly few studies have even considered the question.

However, whole wheat bread may provide more micro-nutrients and definitely provides more fiber than white bread.

White bread is made from wheat that has undergone a degree of milling that removes large amounts of bran and wheat germ. A report at the 1976 Convention of the American Association of Cereal Chemists [4] estimated that the average milling level in the United States is 76 percent extraction, meaning that about 76 percent of the wheat kernel has been retained. One hundred percent extraction flour is whole wheat flour. Figure 7 shows how various levels of milling affect various micro-nutrients, and Table 4 from an unpublished report by Doris Baker, of the Department of Agriculture, shows the degree to which milling may reduce fiber content.

In bread, as with other foods undergoing processing, there is the danger that, as the degree of processing increases, nutrients, known and unknown, are removed or altered in ways not currently understood.

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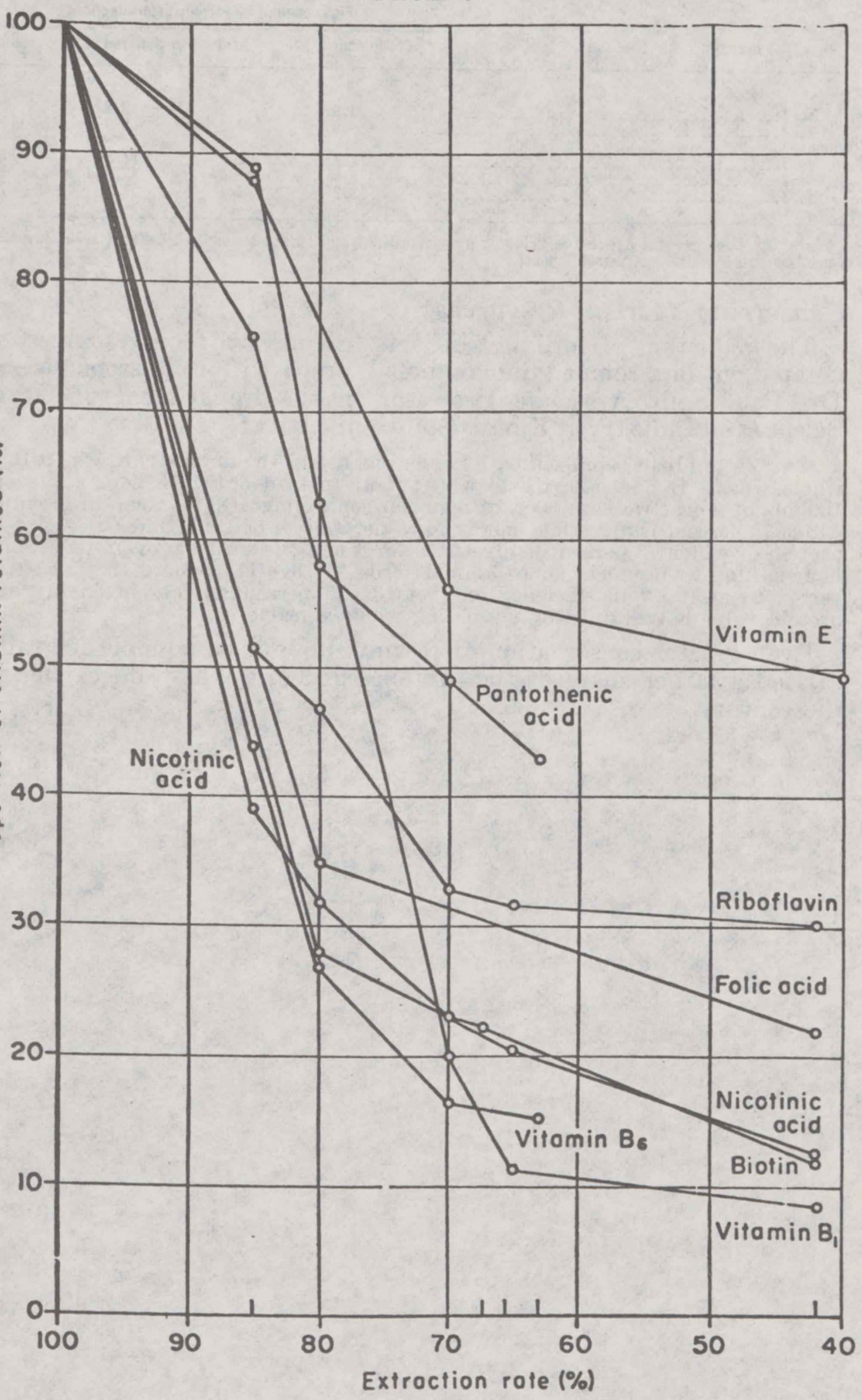
[4] ***Natural Levels of Vitamins and Minerals in Commercially Milled Wheat Flour in the United States and Canada*** **(Flour Base Line Study for the American Bakers Association Ad Hoc Industry Committee on Fortification of Cereals). Paul J. Mattern, University of Nebraska, chairman of panel presenting report.**

FIGURE 7



COMMENT.—Relation between extraction rate and proportion of total vitamins of the grain retained in flour. (Reproduced from "Wheat in Human Nutrition" (Food and Agriculture Organization, Rome, 1970, p. 90)).

TABLE 4.—FIBER CONTENT IN [In grams] WHITE VS. WHOLE WHEAT BREAD

Type bread	Fiber content by various determinations			
	Crude fiber	Acid	Buffered	Neutral
White:				
No. 1	1.3	1.2	8.8	2.8
No. 2	.9	1.5	9.3	2.9
Whole:				
No. 1	2.7	2.8	12.3	6.6
No. 2	2.6	2.6	12.9	5.1
No. 3	3.2	3.1	11.5	7.3

Source: U.S. Department of Agriculture. "Fiber in Wheat Foods," a study presented by Doris Baker at 1976 Convention of the American Association of Cereal Chemists.

Conserving Nutrient Resources

The reduction of milling also acts to conserve food resources, as pointed out in a compendium on bread, prepared for classroom use by Dr. Paul Seib, Associate Professor in the Department of Grain Science and Industry at Kansas State University:

> . . . White bread represents a less efficient use of the nutrients in wheat than whole wheat. If one uses whole wheat flour instead of white flour for every 100 gm. of wheat we gain 30 g. of material containing: (a) 93 kcal. in bread of which 73 percent is digestible energy for a net gain of 63 kcal., and (b) 4.65 g. of protein of which 73 percent is digestible for a net gain of 3.4 g. of protein. Since flour-milling by-products go to animal feeds in the U.S., where they are converted to meat at an efficiency of about 10–25 percent, a loss in energy and protein value is sustained by not eating whole wheat bread.

Even greater conservation of resources might be possible if grains carried a larger share of the protein burden, as they did earlier in the century.

TABLE 5.—NUTRIENT CONTENT OF SELECTED GRAINS

	Water (percent)	Food energy (calories)	Protein (grams)	Fat (grams)	Carbohydrate (grams)	Calcium (milligrams)	Phosphorus (milligrams)	Iron (milligrams)	Sodium (milligrams)	Potassium (milligrams)	Vitamin A (milligrams)	Thiamine (milligrams)	Riboflavin (milligrams)	Niacin (milligrams)	Vitamin C (milligrams)
Whole grain wheat (Hard Red Spring)	13.0	330	14.0	2.2	69.1	36	383	3.1	(3)	370	(0)	0.57	0.12	4.3	(0)
Whole wheat flour (hard wheats)	12.0	333	13.3	2.0	71.0	41	372	3.3	3	370	(0)	.55	.12	4.3	(0)
80 percent extraction wheat flour (hard wheats)	12.0	365	12.0	1.3	74.1	24	191	1.3	2	95	(0)	.26	.07	2.0	(0)
Bread flour enriched (hard wheats)	12.0	365	11.8	1.1	74.7	16	95	[1] 2.9	2	95	(0)	[1] .44	[1] .26	[1] 3.5	(0)
Brown rice cooked	70.3	119	2.5	.6	25.5	12	73	.5	282	70	(0)	.09	.02	1.4	(0)
White rice cooked (enriched)	72.6	109	2.0	.1	24.2	10	28	[2] .9	374	28	(0)	[2] .11	(3)	[2] 1.0	(0)
White rice instant cooked (enriched)	72.9	109	2.2	Trace	24.2	3	19	[2] .8	273	Trace	(0)	[2] .13	2	[2] 1.0	(0)
Cornmeal, white or yellow unbolted (whole grain)	12	355	9.2	3.9	73.7	20	256	2.4	(1)	(284)	[4] 510	.38	.11	2.0	(0)
Cornmeal, degermed dry enriched	12	364	7.9	1.2	78.4	6	99	[1] 2.9	1	120	[4] 440	[1] .44	[1] .26	[1] 3.5	(0)
Rye (whole grain)	11	334	12.1	1.7	73.4	(38)	376	3.7	(1)	467	(0)	.43	.22	1.6	(0)
Rye flour (light)	11	357	9.4	1.0	77.9	22	185	1.1	(1)	156	(0)	.15	.07	.6	(0)

[1] Based on product with minimum level of enrichment.
[2] Values for iron, thiamin and niacin are based on the minimum levels of enrichment specified in standards of identity.
[3] Riboflavin enrichment standard pending further hearings.
[4] Based on yellow varieties.

Source: Agriculture Handbook 8. U.S. Department of Agriculture, 1963.

Selecting Grain Products

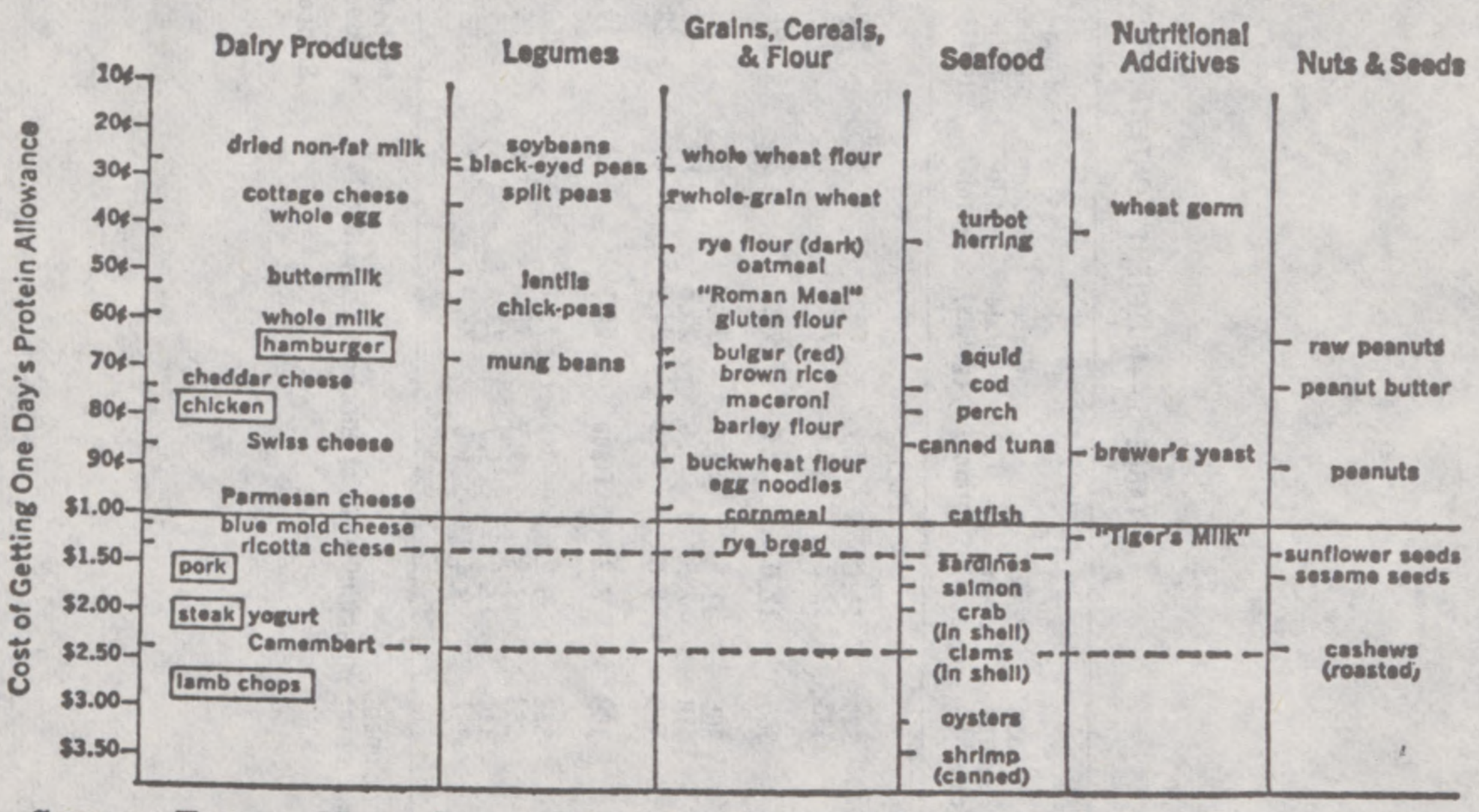
Table 5 compares nutrients offered in various grains and grain products. Table 6, from Frances Moore Lappe's *Diet for a Small Planet*, offers a comparison of costs of grain protein versus other protein sources.

As is apparent in Table 5, the common side-dish rice suffers in processing. The hierarchy of nutrient value in rice, from most to least is:

Brown rice
Parboiled (converted) rice
Common white enriched rice
Instant rice

Hot cooked breakfast cereals are generally less refined and processed and less expensive than ready-to-eat cereals. Of the hot cereals (wheat, rye or oat), whole grained cereals are most nutritious, according to Ruth Fremes and Dr. Zak Sabry in *NutriScore* (Fremes is a Canadian home economist and Sabry headed Nutrition Canada, that nation's recent nutrition survey). Less nutritious are cream of wheat and corn meal. The authors point out also that "infant" and "quick" hot cereals may have less nutrients than their longer-cooking counterparts.

TABLE 6.—Protein cost



Source: Frances Moore Lappe, "Diet for a Small Planet," 1971.

In ready-to-eat cereals, sugar-coated cereals should be avoided, and *NutriScore* explains that granola also offers high caloric intake for the amounts of nutrients available. The book says:

> Granola does have *slightly* more protein, calcium, riboflavin and niacin than plain cereals, but the difference is not great enough to make this a special reason for buying it. Its major disadvantages are its high caloric value, its high fat content, the high saturation of fat in the shredded coconut and its high cost.

Flaked, shredded and puffed cereals may be enriched, but Fremes and Sabry note that many trace elements are not added, nor is fiber, and "So, the enriched refined cereal is never as good nutritionally as the wholesome unrefined cereal."

GOAL 3. REDUCE THE CONSUMPTION OF REFINED AND OTHER PROCESSED SUGARS BY ABOUT 45 PERCENT TO ACCOUNT FOR ABOUT 10 PERCENT OF TOTAL ENERGY INTAKE

Figure 3 (p. 12) from an article by Louise Page and Berta Friend, of the U.S. Department of Agriculture, appearing in "Sugars in Nutrition" published by the Nutrition Foundation, shows that various kinds of sugar accounted for only 32 percent of total carbohydrate consumption in the period 1909 to 1913. However, by 1976, sugars had replaced starch and other complex carbohydrates, as the predominate carbohydrate source. Thus the consumption of all types of sugars has increased from 18 percent of total caloric intake to approximately 24 percent, and the consumption of refined sugar (cane and beet) has increased from 12 percent of total caloric intake to approximately 18 percent. Figure 8 indicates per capita consumption in pounds of refined and processed sugars since 1875, and Table 7 details per capita consumption of caloric sweeteners, 1960–76.

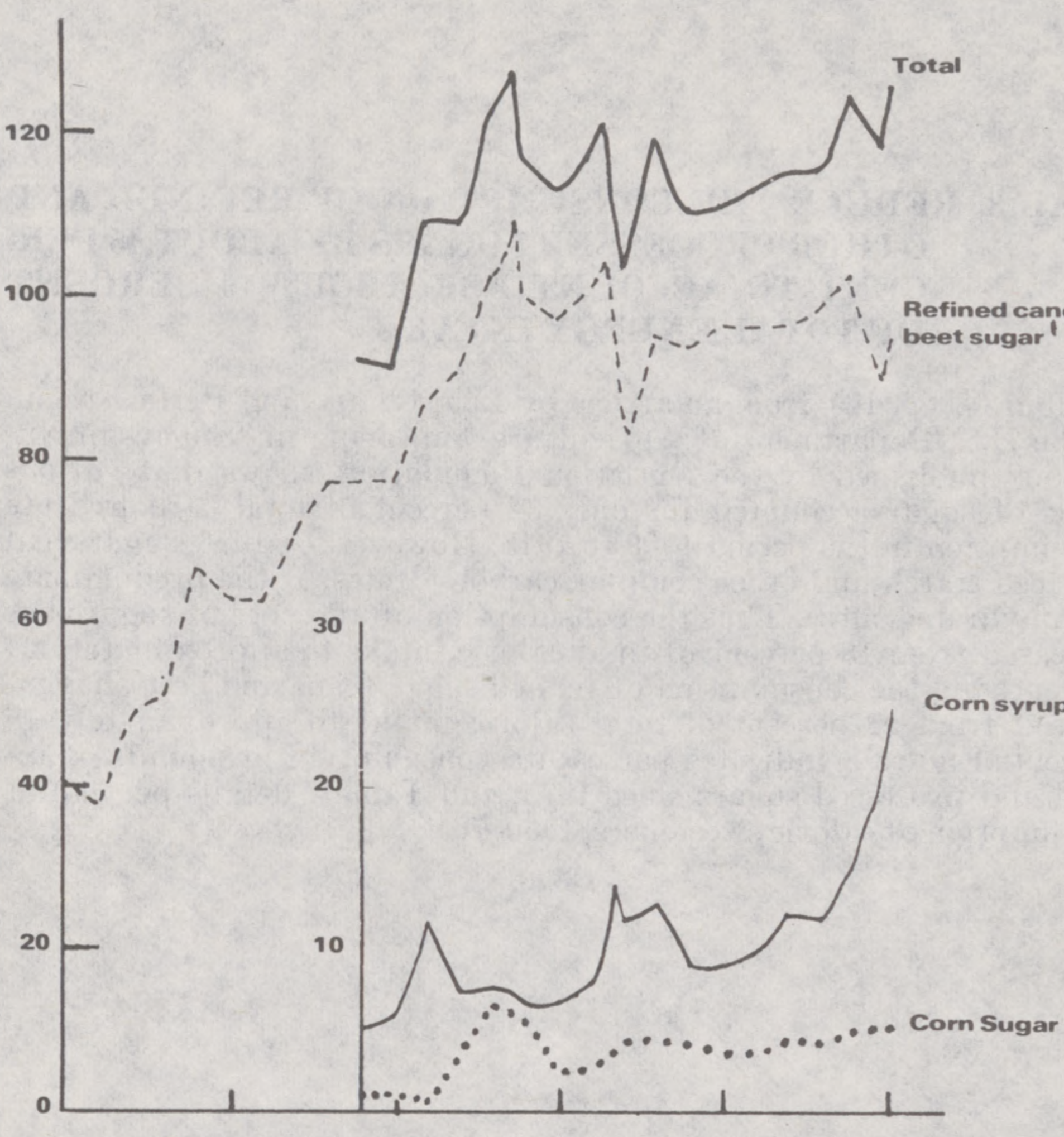


FIGURE 8.—Per capita sugar consumption—United States

[1] Sucrose.
[2] Glucose and frutose.

SOURCES: 1875–1909: U.S. Bureau of Census—"*Historical Statistics of U.S.–Colonial times to 1959.*" (1960) p. 187. 1910–1965: USDA Rep. #138 (1968) p. 84. 1966–76: Sugar and Sweetener Report. (May, 1977) p. 31. 1976-preliminary figure.

TABLE 7.—CALORIC SWEETENERS: PER CAPITA U.S. CONSUMPTION, 1960–76 [1]

[In pounds]

Calendar year	Refined cane an beet sugar						Corn sweeteners [2]				Minor caloric [2]			
	U.S. grown sugar			Cane sugar			Corn sirup							
	Beet sugar	Cane sugar	Total	Imported	Total	Total	High-fructose	Other	Dextrose	Total	Honey	Edible sirups	Total	Total caloric
1960	25.2	28.1	53.3	44.3	72.4	97.6	----------	8.2	3.4	11.6	1.2	0.8	2.0	111.2
1961	26.1	28.7	54.8	43.0	71.7	97.8	----------	8.6	3.4	12.0	1.1	.8	1.9	111.7
1962	23.9	28.0	51.9	45.4	73.4	97.3	----------	9.3	3.6	12.9	1.1	.9	2.0	112.2
1963	27.2	27.8	55.0	41.7	56.5	96.7	----------	9.9	4.3	14.2	1.1	.7	1.8	112.7
1964	28.5	30.3	58.8	37.9	68.2	96.7	----------	10.9	4.1	15.0	1.0	.7	1.7	113.4
1965	29.4	30.3	59.7	37.1	66.4	96.8	----------	11.0	4.1	15.1	1.1	.7	1.8	113.7
1966	28.3	28.6	56.9	40.3	69.2	97.2	----------	11.2	4.2	15.4	1.0	.7	1.7	114.8
1967	26.6	29.9	56.5	41.8	71.7	98.3	----------	11.9	4.2	16.1	.9	.5	1.4	115.7
1968	27.8	26.5	54.3	44.7	71.2	99.0	----------	12.6	4.3	16.9	.9	.7	1.6	117.5
1969	30.1	25.2	55.3	45.4	70.6	100.7	----------	13.2	4.5	17.7	1.0	.6	1.6	120.0
1970	31.4	25.0	56.4	45.5	70.5	101.9	----------	14.0	4.6	18.6	1.0	.5	1.5	122.0
1971	31.1	22.8	53.9	48.5	71.3	102.4	----------	15.0	5.0	20.0	.9	.5	1.4	123.8
1972	30.4	25.4	55.8	47.0	72.4	102.8	0.9	15.6	4.4	20.9	1.0	.5	1.5	125.2
1973	30.4	24.9	55.3	46.2	71.1	101.5	1.4	16.7	4.8	22.9	.9	.5	1.4	125.8
1974	26.1	21.0	47.1	49.5	70.5	96.6	2.3	17.4	4.9	24.6	.8	.4	1.2	122.4
1975 [3]	30.5	24.9	55.4	34.8	59.7	90.2	4.7	17.7	5.1	27.5	.9	.4	1.3	119.0
1976 [4]	33.3	23.5	56.8	38.3	61.8	95.1	7.1	17.7	5.1	29.9	1.0	.4	4.1	126.4

[1] U.S. Department of Agriculture, Sugar and Sweetener Report, SSR vol. 2, February 1977.
[2] Dry basis. Recent corn sweetener consumption may be understated due to incomplete data.
[3] Preliminary.
[4] Estimate.

The largest components in the sugars category are refined sugar (cane and beet), which accounts for 14 percent of total calories, and processed sugars (corn sugar, syrups, molasses and honey), which account for 4 percent of total calories. The other 6 percent of total calories consumed as sugar are obtained from fruit, vegetables and milk products.

The greatest impetus for the increased use of sugars apparently has come from the addition of refined sugar (cane and beet) to processed foods. Figure 9, also from the Page/Friend article, shows the dramatic increase in the use of refined sugar added outside the control of the consumer.

Page and Friend report:

> Use in processed food products and beverages has increased more than threefold from nearly 20 to 70 lbs., while household purchase has dropped one-half from a little more than 50 to about 25 lb. Currently, food products and beverages account for more than two-thirds of the refined sugar consumed—70 lb. out of a little over 100 lb. Moreover, beverages now comprise the largest single industry use of refined sugar, accounting for over one-fifth of the total refined sugar in the United States diet, or nearly 23 lb. Furthermore, the amount used in beverages has increased nearly sevenfold since early in the century when 3½ lb./person/year was used in these products. Use of refined sugar in beverages is now second only to household use.

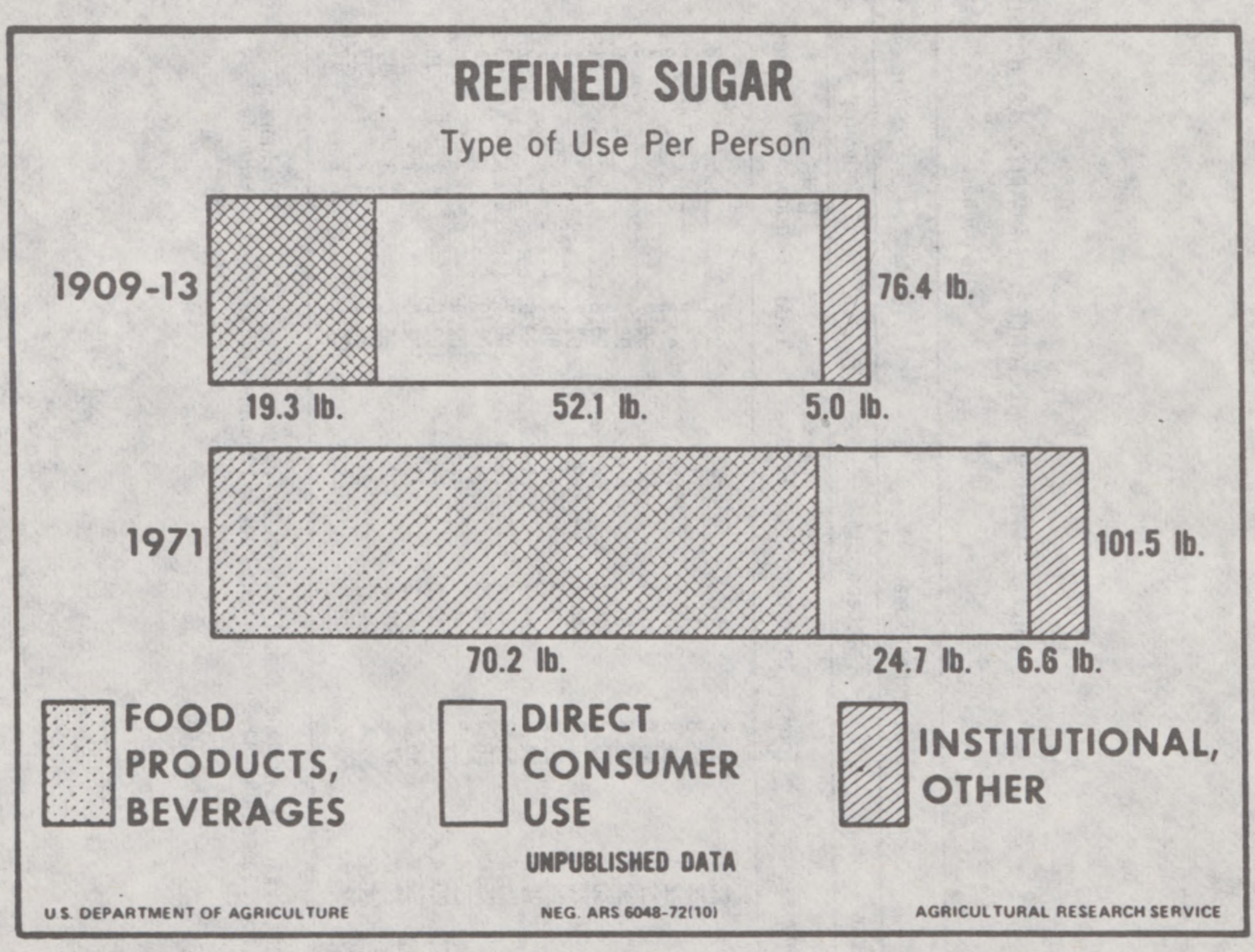


FIGURE 9

Table 8, provided by Page and Friend, shows changes in refined sugar used in this century.

TABLE 8.—REFINED SUGAR, ESTIMATED PER CAPITA CONSUMPTION BY TYPE OF USE, SELECTED PERIODS, 1909–13 TO 1971 [1]

[In pounds]

Type of use	1909–13	1925–29	1935–39	1947–49	1957–59	1965	1971 (preliminary)
In processed foods:							
Cereal and bakery products	4.5	7.7	9.7	12.9	15.4	15.6	17.6
Confectionery products	6.5	8.0	8.2	9.8	9.6	10.4	11.0
Processed fruits and vegetables [2]	3.0	4.6	4.4	9.0	9.8	9.5	10.4
Dairy products	1.5	2.3	2.4	4.6	4.9	5.3	5.8
Other food products [3]	.3	.7	1.2	1.5	1.7	2.5	2.6
Total food products	15.8	23.4	25.9	37.8	41.4	43.4	47.4
Beverages (largely in soft drinks)	3.5	5.0	5.2	10.6	12.6	16.9	22.8
Total processed food and beverages	19.3	28.4	31.1	48.4	54.0	60.2	70.2
Other food uses:							
Eating and drinking places [4]	4.5	5.7	6.3	7.7	7.3	6.2	5.5
Household use [5]	52.1	65.0	58.8	37.4	33.1	28.2	24.7
Institutional and other use [6]	.5	.9	.9	1.3	1.0	1.4	1.1
Total	57.1	71.6	66.0	46.4	41.4	35.8	31.3
Total food use	76.4	100.0	97.1	94.8	95.4	96.0	101.5
Nonfood use [7]	.3	.4	.4	.4	.7	.6	.9
Total consumption	76.7	100.4	97.5	95.2	96.1	96.6	102.4

[1] Prepared by Food Consumption Section, Economic Research Service, U.S. Department of Agriculture.
[2] Canned, bottled, and frozen foods (processed fruit and vegetable products); jams, jellies, and preserves.
[3] Includes miscellaneous food uses such as meat curing, and syrup blending.
[4] Includes hotels, motels, restaurants, cafeterias, and other eating and drinking establishments.
[5] Household use assumed synonymous with deliveries in consumer-sized packages (less than 50 lb).
[6] Largely for military use.
[7] Includes use in pharmaceuticals, tobacco, and other nonfood use.

Source: "Sugars in Nutrition," Levels of Uses of Sugar in the United States, L. Page, B. Friend, 1974.

This increased use of refined sugar is traceable in large part to the desire of food manufacturers to create unique food products with a competitive edge. Just recently, for example, Nabisco introduced an Oreo cookie with double the amount of sugar filling. Robert Buzzell and Robert Nourse in "Product Innovation in Food Processing" report that the addition of sugar to cereal in 1948 was the direct cause of recovery of slumping cereal sales. Since then, the varieties of sweetened cereals have grown dramatically. The profusion of varieties of cereals. soft drinks and other products represent efforts to protect market shares.

Dental Disease

Sugars, particularly foods that contain sticky forms of refined and processed sugars (taffy-like candies, sugar-coated cereals, granolas, raisins and other dried fruits) have been implicated in tooth decay, which may be the most widespread disease related to nutrition. The consumption of sugars can lead to cavities (caries) in children and adults, and gum disease and eventual loss of teeth (periodontal disease) in adults. Dr. Mayer, citing a government survey, said in the *Times* article:

> In nations of the Far East, where sugar intake per person per year ranged (at the time) from 12 to 32 pounds, the national averages for decayed, missing or filled teeth in adults 20 to 24 years old ran from 0.9 to 5. By contrast, in South American nations, where sugar intake was high (44 to 88 pounds per

person annually) the averages for decayed, missing or filled teeth in the same age group ran from 8.4 to 12.6. As for the United States today, it has been estimated that 98 percent of American children have some tooth decay; by age 55 about half of the population of this country have no teeth.

Nutrient Danger

The most important problem, perhaps, is the danger in displacing complex carbohydrates which are high in micro-nutrients, with refined sugar, which is essentially an energy source offering little other nutritional value. This not only increases the potential for depriving the body of essential micro-nutrients but, noted Dr. Jean Mayer in an article in the "New York Times Magazine" in June 1976, sugar calories may actually increase the body's need for certain vitamins.

(Sugar calories) increase requirements for certain vitamins, like thiamin, which are needed (for the body) to metabolize carbohydrates. They may increase the need for the trace mineral, chromium, as well.

Thus, a greater burden is placed on the other components of the diet to contribute all the necessary nutrients—other foods need to show extraordinary "nutrient density" to compensate for the emptiness of the sugar calories.

Diabetes

The role of refined sugar in the development of diabetes is unclear, largely because the cause or causes of diabetes are still unknown. Many researchers who have been before the Select Committee believe there is no relationship between the level of refined sugar consumption and the occurrence of diabetes.

On the other hand there are a few researchers who believe there is a connection between the increasingly larger proportion of refined sugar calories in the diet and the higher incidence of diabetes. Dr. A. M. Cohen and associates report in "Sugars in Nutrition" that rats with a genetic predisposition to diabetes will develop the disease when exposed to high refined sugar diets and that they can be prevented from contracting it with a sugar-free diet. It is not yet known whether or not some humans may have a genetic tendency comparable to that reported by Dr. Cohen in his rat experiments.

Dr. Mayer noted in an article in the *Los Angeles Times* in October 1975, that several epidemiological studies indicate a connection between high refined sugar use and diabetes. For example, Yemenite Jewish immigrants to Israel had a low incidence of diabetes until they had consumed a Westernized diet high in sugar for several years. However, other simultaneous changes such as an increased energy intake might also have contributed to the increased incidence of diabetes among these Yemenites.

These considerations have led to a number of governmental and professional health organizations in the United States, and other nations, cited earlier, to recommend a general decrease in sugar consumption (Appendix B).

In "Sugars in Nutrition," Dr. Arvid Wretlind, of the Nutrition Unit, Karolinska Institutet, Stockholm, writing about refined sugar usage in Europe, suggests that sugar consumption be reduced to 10 percent of calories.

In Europe there has been, and in some countries still is, a continuous increase in sugar consumption. In some of these countries the sugar content of the diet has reached a level between 15 and 18 percent of calories. The increase in sugar consumption, followed by an increased fat intake will, generally speaking, result in a decreased content of essential nutrients and in a reduced consumption of

other foods which contain not only energy but also valuable nutrients. The conclusion is that the amount of sugar in a moderate diet should be moderate. A maximum level of 10. cal/percent is proposed.

Reducing the consumption of refined and processed sugars to about 10 percent of caloric intake is an equally reasonable goal for the United States, and would return the consumption of such sugars to a point slightly below that of the early 1900's.

Guide to Reducing the Intake of Refined and Processed Sugars

In reviewing ways of cutting the consumption of refined and processed sugars, the most obvious item for general reduction is soft drinks. Total elimination of soft drinks from the diet, for many people, would bring at least half the recommended reduction in the consumption of such sugars.

Soft drink consumption in the United States doubled between 1960 and 1975, rising from 13.6 gallons a year to 27.6, as shown in Table 9 from the Department of Agriculture's "Sugar and Sweetener Report," September 1976. This translates into 221 sixteen-ounce cans and 21.5 pounds of refined and processed sugar a year.

TABLE 9.—SOFT DRINK SALES, PER CAPITA CONSUMPTION AND AMOUNTS AND VALUE OF SUGAR USED IN MANUFACTURE, 1960–75

	Sales (millions)	Per capita soft drink consumption		Per capita sugar consumption (pounds)	Value of sugar (millions)
		16-oz	Gallons		
Year:					
1960	$1,857	109	13.6	11.3	$188
1965	3,195	154	19.2	15.2	274
1970	5,016	193	24.1	19.2	420
1975	9,426	221	27.6	21.5	1,218

Source: Sugar and Sweetener Report, vol. 1, No. 8, September 1976 Economic Research Service, U.S. Department of Agriculture.

This increase has evidently been made at the expense of increases in some more nutritious beverages. As Table 10 shows, between 1962 and 1975, soft drinks became the second most highly consumed beverage, displacing milk. Currently, soft drinks compete with coffee for first place.

TABLE 10.—TRENDS IN BEVERAGE CONSUMPTION

[Gallons, per capita, per year]

Beverage	1962[1]	1975
Coffee	40.4	31.6
Milk	25.6	24.4
Soft drinks	16.8	31.4
Juices	4.3	6.2

[1] Earliest data available.

Source: Copyright, John C. Maxwell, Jr., Maxwell Associates, Richmond, Va.

Another source of concern is the caffeine in cola soft drinks, which account for about 65 percent of total drink consumption (at least one non-cola also contains caffeine). Medical World News, of January 1976, reports that suspected connections between caffeine and ulcers, heart

disease and bladder cancer have been investigated but that evidence is not strong enough to cause caffeine to be adjudged a risk factor in these diseases. There have been findings of withdrawal symptoms of headache, nervousness and irritability among subjects deprived of normal coffee doses as well as similar symptoms among those who may have ingested too much caffeine. The report said colas are of special concern since they are the major caffeine source for most children.

(Doctors, particularly pediatricians) have reported signs—including irritability, headaches, and nervousness—of what has come to be known as "caffeinism" among cola-guzzling youngsters whose total caffeine intake (30 mg per 8-oz. can) may be boosted by cocoa or hot chocolate (up to 50 mg per 5-oz. cup) and chocolate bars (25 mg).

Reduction in soft drink consumption also offers the advantage of reducing consumption of non-nutritive additives, colors, flavors, and preservatives.

The second major area for consideration in cutting the consumption of refined and processed sugars is baked goods, reported by Page and Friend to be the second highest source of sugar use. In this area, as in others, home preparation provides greater control over refined and processed sugars, as well as fat use.

Finally, it is important to remember that refined and processed sugars have been added to a wide range of products. Although labeling regulations do not currently require the content of the different sugars to be described, if some kind of sugar (corn syrup, fructose sugar, dextrose, honey, etc.) is listed as one of the first two or three ingredients, then one can reasonably assume that there is a lot of sugar added to the product. As noted earlier, use of fresh food enables greater protection against hidden refined and processed sugars.

GOAL 4. REDUCE OVERALL FAT CONSUMPTION FROM APPROXIMATELY 40 PERCENT TO ABOUT 30 PERCENT OF ENERGY INTAKE

Figures 10 and 11 show the growth in fat consumption in the United States over this century, both in absolute terms and as a percent of calories.

Between the beginning of the century and 1973, the amount of nutrient fat available per person per day rose from about 125 to 156 grams, according to a report by the Agricultural Research Service, *Fat in Today's Food Supply—Level of Use and Sources.* The report noted that this increase is equivalent to about 2½ tablespoons of butter or regular margarine; or a little more than 2 tablespoons a day of vegetable oil; or about 24 pounds a year in nutrient fat.

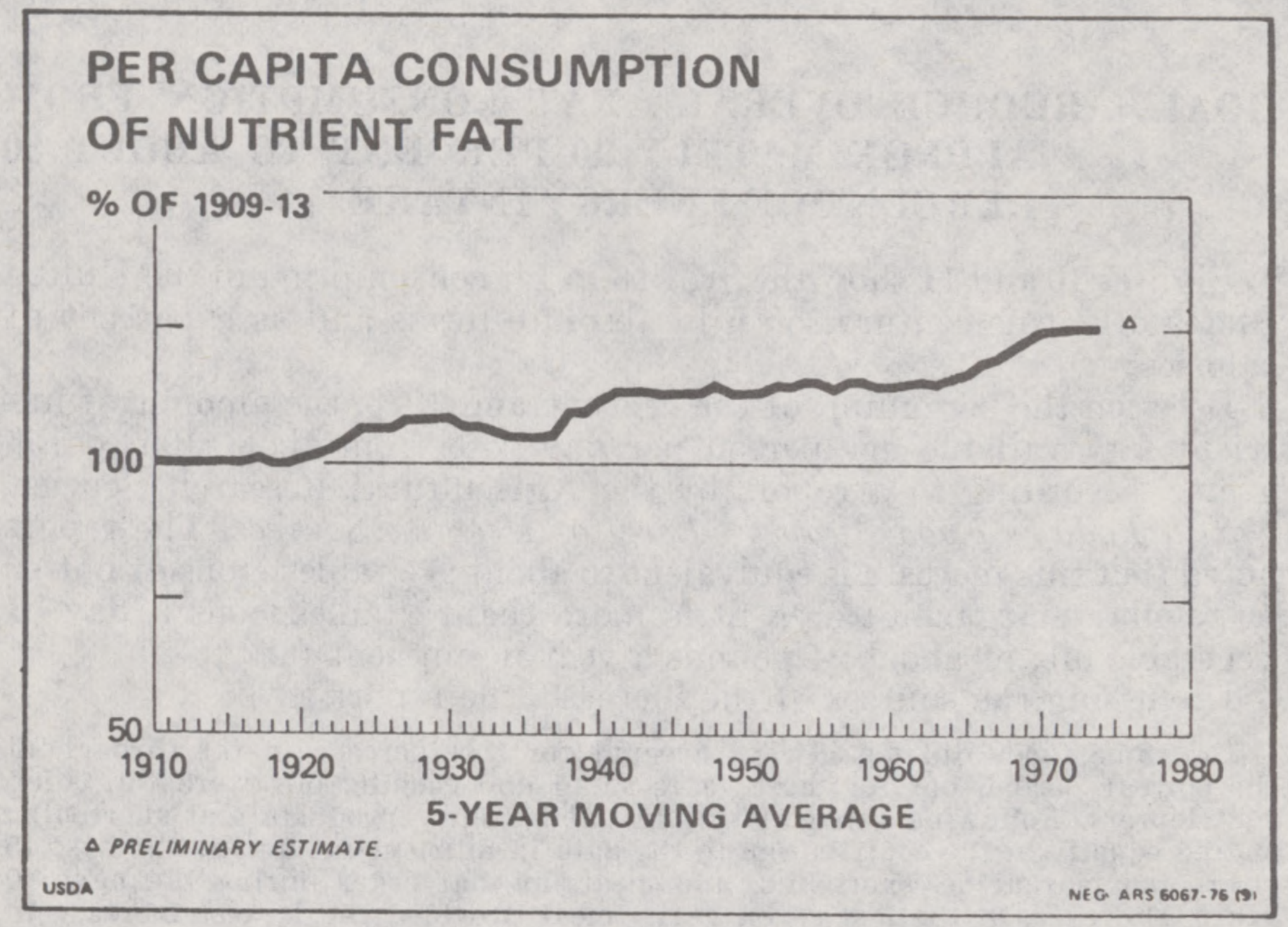
Discussing the sources of the increase, the report says:

> The same foods did not always account for the increase in fat throughout the 60-year period, but for most years salad and cooking oils were the chief contributors. Following salad and cooking oils, dairy products and shortening shared equally in the contribution to the gain in nutrient fat during the first 15 years and margarine, shortening and meat, in that order during the next 40 years. However, in the last seven years, meat provided the largest increase in fat, followed by salad and cooking oils and then by shortening.

The higher fat consumption trends have occurred in other nations as well. Governmental and professional groups in the United States and eight other nations have recommended decreases in total fat consumption. As seen in Appendix B, the intake of total fat ranges from a recommended maximum of 35 percent to as low as 25 percent, which was recommended as the low end of the range by one panel.

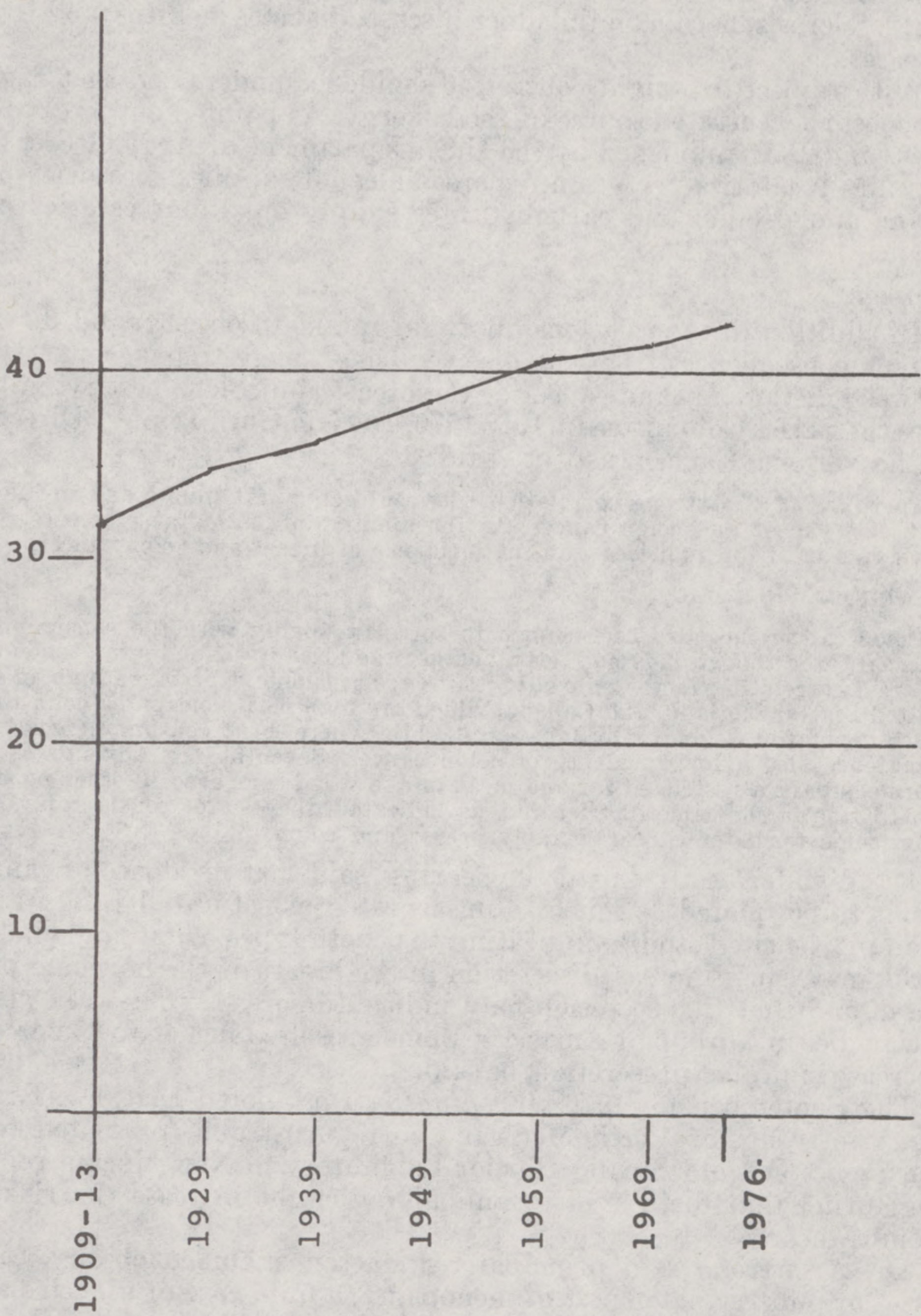
One of the principal reasons for reducing the consumption of fat is to make a place in the diet for complex carbohydrates which generally carry higher levels of micro-nutrients than fat without the complications of fat, which are to be discussed.

FIGURE 10



Source: Handbook of Agricultural Charts, Agricultural Handbook No. 504, U.S. Department of Agriculture, 1976.

FIGURE 11.—Fat as a percent of calories, 1909–76



Source: *Nutrients in United States Food Supply, Review of Trends, 1909–13 to 1965.* B. Friend. The American Journal of Clinical Nutrition. Vol. 20, No. 8, August 1967, pp. 907–914. Data after 1965 unpublished, Agricultural Research Service, U.S. Department of Agriculture.

Obesity

As noted more extensively under Goal 1, obesity is considered a risk factor in: Cardiovascular disease, hypertension (high blood pressure), atherosclerosis, hernia, gallbladder disease, diabetes mellitus, and liver diseases.

With respect to weight control, it should be understood that fat is the most concentrated source of food energy. As pointed out in *Fats in Food and Diet*, published by the U.S. Department of Agriculture, fat supplies 9 calories per gram, whereas alcohol supplies 7 calories per gram, and protein and carbohydrates supply only four calories per gram.

Cancer

In addition to the relationship of fat intake to obesity, and its apparent consequences, there is also evidence suggesting a connection between dietary fat and cancer of the breast and colon. Testifying before the Select Committee in July 1976, Dr. Gio Gori, Deputy Director of the National Cancer Institute, said:

> There is * * * a strong correlation between dietary fat intake and incidence of breast cancer and colon cancer. As the dietary intake of fat increases, you have an almost linear increase in the incidence of breast and colon cancer.

And Dr. Gori said:

> Colon cancer has also been shown to correlate highly with the consumption of meat, even though it is not clear whether the meat itself or its fat content is the real correlating factor. Mortality rates from colonic cancer are high in the United States, Scotland, and Canada, which are high meat consuming countries; other populations such as in Japan and Chile where meat consumption is low, experience also a low incidence of colon cancer. Seventh Day Adventists and Mormons have a restricted fat and meat intake when compared to other populations living in the same district and, as indicated, they suffer considerably less from some forms of cancer, notably breast and colon.

Dr. Wynder, testifying at the hearing, said that incidence of cancer seems to be related as much to unsaturated as saturated fats. As an example, he cited studies indicating that both types of fat, and cholesterol, may cause increased secretion in the breast of the hormone prolactin and that this secretion may induce tumors. A four-week vegetarian diet in a group of American women resulted in a 40 to 60 percent decrease in prolactin secretion, he said.

The September 10, 1976, *Washington Post* noted that Dr. Bruce K. Armstrong, of Perth Medical Centre, Australia, presented to a conference at Cold Spring Harbor Laboratory in New York a report suggesting that diets high in animal fat might increase the risk of womb cancer.

Dr. Armstrong said principal risk factors included obesity, early onset of puberty, late onset of menopause, a mild case of diabetes and high blood pressure. With respect to high intake of fat, he said it may cause excessive secretion of estrogens that either cause cancer or stimulate other cancer-causing agents. He also discussed findings suggesting that vegetarian women appeared to be at reduced risk, generally experiencing earlier menopause and lower blood pressure than non-vegetarians.

A guide to reducing fat consumption follows the explanations of the saturated fat and cholesterol goals.

GOAL 5. REDUCE SATURATED FAT CONSUMPTION TO ACCOUNT FOR ABOUT 10 PERCENT OF TOTAL ENERGY INTAKE; AND BALANCE THAT WITH POLY-UNSATURATED AND MONO-UNSATURATED FATS, WHICH SHOULD ACCOUNT FOR ABOUT 10 PERCENT OF ENERGY INTAKE EACH

Figure 12, from the Department of Agriculture report, *Fat in Today's Food Supply—Level of Use and Sources*, cited earlier, shows the trends in saturated, oleic (mono-unsaturated) and linoleic (poly-unsaturated fat consumption in this century.

There are a number of fats found in foods, but the important fats from a nutritional perspective are those known as triglycerides and phospholipids. Both of these are composed of a very simple alcohol, and two or three large molecules called fatty acids.

The fatty acids, which are called fats in general discussion, are of three types: (1) saturated, in which all the double bonds are saturated; (2) mono-unsaturated, in which there is one unsaturated double bond; and (3) poly-unsaturated, in which two or more double bonds are unsaturated.

Saturated fats are the main kind of fatty acid made by the animal body. Mono-unsaturated fats are usually made by plants, but some can be made by animals. Poly-unsaturated fats, which are often called essential fatty acids, can only be made by plants, and are needed for normal cell function. The key poly-unsaturated fatty acid is linoleic acid which has two unsaturated bonds in specific locations on the fatty acid. Some other poly-unsaturated fatty acids contain more than two unsaturated double bonds, but they are not essential to normal bodily functions.

Only poly-unsaturated fats lower serum cholesterol. Mono-unsaturated fats have little or no effect on serum cholesterol, and saturated fats elevate serum cholesterol.

The level of saturated fat in the diet is of concern because it has been directly linked to excessive levels of cholesterol in the blood and therefore to an increased risk of heart disease. Feeding studies in animals in the early 1900's linked high cholesterol intake to atherosclerosis. Evidence that cholesterol could affect the same arterial lesions in man came from Scandanavian countries where atherosclerotic diseases appeared to decline during the war years when consumption of calories and animal fat declined.

The correlation between serum cholesterol and heart disease became more clear in the 1950's. As reported by Drs. McGill and Mott in *Present Knowledge in Nutrition*, the Framingham study, mentioned earlier, determined that of all risk factors in heart disease, "the strongest and most consistent risk factor was elevated serum cholesterol con-

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centration. This finding has been confirmed in the U.S. and Western Europe in the past two decades." The authors note that in the early 1950's researchers discovered that serum cholesterol levels were lowered by substituting poly-unsaturated fats for saturated fats.

A twelve-year study of patients in two hospitals in Finland, started in 1958, reinforces this view. During the first six years, the patients in the trial hospital were fed an experimental diet which involved an overall reduction of fats and a reduction of the proportion of saturated fat. For the same time period, the patients in the control hospital were given a normal diet. During the next six years, the two diets were continued, but the two hospitals reversed their experimental roles. In both hospitals the coronary heart disease (CHD) mortality rate was dramatically reduced on the low-fat diet. The overall CHD incidence rate per 1,000 man-years for the experimental diet was 14.4 as opposed to a 33.0 rate experienced by those eating the normal or control diet.

FIGURE 12

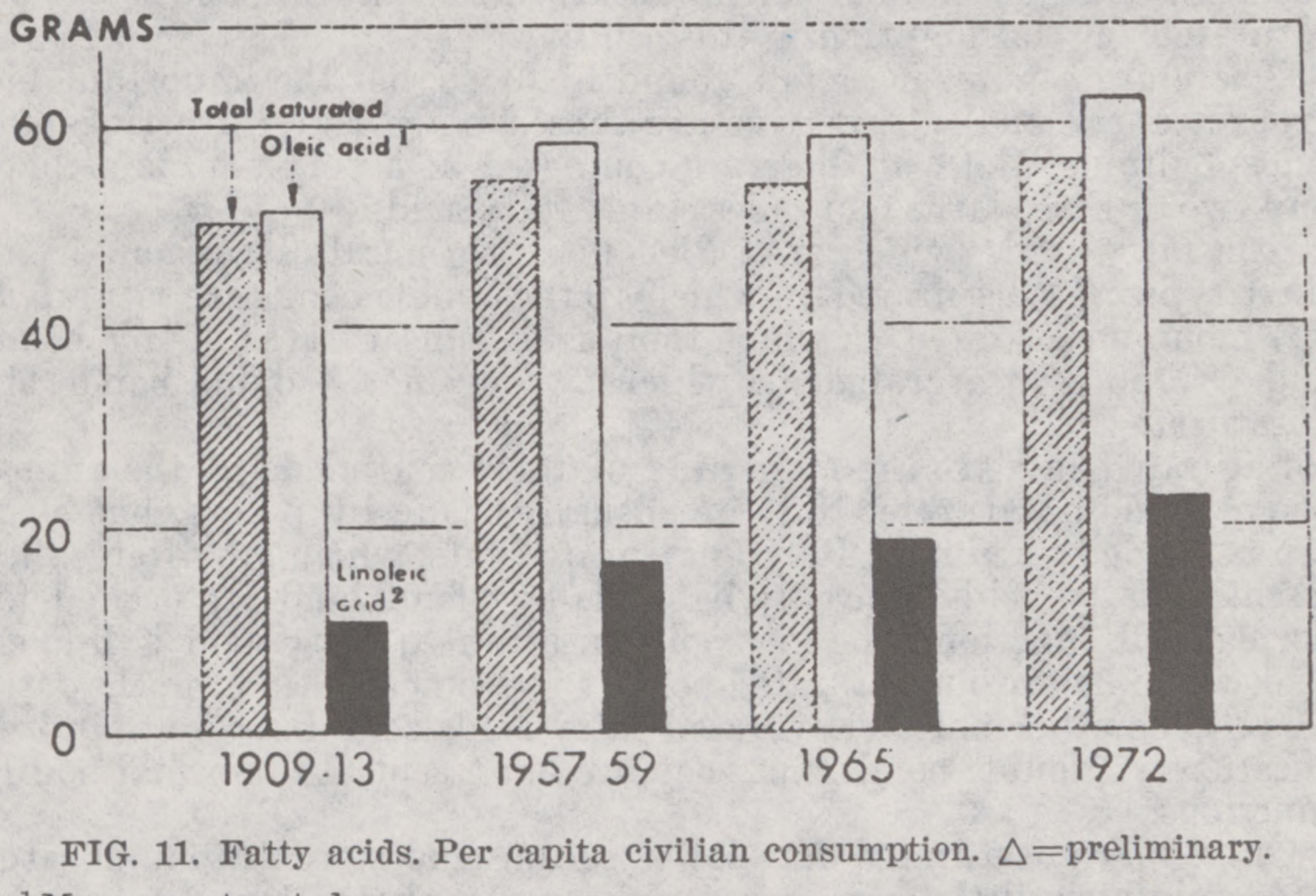


FIG. 11. Fatty acids. Per capita civilian consumption. △=preliminary.

[1] Mono-unsaturated.
[2] Poly-unsaturated.

Source: *Fat in Today's Food Supply—Level of Use and Sources.* Journal of the American Oil Chemists' Society, Vol. 51, No. 6, Pages 244–250. 1974.

Dr. Osmo Turpeinen reporting on the Finnish study in *Future Trends in Nutrition and Dietetics*, 1975, summarizes the evidence of the relation between diet and heart disease to date:

As * * * all these studies have dealt with relatively small numbers of subjects and their design of experiment has shown certain shortcomings, these intervention studies may not yet have produced the final, irrefutable proof of the potentiality of dietary prevention of coronary heart disease. Nevertheless, they have furnished at least substantial evidence in favor of the view that a proper re-adjustment of the fatty acid composition and of cholesterol content of our commonly used diets may have considerable preventive effect.

(One of the reasons the results of these tests were inconclusive is that they involved older people who already had developed atherosclerosis. Had tests been instituted earlier, the results might have been more striking.)

The proportion of saturated fat in the diet has declined from about 40 percent of total fat in the early 1900's to about 38 percent in 1975, but the total amount of saturated fat in the average American diet has increased. Concurrently, mono- and poly-unsaturated fat consumption has grown even more quickly. These increases are primarily due to increased use of salad and cooking oils.

In addition, it should be pointed out that saturated fat is obtained from both animal and vegetable sources. According to unpublished 1977 disappearance data from the Consumer and Food Economics institute, ARS, USDA, the per capita consumption of saturated fats breaks down as follows: 72 percent animal sources (40 grams/person/day) and 28 percent vegetable sources (16 grams/person/day).

Although saturated fat as a percentage of total calories may be a declining proportion of total fat consumption, its level, and that of the other fatty acids, remains higher than recommended by the Inter-Society Commission for Heart Disease Resources.

Preliminary figures for 1976 indicate that saturated fat currently comprises about 16 percent of total calories, poly-unsaturated fat accounts for about 7 percent and mono-unsaturated, 19 percent. The Commission recommends that daily intake of saturated fat be less than 10 percent of total calories. Up to 10 percent of total calories should be derived from poly-unsaturated fat, with the remaining 10 percent coming from mono-unsaturated fats. The limits conform generally with the recommendations of other U.S. and international agencies (Appendix B), and provide a prudent balance among fat types.

Achieving this balance requires partial substitution of poly-unsaturated for saturated fat and the overall reduction of all fatty acids. A guide to these changes follows discussion of the next goal, reduction of cholesterol.

GOAL 6. REDUCE CHOLESTEROL CONSUMPTION TO ABOUT 300 GRAMS A DAY

There is evidence not only that fat and saturated fat tend to increase serum cholesterol levels but direct consumption of cholesterol does as well.

Dr. McGill and Dr. Mott reported in *Present Knowledge in Nutrition*:

> The average American ingests 600 mg. of cholesterol per day, well above the 400 mg. limit below which there is a linear relationship with serum cholesterol. As in the controlled experiments, comparisons among populations with wide ranges of average cholesterol intake show a close relationship between dietary cholesterol and serum cholesterol concentrations. It is now widely accepted that a high dietary cholesterol intake is a major determinant of the high cholesterol concentrations found in the U.S. populations as well as in other technically developed countries.

At the Select Committee's heart disease hearing in February 1977, Dr. Antonio Gotto, chairman of the Department of Medicine at Baylor, discussed the relationship between serum cholesterol levels and the risk of heart disease. In particular, Dr. Gotto referred to the following significant findings that he and Dr. Michael DeBakey discovered:

Lipoprotein phenotyping and significance of cholesterol and triglyceride measurements

Dr. Ancel Keys and Dr. E. H. Ahrens and their colleagues as well as other investigators in the 1950's, observed the cholesterol-lowering effect of a diet rich in polyunsaturated fat. Dr. Ahrens and his group also observed that some individuals seemed to develop hyperlipidemia on a high fat diet while others developed hyperlipidemia on a high carbohydrate diet. Such individuals were referred to as having fat-sensitive or carbohydrate-sensitive lipemia, respectively. There was an important advance in methodology in the early 1960's that led to an awakening of interest in lipoproteins. Doctors Fred Hatch and Robert Lees improved the method for separating the plasma lipoproteins on paper electrophoresis.

With this improved methodology, Drs. Donald Frederickson, Robert Levy and Robert Lees at the National Institutes of Health refined the system of electrophoresis and developed it into a means of classifying lipoprotein phenotypes, based on which family or families of the plasma lipoproteins are present in elevated concentrations. This simplified classifications system has popularized measurement of lipoproteins in clinical laboratories and the phenotyping of lipoproteins by physicians in this country and throughout the world.

Some of the abnormal lipoprotein phenotypes are associated with inherited lipoprotein disorders. Some are associated primarily with high cholesterol; others with elevated triglyceride and some with both high levels of cholesterol and triglyceride. The type II lipoprotein phenotype, associated with hypercholesterolemia, and type IV phenotype, associated with hypertriglyceridemia, have been reported in a number of studies to have a high frequency of association with premature coronary artery disease. There is still disagreement by medical experts as to the importance of high triglycerides as a risk factor for coronary heart disease. As to relative importance, the level of serum cholesterol appears to carry greater weight as a risk factor than does triglyceride.

One of the problems in using the lipoprotein phenotyping system is that it is based on arbitrary values for concentrations of lipids and lipoproteins for defining the normal from the abnormal in the population. Thus, there is some cut-off value for cholesterol which supposedly separates those with hypercholesterolemia and those with normal cholesterols in the population. The problem with this approach is that except for the small percentage of individuals who have recognized inherited forms of hyperlipidemia, the rest of the population have values of cholesterol and triglycerides that exhibit a normal distribution. There do not appear to be distinct values for either cholesterol or triglyceride which separate the population at risk for coronary heart disease from those who are not at risk.

At the Cardiovascular Center in Houston, we have recently studied 496 patients who were referred for evaluation of chest pain and underwent coronary catheterization for the study of the presence of coronary artery disease. Approximately 100 of the patients did not have significant coronary artery narrowing while the remainder of the patients had at least 25 percent narrowing of one or more of the major coronary arteries. We found that the frequency of coronary heart disease and the extent of disease, as measured by the number of vessels involved, showed a continuous correlation with both serum cholesterol and serum triglyceride concentrations. There was a stronger correlation between these parameters with cholesterol than there was for triglyceride. If the patients were divided in quartiles based on the level of cholesterol or triglyceride or both, that quartile with the lowest lipid levels had the lowest frequency of coronary artery disease. There was a stepwise increase such that the quartile with the highest lipid value had the greatest frequency of coronary artery disease. This extensive study, based on direct measurements of coronary artery artherosclerosis, shows a direct relation between the absolute values of serum cholesterol and triglyceride and a frequency and extent of coronary artery narrowing. *The average serum cholesterol in the patients with coronary artery disease was about 230–235 mg% while only about 200–205 mg% in those without coronary artery disease.*

Many physicians would not consider a cholesterol of 235 mg% as an abnormal value. Such values should not be looked upon as representing safe or acceptable levels of serum cholesterol. Obviously, such a patient can be at risk for developing coronary heart disease. *If we attempted to classify these patients on the basis of lipoprotein phenotype using the currently accepted criteria for such classification, we found virtually no correlation between the phenotype with the frequency or extent of coronary artery narrowing.* Thus the association between serum cholesterol and coronary heart disease tended to be obscured if one adopted current definitions for defining hyperlipidemia. *The levels of cholesterol now used to define hyperlipidemia are most certainly too high and should be looked upon as separating individuals with overt hyperlipidemia.* (Italics supplied by committee.)

Professional and governmental bodies in the United States and other countries have generally recommended that cholesterol intake be decreased to 300 mg. a day or less (Appendix B). Also see the preface for further discussion of cholesterol.

Guide to Reducing Consumption of Fat, Saturated Fat and Cholesterol

High levels of fat, saturated fat and cholesterol most often enter our diets in the process of acquisition of animal protein. Consequently, the foregoing recommendations suggest that more of our animal protein needs be satisfied by a mix of lean meats, poultry and fish; and a different balance between vegetable and animal sources of protein will result from increased consumption of fruits, vegetables and whole grains.

The proportion of calories in our diet derived from protein, based on disappearance data, has remained relatively constant in this century at about 12 percent. As noted earlier, prior to increased meat consump-

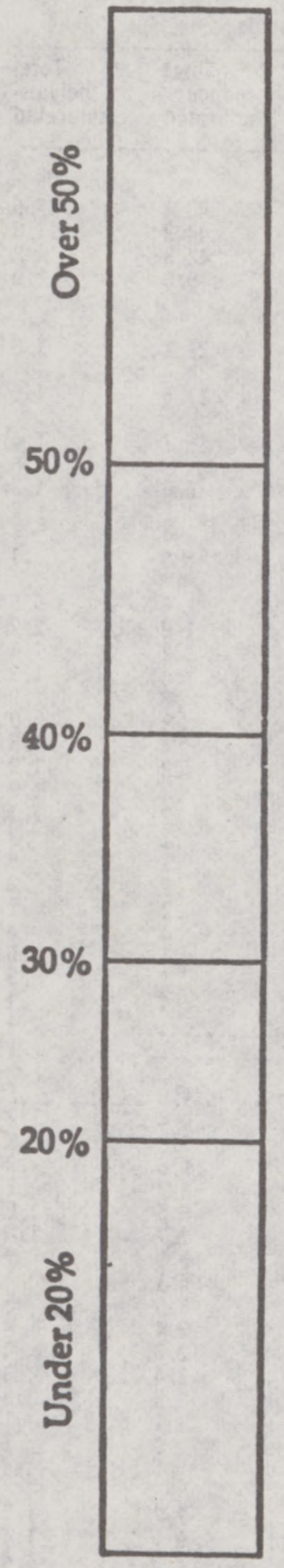
tion, a greater share of our protein was drawn from vegetable sources, especially grains. Tables 11, 12 and 13 show that, in general, increased use of vegetable source proteins will aid greatly in reducing not only the percentage of calories from fat but levels of saturated fat and cholesterol (only foods of animal origin have significant amounts of cholesterol).

Although the changes just described will assist in approaching the goals outlined, it is necessary also to (1) select foods from within the meat, fish, poultry and vegetable groups that are relatively low in fat, saturated fat and cholesterol; (2) reduce fat use and consumption of foods high in fat; (3) make partial substitution of polyunsaturated fat for saturated fat; (4) trim away visible fat from meats, poultry and fish, and reduce or eliminate the use of fat drippings; and (5) be more aware of the fats in foods such as hamburgers, cheese, ice cream, bakery products and many highly processed foods, that are not always apparent. Tables 11, 12 and 13 provide guidance in these areas.

With respect to overall fat consumption, in using Table 11, it may be useful to follow a strategy of selecting greater numbers of foods that derive 30 percent or less of their calories from fat.

The following excerpt from a presentation by the American Heart Association to the Federal Trade Commission compares consumption goals to commonly used food measures.

Percentage of Calories from Fat in Foods



Cream Cheese
Weiners
Peanuts and peanut butter
Pork Lunch meats
Most cheese and cheese spreads
Tongue
Eggs
Ground beef — regular
Salmon, tuna (canned in oil)
Pork — loin and butt
Granola

Chicken — roasted, flesh & skin
Beef — porterhouse, T-bone, round rump, lean ground, kidney
Pork — fresh & cured ham & shoulder
Lamb — shoulder, rib
Salmon — red sockeye, canned

Beef — sirloin, arm, flank, heart
Turkey — flesh & skin, dark meat
Lamb — leg, loin
Pork — heart, kidney
Chicken — dark meat, roasted flesh

Beef — heel of round, pot roast
Liver — pork, chicken, lamb, beef
Fish — bass, ciscoe, oysters, salmon (pink)
Chicken — roasted, light meat broilers — no skin

Fish — haddock, cod, tuna, (water pack) ocean perch, halibut, smelt, sole
Shellfish — most
Porridge
Bread
Most peas, beans and lentils
Skim milk cheese
Uncreamed cottage cheese
Skim milk
Most breakfast cereals (other than Granola type)

Whole milk
Ice cream
Cream cheese sandwich
Peanut butter sandwich

Creamed cottage cheese
Lunch meat or Cheese spread sandwich

Source : "NutriScore," Fremes, Sabry, 1976.

TABLE 11

TABLE 12.—FAT CONTENT AND MAJOR FATTY ACID COMPOSITION OF SELECTED FOODS

[Grams of fat and fatty acids per 100 g of food]

Food	Total fat	Fatty acids		
		Total saturated	Total monounsaturated	Total polyunsaturated
Animal fats:				
Chicken	100.0	32.5	45.4	17.6
Lard	100.0	39.6	44.3	11.8
Beef tallow	100.0	48.2	42.3	4.2
Avocado	15.0	2.0	9.0	2.0
Beef products:				
T-bone steak (cooked, broiled—56 percent lean, 44 percent fat)	43.2	18.0	21.1	1.6
Chuck, 5th rib (cooked or braised—69 percent lean, 31 percent fat)	36.7	15.3	17.5	1.5
Brisket (cooked, braised, or pot roasted—69 percent lean; 31 percent fat)	34.8	14.6	16.7	1.4
Wedge and round-bone sirloin steak (cooked or broiled—66 percent lean; 34 percent fat)	32.0	13.3	15.6	1.2
Rump (cooked or roasted—75 percent lean; 25 percent fat)	27.3	11.4	13.1	1.2
Round steak (cooked or broiled—82 percent lean; 18 percent fat)	14.9	6.3	6.9	.7
Cereals and grains:				
Wheat germ	10.9	1.9	1.6	6.6
Oats (puffed, without added ingredients)	5.5	1.0	1.9	2.2
Oats (puffed, with added nutrients, sugar covered)	3.4	.6	1.2	1.4
Barley (whole grain)	2.8	.5	.3	1.3
Domestic buckwheat (dark flour)	2.5	.5	.8	.9
Cornmeal, white or yellow (whole-ground, unbolted)	3.9	.5	.9	2.0
Shredded wheat breakfast cereal	2.5	.4	.4	1.3
Wheat (whole grain, Hard Red Spring)	2.7	.4	.3	1.3
Wheat flakes breakfast cereal	2.4	.4	.3	1.2
Rye (whole grain)	2.2	.3	.2	1.1
Wheat meal breakfast cereal	1.4	.3	.1	.7
Wheat flour, all purpose	1.4	.2	.1	.6
Rice (cooked brown)	.8	.2	.2	.3
Bulgur from Hard Red Winter wheat	1.5	.2	.2	.7
Oatmeal or rolled oats, cooked	1.0	.2	.4	.4
Rye flour	1.4	.2	.1	.6
Cornstarch	.6	.1	.1	.3
Rice (cooked white)	.2	.1	.1	.1
Farina (enriched, regular, cooked)	.2	----	----	.1
Corn grits, cooked	.1	----	----	.1
Dairy products:				
Nondairy coffee whitener (powder)	35.6	32.6	1.0	----
Cream cheese	33.8	21.2	9.4	1.2
Cheddar cheese	32.8	20.2	9.8	.9
Light whipping cream	32.4	20.2	9.6	.9
Muenster cheese	29.8	19.0	8.7	.7
American pasteurized cheese	28.9	18.0	8.5	1.0
Swiss cheese	27.6	17.6	7.7	1.0
Mozzarella cheese	19.4	11.8	5.9	.7
Ricotta cheese (from whole milk)	14.6	9.3	4.1	.4
Vanilla ice cream	12.3	7 7	3,6	5
Half and half cream	11.7	7.3	3.4	.4
Chocolate chip ice cream	11.0	6.3	2.6	.4
Canned condensed milk (sweetened)	8.7	5.5	2.4	.3
Ice cream sandwich	8.2	4.7	2.6	.5
Cottage cheese (creamed)	4.0	2.6	1.1	.1
Yogurt (from whole milk)	3.4	2.2	.9	.1
Cottage cheese (uncreamed)	.4	.2	.1	----
Eggs:				
Fried in margarine	15.9	4.2	7.2	1.9
Scrambled in margarine	12.6	3.7	5.5	1.4
Fresh or frozen	11.3	3.4	4.5	1.4
Fish:				
Eel, American	18.3	4.0	9.0	2.7
Herring, Atlantic	16.4	2.9	9.2	2.4
Mackerel, Atlantic	9.8	2.4	3.6	2.4
Tuna, albacore (canned, light)	6.8	2.3	1.7	1.8
Tuna, albacore (white meat)	8.0	2.1	2.1	3.0
Salmon, sockeye	8.9	1.8	1.5	4.7
Salmon, Atlantic	5.8	1.8	2.7	.5
Carp	6.2	1.3	2.7	1.4
Rainbow trout (United States)	4.5	1.0	1.5	1.4
Striped bass	2.1	.5	.6	.7
Ocean perch	2.5	.4	1.0	.7
Red snapper	1.2	.2	.2	.4
Tuna, skipjack (canned, light)	.8	.2	.2	.2
Halibut, Atlantic	1.1	.2	.2	.4
Cod, Atlantic	.7	.1	.1	.3
Haddock	.7	.1	.1	.2

TABLE 12.—FAT CONTENT AND MAJOR FATTY ACID COMPOSITION OF SELECTED FOODS—Continued

[Grams of fat and fatty acids per 100 g of food]

Food	Total fat	Fatty acids		
		Total saturated	Total monounsaturated	Total polyunsaturated
Fowl:				
Chicken (broiler fryer, cooked or roasted dark meat)	9.7	2.7	3.2	2.4
Turkey (cooked or roasted dark meat)	5.3	1.6	1.4	1.5
Chicken (broiler/fryer, cooked or roasted light meat)	3.5	1.0	.9	.9
Turkey (cooked or roasted light meat)	2.6	.7	.6	.7
Lamb and veal:				
Shoulder of lamb (cooked or roasted, 74 percent lean; 26 percent fat)	26.9	12.6	11.0	1.6
Leg of lamb (cooked or roasted, 83 percent lean; 17 percent fat)	21.2	9.6	8.5	1.2
Veal foreshank (cooked or stewed, 86 percent lean; 14 percent fat)	10.4	4.4	4.2	.7
Nuts:				
Coconut	35.5	31.2	2.2	.7
Brazil nut	68.2	17.4	22.5	25.4
Peanut butter	52.0	10.0	24.0	15.0
Peanut	49.7	9.4	22.9	15.0
Cashew	45.6	9.2	26.4	7.4
Walnut, English	63.4	6.9	9.9	41.8
Pecan	71.4	6.1	43.1	17.9
Walnut, black	59.6	5.1	10.8	40.8
Almond	53.9	4.3	36.8	10.1
Pork products:				
Bacon	49.0	18.1	22.8	5.4
Sausage, cooked	32.5	11.7	15.1	3.9
Deviled ham, canned	32.3	11.3	15.2	3.5
Liverwurst, braunschweiger, liver sausage	32.5	11.0	15.5	4.1
Bologna	27.5	10.6	13.3	2.1
Pork loin (cooked or roasted, 82 percent lean; 18 percent fat)	28.1	9.8	13.1	3.1
Ham (cooked or roasted, 84 percent lean; 16 percent fat)	22.1	7.8	10.4	2.4
Fresh ham (cooked or roasted, 82 percent lean; 18 percent fat)	20.2	7.1	9.5	2.2
Canadian bacon (cooked and drained)	17.5	5.9	7.9	1.8
Chopped ham luncheon meat	17.4	5.7	8.3	2.2
Canned ham	11.3	4.0	5.3	1.2
Salad and cooking oils:				
Coconut	100.0	86.0	6.0	2.0
Palm	100.0	47.9	38.4	9.3
Cottonseed	100.0	26.1	18.9	50.7
Peanut	100.0	17.0	47.0	31.0
Sesame	100.0	15.2	40.0	40.5
Soybean, hydrogenated	100.0	15.0	23.1	57.6
Olive	100.0	14.2	72.5	9.0
Corn	100.0	12.7	24.7	58.2
Sunflower	100.0	10.2	20.9	63.8
Safflower	100.0	9.4	12.5	73.8
Shellfish:				
Eastern oyster	2.1	.5	.2	.6
Pacific oyster	2.3	.5	.4	.9
Ark shell clam	1.5	.4	.3	.3
Blue crab	1.6	.3	.3	.6
Alaska king crab	1.6	.2	.3	.6
Shrimp	1.2	.2	.2	.5
Scallop	.9	.1	----------	.4
Soups:				
Cream of mushroom (diluted with equal parts of water)	3.9	1.1	.7	.8
Cream of celery (diluted with equal parts of water)	2.3	.6	.5	1.0
Beef with vegetables (diluted with equal parts of water)	.8	.3	.3	----------
Chicken noodle (diluted with equal parts of water)	1.0	.3	.4	.2
Minestrone (diluted with equal parts of water)	1.1	.2	.3	.5
Vegetable (diluted with equal parts of water)	.9	.2	.3	.4
Clam chowder, Manhattan style (diluted with equal parts of water)	.9	.2	.2	.5
Table spreads:				
Butter	80.1	49.8	23.1	3.0
Margarine (hydrogenated soybean oil, stick)	80.1	14.9	46.5	14.4
Margarine (corn oil, tub)	80.3	14.2	30.4	31.9
Margarine (corn oil, stick)	80.0	14.0	38.7	23.3
Margarine (safflower oil, tub)	81.7	13.4	16.1	48.4
Vegetable fats (household shortening)	100.0	25.0	44.0	26.0

Source: Consumer and Food Economics Institute, U.S. Department of Agriculture, Agricultural Research Service, Hyattsville, Maryland. "Comprehensive Evaluation of Fatty Acids in Foods," Journal of The American Dietetic Association, May 1975; July 1975; August 1975; October 1975; March 1976; April 1976; July 1976; September 1976· November 1976; January 1977; unpublished data on shellfish and margarine.

TABLE 13.—CHOLESTEROL CONTENT OF COMMON MEASURES OF SELECTED FOODS

[In ascending order]

Food	Amount	Cholesterol (milligrams)
Milk, skim, fluid or reconstituted dry	1 cup	5
Cottage cheese, uncreamed	½ cup	7
Mayonnaise, commercial	1 tbsp	10
Lard	do	12
Yogurt, made from fluid and dry nonfat milk, plain or vanilla	Carton (227 gr) [1]	17
Cream, light table	1 fl oz	20
Cottage cheese, creamed	½ cup	24
Cheese, pasteurized, processed American	28 g	(25)
Cheese, pasteurized processed Swiss	28 g	(26)
Cream, half and half	¼ cup	26
Ice cream, regular, approximately 10 percent fat	½ cup	27
Cheese, cheddar	1 oz	28
Milk, whole	1 cup	34
Sausage, frankfurter, all meat, cooked	1 frank	34
Butter	1 tbsp	35
Beef and vegetable stew, canned	1 cup	36
Cake, baked from mix, yellow 2 layer, made with eggs, water, chocolate frosting.	75 g	36
Oysters, salmon	3 oz, cooked	40
Clams, halibut, tuna	do	55
Chicken, turkey, light meat	do	67
Beef, pork, lobster, chicken, turkey, dark meat	do	75
Lamb, veal, crab	do	85
Tuna, canned in oil, drained solids	184 g	116
Lobster, cooked, meat only	145 g	123
Shrimp	3 oz, cooked	130
Heart, beef	do	230
Egg	1 yolk or 1 egg	250
Liver, beef, calf, hog, lamb	3 oz, cooked	370
Kidney	do	680
Brains	3 oz, raw	>1,700

[1] Estimates in parenthesis imputed.

Source: "Cholesterol Content of Foods," R. M. Feeley, P. E. Criner, and B. K. Watt, J. American Dietetic Association 61:134, 1972.

A relatively small number of foods do contribute a major proportion of the cholesterol and saturated fat in the American diet. For example, in our 1972 report, the Inter-Society Commission for Heart Disease Resources recommended the reduction of dietary cholesterol *to less than 300 mg. per day.* We noted that the average American daily cholesterol intake was approximately 600 mg. per day. A single egg yolk, however, contains 250 mg. cholesterol by itself, nearly the daily allowance. We further recommend *an intake of less than 10 percent of total calories to be obtained from saturated fat.* Assuming a caloric intake of 2,500 calories per day, the average American should take in no more than 250 calories or *less than 27 grams of saturated fat per day.* One cup of whole milk contains 5 grams saturated fat. One cup of ice cream contains 8 grams; six ounces of ham approximately 8 grams. These are very substantial portions of the maximum recommended allowance for a day. Therefore the contribution of *individual foods* to the cholesterol and saturated fat intake in the diet can be highly significant.

Fremes and Sabry point out in *NutriScore* that food labels rarely if ever indicate the type and saturation of fats used in processed foods. They report that the saturated fats, palm oil and coconut oil, are used interchangeably in powdered, frozen or liquid coffee creamers used at home and in restaurants and coffee machines. They say:

But what of all the other products like chips, convenience spreads and cookies? What oil is in them? We don't know and won't know without some government regulations and industry cooperation. Until it becomes mandatory for maufacturers to declare the type of oil on the labels of foods with vegetable oil listed, we would recommend that you stay away from all commercial snack foods, including potato chips, baked goods, crackers and all mixes. If you must use a whipped topping occasionally, consider this: packaged synthetic toppings are just as saturated as real whipped cream, and real milk or table cream has much less fat than whipped cream or the substitutes.

GOAL 7. LIMIT THE INTAKE OF SODIUM BY REDUCING THE INTAKE OF SALT (SODIUM CHLORIDE) TO ABOUT 5 GRAMS/DAY

The primary source of sodium in the American diet is salt (sodium chloride). Salt consumption in the United States is estimated to range from about 6 to 18 grams a day, according to the National Academy of Sciences', Food and Nutrition Board's, Recommended Dietary Allowances." Drs. George Meneely and Harold Battarbee, in "Present Knowledge in Nutrition", suggest, however, that the average human requirement for sodium is probably only about one-fourth of a gram.

Since sodium occurs indigenously in most foods and many sodium salts are added in the processing of foods (see appendix E), the average requirement normally will be achieved without adding salt, either in cooking, or at the table. Dr. Meneely and Battarbee cite studies indicating that desire for salt is not a physiological necessity but an acquired taste.

Excessive sweat loss from exercise, heat or fever can lead to significant sodium losses. The following guidelines are taken from the 1974 edition of the "Recommended Dietary Allowances":

> **Whenever more than a 4-liter intake of water is required to replace sweat loss, extra sodium chloride (salt) should be provided. The need will vary with sweating in the proportion of 2 g sodium chloride (salt) per liter of extra water loss, and on the order of an extra 7 g/day for persons doing heavy work under hot conditions (Lee, 1964). In unadapted individuals, the need for additional water and salt may be somewhat higher than in fully acclimated persons.**

The authors point also to evidence that there is an important balance between sodium and potassium, required for the proper flow of fluids among and through cells. (The Academy describes a requirement for potassium of 2.5 grams a day.) They provide the following Tables 14 and 15 showing the impact of various processing methods on sodium and potassium content, and say:

> **Aside from the rather uncertain matter of treks to salt licks, there are no terrestrial mammals except man which add salt to their food. Table 14 which traces the changes in sodium and potassium in 100 g of peas exemplifies the extent to which potassium is depleted and sodium increased during canning and freezing. Peas, drained and before butter and salt are added for serving at table, thus contain 255 times as much sodium as the fresh product and more than half of the potassium is gone. Sodium intake is thereby greatly increased, potassium reduced. The sodium and potassium content of several other foods are shown in Table 15 and Appendix E.**
>
> **Consumer purchase of salt has declined somewhat as his use of processed and prepared foods has increased. Sodium intake is more and more determined by the food processors rather than by the individual.**

Salt is added to processed food principally as a flavoring agent rather than as a preservative. In some instances it is the primary flavoring agent and may be used to mask other, less appealing, flavors.

Hypertension

Salt has been found to cause an increase in blood pressure, hypertension, among some individuals, but others do not seem genetically susceptible. There is some evidence that imbalance with potassium intake may be a factor in hypertension. Dr. Meneely and Dr. Battarbee estimate that 20 percent of the United States population is susceptible to hypertension and up to 40 percent of older people. They recommend reduction of salt intake as an important countermeasure.

TABLE 14.—CHANGES IN SODIUM AND POTASSIUM CONTENT OF PEAS

Food (100 g edible portion)	Na–(mg)	K–(mg)
Fresh peas	0.9	380
Frozen peas	100.0	160
Canned peas, liquid poured off	230.0	180
Add salt, serve with salted butter	(?)	(?)

TABLE 15.—SODIUM AND POTASSIUM CONTENT OF SEVERAL FOODS

Food (100 g edible portion)	Na–(mg)	K–(mg)
Olives	2,400	55
White bread	507	105
Cornflakes	660	165
Cheddar cheese	700	82
Dried nonfat milk	525	1,335
Bacon	1,770	225
Chipped beef	4,300	200
Smoked ham, raw	2,530	248
Frankfurter	1,100	230
Salami	1,260	302
Canned crabmeat	1,000	110
Canned salmon	540	330

Source: Present Knowledge in Nutrition: Sodium and Potassium, G. Meneely, H. Battarbee, 1976.

Millions of children and youths are moving toward hypertension. Excess dietary sodium is clearly an adverse factor in some, if not in most, people prone to hypertension. The evidence indicates that a systematic effort to reduce dietary sodium chloride intake and increase dietary potassium intake would result in the amelioration of much suffering among those who are prone and would increase both duration and quality of life for many millions of people.

Other Findings

Drs. Meneely and Battarbee, who also describe excessive salt as "noxious per se," report observations of possible connections between high sodium intake and heart disease. Researchers have found that increases in sodium from 4 grams to 24 grams a day in humans altered the ability to clear intravenously administered fat from the bloodstream. Other researchers have found improvement in vascular disease resulting from a decline in salt consumption even when blood pressure failed to decline.

They also report findings of possible connections between high salt intake and changes in levels of gastric acid secretion, stomach cancer and cerebrovascular disease.

Dr. John Brainard, reporting in *Minnesota Medicine*, April, 1976, draws a connection between migraine headaches and salt. Twelve migraine sufferers were advised to avoid all known factors in migraine, such as sodium nitrite and monosodium glutamate, and also sodium chloride by following a salt restriction which entailed "avoiding all

salted snack foods, such as pretzels, nuts and potato chips before dinner." Ten out of 12 responded favorably, the report said, with a few saying migraine no longer was a problem. And the report noted:

> It has not been appreciated that the sudden salt load of a handful of salted nuts or potato chips, particularly if taken on an empty stomach, can cause a severe migraine six or twelve hours later. The reason for the lag period is not known.

Finally, in *Human Nutrition*, Dr. Jean Mayer warns of hypertension that may develop as a result of high salt intake by children. He reports:

> Clinically, it is well known that the tendency for edema to develop in prematurely-born infants is a function of the sodium content of the diet. It has also been demonstrated that a high salt content of the diet increases the likelihood of renal cast formation (an indication of possible kidney damage) in these infants.

Although there is some evidence that increased potassium intake might help offset possible adverse effects of high sodium consumption, the most prudent course appears to be to reduce salt intake to at least the level of 5 gm a day.

Guide to Reducing Salt Consumption

The goal of 5 gm of salt a day amounts to about one teaspoon and 2,000 mg of sodium alone (salt is about 40 percent sodium). However, as mentioned earlier, the daily goal will be met for most in the United States without the addition of salt to food or consumption of foods on which the salt is visible, such as pretzels and potato chips.

Furthermore, commonly-used seasoning may also be relatively high in sodium. For example, based on Agriculture Handbook 456, a tablespoon of catsup plus the salt on 10 french fries would result in sodium ingestion of about 370 mg. or about 25 percent of the allowance suggested by the foregoing goal. The same french fries would bring only 2 mg of sodium if served unsalted.

In pursuing a reduced sodium diet as purchased from the current market basket available to the consumer, it may be helpful to review appendix E which lists average sodium and potassium content of common foods.

EFFECTS OF GOALS BEYOND NUTRITIONAL CONCERNS

1. SOCIO-CULTURAL IMPLICATIONS

The social, cultural and psychological significance of food in our lives can scarcely be overestimated. Sharing of food is one of the prime social contacts; provision of food is one of the prime signs of caring. Just as the general meaning of food in our lives should not be underestimated, changes in our eating behavior must not be underestimated in terms of their potential impact on our whole way of life. A substantive discussion of the socio-cultural impact of profound changes in eating habits (both those which have in fact occurred in 20th century America and those recommended here) is beyond the scope of this report. Nevertheless, it is possible to illustrate the growing concern that a diet increasingly dependent on highly processed, highly packaged food, i.e., an increasingly mechanized approach to the provision of food, may have not only potential for negative nutritional effect but also a negative psychological effect.

All of the following examples refer directly only to institutional environments. In such situations it is clear that the tendency toward mechanization of the feeding process is particularly strong—stronger, by far, because of the necessities of institutional management, than the same tendency in the home. Nevertheless, observations on the psychological impact of different kinds of eating environments, made in institutional settings, may be appropriately applied to the home-eating situation when the difference in degree is acknowledged.

In May of 1976, the Washington Post reported on the overhaul of food service practices at the Montgomery County Detention Center in Maryland. Inmates had been fed for five or six years on frozen TV-type meals served in aluminum foil pans. While fed this way, groups of inmates, on a regular weekly basis, threw their trays against the wall in anger. When a switch was made to fresh foods, prepared on the premises by an inmate chef, complaints about the food dropped to "almost nothing."

It is plausible to speculate that feelings about taste and nutrition were not the sole motivators of the inmates' disgust over the way they were being fed. The feeding status quo had been de-humanized and was therefore, de-humanizing. The switch not only improved nutrition (more fresh fruits, vegetables and salads; the option of whole wheat bread; and steps toward reducing sugar intake) and saved money (20 to 30 cents per day per capita), but perhaps even more important, as soon as the frozen dinners were replaced, "morale picked up immediately."

Schools, as another example of an institutional mass-feeding situation in which there is a strong temptation to turn to mass-produced food, are relying increasingly on pre-plated convenience meals and formulated foods. While the children may not have rebelled, many

parents and concerned outsiders have objected, and not simply on nutritional grounds. Marian Burros, in a Washington Post article in August of 1976, cited the following general objection to the trend toward using formulated foods to save time and/or money: ". . . such a position ignores the concept that the feeding of children in any school program should be an integral part of their education process and not just something to get out of the way as quickly as possible."

Others have more explicitly described the reasons behind that concept which they feel is being ignored. A Washington Star editorial in June of 1976, praising the work of Mary Goodwin, Montgomery County public health nutritionist, in combating the convenience trend, made the following comments:

> The pleasures of seeing, smelling and tasting food that looks, smells and tastes good, nourish the personality with sensuous experience even as the vitamins and minerals are making their contribution to the growth of bone and muscle. An awareness of real people preparing and serving the foods helps too.
>
> Which is to say that if you eat enough precooked, frozen, reheated foil-and-plastic packed lunches out of machines, part of you will starve to death. On-site food preparation—most important of all—is, in her (Mary Goodwin's) words, "a way of keeping children in contact with the real world rather than a highly mechanized, impersonal one."

Dr. Bruno Bettelheim, a noted child psychiatrist, believes that eating plays a central psychological role in human life, and that in this regard not only what the food is, but also where and how it is served makes a difference. Several quotes from Bettleheim's article, "Food to Nurture the Mind," in the May 1975, School Review, summarize his case. Concerning the general psychological significance of food, he says:

> Eating and being fed are intimately connected with our deepest feelings. They are the basic interactions between human beings on which rest all later evaluations of oneself, of the world, and of our relationship to it. Eating experiences condition our entire attitude to the world, not so much because of how nutritious is the food we are given, but because of the feelings and attitudes with which it is given.

Concerning the specific importance of the sharing of food and the effect it has on inter-personal relations, he says:

> The social climate of a mental institution changes immediately if the entire staff, up to the top of the hierarchy, takes its meals with the patients. The fact that patients, staff, and doctors eat together, and eat the same fare, immediately reduced the levels of tension, the potentiality of violent outbreaks. And this not just at mealtime but all during the day and throughout the institution. Nothing is more divisive than when people eat a different fare, in different rooms.

At a time when more and more meals are being taken away from the home, removed from the company of family members, perhaps more consideration should be given to the possibility that this trend is a factor that substantially contributes to the stresses found in modern family life.

Perhaps the most significant statement in Dr. Bettelheim's article is the following:

> The distinction between physical and emotional need, between body and intellect, is, in reality, a false one.

The impact of changed eating patterns in the home as well as in institutions, on our whole way of life is, no doubt, unquantifiable. It

may even be indescribable. It is important in examining historical trends in eating habits, and in assessing the need for future changes in eating habits, to remember that we are dealing with an aspect of our lives which is by no means limited to the physical.

2. FOOD BUDGET

A shift to the dietary goals outlined offers potential for significant reduction in food costs. Savings may be achieved through home preparation and through reduction of and substitution for fats, refined and processed sugar and expensive, fatty protein sources.

Table 6, from "Diet for a Small Planet," comparing costs of protein sources, shows that every legume listed and every grain product except one provides the daily protein allowance for less than one dollar, whereas the majority of meat protein sources cost over one dollar a day.

Within the category of grain products, choosing the less processed, more nutritious products may often mean a savings. For instance, in one sampling, brand-name converted rice cost more than 25 percent less than the low-priced store brand of instant rice. Slightly processed hot cereals like oatmeal are generally less expensive than ready-to-eat cereals.

The most dramatic savings made by a reduction in sugar consumption result from cutting back on or eliminating purchases of candy, sweet baked goods, and soft drinks. Costs are also cut when the consumer chooses the unsweetened as opposed to the presweetened version of a particular food item; the prime example is breakfast cereals.

Reducing fat consumption, and particularly consumption of saturated fats, may also yield cost savings in several areas. For example, chicken or turkey, which are lower in saturated fat than meats, may average less than half the price of the beef, pork and lamb cuts. Butter, on a per teaspoon basis, is generally more expensive than even the most costly of the unsaturated vegetable oils. Reduced use of prepared salad dressing, catsup, and sauces can not only cut expenses but reduce fat and/or salt and sugar consumption.

Greater home preparation can also yield savings in some areas as well as greater control over diet composition. A recent study by the Department of Agriculture comparing the costs of various convenience foods with their home-prepared counterparts found that out of 25 meat dishes tested, 21 were more expensive per serving when purchased ready-made. Many of the cost differentials were dramatic. The report said:

> The cost of home-prepared batter-dipped chicken was less than one-third that of the convenience products. Both chicken a-la-king frozen in a pouch and canned chicken salad spread, were about 60 percent more expensive per serving. . . . Consumers paid approximately 40 cents more per serving for frozen turkey dinner or tetrazzine than for the separate ingredients.

Many will find it impossible to change food preparation patterns drastically. However, it is evident that home-preparation can offer savings as well as nutrition advantages.

Consumption of Food Additives

There are more than 1,300 food additives currently approved for use as colors, flavors, preservatives, thickeners and other agents for controlling physical properties of food.

The exact amounts of additives now in use are not known, but more accurate measures may be available after a survey being planned by the Food and Drug Administration for 1977. A study prepared by the FDA in 1976 estimates that the average daily consumption of artificial colors alone among children aged 1 to 5 may be about 60 milligrams and average consumption for children aged 6 to 12 may be about 75 milligrams. The study finds, as shown in Table 16, that the largest single category contributing to artificial coloring consumption among children is beverages.

TABLE 16.—AVERAGE MILLIGRAMS OF ALL FD AND C COLORS IN FOOD INTAKE BY FOOD CATEGORY AMONG TWO GROUPS OF CHILDREN

Food category	Color intake			
	Average diet eaters only (mg), age—		Diets of total age group (mg), age—	
	1–5	6–12	1–5	6–12
Candy and confections	5.2	6.0	0.9	1.2
Beverages	21.1	29.3	8.5	13.6
Dessert powders	18.0	20.7	1.8	1.9
Cereals	8.4	10.6	3.8	4.6
Maraschino cherries	----------	8.4	----------	(1)
Bakery goods	3.5	5.1	2.5	3.8
Ice cream	2.6	3.6	.8	1.3
Sausage	7.5	9.2	1.6	2.3
Snack food	3.0	3.4	.5	.8
Miscellaneous	48.6	55.4	38.8	46.4
Food with color, less miscellaneous	21.3	30.3	20.5	29.3
Food with color, including miscellaneous	60.0	76.2	59.2	75.5

[1] Less than 0.05 milligrams.

Source: Arletta Beloian, Food and Drug Administration memorandum: Estimates of average, 90th percentile and maximum daily intakes of FD & C artificial food colors in one day's diets among two age groups of children. July 30, 1976.

The food additives now in use are considered safe by the FDA based on varying degrees of testing, review of scientific literature, expert opinion and long-time usage. The most testing, according to an FDA official, has been given to artificial colors, most of which have had animal toxicity testing by the food industry. The FDA will begin in 1977 a re-evaluation of the safety of colors, flavors, and "direct" additives. Artificial flavors have had the least animal testing of the three additive categories.

Although food additives as a category may not justifiably be considered harmful, the varying degrees of testing and quality of testing and the continuing discoveries of apparent connections between certain additives and cancer, and possibly hyperactivity, give justifiable cause to seek to reduce additive consumption to the greatest degree possible.

In NutriScore, Fremes and Sabry suggest that "necessity should be the touchstone for the use of additives." They argue, as do others, that only those additives that serve a necessary function should be permitted in food. They do not define necessary, but it is apparent that necessity most strictly defined has to do with protecting food safety.

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There are several additives commonly considered under the heading of preservatives and flavor enhancers that Fremes, Sabry and others classify as unnecessary and possibly a hazard to health.

Nitrates and Nitrites

"NutriScore" comments:

> While these additives are not in themselves harmful, they may combine with other chemicals in food or in the intestine to form nitrosamines, which are known to cause cancer. The advantages of using nitrites in processed foods is that they maintain a pinkish-red color, which makes the meat look fresh and attractive, and they check the growth of bacteria. Some of these bacteria, like botulinum, produce deadly poisons. Government should therefore limit the addition of nitrites to the amount needed to check the growth of botulinum bacteria and no more.
>
> This has been done in Canada, where the Canadian Health Protection Branch has recently reduced the amounts of nitrates and nitrites allowed in cured and processed meats. Industry, for its part, should find a preservative other than nitrite that will be effective against bacteria, yet will not present a cancer hazard.

BHT and BHA

These chemical preservatives are judged safe by the Food and Drug Administration, but neither is essential. "Nutrition Scoreboard" points out that foods not using the chemicals can be found readily.

Monosodium Glutamate

"NutriScore" recommends against use of foods containing monosodium glutamate, saying it may be associated with headaches, flushes in the head and body and tingling in the spine. The chemical is a flavor enhancer but not a necessary food ingredient. Researchers at Yale University School of Medicine said in a letter to the editor of the November 4, 1974 Journal of the American Medical Association that their studies indicated:

> That MSG offers a hazard to those endangered by excessive sodium intake: its moderate saltiness fails to warn the user about its high sodium content and can therefore lead to increased sodium ingestion.

Part II

RECOMMENDATIONS FOR GOVERNMENTAL ACTION

Introduction

The dietary trends in the United States described in Part I have occurred in other nations as well, in several cases prompting governmental action. In 1968, the medical boards of Finland, Norway and Sweden published "Medical Viewpoints on the National Diet in Scandinavian Countries" which recommended:

1. The dietary energy supply should, in many cases, be reduced to prevent overweight.
2. The total fat consumption, at present about 40 percent, should be decreased to between 25 and 30 percent of total calories.
3. The use of saturated fat should be lowered, and the consumption of poly-unsaturated fat should be simultaneously increased.
4. The consumption of sugar and products containing sugar should be less.
5. The consumption of vegetables, fruits, potatoes, skimmed milk, fish, lean meat and cereal products should be increased.

In 1969, the Swedish National Board of Health and Welfare motivated by "the decidedly negative results of the changed food habits in our country during the last 30–40 years (and) the enormous costs of medical care of disease related to these changes," began a 10-year campaign to encourage the public to exercise more and alter their diets. Table 17 shows recommended dietary changes.

TABLE 17.—Example of changes desirable in the average consumption of foods in Sweden. The proposed changes are expressed percent of the mean consumption in 1960.

Food group	
1. Green vegetables, dried peas and beans	+100
2. Fruit	+50
3(a). Potatoes	+25
(b). Other root vegetables	+100
4. Standard milk	+25
5. Meat, fish and eggs	±0
6. Flour, meal macaroni for direct consumption	+25
Crispbread and soft bread	+25
7. Fats and oils	−25
Other products: sugar, syrup, sweets, etc.	−25

Source: "Activities in Sweden to Improve Dietary Habits," *Nutr. Diet.*, No. 19, pp. 154–165 (Karger, Basel. 1973).

The impact of Sweden's program has not been completely measured. An interview survey conducted in 1974 found that sugar consumption had declined from 61.5 to 47.8 pounds a year and fresh vegetable consumption had risen from 31.5 to 44.8 pounds a year. Poultry con-

sumption rose from 3.3 to 8.8 pounds, but potato consumption dropped from 191.4 to 144.9 pounds. Consumption of certain fruits also declined.

In addition, the percentage of energy in the diet derived from fats declined from about 41 percent in 1965 to 38.5 percent in 1974.

In 1975, Norway's ministry of agriculture presented to the nation's legislative body a report on nutrition and food policy which described trends in food consumption such as those in the United States and said:

> **The aforementioned unfavorable health tendencies, particularly with respect to cardiovascular disease, as well as the gradual understanding that is being gained of the connection between nutrition and health, make it necessary for the Government to base itself on the experts' recommendations, issued by the National Nutrition Council, when planning the Norwegian nutrition and food policy.**

The report noted that the government would therefore take steps to try to reduce total fat intake to 35 percent of energy intake and compensate by increasing consumption of starchy foods, principally cereals and potatoes. A reduction in sugar consumption is sought as well as an increase in use of poly-unsaturated fats.

United States Experience

The United States' most recent experience with governmental diet counselling occurred during World War II when the government intervened to control food prices, and required production of the most nutritious foods, as well as attempting to educate the public in principles of nutrition.

The education program, aimed primarily at fighting nutrient deficiencies, enlisted the aid of the food industry, advertisers and educators and revolved around the Seven Basic Food Groups. After the war, the Basic Seven concept was simplified to the Basic Four.

The basic food group concept has been criticized for a variety of reasons. First, it recommends eating foods in all groupings, but does not caution about risk factors that may be associated with over-consumption of the dietary elements outlined in Part I. In addition, critics have said that the wide variety of choices by grouping does not ensure adequate nutrition. It has also been said that: the groupings are not designed to meet current nutrition problems; that they give too much emphasis to animal source products; and that they do not take ethnic food preferences into adequate consideration.

There was optimism at the close of the war that advances in nutrition would continue at the wartime pace. However, in a speech in 1948 Hazel K. Stiebeling, chief of the Bureau of Human Nutrition and Home Economics in the Department of Agriculture, anticipated hazards to sound nutritional health for the United States.

> **We do not yet understand the dynamics of modifying food habits well enough to apply . . . laws (of nutrition) in a fully effective way. But we are all aware of the bewilderment that household food buyers feel over much of the current advertising—advertising that attempts to push to the maximum of human capacity the consumption of every separate commodity—indiscriminately. Surely in the education of the public and in the orientation of food production and trade for bettering consumption patterns, we should look at the physiological research, and at the relative economy and usefulness of various foods to serve these needs. And science should speak with one voice in broad over-all terms about food choice and food use. This will have to be done if we are to progress at a pace in keeping with scientific knowledge and potentialities.**

The Impact of Television Food Advertising

Since World War II, the largest expenditure for public information on diet in the United States has been made by the food industry. In 1975, according to Leading National Advertisers, Inc., about $1.15 billion was spent on food advertising, which represents about 28 percent of total television advertising spending.

The most recent study to suggest the possible impact of current food advertising on the nation's nutritional health has been prepared by Lynne Masover and Dr. Jeremiah Stamler, of Northwestern University Medical School, and presented to the 1976 convention of the American Public Health Association. The study, which analysed the food advertising on four Chicago television stations during the period August 4–10, 1975, reported:

> A detailed look at this weekly food advertising time—restaurants excluded—found that the group of non-nutritive beverages was, by far, the single most-advertised food group, capturing approximately two-fifths of time, of which nearly one-third was for wine and beer. Sweets took up about 11 percent of the time; non-nutritive beverages plus sweets—all items low in nutrients and most of them high in calories—commanded an absolute majority of time. Add to these the oils, fats, and margarines, baked goods, snack foods, and relishes, and the proportion of advertising going to low-nutrient, generally high-calorie foods was nearly 70 percent! . . .
>
> Of the restaurants advertised, nearly all were of the limited-menu, fast-food type specializing in foods high in saturated fats and cholesterol.

The study found that only about 25 percent of the time was devoted to "nutritious groups," such as bread, cereal, pasta, meat, fish and seafood, dairy products, fruits and vegetables, soups and nut products.

More specifically, Table 18 shows that on weekdays during the period of analysis, almost 70 percent of the time devoted to food advertising promoted foods generally high in fat, saturated fat, cholesterol, refined and processed sugars and/or salt. However, only 3 percent of the time was devoted to fruit and vegetables. Of that total, no time was spent for the promotion of fresh vegetables and 0.7 percent was devoted to fresh fruit and juices. Fish, seafood and poultry received about the same advertising exposure as beef, 3.2 percent of the time compared to 3.5 percent for beef.

Table 19 indicates an even less healthful balance of weekend food advertising in which about 85 percent of time is devoted to foods high in fat, saturated fat, cholesterol, refined and processed sugars and/or salt. During the sample weekend period, no advertising time was given to fresh fruit or vegetables.

TABLE 18.—*Total weekday food advertising by food groups on four Chicago Television stations, August 4–10, 1975 (including local and network advertising)**

Food group	*Percent time of all stations combined*
Nonnutritive beverages	37.5
Carbonated (with sugar)	13.2
Carbonated (sugar-free)	2.9
Beer and wine	9.2
Drink mixes	7.2
Coffee and tea	5.0
Grain	17.5

See footnotes at end of table.

TABLE 18.—*Total weekday food advertising by food groups on four Chicago Television stations, August 4–10, 1975 (including local and network advertising)**—Continued

Food group	*time of all stations combined*
Bread, cereal, and pasta	13.4
Baked goods	4.1
Sugars and sweets	10.3
Candy, frosting, syrups	5.2
Chewing gum (sugar)	2.6
Chewing gum (sugar-free)	1.5
Gelatin, pudding	1.0
Oil, fat, margarine	8.5
Oil, fat, margarine	4.2
Salad dressing	4.3
Food stores	7.0
Food store-item unspecified	4.0
Food store-low fat dairy	1.5
Food store-fresh beef	1.0
Food store-all other	.5
Processed meat, fish, poultry	5.7
Fish, seafood, poultry	3.2
Beef, pork, lamb	2.5
Snack foods	2.9
Potato chips	1.3
Corn chips	.7
All other snack foods	.9
Dairy	3.1
High fat dairy	2.4
Low fat dairy	.7
Relishes, condiments, sauces	2.6
Vegetables	1.3
Processed vegetables, juices	0.9
Fresh vegetables, juices	.0
Processed potato products	.4
Fruit	1.7
Processed fruit juices	1.0
Fresh fruit, juices	.7
Soup	1.1
Sugar substitutes	.5
Nuts, nut products	.3
Egg substitutes	0
Total	100.0
Total food advertising time (minutes)	751.5

*Restaurants and food preparation equipment excluded.

SOURCE: Unpublished thesis material, Lynne Masover, Department of Community Health and Preventive Medicine, Northwestern University Medical School, Chicago, Ill.

TABLE 19.—*Total weekend food advertising by food groups on four Chicago Television stations, August 4–10, 1975 (including local and network advertising)**

Food group	*All stations combined*
Nonnutritive beverage	51.7
Beer and wine	24.3
Carbonated (with sugar)	17.9
Carbonated (sugar-free)	2.0
Drink mixes	4.0
Coffee and tea	3.5
Grain	19.8
Bread, cereal, and pasta	10.7
Baked goods	9.1
Sugar and sweets	12.9
Candy, frosting, syrups	7.0
Chewing gum (sugar)	4.2
Chewing gum (sugar-free)	1.2
Gelatin, pudding	.5
Oil, fat, and margarine	5.7
Oil, fat and margarine	3.2
Salad dressing	2.5
Snack foods	3.7
Corn chips	1.7
Potato chips	1.0
All other snack foods	1.0
Dairy	2.0
High fat dairy	1.5
Low fat dairy	.5
Vegetables	1.7
Processed vegetables, juice	1.2
Fresh vegetables	0
Processed potato products	.5
Relishes, condiments, sauces	1.2
Processed meat, fish, poultry	.6
Fish, seafood, poultry	.3
Beef, pork, lamb	.3
Sugar substitutes	.2
Eggs and egg substitutes	0
Food store specials	0
Fruit	0
Infant foods	0
Nut products	0
Soup	0
	99.5
Total food advertising time (minutes)	100.12

*Restaurants and food preparation equipment excluded.

SOURCE: Unpublished thesis material, Lynne Masover, Department of Community Health and Preventive Medicine, Northwestern University Medical School, Chicago, Ill.

With respect to restaurant and fast food advertising, not included in the above totals, the percent of total general advertising time devoted to them rose from 2.8 percent on weekdays to 3.2 percent on weekends.

In the report's conclusion, Masover and Stamler said:

> When this outlay of food advertising is juxtaposed with what is known about the prevalence in the United States of malnutrition of both the under-nutrition and over-nutrition types, coronary heart disease, hypertension, diabetes, and alcoholic liver cirrhosis, it is reasonable to conclude that on weekdays over 70 percent and on weekends over 85 percent is negatively related to the nation's health needs . . . Television is the primary source of information for the American public today. On the other hand, positive nutrition education from other sources is comparatively miniscule in the country. Thus it is reasonable to infer further that these combined circumstances are significant contributors to the current array of nutrition-related health problems. Therefore it is further reasonable to inquire why food advertising time on television should not be used exclusively to present the viewing audience with good rather than bad food choices?

A report prepared by Richard Manoff for the Ninth International Congress of Nutrition in 1972 suggests that more than 50 percent of the money spent on television food advertising may be negatively related to health. Calculations based on Table 20, provided in his report, indicate that a minimum of 48 percent of the money spent on television food advertising in 1971 went for items that may be generally characterized as high in fat, saturated fat, cholesterol, refined and processed sugar, salt or alcohol. This is a conservative estimate, not including sugared cereals and certain cake mixes, meat products, butter and cheeses that may be high in one or more of the dietary risk factors. In addition, coffee, tea and cocoa are not included in this calculation.

TABLE 20.—U.S. FOOD AND BEVERAGE ADVERTISING EXPENDITURES

[In thousands of dollars]

	1971	
	6-media total [1]	TV
Sugars, sirups, and jellies	10,125.2	[2] 5,993.2
Shortening and oils	39,547.7	[2] 34,498.6
Flour and prepared baking mixes	18,580.6	12,603.6
Seasons, spices, and extracts	6,576.1	[2] 4,363.9
Desserts and dessert ingredients	32,361.4	[2] 22,824.3
Condiments, pickles, and relishes	10,785.2	[2] 8,056.3
Sauces, gravies, dips	13,214.8	[2] 10,986.2
Salad dressings and mayonnaise	20,506.1	[2] 15,814.6
Miscellaneous ingredients	14,753.0	12,639.3
Soups	25,608.5	17,028.7
Cereals	89,144.0	81,645.5
Health and dietary foods	9,893.2	4,047.1
Infant foods	3,074.0	2,161.3
Pastas	25,426.4	21,010.0
Prepared dinners	27,850.9	22,305.3
Milk, butter, and eggs	30,358.8	25,622.8
Cheese	11,170.4	8,651.2
Ice cream and sherbets	4,575.3	[2] 4,195.5
Fruits and vegetables	36,239.5	24,198.5
Meats, poultry, fish	50,131.5	42,631.1
Bread and rolls	50,183.2	34,454.8
Cakes, pies, cookies	24,244.7	[2] 21,189.0
Coffee, tea, cocoa	82,084.7	75,691.4
Fruit and vegetable juice	23,105.0	19,991.8
Candy, gum, snacks	104,190.2	[2] 98,298.3
Soft drinks	108,050.4	[2] 96,055.8
Beer, wine, liquor	231,785.6	[2] 104,712.7
Total food and beverage [3]	1,159,522.6	890,882.4

[1] Total of measured media excluding spot radio.
[2] Used to determine percent advertising that may be negatively related to health.
[3] Including combination copy advertising which is not detailed.

Source: LNA Competitive Brand Cumulative for 1970 and 1971 (4), presented in "Potential Uses of Mass Media in Nutrition Programs," R. K. Manoff, and appearing in the proceedings of the 9th International Congress on Nutrition, Mexico, 1972, vol. 4, pp. 256–277 (Karger, Basel 1975).

It is important to point out that the amounts of advertising for various kinds of foods are not dictated by any overall plan for the achievement of a healthful diet but by needs of various firms at any given moment. Furthermore, those foods most heavily advertised are predominantly processed foods since it is difficult to develop brand loyalties for relatively undifferentiated raw staples.

Advertising and Low-Income Consumers

It is likely that those most influenced by food advertising are low-income and elderly consumers who are least capable of comprehending written guidance on food selection and least able to make comparisons between foods based on the nutrition labelling and price.

A report quoted by James T. Parker of the Division of Adult Education of the U.S. Office of Education at the Department of Agriculture's 1976 Outlook Conference, found that, with respect to consumer economics, almost 30 percent of the population falls into the lowest category of functional literacy:

> In terms of the general knowledge areas, the greatest area of difficulty appears to be consumer economics. Almost 30 percent of the population falls into the lowest level (those adults who function only with difficulty because of their unsatisfactory mastery of the requirements for functional literacy), while one-third of the population is categorized as (those adults who are functional, but not proficient).

This means, the report said, that about 34.7 million adults "function with difficulty" within consumer economics and an additional 39 million "are functional (but not proficient)." As an example, the report noted:

> When given pictures of three competing packaged cereals marked by net weight and price, only three out of four respondents identified the cereal which, in the sense of lowest cost per ounce, was the "best buy."

The report finds that the level of general competency decreases as levels of education and income decline. And the report finds ". . . the general trend is that the older the individual, the more likely that he/she is incompetent."

In a test gauging nutrition knowledge, 71 percent correctly selected tuna when asked to choose an item for a high-protein dinner from the list: tuna, macaroni, peaches and spinach. The report shows the lowest percent choosing the correct answer, 60 percent, was in the lowest income grouping, under $5,000 family income. In this group, 26 percent selected spinach, the most often chosen incorrect answer among all groups.

Scores by age grouping were: 18–29 years, 62 percent correct; 30–39 years, 79 percent correct; 40–49 years, 80 percent correct; 50–59 years, 72 percent correct, 60–65 years, 66 percent correct.

In another test related to nutrition, only 56 percent correctly calculated the number of calories in question. Again, the lowest scores fell in the lowest income and highest age groups. In the under-$5000 family income group, only 38 percent achieved the correct answer.

Lack of Nutrition Information

While constantly presented with persuasive messages on the kinds of food to buy, the consumer has had remarkably little information on the nutritional characteristics of the food itself.

Currently, nutrition labelling is voluntary and therefore not available on many food packages. Moreover, labels rarely provide information on the types of fats in food, or amounts of sugar, cholesterol or calories. Food additives are listed for some foods but not others.

In short, the situation is one in which the consumer is under intense pressure to buy certain foods but at the same time is ignorant of some of their most important nutritional characteristics.

The following recommendations are based on the premise that the first step toward improving the nation's health through diet is provision of information that will enable food growers, processors, wholesalers, retailers and consumers to make more healthful food choices.

RECOMMENDATIONS

To encourage the achievement of the foregoing dietary goals, it is recommended:

1. That Congress provide money for a public education program in nutrition based on the foregoing or similar goals. The initial minimum period for the promotion of these dietary goals should be five years.

Such a campaign should involve the following five functional areas:

(1) health and nutrition education in the classroom and cafeterias of our schools;

(2) nutrition and health education for school food service workers;

(3) nutrition education in the federally-funded food assistance programs;

(4) nutrition education conducted by the Extension Service of the Department of Agriculture; and

(5) extensive use of television to educate the public in the potential benefits of following certain dietary goals.

2. That Congress require food labelling for all foods, containing the following information to enable the consumer to make informed comparisons between foods:

(1) percent and type of fats;
(2) percent sugar;
(3) milligrams of cholesterol;
(4) milligrams of salt;
(5) caloric content;
(6) a complete listing of food additives for all foods, including those now covered by standards of identity; and
(7) nutrition labelling which is currently voluntary.

3. That Congress provide money to the Departments of Agriculture and Health, Education, and Welfare to jointly conduct studies and pilot projects that would develop new techniques in food processing and institutional and home meal preparation aimed at reducing risk factors in the diet.

4. That Congress increase funding for human nutrition research in the Department of Agriculture in accordance with the plan of the Agricultural Research Service, contained in Appendix D, and that Congress establish a committee for the coordination of human nutrition research undertaken by the Departments of Agriculture and Health, Education, and Welfare.

5. That the Department of Agriculture and Department of Health, Education, and Welfare form a joint committee to periodically consider the implications of nutritional health concerns on agricultural policy.

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APPENDIX A

BENEFITS FROM HUMAN NUTRITION RESEARCH

[By C. Edith Weir]

This report is part of a study conducted at the direction of the Agricultural Research Policy Advisory Committee, U.S. Department of Agriculture. A joint task group representing the State Agricultural Experiment Stations and the U.S. Department of Agriculture was assigned the responsibility for making the study. Task group members were:

Dr. Virginia Trotter, co-chairman, dean, College of Home Economics, University of Nebraska; Dr. Steven C. King, co-chairman, associate director, Science and Education Staff, U.S. Department of Agriculture; Dr. Walter L. Fishel, assistant professor, Department of Agriculture and Applied Economics, University of Minnesota; Dr. H. Wayne Bitting, program planning and evaluation staff, Agricultural Research Service, U.S. Department of Agriculture; Dr. C. Edith Weir, Assistant Director, Human Nutrition Research Division, Agricultural Research Service, U.S. Department of Agriculture.

Better health, a longer active lifespan, and greater satisfaction from work, family and leisure time are among the benefits to be obtained from improved diets and nutrition. Advances in nutrition knowledge and its application during recent decades have played a major role in reducing the number of infant and maternal deaths, deaths from infectious diseases, particularly among children, and in extending the productive lifespan and life expectancy. Significant benefits are possible both from new knowledge of nutrient and food needs and from more complete application of existing knowledge. The nature and magnitude of these benefits is estimated in Table 1. Potential benefits may accrue from alleviating nutrition-related health problems, from increased individual performance and satisfactions and increased efficiency in food services. A vast reservoir of health and economical benefits can be made available by research yet to be done on human nutrition.

Major health problems are diet related.—Most all of the health problems underlying the leading causes of death in the United States (Fig. 1) could be modified by improvements in diet. The relationship of diet to these health problems and others is discussed in greater detail later in this report. Death rates for many of these conditions are higher in the U.S. than in other countries of comparable economic development. Expenditures for health care in the U.S. are skyrocketing, accounting for 67.2 billion dollars in 1970—or 7.0 percent. of the entire U.S. gross national product.

The real potential from improved diet is preventive.—Existing evidence is inadequate for estimating potential benefits from improved diets in terms of health. Most nutritionists and clinicians feel that the real

SOURCE. Human Nutrition Research Division, Agricultural Research Service, U.S. Department of Agriculture. Issued August 1971 by Science and Education Staff, United States Department of Agriculture, Washington, D.C.

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potential from improved diet is preventative in that it may defer or modify the development of a disease state so that a clinical condition does not develop. The major research thrust, nationwide, has been on the role of diet in treating health problems after they have developed. This approach has had limited success. USDA research emphasis has been placed on food needs of normal, healthy persons and findings from this work have contributed much of the existing knowledge on their dietary requirements.

Benefits would be shared by all.—Benefits from better nutrition, made possible by improved diets, would be available to the entire population. Each age, sex, ethnic, economic, and geographic segment would be benefited. The lower economic and nonwhite population groups would benefit most from effective application of current knowledge.

These savings are only a small part of what might be accomplished for the entire population from research yet to be done. Some of the improvements can be expressed as dollar benefits to individuals or to the nation. The social and personal benefits are harder to quantify and describe. It is difficult to place a dollar figure on the avoidance of pain or the loss of a family member; satisfactions from healthy, emotionally adjusted families; career achievement; and the opportunity to enjoy leisure time.

Major health benefits are long range.—Predictions of the extent to which diet may be involved in the development of various health problems have been based on current knowledge of metabolic pathways of nutrients, but primarily of abnormal metabolic pathways developed by persons in advanced stages of disease. There is little understanding of when or why these metabolic changes take place. The human body is a complex and very adaptive mechanism. For most essential metabolic processes alternate pathways exist which can be utilized in response to physiological, diet, or other stress. Frequently, a series of adjustments take place and the ultimate result does not become apparent for a long time, even years, when a metabolite such as cholesterol accumulates. Early adjustment of diet could prevent the development of undesirable long-range effects. Minor changes in diet and food habits instituted at an early age might well avoid the need for major changes, difficult to adopt later in life.

Regional differences in diet related problems.—The existence of regional differences in the incidence of health problems has been generally recognized and a wide variation in death rates still exists among geographic areas. These differences in death rate may reflect the cumulative effect of chronic low intake levels of some nutrients throughout the lifespan and by successive generations. A number of examples of regional health problems attributable to differences in the nutrient content of food or to dietary pattern could be given. Perhaps the best known is "the goiter belt" where soils and plants were low in iodine and the high incidence and death rate of goiter was reduced when the diet was supplemented with iodine. Another situation existed in some of the southern states where pellagra was a scourge a few decades ago. Corn was the major food protein source for low income families in these areas. The resulting niacin deficiency raised the incidence of pellagra to epidemic proportions.

Migration from the high death rate areas almost always results in a reduction in the death rate, although the improvement never approaches the level achieved by those who were born and continued to live in the low rate areas. Similarly, persons who move from low rate areas into higher rate areas lose part of the advantage. If the death rate for one of the high death rate areas, Wilkes Barre, Pennsylvania, were applied to the entire U.S. population, 140,489 more persons under 65 years would have died per year during the period 1959–61. If the death rate for one of the lower rate areas, Nebraska, had prevailed, there would have been 131,634 fewer deaths. The highest death rate areas generally correspond to those where agriculturists have recognized the soil as being depleted for several years. This suggests a possible relationship between submarginal diets and health of succeeding generations.

TABLE 1.—MAGNITUDE OF BENEFITS FROM NUTRITION RESEARCH

Health problem	Magnitude of loss	Potential savings from improved diet
	PART A. NUTRITION RELATED HEALTH PROBLEMS	
Heart and vasculatory	Over 1,000,000 deaths in 1967	
	Over 5 million people with definite or suspect heart disease in 1960–62.	25-percent reduction.
	$31.6 billion in 1962	20-percent reduction.
Respiratory and infectious	82,000 deaths per year	
	246 million incidents in 1967	20 percent fewer incidents.
	141 million work-days lost in 1955–66	15–20 percent fewer days lost.
	166 million school days lost	Do.
	$5 million in medical and hospital costs	$1 million.
	$1 billion in cold remedies and tissues	$20 million.
Mental health	2.5 percent of population of 5.2 million people are severely or totally disabled. 25 million people have manifest disability.	10 percent fewer disabilities.
Infant mortality and reproduction.	Infant deaths in 1967—79,000	50 percent fewer deaths.
	Infant death rate 22.4 per 1,000	Do.
	Fetal death rate 15.6 per 1,000	Do.
	Maternal death rate 28.0 per 100,000 live births	Do.
	Child death rate (1–4 yrs.) 96.1 per 100,000 in 1964	Reduce rate to 10 per 100,000.
	15 million with congenital birth defects	3 million fewer children with birth defects.
Early aging and lifespan	49.1 percent of population, about 102 million people have one or more chronic impairments.	10 million people without impairments
	People surviving to age 65: Percent	
	White males 66	1 percent improvement per year to 90 percent surviving.
	Black males 50	
	White females 81	
	Black females 64	
	Life expectancy in years:	
	White males 67.8	Bring Black expectancy up to to White.
	Black males 61.1	
	White females 75.1	
	Black females 68.2	
Arthritis	16 million people afflicted	8 million people without afflictions.
	27 million work days lost	13.5 million work days.
	500,000 people unemployed	125,000 people employed.
	Annual cost $3.6 billion	$900 million per year.
Dental health	44 million with gingivitis; 23 million with advanced periodontal disease; $6.5 billion public and private expenditures on dentists' services in 1967; 22 million endentulous persons (1 in 8) in 1957; ½ of all people over 55 have no teeth.	50 percent reduction in incidence, severity and expenditures.
Diabetes and carbohydrate disorders.	3.9 million overt diabetic; 35,000 deaths in 1967; 79 percent of people over 55 with impaired glucose tolerance.	50 percent of cases avoided or improved.
Osteoporosis	4 million severe cases, 25 percent of women over 40	75 percent reduction.
Obesity	3 million adolescents; 30 to 40 percent of adults; 60 to 70 percent over 40 years.	80 percent reduction in incidence.
Anemia and other nutrient deficiencies.	See improved work efficiency, growth and development, and learning ability.	
Alcoholism	5 million alcoholics; ½ are addicted	33 percent.
	About 24,500 deaths in 1967 caused by alcohol	Do.
	Annual loss over $2 billion from absenteeism, lowered production and accidents.	Do.

TABLE 1.—MAGNITUDE OF BENEFITS FROM NUTRITION RESEARCH—Continued

Health problem	Magnitude of loss	Potential savings from improved diet
Eyesight	48.1 percent, or 86 million people over 3 years wore corrective lenses in 1966; 81,000 become blind every year; $103 million in welfare.	20 percent fewer people blind or with corrective lenses.
Cosmetic	10 percent of women ages 9 or more with vitamin intakes below recommended daily allowances.	
Allergies	32 million people (9 percent) are allergic	20 percent people relieved.
	16 million with hayfever asthma	
	7–15 million people (3–6 percent) allergic to milk	90 percent people relieved.
	Over 693 thousand persons (1 in 3,000) allergic to gluten.	Do.
Digestive	8,495 thousand work-days lost; 5,013 thousand school-days lost; About 20 million incidents of acute condition annually.	25 percent fewer acute conditions.
	$4.2 billion annual cost; 14 million persons with duodenal ulcers; $5 million annual cost; 4,000 new cases each day.	Over $1 billion in costs.
Kidney and urinary	55,000 deaths from renal failure; 200,000 with kidney stones.	20 percent reduction in deaths and acute conditions.
Muscular disorders	200,000 cases	10 percent reduction in cases.
Cancer	600,000 persons developed cancer in 1968; 320,000 persons died of cancer in 1968.	20 percent reduction in incidence and deaths.
PART B. INDIVIDUAL SATISFACTIONS INCREASED		
Improved work efficiency		5 percent increase in on the job productivity.
Improved growth and development.	113,000 deaths from accident. 324.5 million work-days lost; 51.8 million people needing medical attention and/or restricted activity.	25 percent fewer deaths and work-days lost.
Improved learning ability	Over 6.5 million mentally retarded persons with I.Q. below 70; 12 percent of school age children need special education.	Raise I.Q. by 10 points for persons with I.Q. 70–80.
PART C. INCREASED EFFICIENCY IN FOOD SERVICES		
Improved efficiency in food preparation and menu planning.		Not estimated.
Reduced losses of nutrients in food storage, handling, and preparation.		Do.
Improved efficiency in food selection.		Do.
Improved efficiency in food programs.		Do.

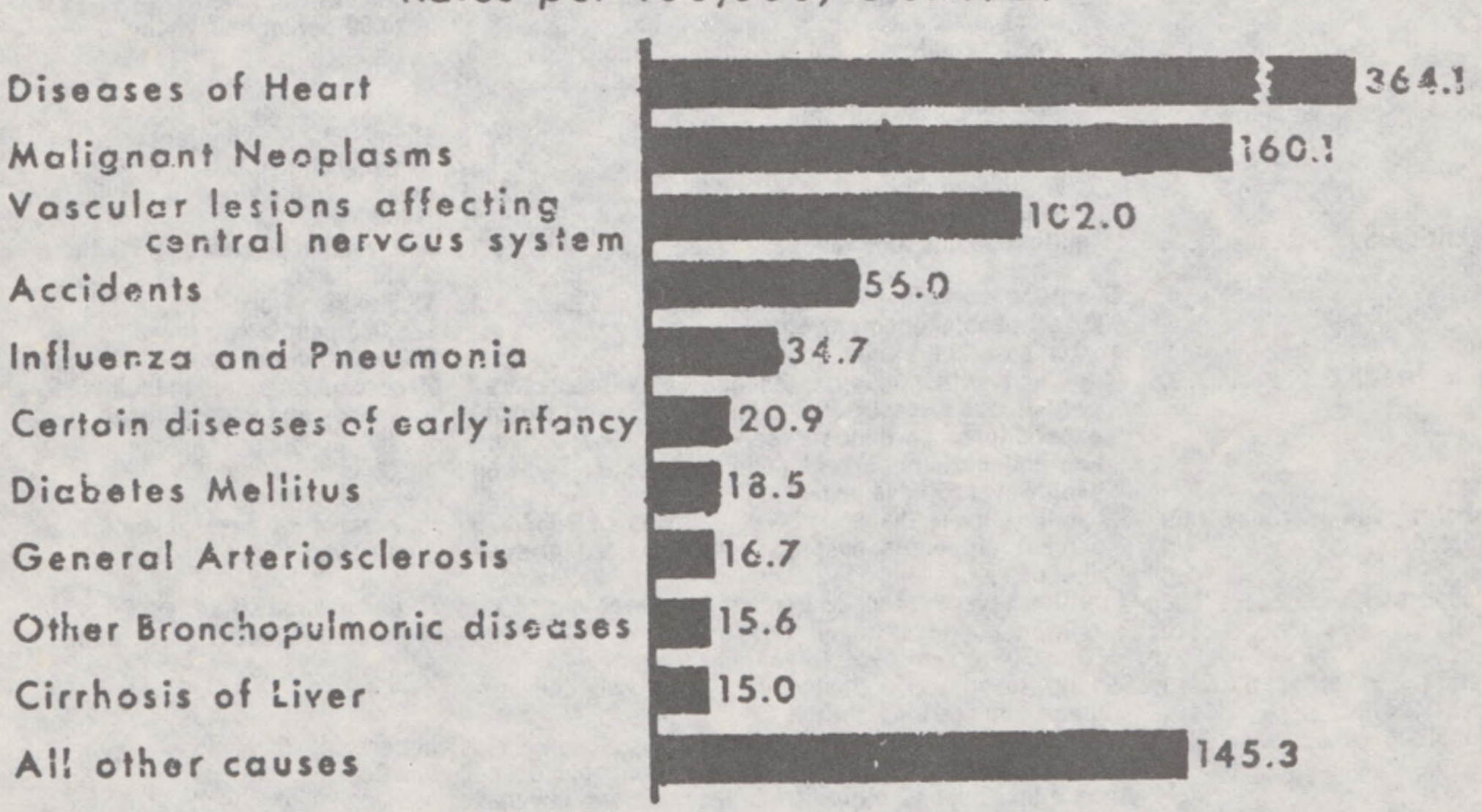


FIGURE 1

APPENDIX B

GENERAL POPULATION—RECOMMENDATIONS OF 12 EXPERT COMMITTEES ON DIETARY FAT AND CORONARY HEART DISEASE

Country	Fat content of total calories percent	Increased PUFA (polyunsaturated fatty acids)	PUFA–SAFA ratio (polyunsaturated fatty acids to saturated fatty acids)	Daily dietary cholesterol (milligrams)	Reduction of sugar	Advised labeling of fat content of foods
United States:						
Inter-Soc. Commission for Heart Disease Resources 1970	<35	Yes	1.0	<300		Yes.
American Health Foundation (1972)	35	Yes	1.0	300	Yes	Yes.
						Yes.
American Heart Association (1973)	35	Yes	1.0	300	Yes	Yes.
White House Conference (1973)	35	Yes		300		Yes.
Norway, Sweden, and Finland, 1968	25–35	Yes			Yes	Yes.
United Kingdom:						
DHSS COMA Report (1974)	(1)	No			Yes	
Royal College Physicians & British Cardiac Society (1975)	(2)	Yes		(3)	Yes	Yes.
New Zealand:						
Heart Foundation (1971)	35			300–600		
Royal Society (1971)		No		(3)		
Australia:						
Academy of Science (1975)	35	Yes	1.0	<350	Yes	Yes.
Germany: (Federal Republic) (1975)	(4)	Yes		300		
The Netherlands (1973)	35	Yes	1.0	250–300	Yes	Yes.

1 Reduce total fat, especially saturated.
2 Toward 35.
3 Reduce.
4 Reduce saturated fat.

Source: "Physiological Effects of Dietary Linoleic Acid," A. J. Vergroesen. Statement prepared for Federal Trade Commission hearing on nutrition information in food advertising, 1976.

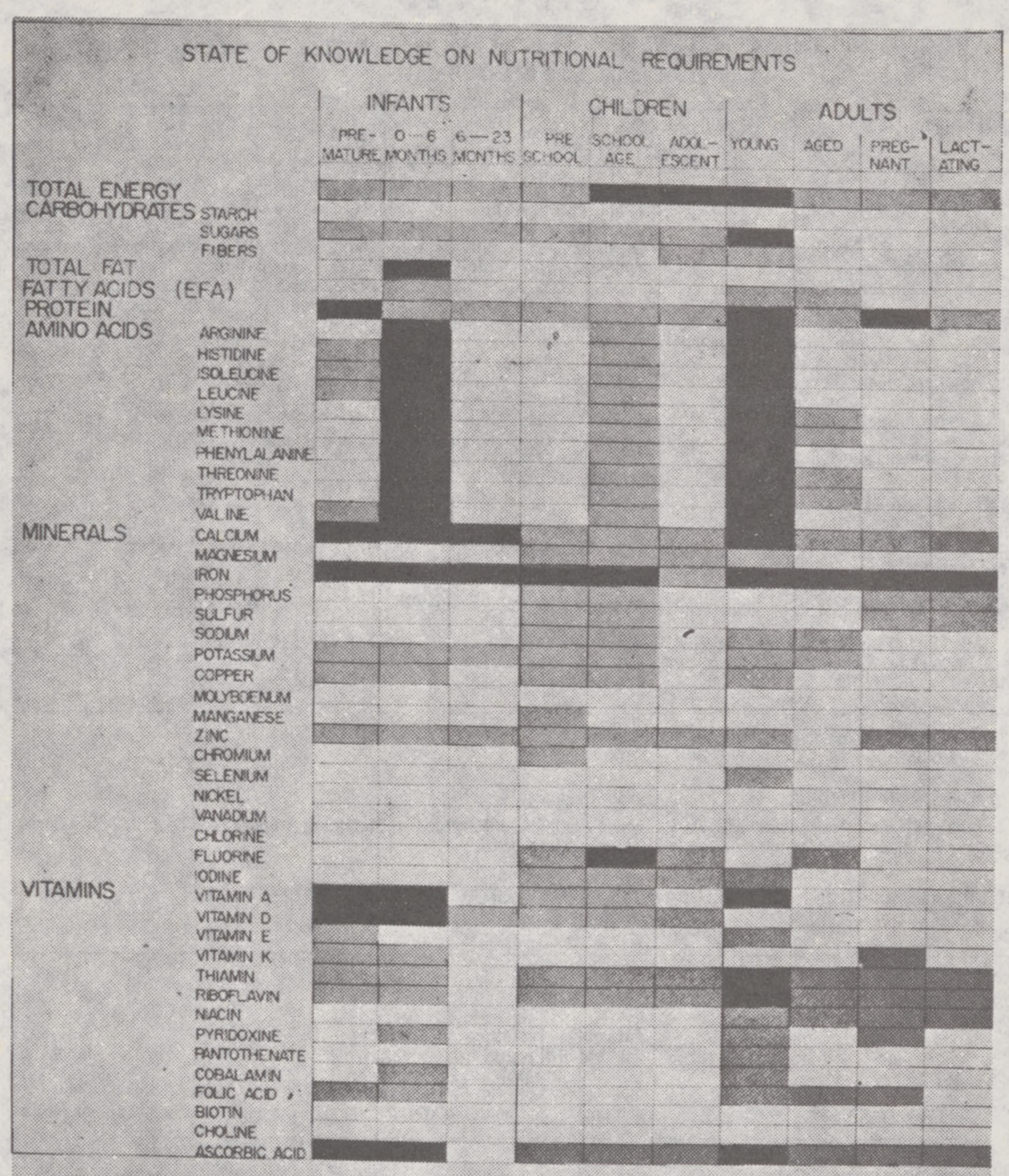
HIGH RISK POPULATION—RECOMMENDATIONS OF 6 EXPERT COMMITTEES ON DIETARY FAT AND CORONARY HEART DISEASE

Country	Fat content of total calories (percent)	Increased PUFA (polyunsaturated fatty acids)	PUFA–SAFA ratio (polyunsaturated fatty acids to saturated fatty acids)	Daily dietary cholesterol (milligrams)	Reduction of sugar	Advised labeling of fat content of foods
United States:						
Inter-Soc. Commission for Heart Disease Resources 1970	<35	Yes	1.0	<300		Yes.
American Medical Association (1972)	(1)	Yes		(2)		Yes.
New Zealand:						
Heart Foundation (1971)	35	Yes	1.0	300–600		Yes.
Royal Society (1971)	(3)	Yes		(2)		
Australia:						
National Heart Foundation (1974)	30–35	Yes	1.5	<300	Yes	
International Society of Cardiology (1973)	<30	Yes	>1.0	<300		Yes.

1 Substantial decrease in saturated fat.
2 Reduce.
3 Avoid excess saturated fat.

Source: "Physiological Effects of Dietary Linoleic Acid," A. J. Vergroesen. Statement prepred for Federal Trade Commission hearing on nutrition information in food advertising, 1976.

APPENDIX C


STATE OF KNOWLEDGE ON NUTRITIONAL REQUIREMENTS
INFANTS
CHILDREN
ADULTS
PRE-MATURE
0—6 MONTHS
6—23 MONTHS
PRE SCHOOL
SCHOOL AGE
ADOL-ESCENT
YOUNG
AGED
PREG-NANT
LACT-ATING
TOTAL ENERGY
CARBOHYDRATES
STARCH
SUGARS
FIBERS
TOTAL FAT
FATTY ACIDS (EFA)
PROTEIN
AMINO ACIDS
ARGININE
HISTIDINE
ISOLEUCINE
LEUCINE
LYSINE
METHIONINE
PHENYLALANINE
THREONINE
TRYPTOPHAN
VALINE
MINERALS
CALCIUM
MAGNESIUM
IRON
PHOSPHORUS
SULFUR
SODIUM
POTASSIUM
COPPER
MOLYBDENUM
MANGANESE
ZINC
CHROMIUM
SELENIUM
NICKEL
VANADIUM
CHLORINE
FLUORINE
IODINE
VITAMINS
VITAMIN A
VITAMIN D
VITAMIN E
VITAMIN K
THIAMIN
RIBOFLAVIN
NIACIN
PYRIDOXINE
PANTOTHENATE
COBALAMIN
FOLIC ACID
BIOTIN
CHOLINE
ASCORBIC ACID
AS OF 1976
LITTLE OR NO DATA
FRAGMENTARY DATA
SUBSTANTIAL PROGRESS MADE

APPENDIX D

U.S. DEPARTMENT OF AGRICULTURE,
AGRICULTURAL RESEARCH SERVICE,
Washington, D.C., November 12, 1976.

Hon. GEORGE MCGOVERN,
Chairman, Select Committee on Nutrition and Human Needs, U.S. Senate, Washington, D.C.

DEAR MR. CHAIRMAN: We welcome the opportunity to respond to your recent request concerning the implementation of a national, comprehensive human nutrition research program under the leadership of the Agricultural Research Service.

The Department of Agriculture and the Agricultural Research Service have a comprehensive mandate to perform human nutrition research, including human requirements for nutrients, studies of food consumption patterns, study of nutrient content of foods and means of preserving and enhancing its nutrient quality. The Agricultural Research Service ongoing program is funded at a $13 million level.

A significant amount of research has been accomplished in this area but many important questions remain to be answered. For example, only limited knowledge exists concerning proper diets for humans. This was confirmed during recent Congressional Hearings on the relationship between diet and disease when the Assistant Secretary for Health, the nation's top health officer, stated: "While scientists do not yet agree on the specific causal relationships, evidence is mounting and there appears to be general agreement that the kinds and amount of food and beverages we consume and the style of living common in our generally affluent, sedentary society may be the major factors associated with the cause of cancer, cardiovascular disease, and other chronic illnesses."

The agricultural research community believes that major breakthroughs of knowledge can result from an expanded nationally coordinated human nutrition program. Potential savings in terms of human lives and resources devoted to health care can be immense. Increased knowledge of human requirements for nutrients and how this can be accomplished by changes in crop and animal production practices and food processing techniques can result in increased efficiency in food consumption patterns. Overall, an expanded nutrition research program can contribute to strengthening the nation's economy and to the well being of its citizens.

National program managers feel that major breakthroughs can occur and long term needs met by building on research knowledge already known and by concentrating efforts in five major areas of work. Rationale for recommended long-range studies and recurring additional funding requirements are summarized below:

1. Human requirements for nutrients necessary for optium growth well-being—$66.6 million.

Our dietary guidance for families is hindered by inadequate knowledge about the nutritional needs at different stages of life, and the consequences of inadequate nutrition. This knowledge is needed to guide major USDA feeding programs for groups believed to be at nutritional risk. This research would establish the extent of biological variability for nutrients in individuals differing in age, sex, and genetic background. Many of these population groups have never been studied to quantitate their requirements for a particular nutrient.

2. The nutrient composition of foods and the effects of agricultural practices, handling, food processing and cooking on the nutrients they contain—$11 million.

Nutritional needs must be translated into the foods or food patterns that can best meet these needs. Up-to-date information on the composition of all important foods for the many nutrients required by man is a research goal that requires additional support.

3. Surveillance of nutritional benefits in the evaluation of the USDA food programs—$9.5 million.

The major USDA programs in child nutrition, food stamps for low-income families, and the nutrition education efforts among the hard-to-reach poor need continual surveillance and evaluation in terms of measures of nutritional health of the recipients. Research is needed on the relationship between specific foods in the diet and health.

4. Factors affecting food preferences and food habits—$4.8 million.

The nutrition educator is faced with a problem of helping people to change and improve their nutrition through diet. There is insufficient knowledge about food habits, choice, and motivations. Factors affecting food preference, such as odor, taste, and texture, need increased attention.

5. Techniques and equipment to guide consumers in the selection of food for nutritionally adequate diets in the home or in institutions—$4.7 million.

Guidance of consumers toward nutritionally adequate diets must include research-based knowledge on food management procedures and preparation of foods for the table, to assure retention of both nutritional and eating qualities and to avoid food-borne illness.

National program managers recommend that $60 to $65 million of the proposed $95 million (about 70%) be used to finance research performed by Land-Grant Colleges and other qualified public and private institutions. It is envisioned that the bulk of this research would be performed through the Land-Grant College System.

Estimated funding and distribution of effort in the five categories listed above for the expanded human nutrition program is as follows:

	Intramural Agricultural Research Service		Extramural land-grant and other institutions	
	Amount	Percent	Amount	Percent
	[Dollar amounts in millions]			
Category:				
1	$21.8	70.0	$44.8	70
2	3.1	10.0	6.4	10
3	3.1	10.0	6.4	10
4	1.6	5.1	3.2	5
5	1.5	4.9	3.2	5
Total	31.1	100.0	64.0	100

We appreciate your interest in human nutrition research and hope that the information provided meets your needs. All estimated funding levels are provided for information. They have not had the approval of Department officials or the Office of Management and Budget and should not be considered a request for funds. If I can be of further assistance, please do not hesitate to contact us.

Sincerely,

T. W. EDMINSTER, *Administrator.*

APPENDIX E

AVERAGE SODIUM AND POTASSIUM CONTENT OF COMMON FOODS [1]

[Weight in grams except as noted]

	Weight (grams)	Sodium (milligrams)	Potassium (milligrams)
Meat, fish or poultry: Cooked without added salt:			
Average	30	33	125
Clams, soft	100	36	239
Clams, hard	100	205	311
Crab, canned	100	1, 000	110
Crab, steamed	100	456	271
Flounder	100	237	587
Frankfurters (2)	100	1, 100	220
Frozen fish (cod)	100	400	400
Haddock	100	177	348
Kidneys, beef	100	253	324
Lobster, canned	100	210	180
Lobster, fresh	100	325	258
Oysters, raw	100	73	121
Salmon, canned	100	522	349
Salmon, salt-free canned	100	48	391
Scallops, fresh	100	265	476
Shrimp, raw	100	140	220
Shrimp, frozen or canned	100	140	220–312
Sweet breads	100	116	433
Tuna, canned	100	800	240
Tuna, salt-free, canned	100	46	382
Cheese:			
American cheese	30	341	25
Cream cheese	30	75	22
Cottage cheese	30	76	28
Cottage cheese, unsalted	30	6	----------
Low-sodium cheese (cheddar)	30	3	120
Egg:			
Whole, fresh and frozen (1)	50	61	65
Whites, fresh and frozen	50	73	70
Yolks, fresh	50	26	49
Milk:			
Buttermilk, cultured	120	135	192
Condensed sweetened milk	120	135	377
Evaporated milk, undiluted	120	142	364
Powdered milk. skim	30	160	544
Low-sodium milk, canned	120	6	288
Whole	240	120	346
Yogurt (skim milk)	100	51	143
Vegetables (See p. 82).			
Potato:			
White, baked in skin	100	4	323
White, boiled	100	2	285
Instant, prepared with water, milk, fat	100	256	290
Sweet (canned solid pack)	100	48	200
Bread and cereal products:			
Breads:			
Bakery white	25	127	26
Bakery, wholewheat	25	132	68
Bakery, rye	25	139	36
Low sodium (local)	25	4	25
Plain muffin	40	132	38
English muffin	57	215	57
A-proten rusk (1)	11	4	5
Graham crackers (2)	14	93	53
Low-sodium crackers (2)	9	10	11
Vanilla wafers (5)	14	35	10
Yeast doughnut	30	70	24
Cake doughnut	35	160	32

See footnotes at end of table.

AVERAGE SODIUM AND POTASSIUM CONTENT OF COMMON FOODS—Continued [1]

[Weight in grams except as noted]

	Weight (grams)	Sodium (milligrams)	Potassium (milligrams)
Bread and cereal products—Continued			
Cereal (dry):			
Kellogg's Corn Flakes	30	282	15
Puffed Rice	15	Trace	7
Rice Krispies	30	267	15
Special K	30	244	17
Puffed Wheat	15	Trace	21
Shredded Wheat	20	1	52
Kellogg's Sugar Frosted Flakes	30	200	19
Sugar Pips	30	67	22
Bran Flakes	30	118	151
Cereal (cooked—without added salt):			
Corn grits—enriched, regular	100	1	11
Farina enriched—regular	100	2	9
Farina instant cooking	100	7	13
Farina quick cooking	100	190	10
Oatmeal or Rolled Oats	100	2	61
Pettijohn's Wheat	100	Trace	84
Rice	100	5	28
Rice, instant	100	Trace	Trace
Wheat, rolled	100	Trace	84
Wheatena	100	Trace	84
Fat:			
Bacon (1 strip)	7	73	17
Butter	5	49	3
Margarine	5	49	1
Mayonnaise	15	90	5
Mayonnaise, low-sodium	15	17	1
Low-sodium butter	15	1	3
Unsalted margarine (Fleishman's)	5	1	1
Vegetable oil	15	0	0
Cream:			
Coffee mate	[2] 1	4	27
Half-and-half	30	14	39
Heavy whipping cream (30 percent)	30	10	27
Poly-perx	30	----------	----------
Sour cream (Sealtest)	30	13	43
Table cream (18 percent)	30	13	37
Whipped topping	30	4	6
Gravy:			
Low sodium (JHH analysis)	30	10	25
Regular (JHH analysis)	30	210	28
Peanut butter:			
Cellu: Salt free	15	1	100
Regular, made with small amounts of added fat and salt	15	91	100
Desserts:			
Baked custard (Delmark)	120	128	174
D'zerta	120	35	0
Gelatin	120	51	1
Ice cream (4-oz. cup)	60	23	49
Sherbert	60	6	14
Water ice	60	Trace	2
Cakes:			
All varieties except gingerbread and fruit cakes (both mixes and recipes)	[3] 50	123	50
With low-sodium shortening and baking powder	[3] 50	10–20	75-150
Pies: All varieties except raisin, mince (⅛ of 9-in pie)	[3] 320	375	180
Candy:			
Hard candy (1 equals 5 g)	100	32	4
Gum drops (8 small equals 10 g)	100	35	5
Jelly beans	100	12	1
Salt:			
(1 g NaCl—1 packet salt)	----------	400	----------
(5 g NaCl—1 tsp.)	----------	2,000	----------
Salt substitutes:			
Diamond Crystal	[4] 500	1	220
Co-salt	[4] 500	0	135
Adolph's	[4] 500	0	241
McCormick's	[4] 500	0	234
Morton	[4] 500	0	250
Sugar substitutes:			
Saccharine (¼ gr tablet)	1	1	0
Sucaryl	[4] 500	0	0
Sweet-10	[4] 500	0	0
Adolph's	[4] 500	0	0
Morton	[4] 500	0	0
Diamond Crystal	[4] 500	0	0

See footnotes at end of table.

AVERAGE SODIUM AND POTASSIUM CONTENT OF COMMON FOODS—Continued [1]

[Weight in grams except as noted]

	Weight (grams)	Sodium (milligrams)	Potassium (milligrams)
Beverages:			
Beer	100	7	25
Chocolate syrup (2 tsp)	10	5	29
Coca-Cola (JHH analysis)	100	4	1
Coffee, instant (beverage)		1	50
Cranberry juice	100	1	10
Diet Seven-Up	100	10	0
Egg nog, reconstituted	240	250	630
Fresca	100	18	0
Frozen lemonade, reconstituted	100	Trace	16
Gingerale (JHH analysis)	100	6	2
Hot chocolate (Carnation 1 pack—6 oz. water)	100	104	190
Kool-Aid, reconstituted	240	Trace	0
Meritene, reconstituted	240	250	740
Pepsi Cola (JHH analysis)	100	2	4
Royal Crown Cola	100	3	Trace
Seven-Up	100	9	0
Sprite	100	16	0
Tab	100	5	0
Tea, instant (beverage)		Trace	25

[1] Fresh fruits and fruit juices are naturally very low in sodium and thus are not listed individually in this table.
[2] Teaspoon.
[3] Average serving.
[4] Milligrams.

Vegetable Lists

Group I (0–20 mg/100 gm)

NOTE.—Assumes the use of fresh vegetables without salt added in cooking. The amount of salt added to canned and frozen vegetables can vary. Handbook #8 estimates that canned vegetables average 235 mg of sodium/100 gms edible portion. Frozen vegetables range from almost no sodium/100 gms edible portion to as high as 125 mgs of sodium/100 gms. edible portion.

Average 7.4 mg

	Mg Na		*Mg Na*
Asparagus	7	Mushrooms (raw)	15
Broccoli	12	Mustard green	10
Brussel sprouts	14	Navy beans	7
Cabbage (common)	14	Okra	2
Cauliflower	9	Onions	7
Chicory	7	Parsnips	8
Collards	16	Peas, dried, split (cooked)	13
Corn	2	Peas, green	1
Cow peas	1	Potatoes, baked in skin	4
Cucumbers	6	Potatoes, boiled, pared before cooking	3
Egg plant	1	Radishes	18
Endive	14	Rutabagas	4
Escarole	14	Squash (summer or winter)	1
Green peppers	13	String beans	2
Kohlrabi	6	Sweet potato	10
Leeks	5	Tomatoes	4
Lentils	3	Turnip greens	17
Lettuce	9	Wax beans	2
Lima beans (not frozen)	1	Yams	4

Group II (23–60 mg/100 gm)

Average 40 mg

	Mg	*Na*		*Mg*	*Na*
Artichoke		30	Kale		43
Beets		43	Parsley		45
Black-eyed peas (frozen only)		39	Red cabbage		26
Carrots		33	Spinach		50
Chinese cabbage		23	Turnips		34
Dandelion greens		44	Watercress		52

Group III (75–126 mg/100 gm)

Average 84 mg

	Mg	*Na*		*Mg*	*Na*
Beet greens		76	Chard, Swiss		86
Celery		88			

Source: "Composition of foods—raw, processed, prepared." Agricultural Handbook No. 8. U.S. Dept. of Agriculture, Agricultural Research Service, Washington, D.C.: Government Printing Office, 1963.

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