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THE ROLE OF THE FEDERAL GOVERNMENT IN HUMAN NUTRITION RESEARCH

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FOREWORD

The extent and nature of human nutrition research funded by the Federal Government have been unknown until this report.

Questions in this area have been met with a mass of seemingly unrelated data, conflicting reports on levels of funding and an absence of reference points from which to make comparative judgments.

Now, after a request by Congressman Frederick W. Richmond to the Congressional Research Service, and the painstaking work of CRS researchers Cynthia Chapman and Freeman Quimby, we have the first comprehensive, useable assessment of Federal support for human nutrition research. The report examines human nutrition research in five categories: Nutrient requirements, food composition, measurement of nutrition status, diet and its relationship to disease, and metabolic defects.

The report concludes that Federal human nutrition research is inadequate, particularly in light of the increasing challenges confronting nutrition science.

In fiscal year 1975, the researchers estimate the Federal Government spent $73 million on human research, or about 35 cents per citizen. This figure is based on fiscal year 1975 expenditures for the Department of Health, Education, and Welfare, $60 million; the Department of Defense, $2.6 million; and the Veterans Administration, $450,000; and fiscal year 1974 expenditures for the Department of Agriculture, $9.7 million.

This small expenditure is a clearly insufficient response to the mounting concern over the relationship of nutrition to some of our most dread diseases, such as heart disease, diabetes and cancer, and the growing uneasiness about the accelerating changes in the composition of our diets. The report says:

> Research in human nutrition, as in biomedical research generally, has reached the point of difficult solutions, both because of the complexity of the problems now under study and because of the difficulties imposed by the almost insuperable variables in the human environment. Nevertheless, it is the goal of nutrition research to obtain sufficient knowledge so that it will be possible to manipulate the nutritional environment toward improvement of human health and longevity. The advancement of knowledge towards this goal would appear to require more funds than are presently available to the fused disciplines which now make up the nutrition research enterprise, together with a somewhat greater degree of coordination within and among the agencies supporting major activities in nutrition.

One of the most serious findings of underfinancing is in the Department of Agriculture, where only $10 million, or about 2.6 percent of the total USDA agricultural research budget, was spent on human

nutrition research in fiscal year 1974. This amount, the researchers say:

> . . . may be regarded as rather small for a Department of the Federal Government which is so importantly placed in the center of the food enterprise. Moreover, the facilities, manpower, and funds seem minimal to support the *only* (emphasis by the researchers) Federal Department which both:
>
> (1) Sponsors basic research to discover new nutrients, to investigate foods for nutrient content, and to establish nutrient levels required for optimal health; and
>
> (2) Applies these research results to various studies on national food consumption patterns; on specific nutritionally-vulnerable groups; and on improving foods and dietary habits.

If State funding is counted, agriculture departments in the United States spend far more for animal than human nutrition research. The U.S. Department of Agriculture spent about $5 million on animal nutrition research in fiscal year 1974 and, as noted, about $10 million on human nutrition research. If State agriculture expenditures are added, we find that the total agriculture spending for animal nutrition research was about $52 million in fiscal 1974 compared to about $18 million for human nutrition research.

This report finds similar underfinancing in the Department of Defense, where $2.6 million was spent on nutrition research in fiscal year 1975, or about $1 per year per military person. The report concludes that this amount "seems small for a specialized population exposed to so many changing nutritional risks." The Armed Forces fare better than the general population in terms of money expended on their nutritional health, however.

This report does not review Federal spending for human nutrition research related to international nutritional issues. International Development spent $750,000 in this area in fiscal year 1975.

The report also finds that the Department of Health, Education, and Welfare, which accounted for 80 percent of Federal nutrition research expenditures in fiscal year 1975, spent that sum without reference to general guidelines or objectives.

> Neither DHEW, nor the individual Public Health Service agencies, seem entirely aware of the program content or federal support for human nutrition research in the department. Only one agency, the National Institutes of Health, appears to have established a visible organizational structure, namely the NIH Nutrition Coordinating Committee, as a means to monitor and coordinate nutrition research within the agency. No such interagency group or office now acts to bring the agencies together for a coordinated and cooperative effort in human nutrition research. Consequently, the Nutrition Plan in the fiscal year 1977–1981 *Forward Plan for Health* does not contain a current assessment or a detailed projection for the DHEW human nutrition research effort.

The Department's ignorance of its own nutrition research activity is distressingly typical. CRS reports;

> In preparing these sections on USDA-supported human nutrition research, no single administrator, scientist, or published source could provide overall human nutrition research policy, or

detailed information on all research projects, facilities and scientists in USDA.

The report adds that attempts have been made within the various departments to coordinate and plan research activities, but that there evidently is no interest at higher managerial levels.

The more difficult high-level interdepartmental communication directed toward achieving broad nutrition research goals has yet to be established within the framework of available resources in manpower and funds. Without such interdepartmental communication, the objective of an efficient and cohesive Federal nutrition research plan appears seriously jeopardized.

The CRS report does not analyze the quality or the emphasis of federally funded human nutrition research, but it does argue that such analysis is needed. Consequently, in the attached letter, I am asking the General Accounting Office to both review Federal activity in human nutrition research, using this report as a basis for inquiry, and to make recommendations for research priorities and organizational, legislative and funding changes.

It is evident that the Departments involved in human nutrition research must immediately develop centralized sources of information about their own research activities. In addition, a system must be established to make the work of each Department known to other Departments and concerned researchers.

Finally, a comprehensive approach to human nutrition research requires a statement of Federal policy, assigning responsibilities among the various Departments, based on their legislative mandates, their historical roles and unmet research needs. In some cases, it may be necessary to expand the legislative mandate for human nutrition research.

There is a wealth of scientific talent and energy in the United States. We have the capacity to move ahead as vigorously in nutrition research in the second half of this century as we did in the first. The Federal Government, as the single largest source of support for nutritional research, must provide the leadership.

I have spoken many times of the need for a national food and nutrition policy, of the need to plan for the use of our food resources and the improvement of our nutritional health. This report provides still more evidence that such a plan is needed, that we must set a course to steer, that we must have a means of holding ourselves accountable for the nutritional health of our people and those we assist abroad.

I am not talking about policy for policy's sake. I am talking about policy for the sake of people. Human nutrition research is not a matter of policy manipulation, a matter of intellectual gymnastics or a matter of keeping scientists employed. Human nutrition research is not a luxury to be tended to after everything else is taken care of. Human nutrition research is a matter of bringing this Nation and other nations, to a new plateau of freedom from suffering. This is what this report is about, and this is public business which we should be about without further delay.

GEORGE MCGOVERN, *Chairman.*

UNITED STATES SENATE,
SELECT COMMITTEE ON NUTRITION AND HUMAN NEEDS,
Washington, D.C., March 11, 1976.

Hon. ELMER B. STAATS,
Comptroller, U.S. General Accounting Office,
Washington, D.C.

DEAR MR. STAATS: The Congressional Research Service has prepared the enclosed report, "The Role of the Federal Government in Human Nutrition Research," disclosing inadequate Federal funding for human nutrition research and uncoordinated Federal activity in this area.

Advancement in human nutrition research is fundamental to improving the health of U.S. citizens and all mankind. Consequently, I request that the General Accounting Office examine all Federal activity in human nutrition research and report on the major gaps in our nutrition knowledge, what Federal agencies are doing to fill them and what areas of inquiry may be receiving insufficient attention and funding. In addition, we request recommendations on organizational, legislative or other changes needed to facilitate progress.

Our purpose is to provide Congress with an outline of the most pressing needs in human nutrition research and a plan for action.

We recognize this as a complex task, but we feel it is of utmost importance, and we hope it might be completed as quickly as possible.

Sincerely,

GEORGE MCGOVERN, *Chairman.*

Statement by Congressman Fred Richmond on the Role of the Federal Government in Human Nutrition Research

This report is a major step toward enumerating and evaluating the role of the Federal Government in human nutrition research. It shows that the human nutrition research performed by the Federal Government is a haphazard jigsaw puzzle, whose pieces fail to fit together because of a lack of coordination, funding, guidance, and planning. The need for a comprehensive national nutrition policy is dramatically underscored by the findings of this report.

Traditionally, nutrition policy in this country and the research it generates has been piecemeal in scope and fragmented in implementation. There has been no overall strategy and no systematic approach to either the thrust of research planning or to coordinating the use of research results.

This report fills a void in our knowledge concerning nutrition research projects, their budgets, and the role of key Federal agencies responsible for this research. The report describes and analyzes nutrition research in the U.S. Department of Agriculture, Department of Defense, Department of Health, Education, and Welfare, and the Veterans' Administration. It outlines, in explicit detail, the expenditures, decisionmaking policies, and resource allocation of each department and agency in addition to providing an historical perspective on human nutrition research and the evolution of Federal nutrition research activities.

The report reveals that funds allocated for nutrition research are appallingly small when compared to the total research effort of the three departments and one agency studied.

In the case of nutrition research performed by the USDA for example, efforts suffer from a lack of direction, low priority, and inadequate funding. Only 2.6 percent of the entire USDA Agricultural Research Service budget of $373 million is spent on human nutrition research. This is totally inadequate for an agency so importantly placed at the very center of our Nation's food network.

Only a trivial proportion of the resources of the USDA are invested in activities related to the improvement of consumer food purchase patterns and diet practices. The Department has demonstrated little effective leadership in applied nutrition and nutrition education. Tunnel vision, provincialism and disciplinary conservatism serve to hamper innovation and real progress in these areas within the USDA.

The Department of Agriculture has established no overall priority, policy, direction, or coordination for nutrition research activities. It appears that the Department considers human nutrition research and the dissemination of nutrition information a poor stepchild to its role of fostering the growth and profitability of the special interests of agribusiness. Additionally, the report describes the nutrition research facilities of USDA's Agricultural Research Service as being

small, old, and "conducted on a shoestring operation in terms of staff and budget."

Similarly, the other Federal agencies studied lack coordination, planning and funding. Prior to this study, no one has been able to analyze these figures accurately because they are not available from one source and because the agencies do not collect the data in a manner suitable for coordinated evaluation. Thus, a major effort was required to collect this data. It is incomplete in certain aspects because the authors found it literally impossible to obtain exact figures. Yet, it is the best collection of data on the Federal role in human nutrition research now available. Hopefully, it will stimulate more complete recordkeeping in the future by the agencies involved.

This report reveals that the application of nutrition science to consumer habits, consumption patterns, nutrition education and the use of modern media to aid people in the selection of the most nutritious foods have all been sacrificed and neglected by the Federal Government.

Out of the paltry $73.4 million allocated for human nutrition research, the Federal Government earmarks $60.7 million for metabolic studies of specific nutrients and research on nutrients and their interrelationships with disease. Only $9.7 million is allocated for use by the USDA in consumer related areas.

Where the Federal Government has deemed it important to study the basic biological needs for nutrition, they have done an extremely commendable job. However, the sad fact remains that little has been expended and too low a priority has been set in applied nutrition programs or in helping consumers to cope with a rapidly changing food supply.

The total investment in human nutrition research throughout all Federal agencies is too small and must be substantially increased so that the general public may become better informed as to the true value of their food. It is indeed evident that the Federal Government's efforts suffer from a severe lack of coordination within and among the agencies supporting nutrition research. Access to reports, findings and results of projects across the Nation is extremely limited. Legislators, nutritionists, consumers, educators, researchers and Federal employees specializing in nutrition are too often forced to undertake extensive searches to find out what activities and projects are currently underway. What is needed is a central clearing house established in the executive branch to gather and disseminate information developed by various research projects. Furthermore, Congress must step in and reorder the priorities of the Departments to assure that human nutrition research does not remain an afterthought and that a socially responsible policy of making certain that applied nutrition research, consumer eating habit studies, consumption patterns, and the use of modern media and nutrition education are no longer sacrificed.

It is now apparent that on both the State and Federal levels, neither the general public or Government officials know the full scope of or gaps in nutrition assistance and research programs. This report begins a process to sort out what is being done by the Federal Government in regard to nutrition research. To follow up on the need to index U.S. nutrition activities, a survey of nutrition assistance and

related programs across the county is needed. This will assist not only State officials who frequently are not aware of various nutrition programs being conducted by numerous and often uncoordinated agencies within a State, but it will be of particular assistance to Congress in legislating nutrition programs and formulating a cohesive nutrition policy. I believe Senator McGovern's request to the GAO is an important step in this direction.

Finally, the executive levels of the Federal Government must begin to coordinate their activities and develop an overall plan for nutrition research and education. An effort is needed at the highest levels of government, which has been sorely lacking, to make nutrition one of our most important national priorities.

As we grapple with the domestic problems afflicting the country, it becomes clear that there are serious deficiencies in our commitment to promoting sound nutrition for all Americans.

I believe this report can be an important statistical yardstick for us to measure our progress today, reassess our priorities, increase funding where warranted, and move towards establishing a cohesive, coordinated, and comprehensive national nutrition policy.

CONGRESS OF THE UNITED STATES,
HOUSE OF REPRESENTATIVES,
Washington, D.C., April 21, 1975.

MR. LESTER JAYSON,
Director, Congressional Reference Service,
Library of Congress, Washington, D.C.

DEAR MR. JAYSON: Pursuant to discussions with Dr. Freeman Quimby of your staff, I am hereby making a formal request for C.R.S. to conduct a major, comprehensive study of the Federal role in human nutrition research.

Specifically, I would like to know which Federal agencies are involved in the field of human nutrition research, what they are doing and how much money is spent on these programs. I would like to know the size and scope of the Federal human nutrition research activities, as well as the specific purposes of the various activities.

Thank you for your attention to this request.

Yours sincerely,

FRED RICHMOND.

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CONGRESSIONAL RESEARCH SERVICE,
Washington, D.C., March 5, 1976.

To: Honorable Frederick W. Richmond, Attn: Brad Michaelson.
From: Cynthia B. Chapman, Analyst in Life Sciences, and Freeman H. Quimby, Specialist in Life Sciences, Science Policy Research Division.
Subject: Final copy of "The Role of the Federal Government in Human Nutrition Research"

In response to your request of April 22, 1975, we have finally completed the study entitled, "The Role of the Federal Government in Human Nutrition Research". The report in its final form has been reviewed for typewritten errors and policy; it differs little from the draft copy transmitted to your office on December 12, 1975. As per your suggestion, the enclosed copy includes the original un-reduced tables for use by the Government Printing Office.

There remains those parts of the manuscript which make for rather laborious reading, as well as the complex organization of the overall study. However, we believe these features to be intrinsic to the issues themselves rather than to the technique of stating and analyzing them.

We hope that this study will supply the information you desired; if we can be of any further assistance, please do not hestitate to ask.

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THE ROLE OF THE FEDERAL GOVERNMENT IN HUMAN NUTRITION RESEARCH

BY

CYNTHIA B. CHAPMAN
Analyst in Life Sciences

AND

FREEMAN H. QUIMBY
Specialist in Life Sciences
Science Policy Research Division

THE ROLE OF THE FEDERAL GOVERNMENT IN HUMAN NUTRITION RESEARCH

[by Cynthia B. Chapman and Freeman H. Quimby]

Abstract

This report describes and analyzes the role of the Federal Government in research on human nutrition. The Federal Government in this case is represented by four departments, namely, Agriculture; Defense; Health, Education, and Welfare; and the Veterans Administration, which conduct or administer substantial programs in nutrition research and related activities.

The study begins with a brief historical perspective on human nutrition research that includes past achievements and current interests. The evolution of nutrition activities in each department is also provided as background to its present human nutrition research effort. The study defines five categories of human nutrition research and attempts, by means of numerous information retrieval techniques, to determine the total effort as well as the major areas of emphasis for nutrition research in each defined category. The general findings included: (1) In fiscal year 1975, DHEW led all departments with a total expenditure of over $60 million for nutrition research out of a total of $73 million for all departments; (2) The remaining three departments, namely, Agriculture, Defense, and the Veterans Administration, expended $9.7 million (fiscal year 1974), $2.6 million (fiscal year 1975), and $450,000 (fiscal year 1975), respectively.

It was noted that, for the most part, the departmental programs in nutrition research fell within the scope of their statutory missions, but that all shared a common interest in certain nutritional problems. For example, organizational units within DHEW supplied funds for cooperative nutrition studies to the Agricultural Research Service (ARS), USDA, and to nutrition investigators affiliated with the Veterans Administration hospitals.

The report provides some documentation of the limited nutrition research resources of ARS which suggests the advantages of a small extramural program of grants, contracts, and cooperative agreements with non-government nutritionists in universities. Several years ago, ARS proposed to the Congress such an expansion of its research in food and nutrition in which it was specified that extramural work performed in universities affords special opportunities to support basic research, to assist in the training of nutritionists, and to enlist the interest of scientific leadership the country over. This proposed extramural program would be supported by the Department of Agriculture in the interests of that Department's unique position in the food and nutrition enterprise.

Evidence provided in this study indicates that the four Federal departments have recently revived their long-standing interests in human nutrition research. The departments have begun to assess their nutrition research efforts in terms of purpose, content, scope, relevance, information exchange, and possible collaboration so that they might more effectively direct the research with the currently available manpower and funds. Furthermore, USDA, DHEW, and DOD have proposed new initiatives for nutrition research and training which would be undertaken if and when financial resources were increased and nutrition research activities were conducted in the context of common National objectives.

I. INTRODUCTION

The purpose of this report is to describe concisely food and nutrition research, its past and present achievements, and the overall character of major Federal research activities directly related to human nutrition.

The report begins with a brief narrative on the role of food in the history of civilization. It proceeds with detailed tables on conceptual advancements and milestone discoveries in nutrition over the past several decades and even recent centuries. The history of nutrition is highlighted by a final discussion of selected areas of interest now regarded as among the most promising and exciting developments on the cutting edge of nutrition research.

Following the construction of a unique definition for human nutrition research, the study then classifies and reviews the numan nutrition research projects of four Federal departments, namely, Agriculture; Defense; Health, Education, and Welfare; and the Veterans Administration. Data on numbers of research projects and Federal support is derived from on-demand searches of each Department's computerized information system. Information on Federal authority, perceived mission, implemented policies, administrative organization, and research facilities for each agency is provided from several available sources, that is, from personal interviews, telephone conversations, letters, published materials, and the public record. These data and background information are organized to provide a detailed account of the evolution, scope, and content of federally sponsored human nutrition research endeavors within each department.

A comparative analysis concludes the report and provides an overall perspective to summarize Federal participation in four major human nutrition research efforts.

II. THE STORY OF FOOD AND NUTRITION

A. Background

All living things are preoccupied with obtaining adequate nourishment. For plants and attached animals the process is passive; for other animals it is usually active and, at times, seemingly compulsive. Minerals, fats, carbohydrates, and proteins are the building and energy blocks of the living machine, and these, together with numerous other nutrients must be synthesized by the living organism itself or ingested from other organisms (dead or alive—plant or animal). Without nutrients of its own making or from external sources, the living organism will not grow and if denied essential nutrients, will die.

It has been postulated often that early man was continually struggling with the problem of getting food. Determining what to eat to produce satiety and insure survival must have been very much a matter of trial and error. Many plant foods were toxic,[1] unless they were cooked. If early hominid man did subsist on uncooked vegetable products, only a slight increase in population would have required migration in search of new sources of non-toxic plant foods. Archeological evidence of the evolution of man indicates that land occupied by him some 14 million years ago was dry veldt (level grassland, probably African, with scattered trees and shrubs) country rather than the verdant forest, suggesting that vegetation was sparse at that time and location, and that migration was a necessity.

The discovery of fire and the favorable effect of cooking on grains and vegetables undoubtedly gave birth to our earliest agricultural cultures. The cooking of wheat, barley, millet, oats, rye, rice, corn, and of vegetable foods, then as today, together with the selective breeding of palatable and productive crop plants, may account for the population increase of the more recent neolithic times. During this period man learned to produce food rather then to collect it, and there was more freedom from the constant quest for food. This provided time for other achievements and the basis for modern civilization was laid.

During this general time-frame in man's evolution, his escape from the tropics, his migration into temperate climates, and from there his move into even colder areas, appear to rest on the fact that he could subsist largely on meat.[2] Thus the prowess of our ancestors as hunters appears frequently in early paintings on rocks and in caves. Whether or nor early man was subsisting almost wholly on uncooked vegetable food, (as Goodhart contends) or whether his fortunes were at first restricted by the toxicity of many uncooked

---

[1] Early man's food habits (letter by A. C. Leopold and Robert Ardrey), Science, v. 177, No. 4052, Sept. 8, 1972: 833–834.

[2] Early man's food habits (letter by C. B. Goodhart) Science, v. 177, No. 4052, Sept. 8, 1972: 833.

plant foods (as argued by Leopold and Ardrey), there seems little disagreement concerning his strong appetite for meat, once its taste and food value were discovered.

Whatever the diet of the much later neolithic man may have been, the period falls well within the range of early agricultural practices. Burl [3] for example, refers to neolithic farmers in the British Isles between about 2000 and 3000 B.C. (plus or minus 500 years) as well as pottery which included urns, cups, and food vessels. Osteological studies of neolithic skulls indicate that their ages exceeded 70 years. This is an interesting observation in view of the fact that modern western man's average longevity is also approximately 70 years.

Speculations on the diets of our ancestors have been used to justify massive intakes of vitamins. Vitamin C intake is among these "anthropological" arguments with the view that the dietary sources available to early or prehistoric man, as already stated, consisted of uncooked vegetables and fruits which because of their relatively low content of protein and fat had to be ingested in large amounts, thus resulting in an average daily ingestion of 1000 mg. or more of vitamin C. Similarly, large amounts of vitamin A were present in vegetables and greens, and especially in the raw livers of land and sea mammals, which our northern European ancestors are assumed to have consumed in abundance.

Whatever the truth of these speculations, the road to civilization, the history of it, and its future is closely associated with food gathering and food quality. While neither of the latter problems are completely solved, man did develop a "palate" for food. Perhaps contemporary man is a product of natural selection in this area. That is to say, he has adapted to some degree to his nutritional environment. Nevertheless, in countries where food is readily available and even inexpensive he continues his search for food and often consumes it in amounts far in excess of his physiological needs. Thus a considerable population of human beings are burdened with stores of excess fat and with diseases which match the over-indulgence—if not specifically, at least generally. On the other hand, in most parts of the developing world there is an even greater population of human beings which are dangerously thin for lack of adequate nutrients and with diseases which result from their undernutrition. When nutritional deficiency diseases are not sufficient to account for young people who look old or children with pot bellies, infectious diseases fill in the remainder. In some areas malnutrition and disease interact to destroy as many as half of the infants and children before they reach the age of five.

It is not known what early man or neolithic man might have done under these circumstances, because in some regions he might not have had to contend with them. Famines were certainly prevalent during Biblical times and in the Mediterranean area, but they may not have been so prevalent in Europe and elsewhere. Gluttony was known in ancient Greece and Rome and malnutrition and starvation during the above-mentioned famines. Unfortunately, none of these conditions, then or today, except severe starvation, affects man's ability to reproduce nor his attitude in favor of minimizing reproduction. Today, the human species "pours" new life into exactly those environments which cannot sustain it nutritionally or otherwise.

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[3] Burl, Aubrey. Dating the British Stone Circles, American Scientist, v. 61, No. 2, March-April 1973: 170-171.

While the food-population problem is beyond the scope of this paper, there may be a partial solution in food technology and nutrition itself. Within limits, the amount of food may be less important than its nutritional quality. That is to say, the optimum nutrient composition of diets for those populations who desire to be "well-fed" has yet to be determined by nutrition research. Similarly, the optimum nutrient composition for those under restricted food supply also constitutes a special area for future human nutrition research.

In 1950 a "nutrition is dead" article, by Howard Schneider [4] appealed for manipulation of the nutritional environment. Before discussing this, however, he set forth a brief history of nutrition that is paraphrased and modified below:

B. Brief History of Nutrition

The Naturalistic Era (1400 B.C. to 1750 A.D.) was a long period of naturalistic medicine. Food had an important place in health and disease, but lacking a science of chemistry the role of food in health was dominated by pure observation and speculation.

[Today we are seemingly reentering this naturalistic phase, with or without the help of advanced biochemistry. "Natural" food and the idea of "nature knows best" has entered the field of nutrition at both scientific and consumer levels. There is a profound disillusionment with doctors and drugs. Food, more specifically health food, and massive intake of vitamins, dominates a considerable portion of current practices in self-medication. Modern medicine, drugs, and biologicals, which at their best are among the most impressive contributions of science and technology to human health, are flatly rejected by millions of Americans as not only the wrong way of preventing ill health, but also an expensive and high risk method of regaining it. While much of this outlook represents the views of special interest groups and certain religious doctrines, the nutritional alternative to doctors and drugs is not the "pouring in" of vitamin and mineral formulations, but rather a revitalization of the role of nutrition in medical practice. In any event, the historical "Naturalistic Era", although dominating the period outlined for it above, has always continued to a degree beyond 1750 and is rising again in current "back to nature" movements.]

The Chemico-analytical Era (1750–1900) was marked by discoveries concerning chemical nature of the many nutrients in our foods. The energy content of foodstuffs was determined by calorimetry and much emphasis was placed on the improved methods of analysis. As in physics, for example, one phase of nutrition became preoccupied with more decimal places, whereas, the real excitement was yet to come.

The Biological Era (1900 to the present) represents the greatest stride in the advance of nutrition. While it should have been obvious on theoretical grounds alone that there was more to nutrition than the chemistry of energy yielding foods, the fact that something was missing became apparent as "assembled diets" were fed and "deficiency diseases" were observed. In 1912 C. J. Funk suggested the

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[4] Schneider, Howard A. "What has happened to nutrition?" Perspectives in Biology and Medicine, Spring 1950, p. 279.

word "vitamin" for substances which were unidentified but obviously absent in diets of those with such diseases as scurvy, rickets, beriberi, and pellagra. There followed a revolutionary period in dietary theory and animal experimentation in identification of the vitamins and some of the more common minerals.

In the 1930's there was a burst of vitamin discoveries which appears to have ended in 1948 when vitamin B_{12} was crystallized and prepared for use in the treatment of pernicious anemia. But the term vitamin, perhaps because of its similarity to vitalism or vitality, captured the public's interest and vitamins became a major industry in pharmaceuticals, health foods, food enrichment, and even in cosmetics.

C. Tables Presenting the History of Human Nutrition Research Activities

Who discovered these nutrients and when? Do these early studies include the discovery of the essential trace elements? Is there a more detailed history of the advances in nutrition than the three general periods outlined by Schneider, above? In addition to the massive corpus of today's nutritional orthodoxy developed over the past 70 years, what are some lines of research which are of particular interest to nutritionists now? In order to answer these questions and to give historical and contemporary perspective to this study, the principal advances in nutrition and the discoveries of vitamins and minerals are presented separately in tabular form below. The matter is concluded by a final section which discusses some recent developments in human nutrition and related activities.

TABLE A.—MILESTONES AND CONCEPTUAL DEVELOPMENTS IN THE HISTORY OF HUMAN NUTRITION RESEARCH [1]

Milestone	Date	Period	Conceptual developments
Menghini proved the presence of iron in blood by drying it and removing the iron with a magnet.	1747	1700's	Lavoisier "Father of Nutrition" was responsible for the discovery of oxidation process and the development of calorimetry.
James Lind showed that scurvy (the vitamin C–deficiency disease) could be cured by giving citrus fruits.	1753		Discovery of digestive processes.
Magendie demonstrated for the 1st time that life could not be supported without a source of nitrogen in the food.	1816	1800's	Nutrition knowledge was dominated by William Prouti's classification of the calorie nutrients as "the albuminours, the oily, and the saccherine."
Mulden introduced the word "protein"	1838		
Eijkman produced, for the 1st time in history, a disease of dietary orgin when he induced beriberi in fowl by removing the bran from their rice diet.	1897	1900's	Causative agents of disease could be absence of a factor, rather than presence of etiological agent.
Osborne and Mendel recognized that certain amino acids (lysine and tryptophane) were indispensable, and some proteins were incomplete because they lack essential amino acids.	1911		Identification of different amino acids.
Hopkins, a biochemist who had isolated the amino acid tryptophane in 1906, showed that unknown nutrients in natural foods were essential to life.	1912		
Casimir Funk proposed the term "vitamines" for certain indispensable food factors.	1912		
McCollum & Kennedy reported the finding of a water-soluble B vitamin as the anti-beriberi factor (thiamin, vitamin B–1).	1916		
Mellanby presented the 1st data on the role of a fat-soluble "accessory factor" in the prevention of rickets (vitamin D).	1919	1915–30	Identification of fats and their constituent fatty acids, some of which are essential components of the diet.
McCollum isolated the 2d fat-soluble vitamin from codliver oil (the 1st was vitamin A) and called it vitamin D.	1922		Minerals and trace elements shown to be essential to the diet.

TABLE A.—MILESTONES AND CONCEPTUAL DEVELOPMENTS IN THE HISTORY OF HUMAN NUTRITION RESEARCH [1]—Continued

Milestone	Date Period	Conceptual developments
Goldberger demonstrated that pellagra could be cured by a dietary factor in the nonprotein segment of yeast extract (later shown to be niacin, vitamin B–3).	1926	
Isolation and later synthesis of ascorbic acid—vitamin C.	1928–32	
Burr and Burr identified linoleic acid as the essential fatty acid.	1929	
Kuhn, the chemist responsible for isolating riboflavin, vitamin B–2, synthesized this vitamin.	1935	
Elvehjem, Madden, Strong, and Wooding isolated the "antiblack tongue factor" from liver and identified it as niacinamide (vitamin B–3).	1938	
	1940's	Realization that body constituents (carbohydrates, fat, protein, minerals, vitamins) are in dynamic state and are constantly being replaced.
	1940's and 1950's	Organic chemists, biochemists, and nutritionists attempted to determine the "mechanism of action" of vitamins and minerals. Micronutrients function biologically as components of enzyme systems involved in metabolism.
The antipernicious anemia vitamin (later identified as B–12) was isolated in England and United States simultaneously.	1948	
Keys demonstrated the effects of semi-starvation on man's mental state.	1950	
S. Lepkovsky demonstrated that the central nervous system plays a role in hunger and satiety.	1959	
H. A. Barker discovered the function of vitamin B–12 as a coenzyme.	1959	
	1960's–1970's: New frontiers in nutrition.	(1) Exact relationship of nutrients in the onset and prevention of disease (e.g. cardiovascular disease). (2) Role of trace elements in nutrition. (3) Absorption and utilization of dietary components at the cellular level. (4) Psycho-physiological control of food intake. (5) Improvement in nutrition education to enable man to become self-directed in his food choices.

[1] Table prepared by Drs. Mitchell, Mehlman, and McLaughlin (DHEW) Jan. 27, 1975.

Sources: (1) "Milestones in Nutrition," Goldblith & Joslyn. (2) E. Neige Todhunter, Ph. D., "The Evolution of Nutrition Concepts", JADA, vol. 46, No. 2, February 1965. (3) "Scope Manual on Nutrition", Latham, McGandy, McCann and Stare. (4) Nutrition Today, September–October 1974.

TABLE B.—*Known vitamins and names of principal discoverers*

Vitamin or factor	*Names of principal discoverers*
Vitamin A (''the vision'' vitamin)	McCollum and others identified substance in food fats and oil in 1913–22. Isolation and synthesis by Karrer, Heilbron, and by Holmes and Corbett in 1930–1937.
Vitamin D (anti-rickets)	Hopkins, Mellanby, McCollum and others controlled rickets with diets in 1906–1924. The parent "D" substance was identified by Windaus in 1927.
Vitamin E (Alpha-tocopherol)	Discovered as "anti-sterility" vitamin by Evans and Bishop in 1922. Named Vitamin E by Sure in 1924. The tocopherols isolated and synthesized by Karrer, Bergel, and Smith in 1938.
Vitamin K (prothrombin factor)	Postulated by Dam in 1934 as cause of hemorrhage disease. Isolated in 1939 by Karrer, Dam, and Doisy, Further characterized by Doisy, Almquist, and Feiser in 1939.
Vitamin B_1 (Thiamine)	First curative substance isolated by Funk in 1911. Williams and Kline synthesized thiamine in 1936.

TABLE B.—*Known vitamins and names of principal discoverers*—Continued

Vitamin or factor	*Names of principal discoverers*
Vitamin B_2 (Riboflavin)	Deficiency of B2 ("G") as compared to B1 established by Goldberger and Lillie in 1926. Synthesized by Kuhn and by Karrer in 1935.
Niacin (Nicotinic acid)	Synthesized early by Huber and Weidel in 1867. Presence in coenzyme systems demonstrated by Warburg and Euler in 1935. Use in therapy in dogs and in human pellagra shown by Elvehjem and others in 1938.
Vitamin B_6 (Pyridoxine)	Isolated from other "B" factors by Gyorgy in 1934. Synthesized by Kuhn and others in 1936. Synderman and others established human requirement.
Biotin (anti-"egg white injury" vitamin)	Deficiency effect noted by Bateman in 1916 and by Boaz in 1927. Gyorgy, Hofmann and others announced workers were experimenting with some substance in 1940. du Vigneaud discovered structure of Biotin in 1942.
Pantothenic Acid	Jukes and Woolley proved existence of pantothenic factor in 1939. Synthesized by three different scientific groups in 1940.
Folic Acid (anti-anemia factor)	Snell and Peterson isolated factor in 1940 and Mitchell called a factor from spinach, "folic acid." Angier synthesized the factor in 1943.
Vitamin B_{12} (cobalt vitamin)	Isolated from liver extract simultaneously by scientists in U.S.A. and England in 1948. Structure by Todd and Hodgkin in 1955.
Vitamin C (ascorbic acid)	Isolated by Szent-Gyorgi in 1928. Identified by King and Waugh in 1932. Characterized by many workers in 1933. Named "ascorbic acid" by Szent-Gyorgi in in 1933.

TABLE C.—*Discoveries concerning minerals and trace elements in the diet*

Name of mineral or trace element:	*Names of principal contributor—dates*
Calcium	Architecture of bones and calcium turn over—by John Huntern 200 years ago. In United States 85% of calcium derived from dairy products—Eckelmann, 1958. Protein intake affects calcium—Margen and Calloway, 1967 and others. Requirements of 800 mg per day (adults)—Goldsmith, 1966. Bone loss faster in older women than in men—Garn, 1967. Long periods of high protein intake produces loss of body calcium—Johnson, 1970.
Phosphorus	Intake is adequate in ordinary diets—Hegsted, 1973. In United States daily intake is 1.5 g—Davidson and Passmore, 1970. Cow's milk is different than human milk and the calcium-phosphorus ration is crucial in first week of life—Mezrchi, 1968.
Magnesium	Symptoms of magnesium deficiency—Wacker and Parisi, 1968. Average adult requirement about 300 mg per day—Seelig, 1971. Large oral intake of magnesium not harmful in healthy people—Seelig, 1971.
Sodium	Adult intake of sodium in United States is 6–18 g per day in form of table salt—Dahl, 1958. Since 1970 amount of sodium chloride added to many infant foods has decreased—Filer, 1971. Hypertension cannot be produced in normal men by high salt intake—Brown, Gros, Kirkendall, 1971. Hypertension may be reduced by low salt diet—Corcoran and Dole, 1951. Sodium balance in pregnancy and in salt depletion is regulated by the renin-agiotension-aldosterone system—Pike and Smiciklas, 1972.

TABLE C.—*Discoveries concerning minerals and trace elements in the diet*—Con.

Name of mineral or trace element:	*Names of principal contributor—dates*
Potassium	Healthy adults need about 2.5 g per day—Wilde, 1962. Potassium deficiency syndrome produced by diarrhea, diabetes, or diuretic drugs—well-known.
Chloride	Most important anion in fluid electrolyte balance and for the formation of hydrochloric acid in the gastric juice—Catlove and Hogben, 1962. Daily turnover and loss parallels that of sodium. Diseases requiring restricted salt intake require alternative sources of chloride—well-known.
Iron	Iron is a constituent of hemoglobin, myoglobin, and a number of enzymes—Bothwell and Finch, 1962. Anemia is not a very sensitive criterion of iron depletion, iron stores must be examined—Finch, 1971. 10 mg. of iron per day is required for adult males and post menopausal females—Food and Nutrition Board, 1974. Women of child-bearing age require 18 mg of iron per day; during pregnancy daily supplements of 30–60 mg of iron are recommended—Food and Nutrition Board, 1974. Children and adolescents require about 1 mg of additional iron per day—Moore, 1965. A high incidence of iron deficiency was found in the population surveyed in the National Nutrition Survey, 1972. Heme iron in animal meats is a reliable source of available iron—Monsen, 1972.
Copper	Copper is an essential nutrient for all mammals—Elvehjem, 1935. Copper deficiency diseases described—Underwood, 1971. Copper containing proteins and enzymes identified by Frieden, 1965. Severe copper deficiency is rare in man—Cartwright and Wintrobe, 1964, but occurs in cases of protein-calorie malnutrition in Peru—Cordano, 1968. May also occur in premature infants in United States fed parenterally on modified cow's milk—Al-Rashid and Spangler, 1971.
Iodine	Iodine is an essential micronutrient in man, being an integral part of the thyroid hormone—Underwood, 1971. The endemic "goiter-belt" of the United States has fallen sharply following iodization of table salt, but a few women of child-bearing age are still afflicted with goiter—Matovinovic, 1965. Seafoods are excellent and consistent sources of iodine—Underwood, 1971.
Fluoride	Fluoride is a constituent of all normal diets and is required for maximal resistance to dental caries—Sognnaes, 1965 and Berstein, 1966. Fluorine is an essential trace element for growth—Schwarz, 1971 and Schwarz and Milne, 1972. The range of safety in fluoride intake is wide enough in foods to prevent tooth mottling—Food and Nutrition Board, 1953 and Waldbott, 1963. Fluoridation of water is safe and offers nutritional benefits—AAP, 1972.
Zinc	Zinc is an essential element for plants, animals, and man. It is a constituent of enzymes involved in most major metabolic pathways—Underwood, 1971. Even transient deficiencies during intrauterine or early postnatal development can have permanent effects in animals—Food and Nutrition Board, 1970. Zinc deficiency in wide areas in the soil in the United States has necessitated zinc enrichment of animal feeds—FNB, 1970. Pronounced zinc deficiency in man may result in hypogonadism and dwarfism—Prasad, 1966. There are some marginal states of

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TABLE C.—*Discoveries concerning minerals and trace elements in the diet*—Con.

Name of mineral or trace element:	*Names of principal contributor—dates*
Zinc	zinc nutrition in the United States; increased zinc intake has improved taste acuity and accelerated rates of wound healing—Henkin, 1971 and Pories, 1967. Increased zinc intake in otherwise healthy children in Denver, improved appetite and growth—Hambridge, 1972. In view of data provided by Sandstead, 1967, Schroeder, 1967, Schlage and Wortberg, 1972, Cavell and Widdowson, 1964, White and Gynne, 1971, Richmond, 1962, Engel, 1966, a recommended daily allowance for zinc has been set at 15 mg. for adults, 20 during pregnancy, and 25 during lactation—FNB, 1974.
Chromium	Chromium is required for maintaining normal glucose metabolism in animals and probably acts as a co-factor for insulin—Mertz, 1969. Chromium responsive disturbances in glucose metabolism suggest that marginal deficiency states may exist within the United States—Glinsmann and Mertz, 1966 and Levine, 1968, as well as abroad—Hopkins, 1968, and Gurson and Saner, 1971. Chromium levels in tissue were found to decline with age—Schroeder, 1962. Dietary supplements of chromium-nicotine acid complexes produced maximal growth effects in rats at levels of 16 mg NA per kg. These complexes produced a significant increase in glucose tolerance with only 1 to 10 mg per kg of chromium in the diet. I.V. injection or stomach tubing of a chromium-nicotine acid complex quickly lowered blood glucose—Mertz and Roginski, 1975.

D. RECENT DEVELOPMENTS IN HUMAN NUTRITION AND RELATED ACTIVITIES

It required nutritionists just 42 years (1906 to 1948) to show that numerous specific organic and inorganic substances were indispensable components of a diet for healthy human beings. These substances include the carbohydrates, the essential fatty acids and amino acids, several minerals, and all of the vitamins up to and including vitamin B_{12}. These forty "milestone" discoveries, were not individual achievements, but rather a progressive series of developments. And the progression has continued to the present as new areas of fundamental and applied nutrition open up along the cutting edge of research.

Nutrition as a science appeared to be a distinct and completed discipline 15 years ago. Since that time, however, nutrition has evolved into a multidisciplinary activity involving some 1,500 scientists who may choose to call themselves nutritionists, as well as others who are by profession biochemists, physiologists, physicians, dentists, microbiologists, dietitians, endocrinologists, food technologists, agriculturists, plant and animal geneticists, etc.

The discoveries of the cause and control of infectious disease, together with the achievements of nutrition research are among the principal reasons for improved health and life expectancy in western civilization. The future holds great promise as the growing fields of nutrition research gradually (1) continue to identify new nutrients, (2) determine the optimal dietary requirements of all nutrients, and (3) apply the results of this research to the prevention and treatment of diseases and metabolic disorders.

Foremost among the search for new nutrients are the trace elements. Some of these, such as manganese and zinc, have been studied suffi-

ciently so that recommended daily intakes have been established. Others, such as selenium, fluorine, nickel, tin, silicon, and vanadium are known to be required or may eventually be found to be required by humans. Among the most interesting of the trace elements today is chromium, a part of a "glucose tolerance factor" which appears to be important for normal carbohydrate metabolism. Dr. Mertz, of the Nutrition Institute of the United States Department of Agriculture in Beltsville, for example, has been working on the metabolic role of chromium for nearly twenty years. If his current hypothesis concerning dietary chromium is correct, the management of diabetes may be considerably altered.

Like chromium, other trace elements may be essential in specific ways or may be essential to generally good health and perhaps extend life expectancy. These and other developments have been made possible by the use of new techniques in plastic isolator research animal housing systems and the ability to prepare highly purified experimental diets.

New metabolic roles have been discovered for some of the established nutrients, known for their prevention of deficiency diseases. For example, one biologically active form of vitamin D_3 is now considered to act as a steroid hormone. In this context the vitamin probably interreacts with other hormones from the adrenal cortex and the parathyroid glands in tooth and bone development, as well as in other physiological processes where phosphate and calcium balance are important. The discovery of the vitamin D metabolites has already led to their use in alleviating some of the problems associated with certain diseases of the liver and kidneys. Similarly, new roles have been discovered for vitamin C in metabolic processes involving sulfate, cholesterol, histamine, adipose tissue lipase, and proteins. The pharmacological use of vitamin C in reducing the severity of upper respiratory infections remains controversial; however, should the issue be resolved in favor of high doses of the vitamin for the partial prevention of the discomforting symptoms in the common cold, it would represent the first significant advancement in the management of this disease in many years.

A part of the discovery process in any science depends on the rational development of hypotheses and theories, which may be further examined by the quality of the evidence on which they are based in the first place, or experimentally validated or disproven through epidemiological and laboratory studies. Two such theories are the so-called "fat cell theory" for obesity and the "dietary fiber hypothesis" for the control of certain diseases of the colon and of coronary heart disease. The prevention or treatment of obesity under a concept more sophisticated than that of the mere reduction of specific nutrients or total calories is certainly more attractive than the current array of drugs now in use for this purpose. However, like all diseases with multiple causes, any dietary theory and practice is likely to be only a part of the solution. Currently, nutritionists are joining with neurophysiologists, endocrinologists and behavioral scientists in studies of the regulation of food intake for the control of obesity.

Dietary fiber is perhaps only one of several "non-nutrient" components of natural foods, whose functions in health and disease remain to be vigorously explored. Scientists, primarily in the United Kingdom,

have brought this matter to attention. The large number of diseases for which fiber is promoted as beneficial renders it somewhat suspect; it may be "snake oil," but then again it may not.

There are numerous individual projects as well as national programs to determine the risk factors in coronary heart disease, including blood cholesterol. Projects involving cholesterol and fat in the dietary approach to atherosclerosis are prevalent in the nutritional programs of the Department of Defense, the Veterans Administration and the National Institutes of Health. These long term studies remain attractive not only in the light of past epidemiological studies, but also from observations made on religious vegetarian populations and on populations in nonindustrialized societies with subsistence economies, where low cholesterol levels, low fat diets, and reduced coronary heart disease appear to coexist. However, other explanations for such results are possible, and much research remains to be done before full scale dietary intervention could be undertaken as a national public health policy.

Although the results are not yet final, there is a considerable amount of nutritional research on the effect of nutrition and malnutrition on growth and development, the nutritional needs of pregnant women, the interactions of nutrients with each other, the effect of oral contraceptives on nutrient requirements, the role of nutrition in aging, eye disease, cancer, mental illness, alcoholism, etc. There is also a large research interest in nutritional treatment of inborn metabolic errors and malabsorption syndromes. Among the latter is the problem of the bioavailability of iron. This seemingly global problem appears on the verge of solution by ongoing studies in the Department of Agriculture, NIH, FDA, in Japan, and elsewhere.

Some nutritionists feel that the "discovery" period of nutrition, like early descriptive biology, has largely ended. Others view present knowledge as inadequate not only to formulate ideal diets but also to determine nutrient requirements for various age groups and conditions. Still others believe that nutrition is a relatively young science yet to be developed as a full scale discipline with an effective place in medical education, medical practice, the food industry, and public dietary habits. In the latter case, little methodology exists to effectively modify the diet of large population groups in either the developing or developed countries. The so-called food faddists are apparently more successful in gaining acceptance of their ideas than are the professional nutritionists. Dr. Willis Gortner, of the USDA Agricultural Research Service, commenting on this anomaly believes it will continue until nutritionists are able to add substantially to existing data. At the going rate of research he predicts that it will be the year 2100 before the blanks can be even partially filled.

While this type of gap-filling research progresses, basic research in the biochemistry of the water- and fat-soluble vitamins is underway to determine (1) the effects of adequate vitamins on animal tissues and (2) the various symptoms and pathologic changes in tissues which result from vitamin deficiencies.

The need to determine the nutrient status of populations in both affluent and developing countries is critical. More reliable and simpler tests are now required. While it may be an insurmountable task to develop "easy" definitions and methods for this purpose, especially

for marginal nutritional intakes, the present array of biochemical and clinical measures is unsatisfactory for a world which must base its food assistance programs on facts rather than demands. Since most nutritionists know as much, if not more, about malnutrition than they do about normal optimal nutrition, it can be expected that they will soon develop or recommend a small battery of simple tests which will determine nutritional status before irreversible malnutritional damage has already been done.

Research in human nutrition, as in biochemical research generally, has reached the point of difficult solutions, both because of the complexity of the problems now under study and because of the difficulties imposed by the almost insuperable variables in the human environment. Nevertheless, it is the goal of nutrition research to obtain sufficient knowledge so that it will be possible to manipulate the nutritional environment toward improvement of human health and longevity. The advancement of knowledge towards this goal would appear to require more funds than are presently available to the fused disciplines which now make up the nutrition research enterprise, together with a somewhat greater degree of coordination within and among the agencies supporting major activities in nutrition. Also important is a system of research and training grants and incentives within the discipline itself which will stimulate young scientists and physicians to pursue careers in basic and clinical nutrition.

It is obviously slanted or at least incomplete to discuss the recent advances and new areas of research in nutrition, without also mentioning some important developments affecting food and production. Only a few of these advances will be highlighted here.

Integrated experiments on corn culture beginning in 1944 brought scientific knowlege together from several fields resuting in increased corn yields from 20 to over 70 bushels per acre.

Beginning in 1950, American scientists, largely those in USDA were able to improve the preservation of foods by dehydration and assisted industry in the development of more concentrated frozen products. Dehydrated foods, incidentally, are not restricted to the interests of the Armed Services and "back-packers". For example, about 12 million bushels of potatoes are marketed yearly under USDA licenses issued to 19 manufacturers of dehydrated mashed potatoes—a fairly popular standard consumer food staple.

Food productivity is obviously increased by the elimination or control of plant and animal disease. One of the most innovative approaches to this problem was the eradication of the screwworm in the Southeastern United States in 1959 by means of radiation-sterilized flies. The basic idea and scientific work was that of Dr. Edward F. Knipling of USDA.

A series of high-yielding, disease-resistant plants emerged from research performed over several years by the cooperation of Federal and State agriculture departments with the Rockefeller Foundation. The achievements climaxed in the award of the Nobel Peace Prize to Dr. Norman E. Borlaug in 1970 for his pioneering work in what has been called the "Green Revolution." All told, food availability was enhanced in hard red winter wheat, a nematode resistance potato, high-yield hybrid barley, and Japanese-United States wheat hybrids

yielding over 200 bushels per acre. High output varieties of wheat and rice were particularly adaptable to India, Pakistan. Tunisia, and other countries periodically threatened by famine.

Finally, it should never be overlooked that technological capabilities in one area of the scientific enterprise may bring success and application in another. While the discovery of penicillin was distinctly the work of Fleming, Chain, and Florey in England, it was a U.S. Agriculture Regional Research Laboratory, during World War II, which developed a nutrient from cornsteep liquor and lactose for the mass culture of the antibiotic. The problem was not altogether alien to nutrition; it was simply a matter of finding the proper nutrients for the growth of a mold instead of our more customary goal of optimal nutrients for the growth of human beings.

III. MAJOR HUMAN NUTRITION RESEARCH PROGRAMS OF THE FEDERAL GOVERNMENT

A. Background

This section concentrates on the nature and extent of federally supported human nutrition research activities. Although there is undoubtedly some research in nutrition in most of the Federal agencies, it was decided to emphasize in this study only those agencies which have substantial programs in these fields of research. Prior project reviews of work in nutrition indicated that the Federal agencies conducting the bulk of human nutrition research in the United States are the Department of Agriculture, the Department of Defense, the Department of Health, Education and Welfare, and the Veterans Administration. Therefore, information presented in this report will relate directly to these departments.

The definitions of nutrition as a science are surprisingly numerous and its status as a discrete discipline is equally confusing because of dynamics within the profession itself. The tasks then, in this study were (1) to unravel or combine the various views of eminent nutritionists, (2) to develop a method of data collection, and (3) to design a classification of human nutrition projects suitable to this study. The purpose of this classification was to arrange the data by subject areas based on most of the objectives of experimenters in nutrition and at the same time to avoid certain related activities which, in the past, have lead to excessive estimates of the support of nutrition research in the United States. This proved to be extremely difficult as the number of data sheets mounted into the thousands, and judgments already subjective were further strained in order to classify research areas not originally encountered.

Nevertheless, it was necessary that a philosophy and system of human nutrition research categories be adopted from the outset regardless of the extent of "add-ons" which might emerge from unanticipated program content or new initiatives within the agencies. The basic philosophy, alluded to above, is unique to this study and consists essentially of structuring human nutrition research activities around the concept of the "individual". As will be noted in each of the tables of study, the research units, projects, or programs were included in one of the five following categories:

(*a*) *What's needed.*—optimum normal human nutrition requirements; nutrient function and metabolism; malnutrition (deficiency or excess); neuroendocrine-nutrient interactions, fundamental intermediary metabolism involving the role of one or more nutrients.

(*b*) *What's available.*—composition of foods; food cost plans, nutrient analysis of foods (old and new methods); National Nutrient Data Bank (NNDB).

(c) *What's consumed.*—dietary or food consumption surveys; current dietary practices or habits; nutritional surveillance and status; nutritional education.

(d) *What's applied.*—nutrition and disease or clinical nutrition; dietary therapy; effect of disease on nutrition; environmental toxicants; alcohol and nutrition; nutrition and cancer; nutrition and vision research; etc.

(e) *What's not utilized.*—malabsorption syndromes; inborn errors of metabolism; familial or inherited nutritional defects.

The tables reflect this classification and are subject to three sources of error:

(1) The limitations of the computer registries or the manner in which they were interrogated.

(2) The possible errors introduced by "forcing", so to speak, research into one of the five categories, and

(3) Errors in scientific judgment made during the "best fit" of research into one of the five categories, or eliminating them altogether.

Although program information is provided in this report from personal interviews, letters, telephone conversations, papers submitted by the agencies, and some documentation from the public record, there is a heavy reliance on the data registered in computer information retrieval systems. The justification for this approach lies in the fact that the Federal agencies are known to have achieved a high degree of completeness in such project banking systems over the past many years and rely on them for record keeping and for other purposes. Also the information from such systems reflects the general content of research and details of support which most directors of large laboratories or research institutes make no pretense of remembering. Indeed, except for prolonged examination of the records of program chiefs in nutrition and lengthy interviews with scores of nutritionists and other scientists in the Federal agencies, there is no other practical way of determining the nature, extent, and expenditures for federally supported nutrition research activities. The direct "man-to-man" approach as the sole means of obtaining information on nutrition research activities was considered impractical for a study whose purpose was largely scientific, rather than "investigational."

Insofar as it was possible to collect, classify, and tabulate readily available data, this section presents information sufficiently standardized to allow a broad comparison of the size, scope, cost, and purpose of the human nutrition research activities supported by the major Federal agencies involved in these fields.

B. The Department of Agriculture (USDA)

(1) overview

The Department of Agriculture and the State agricultural experiment stations were the first scientific organizations in the United States to establish a program of research and human nutrition, and to make the results of this work available to the people for better living.

The first appropriation by the Congress to a Federal agency specifically for studies in human nutrition was made to the Department in 1893.[1]

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[1] U.S. Department of Agriculture. Agricultural Research Service. Proposed Program for Expanded Research in Food and Nutrition. Washington, U.S. Government Printing Office, 1963. p. 1. (Published as Senate Document No. 35, 88th Congress, 1st session).

Legislative authority for nutrition research within USDA was originally derived from the general mission delegated by the Congress when the Department was established on May 15, 1862 (7 U.S.C. 22201): "to acquire and to diffuse among the people of the United States useful information on subjects connected with agriculture in the most general and comprehensive sense of those terms . . ."

Later, the Research and Marketing Act of 1946 (7 U.S.C. 427) clarified this general mission, provided specific legislative authority, and directed the Secretary USDA:

> to conduct and to stimulate research into the laws and principles underlying the basic problems of agriculture in its broadest aspects, including but not limited to . . . research into the problems of human nutrition and the nutritive value of agricultural commodities, with particular reference to their content of vitamins, minerals, amino and fatty acids, and all other constituents that may be found necessary for the health of the consumer and to the gains or losses in nutritive value that may take place at any stage in their production, distribution, processing, and preparation by the consumer . . . Including such investigations as have for their purpose . . . the maximum contribution by agriculture to the welfare of the consumer.[2]

In light of its mission as stipulated in the above legislation, USDA has evolved a strict view of its mandate regarding human nutrition research:

> U.S. Department of Agriculture research on human nutrition (conducted in the Agricultural Research Service and in the State Agricultural Experiment Stations) strives to increase understanding of what foods are needed and in what amounts and combinations they can make the greatest contribution to normal healthy people. The research is chiefly in three broad areas—nutrition, food, science, and food consumption.
>
> If the public is to benefit from this research, USDA must interpret its results in terms of the practical problems of the family food manager, the individual consumer, teacher, or Extension worker, or the Government agency formulating a national or international food program.[3]

USDA views its research on human nutrition to be concerned with (1) optimum nutrient requirements for healthy individuals, (2) nutrient composition of foods, and (3) nutrient intake, that is, food habits and food consumption, of the American population. USDA also recognizes its charge to diffuse the results of this research to the consumer, the professional and teaching communities, and to other Federal agencies. The method most frequently employed by USDA to disseminate information on nutrition is the publication of various guides, reports, menu plans, surveys, etc.

It should be noted that USDA has published at least two comprehensive reports on human nutrition research in the United States.[4] In addition, the Department supported a series of reports on Federal human nutrition activities, including research, in 1945, 1948, 1952, 1954, and 1960.[5] Later, in 1963, USDA's Agricultural Research Service prepared a Report to Congress which outlined a proposed

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[2] U.S. Congress. House. Committee on Appropriations. Agriculture—Environmental and Consumer Protection Appropriations for 1975. Part 4, Agricultural Program. Hearings, 93d Congress, 2d Session. Washington, U.S. Government Printing Office, 1974. p. 796.

[3] U.S. Department of Agriculture. Food For Us All, the Yearbook of Agriculture, 1969. Washington, U.S. Government Printing Office, 1969. p. 324.

[4] U.S. Department of Agriculture. An Evaluation of Research in the United States on Human Nutrition. Report No. 1, A survey of research on human nutrition supported and/or conducted by public research organizations. (Compiled by) Walter L. Fishel, C. Edith Weir, and Hazel M. Fox. Washington, U.S. Department of Agriculture, 1971. 123 p.

———. An Evaluation of Research in the United States on Human Nutrition. Report No. 2, Benefits from nutrition research. (Compiled by) C. Edith Weir. Washington, U.S. Department of Agriculture, 1971, 129 p.

[5] Agricultural Research Service. Food and Nutrition Services of Federal and Quasi-Official Agencies of the United States. Washington, U.S. Department of Agriculture, 1960. 45 p.

program for research in food and nutrition.[6] Since 1966, and after the close of each subsequent fiscal year, the Cooperative State Research Service has compiled and issued an *Inventory of Agricultural Research* which includes support and manyear data from USDA agencies on human nutrition research in two "research problem areas (RPA)": (1) RPA 703, Food Choices, Habits, and Consumption, and (2) RPA 708, Human Nutrition.[7]

In 1975, USDA supports human nutrition research through the Agricultural Research Service (ARS) and the Cooperative State Research Service (CSRS). Activities related to this research, such as the creation, publication, and distribution of reports, are performed by the Extension Service (ES) and the Economics Research Service (ERS). Figure I below presents the organizational structure of the USDA, and highlights those branches of the Department which primarily support and perform human nutrition research.

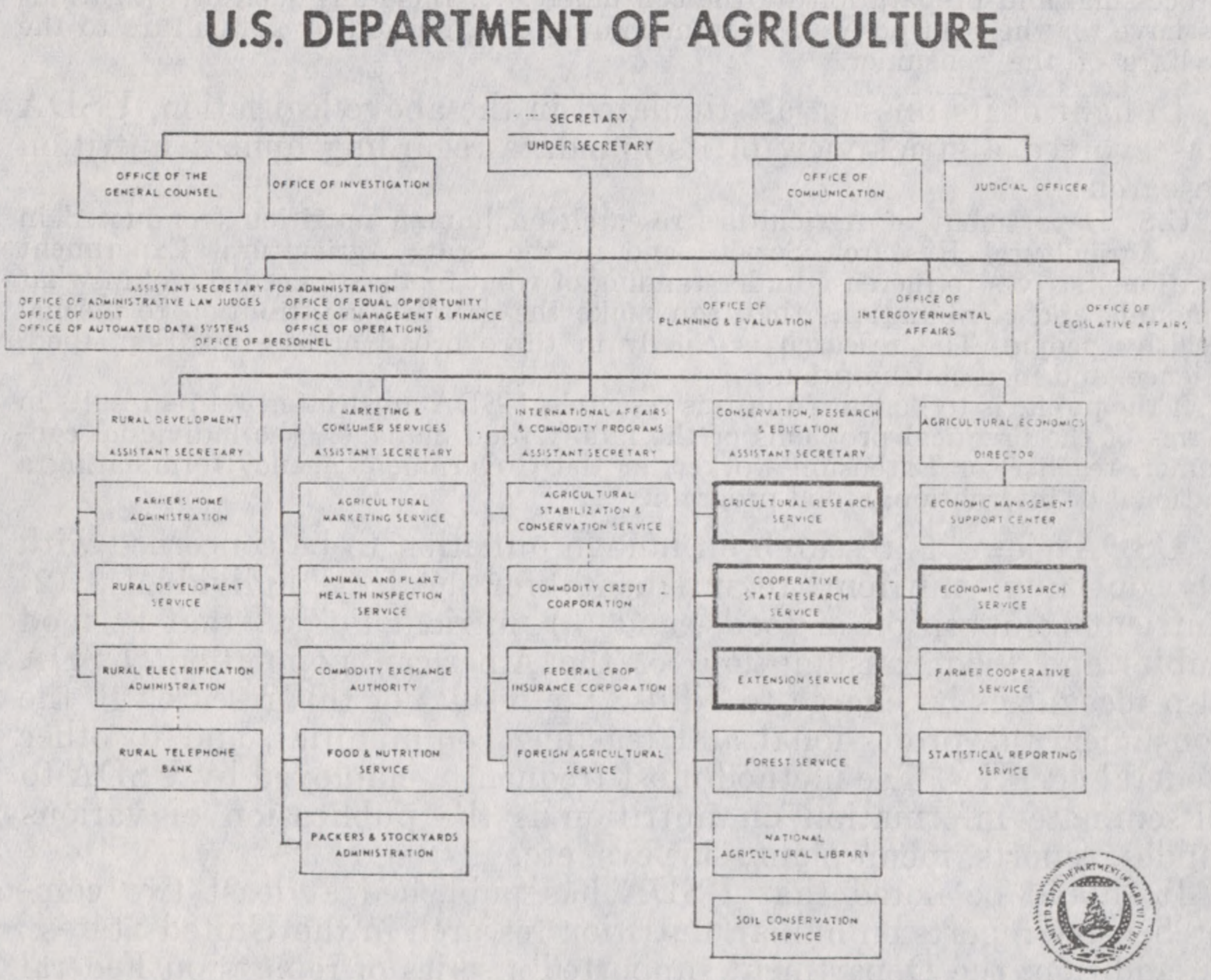


FIGURE 1.—ORGANIZATION.

(a) *Human nutrition research supported by the Department of Agriculture, fiscal year 1974.*—Table I which follows presents a breakdown of the number of projects, scientist man-years, and levels of funding

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[6] Agricultural Research Service. Proposed Program For Research In Food And Nutrition. A Report to Congress. Washington, U.S. Government Printing Office, 1963, 26 p. (Published as Senate Document No. 35, 88th Congress, 1st session.) The proposed plan went largely unnoticed.

[7] Cooperative State Research Service. Inventory of Agricultural Research, 3 Vols. Washington, U.S. Department of Agriculture, 1974, 1975.

for human nuturition research supported by USDA in FY 1974. Data in this table were derived from over 350 project sheets in the form of annotated summaries which were yielded via an inquiry of the USDA Current Research Information System (CRIS). Funding levels for FY 1974 are employed in this table because the CRIS system does not contain data on FY 1975 projects until 6 to 8 months after the close of that fiscal year. Since the funding mechanisms vary with each awarding organization within USDA, a summary of these mechanisms is provided below: [8]

USDA appropriation means funds derived from regular Federal appropriations, including those funds administered by the Cooperative State Research Service. These funds can include: (1) Regular contracts, grants, and agreements with State Agricultural Experiment Stations (SAES), and with "others" (not specified); and (2) Special inhouse funds for the Agricultural Research Service.

CSRS administered means funds derived from regular Federal appropriations and only made available by the Cooperative State Research Service to State Agricultural Experiment Stations, Forestry Schools, and Other Cooperating Institutions.

Other Federal means funds which USDA derives from contracts, grants, and cooperative agreements with Federal agencies including:

1. Agency for International Development (AID).
2. Department of Defense (DOD).
3. Energy Research and Development Administration (ERDA).
4. National Aeronautics and Space Administration (NASA).
5. National Institutes of Health (NIH).
6. National Science Foundation (NSF).
7. Other Department of Health, Education, and Welfare (DHEW).
8. Public Health Service (PHS).
9. Tennessee Valley Authority (TVA).

It should be noted that the CRIS system does not provide on its annotated summaries an indication of which "Other Federal" agency, if any, is supporting an individual project in addition to specific USDA support.

Non-Federal means funds derived by USDA from inhouse trusts; from trusts, contracts, and agreements with State Agricultural Experiment Stations; from trusts, contracts, and agreements with others (not specified); from State appropriations; from sale of products; from industry grants and agreements; and from others (not specified).

Scientist man-years means equivalent years for Federal scientists grade 11 or above, and for all other research workers with a rank of assistant professor or above. This term excludes work performed by graduate students, research administrators, and other professional, technical, clerical and/or labor support.

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[8] Cooperative State Research Service. Inventory of Agricultural Research, Volume I, Data by Research Problem Areas, FY 1973. Washington, U.S. Department of Agriculture, 1974. p. vi-x. Further explanation and clarification provided in personal communications with Dr. Elizabeth Y. Davis, Coordinator for Home Economics Research, CSRS, and Mr. Raymond Peters, Budget Analyst, Budget Development Branch, Budget and Finance Division, ARS.

TABLE I.—HUMAN NUTRITION RESEARCH SUPPORTED BY THE DEPARTMENT OF AGRICULTURE, FISCAL YEAR 1974 [1]

[Number of projects within parentheses are those projects receiving support from other Federal and non-Federal sources in addition to their support received from USDA]

Awarding organization	Nutrition requirements [2]		Food composition [3]		Dietary surveys and status [4]		Disease and diet [5]		Metabolic defects [6]		Total by category	
	Number projects	Funds	Number projects	Funds	Number projects	Funds	Number projects	Funds	Number projects	Funds	Number projects	Funds
I. Agricultural Research Service (ARS):												
(A) ARS extramural:												
USDA appropriations	7	$240,406	3	$99,733	3	$534,300	1	$45,497			14	919,936
Scientist man-years	4.8		1.6		5.2		.4				12	
(B) ARS intramural:												
USDA appropriations	28	3,907,901	8	1,082,359	6	394,522	5	452,402			47	5,837,184
Other Federal	(5)	9,905	(1)	50,010			(1)	1,480			(7)	61,395
Intramural subtotal	28(5)	3,917,806	8(1)	1,132,369	6	394,522	5(1)	453,882			47(7)	5,898,579
Scientist man-years	40.3		21.4		8.2		5.9				75.8	
(C) ARS subtotals:												
USDA appropriations	35	4,148,307	11	1,182,092	9	928,822	6	497,899			61	6,757,120
Other Federal	(5)	9,905	(1)	50,010			(1)	1,480			(7)	61,395
ARS subtotal	35(5)	4,158,212	11(1)	1,232,102	9	928,822	6(1)	499,379			61(7)	6,818,515
Scientist man-years	45.1		23.0		13.4		6.3				87.8	
II. Cooperative State Research Service (CSRS):												
CSRS administered	62	557,979	11	140,117	115	1,600,743	9	201,461	1	1,565	198	2,501,865
Other Federal	2(7)	135,841	1(3)	29,787	(11)	74,859	(1)	33,132			3(22)	273,619
Non-Federal	(59)	936,646	(9)	118,736	(73)	513,474	(4)	47,994			(145)	1,616,850
CSRS subtotal	64(66)	1,630,466	12(12)	288,640	115(84)	2,189,076	9(5)	282,587	1	1,565	201(167)	4,392,334
Scientist man-years	24.0		5.1		40.0		6.3		.1		75.5	

III. Economic Research Service (ERS) (intramural):												
USDA appropriations					4	453,472					4	453,472
Other Federal					(1)	72,100					(1)	72,100
Non-Federal					(1)	1,195					(1)	1,195
ERS subtotal					4(2)	526,767					4(2)	526,767
Scientist man-years					11.6						11.6	
IV. Totals:												
USDA appropriations	97	4,706,286	22	1,322,209	128	2,983,037	15	699,360	1	1,565	263	9,712,457
Other Federal	2(12)	145,746	1(4)	79,797	(12)	146,959	(2)	34,612	0	0	3(30)	407,114
Non-Federal	(59)	936,646	(9)	118,736	(74)	514,669	(4)	47,994	0	0	(146)	1,618,045
Total	99(71)	5,788,678	23(13)	1,520,742	128(86)	3,644,665	15(6)	781,966	1	1,565	266(176)	11,737,616
Total scientist man-years	69.1		28.1		65.0		12.6		.1		174.9	

[1] Information provided by Mr. John R. Myers, director, Current Research Information System (CRIS), Cooperative State Research Service (CSRS), USDA, Apr. 29, 1975. Approximately 350 data sheets on nutrition projects sponsored by USDA were obtained as CRIS annotated summaries. After Classification by category, selected data sheets were forwarded to Dr. Elizabeth Y. Davis, coordinator for home economics research, CSRS, USDA, and Mr. Raymond Peters, budget analyst, budget development branch, budget and finance division, Agricultural Research Service, USDA, for clarification of funding levels and years of support. Data were then tabulated.

[2] What's needed: Optimum, normal human nutrition requirements, nutrient function and metabolism, malnutrition (nutrient deficiency or excess), nueroendocrine-nutrient interreactions, fundamental intermediary metabolism involving the role of one or more nutrients.

[3] What's available: Composition of foods, food cost plans, nutrient analysis of foods (old as well as new methods), National Nutrient Data Bank (NNDB).

[4] What's consumed: Dietary or food consumption surveys, current dietary practice or habits, nutritional surveillance and status, nutrition education.

[5] What's applied: Disease or clinical nutrition, dietary therapy, effect of disease on nutrition, environmental toxicants, alcohol and nutrition, nutrition and cancer, nutrition and vision research, etc.

[6] What's not utilized: Malabsorption syndromes, inborn errors of metabolism, famltair or inherited nutritional defects.

Note: Funds provided for research by USDA are found only in the "USDA appropriations" and "CSRS administered" funding mechanisms. "CSRS administered" funds are USDA appropriations, and applies only to Federal funds made available by CSRS to State agricultural experiment stations, forestry schools, and other cooperating institutions. "Other Federal" and "non-Federal" funds have been included to show the levels of support from other sources which USDA sponsored projects are receiving.

(*b*) *Discussion and comments—Table I.*—Although Table I provides funding figures on three levels, namely USDA Appropriations, Other Federal, and Non-Federal, it is important to emphasize that only USDA Appropriations (and therefore also CSRS Administered funds) represent actual support derived from the budget of this Department during FY 1974 for human nutrition research.

While it is possible to make certain specific comments from the data in Table I, only general observations are presented in this discussion. In the sections to follow, each awarding organization within USDA is discussed in detail.

Within USDA, human nutrition research projects concentrate on the areas of nutrient requirements (48 percent), food composition (15 percent), and dietary surveys and status (30 percent). While CSRS supports the largest number of projects (75 percent), ARS commands the lion's share of research support (68 percent) and scientist man-years (50 percent). Each awarding organization also appears to selectively support a certain category of research: ARS allocates over 61 percent of its human nutrition research support to the study of nutrient requirements; CSRS diverts over 63 percent of its human nutrition research funds into research on dietary surveys and status; 100 percent of the projects reported by ERS are also related to the study of dietary surveys and status.

The numbers of scientist man-years invested in human nutrition research during FY 1974 also vary considerably among the awarding organizations. For example, 61 ARS projects required the investment of approximately 50 percent of USDA scientist man-years, while CSRS, supporting 198 projects, needed 43 percent of the total estimated USDA manpower devoted to human nutrition research.

The nearest "standard" by which to measure the accuracy of the data in Table I is the information contained in the most recent CSRS *Inventory of Agricultural Research, Fiscal Year 1974.*[9] Figures have been rearranged from this publication and are reproduced below:

TABLE IA.—USDA SCIENTIST MAN-YEARS AND AMOUNTS OF FUNDS BY PERFORMING ORGANIZATION AND BY RESEARCH PROBLEM AREA, FISCAL YEAR 1974[1]

Performing organization	RPA 703—Food consumption habits	RPA 708—Human nutrition	Total
Agricultural Research Service:			
Projects	6	50	56
Scientist man-years	8.7	77.3	86.0
USDA appropriation	$413,147	$6,001,969	$6,415,116
Subtotal, ARS (gross)	$413,147	$6,064,845	$6,477,992
Cooperative State Research Service:[2]			
Projects	4	12	16
Scientist man-years	0	0	0
USDA appropriation/CSRS administered	$183,051	$1,942,729	$2,125,780
Subtotal, CSRS (gross)	$183,051	$1,942,729	$2,125,780
Economic Research Service:			
Projects	4	0	4
Scientist man-years	11.6	0	11.6
USDA appropriation	$453,472	0	$453,472
Subtotal, ERS (gross)	$526,767	0	$526,767
USDA total:			
Projects	14	62	76
Scientist man-years	20.3	77.3	97.6
USDA appropriation	$1,049,669	$7,944,698	$8,994,367
Total, USDA (gross)	$1,122,964	$8,007,574	$9,130,538

[1] Inventory of Agricultural Research, Fiscal Year 1974, vol. I, table I–B. p. 433, 438–39.
[2] Numbers for CSRS do not include subtotals for State agricultural experiment stations (SAES), forestry schools, or other cooperating institutions as the "Inventory" does not include these numbers under the CSRS subtotal. Federal support of the SAES, etc., approximated $1,100,000 in fiscal year 1974. CSRS funds listed here are special grants.

[9] Data on human nutrition research projects supported by USDA in FY 1975 will not be available until after November 1975. At the time of this study (April–September 1975) the CRIS staff had yet to input any FY 1975 data which could be retrieved from the system.

A few major differences exist between the data in Table I and Table IA for CSRS and ARS. For CSRS, the number of projects in Table I are more than twelve-fold the number in Table IA; the funding levels on Table I, especially in the areas of dietary assessment ("Food Composition", and "Dietary Surveys and Status"), represent a difference of over $1.5 million from Table IA data; on Table I, 75.5 scientists man-years are recorded for CSRS projects, while on Table IA scientist man-years for CSRS projects are noted at zero. For ARS, Table I data include a larger number of projects with funding and scientist man-years slightly greater than that reported on Table IA. For ERS both tables agree.

The dissimilarities that are exhibited between the FY 1974 data in Table I and the FY 1974 data in Table IA may represent differences in input and retrieval from the CRIS system. However, each research scientist or his administrator writes and classifies according to one or more Research Problem Area number (RPA) his own CRIS project summary; these discrepancies, therefore, may also reflect the multiple assignment of projects and their funds to many RPA's prior to transmitting data to the Federal Government, namely to CRIS. In this instance, the *Inventory* data (Table IA) would separate relative amounts of funding for each reported RPA, while a summary of data from individual CRIS project sheets (Table I) would attribute all funds reported for an individual project to a single RPA. Numbers of projects reported in the *Inventory* for CSRS may actually represent numbers of special grant programs at the 16 Land-Grant Colleges of 1890, and not the actual numbers of projects within these programs.

Whatever the underlying reasons for these differences, the FY 1974 data compiled in Table I for this study appears accurate enough to outline the present scope and areas of emphasis for human nutrition research programs within the Department of Agriculture.

(2) AGRICULTURAL RESEARCH SERVICE (ARS)

The Agricultural Research Service was established by the Secretary of Agriculture on November 2, 1953, under the authority of the Reorganization Act of 1949 (5 U.S.C. 133z–15), Reorganization Plan No. 2 of 1953, and other authorities.

The Service is responsible for conducting basic, applied, and developmental research on:

Animal production.
Plant production.
Use and improvement of soil, water, and air.
Marketing, use, and effects of agricultural products.

The research applies to a wide range of goals; commodities; natural resources; fields of science; and geographic, climatic, and environmental conditions. It is categorized into approximately 300 research activities.[10]

The administrative and regional structures of the Agricultural Research Service (ARS) are presented in Figure 2 and Figure 3, respectively. These figures reflect the changes in administrative responsibility for agricultural research, including human nutrition research, due to the reorganization of ARS, effective July 1, 1972. In this reorganization, USDA–ARS national headquarters were decentralized into (1) the National Program Staff which assumed research planning responsibilities, and (2) four Regional Headquarters

[10] U.S. Congress. House. Committee on Appropriations. Agriculture and Related Agencies Appropriations for 1976. Part 2, Agricultural Program. Hearings, 94th Congress, 1st session. Washington, U.S. Government Printing Office, 1975. p. 269.

which were delegated responsibilities to manage research programs within the region. Each region was further subdivided to include Area Offices and Research Locations which were held responsible for performing research and for reporting research results to the Regional Headquarters.

No central listing of research facilities is maintained by USDA or ARS.[11] Consequently, no central *official* listing of locations and/or chief administrators exists for human nutrition research activities within ARS. However, Figure 4 is offered as an initial outline of site-locations and program directors for human nutrition research activities within ARS:

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[11] See: A report to the Committee on Appropriations, U.S. House of Representatives, On Research Activities of the Agricultural Research Service, USDA, by the Surveys and Investigations Staff, House Appropriations Committee, Ibid., p. 359.

UNITED STATES DEPARTMENT OF AGRICULTURE

AGRICULTURAL RESEARCH SERVICE

October 23, 1974

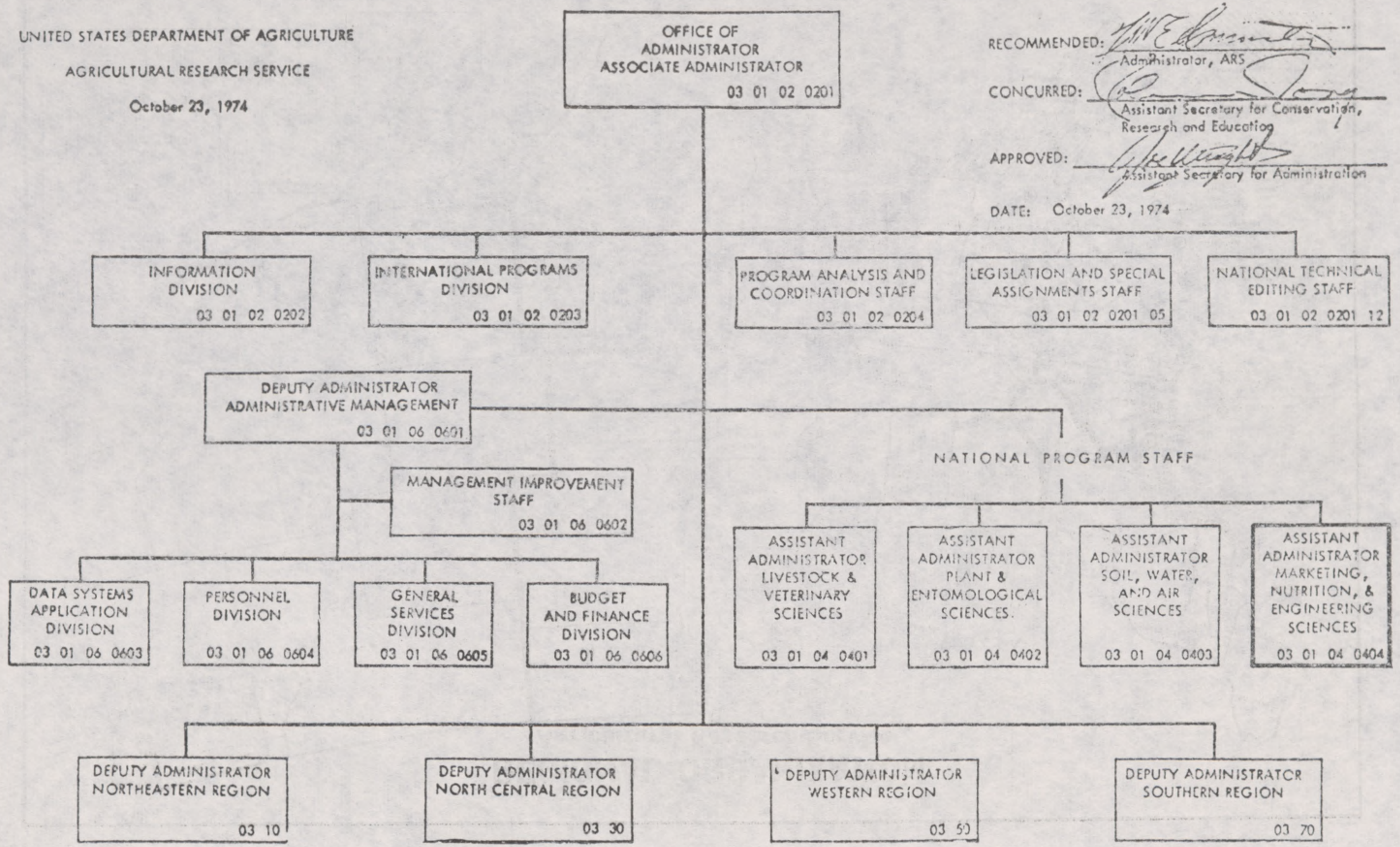


FIGURE 2.—Administrative structure, Agricultural Research Service.

67-532—76——4

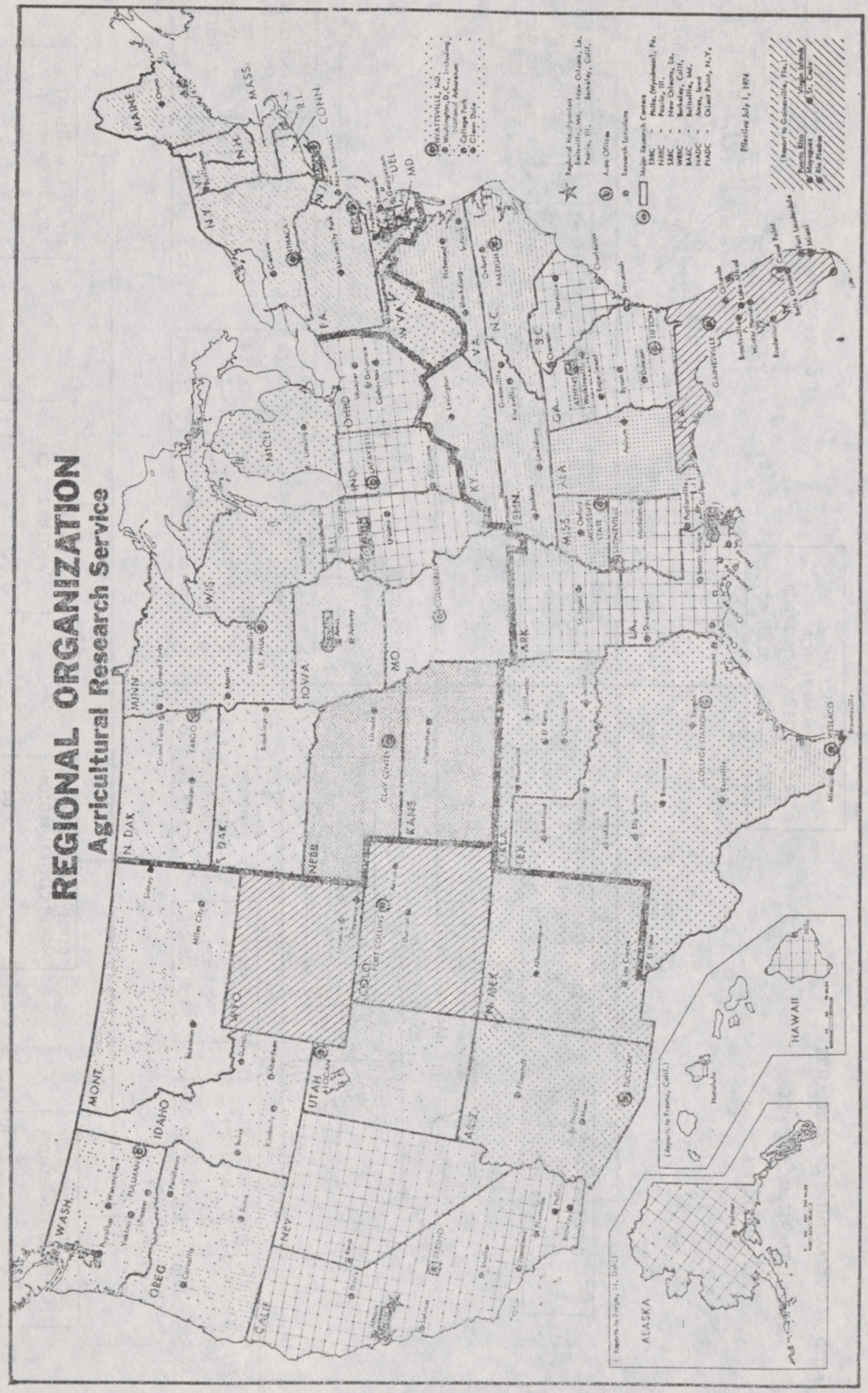

REGIONAL ORGANIZATION
Agricultural Research Service
Effective July 1, 1974
Regional Headquarters
Beltsville, Md. - New Orleans, La.
Peoria, Ill. - Berkeley, Calif.
Area Offices
Research Locations
Major Research Centers
ERRC - Philo, (Wyndmoor), Pa.
NRRC - Peoria, Ill.
SRRC - New Orleans, La.
WRRC - Berkeley, Calif.
BARC - Beltsville, Md.
NADC - Ames, Iowa
PIADC - Orient Point, N.Y.
(Reports to Gainesville, Fla.)
Puerto Rico
Mayaguez
Rio Piedras
Virgin Islands
St. Croix
MAINE
MASS.
R.I.
CONN.
DEL.
MD.
N.H.
VT.
N.Y.
PA.
OHIO
MICH.
IND.
ILL.
WIS.
MINN
IOWA
MO.
KY.
TENN.
MISS.
ALA.
GA.
S.C.
N.C.
VA.
W.VA.
ARK.
LA.
OKLA.
TEX.
KANS.
NEBR.
N. DAK.
S. DAK.
COLO.
WYO.
MONT.
IDAHO
UTAH
NEV.
ARIZ.
N. MEX.
CALIF.
OREG.
WASH.
HYATTSVILLE, Md.
Washington, D.C., including, National Arboretum
College Park
Glenn Dale
ITHACA
Geneva
University Park
Frederick
Richmond
Blacksburg
Sydnia
Oxford
RALEIGH
Charleston
Florence
Athens
Watkinsville
Experiment
Byron
Tifton
Dawson
Orlando
Lake Alfred
Winter Haven
Brooksville
Gainesville
Fort Lauderdale
Miami
Coral Point
Belle Glade
Auburn
Jackson
Lexington
Lansing
Madison
Urbana
Columbia
Lincoln
Manhattan
Woodward
El Reno
Chickasha
Stillwater
Bushland
Big Spring
Brownwood
Temple
COLLEGE STATION
Knoxville
Fayetteville
Monticello
Pine Bluff
Baton Rouge
Lafayette
Shreveport
Natchez
Meridian
Oxford
MISSISSIPPI STATE
STONEVILLE
Agricultural Research Service
Regional Headquarters
Area Offices
Research Locations
Major Research Centers
Reports to Fargo, N. Dak.
Reports to Fresno, Calif.
Reports to Fargo, N. Dak.
HAWAII
ALASKA
Honolulu
Palmer
Hilo
Sidney
Miles City
Bozeman
Dubois
Aberdeen
Kimberly
Burley
Pullman
Wenatchee
Yakima
Pasco
Pendleton
Burns
Corvallis
Reno
Davis
Salinas
Fresno
Shafter
Parlier
Brawley
Indio
Phoenix
Mesa
Florence
Tucson
Los Cruces
Albuquerque
Fort Collins
Akron
Cheyenne
Logan
Ogden
Alberton
Grand Forks
E. Grand Forks
Fargo
Morris
Minneapolis
St. Paul
Brookings
Lincoln
Manhattan
Clay Center
Columbia
Fort Collins
Akron
Cheyenne
Logan
Ogden
Alberton
Bozeman
Dubois
Burley
Kimberly
Pullman
Wenatchee
Yakima
Pasco
Pendleton
Burns
Corvallis
Reno
Davis
Salinas
Fresno
Shafter
Parlier
Brawley
Indio
Phoenix
Mesa
Florence
Tucson
Los Cruces
Albuquerque

FIGURE 3

FIGURE 4.—Locations and program directors, human nutrition research, Agricultural Research Service, 1975–76 [12]

I. NATIONAL PROGRAM STAFF (Washington, D.C.).
  A. Marketing, Nutrition, & Engineering Sciences, Assistant Director: Dr. Michael J. Pallansch.
    1. Human Nutrition & Family Living, Chief Scientist: Dr. Willis A. Gortner.
II. REGIONAL STAFFS.
  A. Northeast Region.
    1. Beltsville Agriculture Research Center (Beltsville, Md.).
      a. Nutrition Institute, Chairman: Dr. Walter Mertz.
        i. Human Nutrition Laboratories:
          (a) Carbohydrate Nutrition Laboratory;
          (b) Lipid Nutrition Laboratory;
          (c) Protein Nutrition Laboratory;
          (d) Vitamin & Mineral Nutrition Laboratory;
          (e) Analytical Food Laboratory (established July 1, 1975).
        ii. Other Nutrition Laboratories:
          (a) Ruminant Nutrition Laboratory;
          (b) Nonruminant Animal Nutritiod Laboratory;
          (c) Nutritional Microbiology Laboratory;
          (d) Dairy Product Nutrition Laboratory.
    2. Consumer & Food Economics Institute (Hyattsville, Md.), Chairman: Dr. Robert L. Rizek.
      a. Nutrient Data Research Center.
      b. Food Consumption Survey Group.
      c. Food Diet Appraisal Group.
    3. North Atlantic Area Office (Ithaca, N.Y.).
      a. U.S. Plant, Soil, and Nutrition Laboratory, Director: Dr. William H. Allaway.
  B. North Central Region.
    1. Human Nutrition Laboratory (Grand Forks, N.D.), Director: Dr. Harold Sandstead.

In addition, research on nutrient quality, food technology, food processing, and food enrichment was reported to be performed in three other ARS Regional Research Centers (Peoria, Illinois; Albany, California; and New Orleans, Louisiana).[13]

(*a*) *The Nutrition Institute.*—The Nutrition Institute was established in July 1972 during the reorganization of ARS. The Institute is organized into nine laboratories, five of which relate directly to human nutrition research: the Carbohydrate Nutrition Laboratory, the Lipid Nutrition Laboratory, the Protein Nutrition Laboratory, the Vitamin & Mineral Nutrition Laboratory, and the Analytical Food Laboratory which was established July 1, 1975. The Institute maintains a staff of between 60–70 scientists and approximately 165 supportive personnel.

According to Dr. Walter Mertz, Chairman of the Institute:

> It is the mission of our Institute to identify the requirements of nutrients for optimal health and to recommend foods and dietary patterns that meet these requirements. . . . Although our research is not disease oriented, it is based on the theory that at least some chronic diseases for which no etiology is now known might be preventable by good nutrition. . . . Our program is also concerned with the changes in dietary habits of our population as they have occurred in this century and as they can be projected to continue in the future. . . . Our own budget for our Institute runs, I would say, between $4 and $5 million a year.[14]

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[12] Information compiled from personal communications with Drs. Gortner, Mertz, and Rizek, and from: Ibid., p. 130–131; USDA Telephone Directory, Sept. 1974, Organizational Listing, p. 8–9. U.S. Congress. Senate. Select Committee on Nutrition and Human Needs. Nutrition and Diseases, 1973. Part 2. Hearings, 93rd Congress, 1st session. Washington, U.S. Government Printing Office, 1973. p. 148–159.

[13] Personal communication with Dr. Walter Mertz, Chairman, Nutrition Institute, April 18, 1975.

[14] U.S.Congress.Senate. Select Committee on Nutrition and Human Needs. Nutrition and Diseases, 1973. Part 2, Sugar in Diet, Diabetes and Heart Diseases. Hearings, 93rd Congress, 1st session. Washington, U.S. Government Printing Office, 1973. p. 148, 158.

The Institute ascribes to an orderly sequence of events in order to determine these minimum and optimum requirements for the maintenance of health and the prevention of disease. First, the nutrient composition of food is studied; next, nutrients are isolated from the food and purified; then, animal experiments are performed on the availability of the nutrient and its role in animal nutrition; finally, tests are conducted to determine the minimum and optimum requirements of the nutrient in human nutrition.

Following this procedure, the *Carbohydrate Nutrition Laboratory* investigates the influence of the quantity and type of carbohydrate on the carbohydrate and lipid metabolism of experimental animals and man. The *Lipid Nutrition Laboratory* studies the dietary intake of fat in experimental animals and human volunteers, and the lipid composition of foods. The *Protein Nutrition Laboratory* attempts to determine the optimal protein intake and emphasizes studies on the quality of proteins, on the availablilty of individual amino acids in animal and vegetable proteins, and on the effect of food processing on protein quality. The *Vitamin & Mineral Nutrition Laboratory* seeks to discover new micronutrients and to define the optimal intake of known essential vitamins, minerals, and trace elements, their availability in foods, and the effect of food processing on these micronutrients. Similarly, the nutrient composition of foods will be investigated in the new *Analytical Food Laboratory*.

Over the past 15 to 20 years, the Nutrition Institute has sponsored research projects which resulted in the professional, scientific publication of over 82 research papers on carbohydrates, 64 on lipids, 113 on proteins and amino acids, 78 on vitamins, and 82 on minerals and trace elements.[15] Although neither the number nor the length of research papers is a reliable means to evaluate the scientific merit of an individual or a laboratory, publications in respected professional journals are one measure of productivity in research situations. The more than 300 papers emanating in recent years from these rather small intramural laboratories might be regarded as a sustained and very noteworthy effort. In addition, these papers provide evidence that the Institute does support research in keeping with its own perceived mission, and does collaborate with other Federal departments to determine the role of human nutrition in the maintenance of health and the prevention of disease.

(*b*) *The Consumer and Food Economics Institute.*—One of the important nutrition activities of the Agricultural Research Service is the work of the Consumer and Food Economics Institute.[16] The Institute is functionally divided into three units: the Nutrient Data Research Center, the Food Consumption Survey Group, and the Food Diet Appraisal Group.

The Nutrient Data Research Center (NDRC) maintains current and accurate data on the nutrient composition of foods. In 1963, such data was published in Agricultural Handbook No. 8, and was later revised and reduced for publication in Home and Garden Bulletin No. 72 entitled, "Nutritive Value of Foods". Comprehensive, current information on the composition and nutritive value of foods is required for use in the evaluation of diets, food distribution programs, and food

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[15] Citations for these papers were provided by Dr. Walter Mertz, Chairman, Nutrition Institute, in a personal communication, August 18, 1975.

[16] Information on the Consumer & Food Economics Institute was provided in an interview with Dr. Rizek, April 30, 1975.

supplies; for the development of family food plans, and guidance materials employed in consumer education; and for planning special diets for therapeutic use. The USDA tables of reference data on composition of foods are the major source of such information.

Recent developments in the food industry and improvements in the technology of food analysis and computer programming have rendered Handbook No. 8 obsolete. Rather than revise this entire handbook, NDRC will deposit revised food composition data into the National Nutrient Data Bank (NNDB), and will retrieve the data in sections for periodic publication. While some nutrient composition data will be forthcoming from the new Analytical Food Laboratory in the Institute of Nutrition, information on nutrients in foods will be gathered from all available sources—from industry, land grant colleges, special contractors, etc. Among the interesting sources of information for the NNDB are baby food companies which will provide food analysis data already recorded on computer tape.

The above mentioned Analytical Food Laboratory began operations July 1, 1975 as a result of an approximate $90,000 increased appropriation during FY 1975, with final support estimated at $500,000 in FY 1976 due to further increased appropriations and reprogramming within the ARS. The Nutrient Data Research Center has received moderate support for search and evaluation of data from the literature and other sources in the area of lipid composition of foods. The net amount of funds available to the Center for this purpose was $41,000 in FY 1974, $50,000 in FY 1975, and will be $62,000 in FY 1976.

The computer system for the NNDB is being developed for the USDA Nutrient Data Research Center by the Food and Drug Administration wherein FDA, in effect, is acting as the contractor for the Consumer & Food Economics Institute, with its Director, Dr. Rizek, acting as the program chief. The $250,000 cost, however, is being borne by the FDA itself.

The incorporation of data on food composition from all available sources will enable the entire system to be operational by October 1975.

While various food composition reference tables will be published and released from the NNDB at appropriate times, the system is a continuing operation designed to gather, evaluate, maintain, and disseminate current information on the nutrients in foods, and on other factors which alter nutritive content such as the variety of the food, the growing season and site, and the method of food processing and production. Moreover, the computerized system will facilitate consolidation of international data and thereby provide comprehensive dietary information for consumers, governments, and industry.

The Nutrient Data Research Center is currently operating with a staff of relatively medium level scientists, statisticians, chemists, and computer programmers. Total manpower consists of about 20 full time man-years.

To obtain information on the Nation's dietary situation. USDA has sponsored five nationwide surveys of food consumption over the past 30 years—in 1936, 1942, 1948 (urban only), 1955, and 1965–66. These studies are known as the Household Food Consumption Survey. Data from these surveys serve many purposes.

Congress, the Department of Agriculture, and other Federal agencies use these data in the development and administration of public programs and policies that relate to the marketing, regulation, and distribution of food.

Research and development laboratories, food manufacturers, and food industries use these data to help interpret the needs and wants of consumers.

Nutritionists, home economists, and welfare workers use these data to help determine the need for educational programs, to identify the groups that such programs should serve, and to provide a basis for the development of materials and programs for guiding households and individuals in their food selection.[17]

In summary, data on food consumption, dietary levels of nutrients, and food expenditures provide information necessary to evaluate the effectiveness of Federal food assistance programs, and to assess the nutritional status of the Nation's various populations.

At the present time, the Food Consumption Survey Group is considering contracts for exploratory studies on the best method to collect and update these data on food consumption. The survey is expected to involve a representative base sample of 15,000 households, and will include about 45,000 persons in those households. Methodology will incorporate the collection and analysis of (1) 24-hour recalls of foods consumed by individuals, and (2) two-day "diary" records of foods ingested. Family and individual data will emphasize information on food selections, their price, weight, spoilage, and amounts discarded.

The exploratory survey contracts will be funded by $44,000 from USDA's FY 1975 appropriation, and $100,000 provided by the Department of Health, Education, and Welfare. Reprogramming within the Consumer and Food Economics Institute will increase total available funds to approximately $200,000. Any additional support will be provided by the Agricultural Research Service Administrator.

The costs of conducting the survey itself will depend upon the methodology developed during these exploratory studies and finally adopted to obtain the data. If the Household Food Consumption Survey were to be conducted by standard interview methods, and were to include a 15,000 household sample, the total cost is estimated at $4.5 million. Should DHEW join in support of the survey to include coverage of special populations, such as the elderly, families on public aid for dependent children, the "working poor", etc., the number of households in the survey would be doubled and the contract cost would approximate $8 million.

In either case, the costs would be spread out over a three-year period. USDA is requesting $1.3 million in appropriations for the survey in FY 1976, but may have to request supplemental funds depending on the final methodology adopted.

The Food Consumption Survey Group, which over the past decade has prepared and published more than 18 comprehensive reports based on the 1965–66 survey, comprises a staff of ten professionals. Personnel costs for this group now total $220,000 per year.

The Food and Diet Appraisal Group of the Institute supports nutrition education; prepares food guides and food plans for various income-level households; constructs tables of foods and nutrients available to the Nation's civilian population; monitors trends in per

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[17] Agricultural Research Service. Dietary Levels of Households in the United States, Spring, 1965. Household Food Consumption Survey 1965–66, Report. No. 6. Washington, U.S. Government Printing Office, 1969. p. 1.

capita food and nutrient consumption; and compiles data for the consumer's use of foods including pamplets on recipes, canning, freezing, and food safety. This group also cooperates in the above capacities with the USDA Food and Nutrition Service in connection with the school lunch and food stamp programs, etc.

Total full-time staff for the Food and Diet Appraisal Group consists of 32 people at an annual personnel cost of $440,000. Ten of these staff and $200,000 are provided by the Food and Nutrition Service.

In FY 1975, the Consumer and Food Economics Institute of the Agricultural Research Service received an appropriation of $1,285,000 to support all of these inhouse operations, including personnel costs.

(c) The U.S. Plant, Soil, and Nutrition Laboratory.—

The Plant, Soil, and Nutrition Laboratory was established in 1939 by direction of the Secretary of Agriculture. A Memorandum of Understanding was entered into the United States Department of Agriculture and the agricultural experiment stations of Northeastern States—Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hamsphire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and West Virginia. The memorandum provided that the laboratory would be national rather than regional in scope, and should have a group of collaborators representing all the different regions of the country. . . .

The laboratory functions in close cooperation with Cornell University. It is located on the university campus and is served as part of the Cornell plant. . . .

The laboratory buildings, constructed during 1939–41, are located on a plot of approximately 2 acres. . . .

The broad over-all purpose of the laboratory's program is to improve the health and performance of human beings and farm animals by showing how they may be provided with nutritionally superior food and feed.[18]

In 1975, the U.S. Plant, Soil, and Nutrition Laboratory houses a professional staff which includes: 6 research chemists, 2 plant physiologists, 1 animal research physiologist, and 3 soil scientists. The annual budget of the Laboratory is approximately $546,000.[19]

Research at the U.S. Plant, Soil, and Nutrition Laboratory focuses on the relationship between soil and human nutrition, that is, a concerted "attempt to identify the various essential, nutrients, to determine which foods contain these nutrients, and to understand how the concentrations of these nutrients is controlled by the fertility of the soil on which food or feed plants are grown." [20] The investigations concentrate on the movement of these nutrients through the food chain from soils to plants to animals and man. Furthermore, these studies monitor the interactions among nutrients, and various chemical forms of nutrients, as they proceed through the food chain.

The U.S. Plant, Soil, and Nutrition Laboratory has thereby investigated, and continues to study, the transfer of the following elements from soils to plants to animals and people: boron, calcium, chlorine, chromium, cobalt, copper, fluorine, iodine, iron, magnesium, manganese, molybdenum, phosphorus, potassium, selenium, silicon, sodium, sulfur, and zinc. Additional research is underway to determine the

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[18] U.S. Department of Agriculture. Factors Affecting the Nutritive Value of Foods; Studies at the U.S. Plant, Soil, and Nutrition Laboratory. Miscellaneous Publication No. 664. Washington, U.S. Government Printing Office, 1948. p. 1–3.

[19] Information on the U.S. Plant, Soil, and Nutrition Laboratory provided by Dr. Horace L. Puterbaugh, Assistant to the Deputy Administrator, Program Planning and Review Staff, ARS, Northeast Region, in personal communications, September 18, 19, 1975.

[20] Allaway, W.H. The Effect of Soils and Fertilizers on Human and Animal Nutrition. Agriculture Information Bulletin No. 378. Washington, U.S. Government Printing Office, 1975. p. 2.

essentiality and toxicity of nickel, strontium, tin, and vanadium. Research continues on the movement of toxic elements, such as arsenic, cadmium, lead, and mercury, into food crops.

Further studies related to human nutrition include:

(1) Nitrogen in soils and the nature of proteins, including the synthesis of proteins by plants and the utilization of these proteins by people and animals;

(2) Nitrate accumulation in plants and the conversion of nitrates to nitrites in animals and men;

(3) Soil fertility and vitamin levels in plants;

(4) Soil depletion and the nutritional quality of plants; and

(5) Nutritional quality of crops in relation to the use of organic and inorganic fertilizers.

Human nutrition research at the U.S. Plant, Soil, and Nutrition Laboratory originates in studies of specific soils. The purpose of this research is to improve the levels of essential elements, other nutrients, and the quantity and quality of proteins in food crops:

> "If the world populations continue to grow, with greater pressure on food supplies, it will become necessary to produce food and feed crops on some soils not now being used. In many instances, especially in the Tropics, these new cropland soils are likely to be deficient in several of the mineral elements required by man and animals. Effective research programs will be needed to insure that the crops produced on these soils contain adequate levels and the proper balance of essent al nutrients." [21]

(d) The ARS Human Nutrition Laboratory.—

In 1963, the Agricultural Research Service proposed an expanded program for research on food and human nutrition. This program was presented to the Congress in Senate Document No. 35 by the Honorable Milton R. Young. The proposed program included the construction of three regional laboratories for food and nutrition research. The Human Nutrition Laboratory, North Central Region, is one of those proposed laboratories.

Construction on the Laboratory was begun in 1969. It was dedicated at an International Trace Element Symposium held in Grand Forks at the University of North Dakota in 1970. . . . A cooperative agreement was established with the University of North Dakota School of Medicine on March 21, 1972.

From its inception until July of 1972, the Laboratory was a field station of the Human Nutrition Research Division. With the reorganization of ARS, the Laboratory was separated administratively from the Nutrition Institute, Beltsville and was designated the Human Nutrition Laboratory, North Central Region.

The mission of the Human Nutrition Laboratory is the definition of human nutrient requirements and the physiological and biochemical factors which influence those requirements. At present, research at the Laboratory is primarily focused on the requirements for trace elements.[22]

In FY 1975 Federal personnel of the Human Nutrition Laboratory included 2 medical research officers, 5 research chemists, 1 statistician, 1 research microbiologist, 1 research psychologist, and a nonprofessional support staff of 10 persons. In addition, the Laboratory cooperates with approximately 8 scientists from the University of North Dakota under the Cooperative Agreement. Scientists at the Laboratory have been assigned 3 Postdoctoral Research Fellows from the Univer-

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[21] Ibid., p. 52.

[22] Agricultural Research Service. National Program Staff Review of ARS Research, Human Nutrition Laboratory, North Central Region. Unpublished report. February 20–21, 1974. p. 3. Information provided via personal communications with Drs. Gortner and Sandstead, September 10 and 18, 1975.

sity's Department of Biochemistry. The Laboratory investigators, together with the University's scientists, co-direct research projects which provide training to medical, graduate and undergraduate students. About 30 technical support personnel are provided to the Laboratory by the University and are funded under the Cooperative Agreement. Collaborative Research Projects are currently underway or planned with investigators from four medical schools: Vanderbilt University School of Medicine, University of Maryland School of Medicine, University of Okalahoma Medical Center, and University of Chicago Pritzker School of Medicine. The Human Nutrition Laboratory has engaged in discussion and planning of research with other ARS facilities, namely, the U.S. Plant, Soil, and Nutrition Laboratory; the Nutrition Institute; and the Regional Laboratory at Peoria, Illinois.

The budget of the Human Nutrition Laboratory approximates $1 million. Of this amount, $200,000 is expended under the Cooperative Agreement, $153,000 provides salaries; $53,000 is spent on administration and facility maintenance; $361,500 provides for supplies and equipment; and $240,000 permits research in the metabolic unit.

Research projects conducted at the Laboratory emphasize the requirements, absorption, and metabolism of trace elements, especially zinc, nickel, chromium, vanadium, and copper. Trace elements are also studied to determine toxicity levels as well as essential amounts, the interactions between elements, and the interrelationships among these nutrients, other nutrients, and degenerative diseases.

Since the laboratory began operations in 1970, professional staff members have contributed to chapters in about 18 medical, biochemical, and nutritional texts; have published over 12 technical papers in the scientific literature; have participated and published in the proceedings of over 5 conferences; and have cooperated with the World Health Organization to produce WHO Technical Report No. 532, entitled, "Trace Elements in Human Nutrition."

Research at the laboratory is periodically reviewed by members of the ARS National Program Planning Staff; the Directors of the U.S. Soil, Plant, and Nutrition Laboratory, the Nutrition Institute, and the Food and Consumer Economics Institute; Administator for the North Central Region; representatives from university medical schools; and the President of the Nutrition Foundation.

(3) COOPERATIVE STATE RESEARCH SERVICE (CSRS)

The Cooperative State Research Service was established by Secretary's Memorandum No. 1462, dated July 19, 1961 and Supplemental 1, dated August 31, 1961 under Reorganization Plan No. 2 of 1953. The primary function of the Service is to administer acts of Congress that authorize Federal appropriations for agricultural research carried on by the State agricultural experiment stations of the 50 States, Puerto Rico, Guam, the Virgin Islands, and the University of the District of Columbia; by approved schools of forestry; Colleges of 1890 and Tuskegee Institute; and non-profit institutions.

Administration of payments and grants involves the review and approval in advance of each individual research proposal submitted by a State agricultural experiment station or other institutions to be financed in whole or in part from Federal-grant funds, the disbursement of the funds, and the continuous review and evaluation of research programs and expenditures thereunder.[23]

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[23] U.S. Congress. House. Agriculture and Related Agencies Appropriations For 1976. Part 2. p. 463.

Program cooperation and planning for the Cooperative State Research Service (CSRS) is provided by a staff of approximately 80 full-time employees, located entirely in Washington, D.C. The administrative structure of CSRS is presented below in Figure 5.

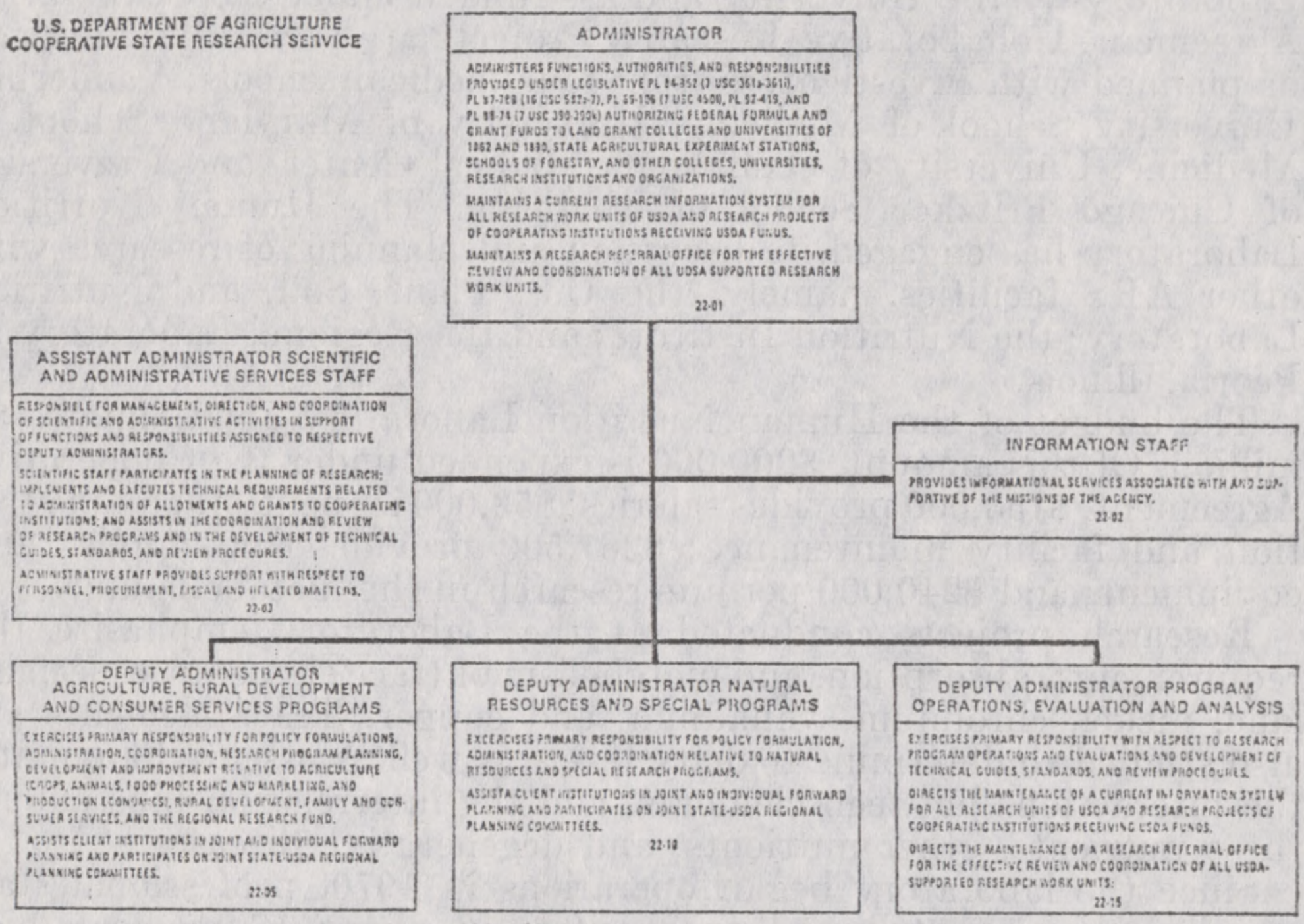


FIGURE 5.—Administrative structure, Cooperative State Research Service

Acts of Congress and programs administered by CSRS are subsequently outlined in Figure 6.[24]

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[24] Information on CSRS and on CSRS supported human nutrition research was provided by Dr, Elizabeth Y. Davis, Coordinator for Home Economics Research, Family and Consumer Services Unit. CSRS, in personal communications May 13, 20, 30, 1975, and Sept. 4, 1975.

FIGURE 6.—PROGRAMS ADMINISTERED BY COOPERATIVE STATE RESEARCH SERVICE

Authority	Delegation to CSRS	Recipients	Matching requirements	Distribution of funds
Hatch Act of 1887 as amended by the Act of Aug. 11, 1955 (Public Law 352–84th Congress) as amended by sec. 506, education amendments of June 23, 1972 (Public Law 92–318) which provided funds for Guam and Virgin Islands.	The administration of this act (7 USC 361a–361i).	(55) [1] State agricultural experiment stations and Puerto Rico established in accordance with the act of July 2, 1862 (First Morrill Act).	All funds above $90,000 to each State (exclusive of regional research fund).	Increases subsequent to act of 1955 distributed by statutory formula as follows: Not more than 25 percent for regional research; 20 percent equally to each State; 26 percent rural population basis; 26 percent farm population basis; 3 percent Federal administration; not less than 20 percent of funds for marketing.
Cooperative Forestry Research (McIntire-Stennis) Act of Oct. 10, 1962 (Public Law 87–788).	The administration of this act (16 USC 582–582a–7).	(64) [2] State agricultural experiment stations including Puerto Rico, Guam, and Virgin Islands and other State-supported colleges and universities offering graduate training in the sciences basic to forestry and having a forestry school.	100 percent	Distributed by formula as determined by the Secretary of Agriculture after consultation with a national advisory board of not less than 7 officials of the eligible forestry schools chosen by a majority of such schools. Current formula is as follows: $12,500 equally to each State; 40 percent based on areas of nonfederal commercial forest land; 40 percent based on volume of timber cut annually from growing stock; 20 percent based on non-federal expenditures.
Act of Aug. 4, 1965 (Public Law 89–106).	Authority to make grants for either basic or applied research under sec. 2 of the act (7 USC 450i).	State agricultural experiment stations, colleges, universities, and other research organizations and to Federal and private organizations and individuals for research to further the programs of the department of Agriculture. (Includes the 16 land-grant colleges of 1890 and Tuskegee Institute).	None—Cost sharing only	Distributed on the basis of executed grants. Funds for Colleges of 1890 and Tuskegee Institute are earmarked in appropriation and distributed by approved formula.
Research Facilities Act of July 22, 1963 (Public Law 88–74) (last appropriation—Fiscal Year 1970).	The administration of this act (7 USC 390–390k).	(52) [3] State agricultural experiment stations and Puerto Rico.	100 percent	Distributed by statutory formula: ⅓ equally to each State; ⅓ based on rural population; ⅓ based on farm population.
Title V, Rural Development Act of Aug. 30, 1972 (Public Law 92–419).	The administration of this act (7 USC 2661–2668).	50 States and Puerto Rico	None	Distributed by statutory formula: 10 percent for regional research; 20 percent equally to each State; 33 percent rural population basis; 33 percent farm population basis; 4 percent Federal administration.

[1] Includes (2) in Connecticut, (2) in New York, and Guam and the Virgin Islands.
[2] Includes (2) in Arizona, California, Connecticut, Illinois, Louisiana, Montana, New York, Texas, nd Washington and (3) in Michigan.
[3] Includes (2) in Connecticut.

Within CSRS, human nutrition research is administered by Dr. Elizabeth Y. Davis, Coordinator for Home Economics Research, Family and Consumer Services Unit, Office of the Deputy Administrator, Agriculture, Rural Development, and Consumer Services Program. Dr. Davis coordinates the review and approval process for human nutrition research projects with a professional staff that includes: 1 meat scientist, 2 biochemists, 1 food technologist, and 1 food scientist. This CSRS staff reviews these research projects funded through the Hatch Act and the CSRS Specific Grants Program authorized by Section 2, Public Law 89–106. The administrative process oversees human nutrition research projects funded primarily by CSRS (special grants), jointly by CSRS and State Agricultural Experiment Stations ("Hatch" funds), and exclusively by State Agricultural Experiment Stations (State funds). The review procedure consists of project proposal review and on-site visits during the research process. On-site review may be conducted by CSRS staff, staff provided by the State Agricultural Experiment Stations (SAES), or staff selected from other cooperating institutions such as university personnel. The costs of administration for human nutrition research projects approximates $75,000 annually, an estimated 3 percent of appropriated research funds (see Table I, page 24).

As indicated in Table I and Table IA above, CSRS administered human nutrition research projects emphasize the study of dietary status and related activities such as the investigation of nutrient requirements and food composition. The research proceeds on three levels: regional research, research performed at the 55 SAES, and research performed in other cooperating institutions.

Regional and SAES research receive Federal support as prescribed by the Hatch Act. For budgetary purposes, research projects administered by CSRS under this Act are organized into six national research programs. The subprogram entitled "Food and Nutrition" is part of the national People, Communities, and Institutions Program:

> This research develops information needed to establish nutrient requirements of specific age groups and the nutrient content of foods. This information is utilized in developing dietary recommendations that can be used by all segments of the population to achieve optimum nutritional status. It provides the information needed to assure that food is produced, processed, stored, and distributed under conditions that guarantee that it is safe and wholesome when it reaches the consumer. It also provides the knowledge necessary to improve the quality of living in rural America.[25]

While no comprehensive statement has been published to describe in detail the human nutrition research programs at these "Hatch"-supported levels, specific examples have been included in the public record:

> Coordinated research in each of the four regions has produced important insights for improving nutrition. Regional projects NC–108, NE–73, W–116, and S–87 have clarified procedures for studying dietary habits and factors undergirding them with accompanying nutritional status for large population samplings. This will be useful in a systems approach to routine monitoring of nutrition within States. California (Davis) has developed a technique for grouping individuals according to food habits. Nebraska has identified the potential for using non-nutrition personnel among teaching staffs to advance nutrition education in schools. Rhode Island has develop a technique for eliminating the lactose component in milk. This will permit individuals that are intolerant to lactose to consume milk as a highly important source of nutrients. Texas has designed pro-

[25] U.S. Congress. House. Agriculture-Environmental and Consumer Protection Appropriations for 1975. Part 2. p. 456.

cedures for rapid assessment of dietary and accompanying nutrition profiles. These developments provide guidelines for nutrition education, nutritional status, and improvement potential in the population.

. . . Scientists at the Florida Agricultural Experiment Station analyzed foods from fast food drive-in restaurants for energy, water, fat, protein, carbohydrates, vitamims, and minerals by standard laboratory procedures.[26]

Specific grants authorized by Section 2 of Public Law 89–106 provide primary research support to colleges, universities, and research organizations. Since these funds are also awarded as competing grants, they are available to other Federal Agencies and the SAES. In FY 1975 over 77 percent of support under Specific Grants was earmarked for continuing research programs in the colleges of 1890 and Tuskegee Institute.[27] However, the "major thrust of research programs in progress in these institutions is in human nutrition and improving the quality of life of low-income rural people. The history of involvement of these institutions with low-income people, their knowledge of the problems of the rural poor, and their continued contact with them make it particularly appropriate for them to conduct research on problems of rural people. . . . Lincoln University and Kentucky State College have developed major research programs in human nutrition. The goal is to develop centers of excellence in nutrition at several of these institutions. Prairie View A. & M. College is establishing a center for human nutrition to serve the area in which the college is located. Langston University in Oklahoma is also establishing a center for human nutrition." [28] In the same fiscal year, the remaining funds authorized as specific grants were awarded in the Special Grant Program, the competitive research-award situation. The current Special Grants Program for human nutrition research has been generally described in the public record as follows:

"Research is proposed to determine the nutrient requirements of specific age groups, sexes, and other segments of the population. We need information on the effects of processing on the nutrient quality of the final product. Part of these funds will be used in such efforts. . . . We sorely need additional data that is applicable to individuals and for food combinations as they are normally consumed. This means research involving large numbers of human subjects to better understand individual food and nutrition relationships; how an individual normally eats and how this affects nutritional status; what new food practices can improve nutritional status; how improved food practices can be initiated and sustained; and how all these differ between individuals. We expect to reduce some of these research gaps . . . particularly for children and the elderly. New technology on how to detect responses to specific food intake should also emerge. Findings should provide guidelines with more valid application to a larger number of individuals and with greater utility for the food and consumer sectors." [29]

Coordination of human nutrition research administered by CSRS appears to surface in at least two situations. First, CSRS has been compelled, primarily through the process of Congressional review and appropriations, to explain the means by which approved human nutrition research projects complement and yet do not duplicate human nutrition activities supported and directed by other USDA agencies and other Federal departments. Similarly, CSRS has been held responsible for at least overseeing these same processes, namely complementarity and duplication of this research, in the SAES and in other cooperating institutions.[30]

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[26] U.S. Congress. House. Agriculture and Related Agencies Appropriations for 1976. Part 2. p. 495.
[27] Ibid., p. 479.
[28] U.S. Congress. House. Agriculture-Environmental Consumer Protection Appropriations for 1975. Part 2. p. 478.
[29] Ibid., p. 477, 501–502.
[30] Ibid., p. 51.

At the Federal level, CSRS cites the Current Research Information System as a "channel for exchange of information about research in progress . . . [whereby] other interested units can maintain contact with the CSRS program." [31] Furthermore, "[f]ormal cooperation with other agencies is welcomed by scientists in the CSRS program. A channel for dialog (sic) between specific scientists in the CSRS program and representatives from FDA and NIH was opened earlier in USDA." [32]

At the SAES level, coordination of human nutrition research has largely been dependent upon cooperation among the Directors of SAES. CSRS has cosponsored, together with the National Association of State Universities and Land-Grant Colleges, at least two recent national conferences which were convened to develop priorities for agricultural research, including human nutrition research.[33]

At the most recent conferences over 400 participants rated research needs on a scale of 1 to 5, with 5 denoting needs of utmost importance. The representatives rated ninety-six research needs on an average scale between 4.73 and 3.22. Nutrition-related needs were rated as follows:[34]

Rank	Need	Rating
5	Nutrient requirements	4.45
17	Food technology	4.28
20	Food safety	4.19
22	Nutrient composition	4.16
23	Food quality and distribution	4.12
49	Food consumption	3.83

While these ratings do indeed rank research needs as perceived by the conference's 400 participants, these ratings indicate that at least 33 research areas were considered of major importance or greater, and 63 additional areas significant enough to be considered "important". The ratings appear to reflect the overall concensus that all agricultural research is noteworthy of support. And yet, "Dean Bentley [University of Illinois, College of Agriculture] noted that decision-makers must face the reality that available funds probably will be too scarce to fully finance all proposed research efforts in the years ahead." [35] The research priorities determined at this conference are not considered mandatory for research planners, but are expected to provide planners, administrators, and scientists with a professional perspective to target research on pressing world food needs.

The CSRS has been delegated specific authority to administer the funding of research programs in State Agricultural Experiment Stations, Land-Grant Colleges, and other cooperating institutions. This administrative authority is expressed through disbursement,

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[31] Ibid.

[32] Ibid. A "Committee on Food and Nutrition Research" was established in 1972 by Secretary's Memorandum No. 1773, revised October 1973. The Committee was inactive from March 1974 through June 1975 when it was reactivated. Committee membership includes 3 representatives from the Agricultural Research Service; 1 from the Cooperative State Research Service; 1 from the Agricultural Marketing Service; 1 from the Economic Research Service; 1 from the Extension Service; and 3 from the Food and Nutrition Service. The Chairman of the Committee is the Deputy Assistant Secretary for Conservation, Research and Education.

[33] October 1–4, 1973: A workshop on the role of land-grant institutions in applied nutrition. Greensboro, North Carolina, (Proceedings published by the Nutrition Foundation, 118 p.) July 9–11, 1975: Working conference on research to meet U.S. and world food needs. Kansas City, Missouri.

[34] Production Key Word In Establishing Food Research Priorities. U.S. Department of Agriculture News, No. 2109–75. p. 3–4.

[35] Ibid., p. 2.

review, and approval functions dependent upon research priorities primarily established in the SAES, and the Land-Grant Colleges.

(4) ECONOMIC RESEARCH SERVICE (ERS)

The Economic Research Service was established by Secretary's Memorandum No. 1446, Supplement No. 1, of April 3, 1961, under Reorganization Plan No. 2 of 1953 and other authorities.

The mission of the Economic Research Service is to develop and disseminate economic information for use by public and private decisionmakers concerned with the allocation and use of resources in agriculture and rural America.

. . . The Service functions through a central office in Washington, D.C. and a small staff in each of 36 States, principally at the Land Grant Colleges and Universities. Much of the research is carried on in cooperation with State Agricultural Experiment Stations.[36]

Human nutrition research in the Economic Research Service (ERS) is administered and performed by the Food Consumption Demand Analysis and Consumer Interest Unit of the National Economic Analysis Division. While no mention is made of human nutrition research activities in the public record, four human nutrition research projects are noted for ERS in both Table I and Table IA. All four research projects are underway in the Washington, D.C. Office of the National Economics Analysis Division. The following projects contain an obvious economic component, and are noteworthy because they especially emphasize the relationships between food costs and food consumption habits [37]:

Short title and project objectives:	*Fiscal year 1974 USDA appropriations*
Consumer interests—Determine effect of open dating of food products on quality of food offered by retailers, cost of programs of open dating, usefulness to consumer, and extent of date labeling. Assess types of information needed by shoppers to make sound buying decisions, and evaluate current and future proposals aimed at informing consumers relative to buying food	$116, 882
Consumer surveys—Provide information on consumer attitudes, knowledge, and practices related to consumer issues. Develop information on homemakers preferences, uses, and buying habits of selected [food] products	173, 195
Consumption data systems—Develop improved information on consumer purchases and prices through complementary consumer panels and retail warehouse movement data. Disaggregate existing time series data on food disappearance (per capita consumption) into household consumption, away-from-home consumption and industrial use	39, 794
Domestic food programs—Evaluate income-food expenditures and consumption relationships among economically disadvantaged households and how they are affected by participation in the Food Stamp Program. Determine job development and income generating impacts of the Food Stamp Program upon local program areas, along with the rate of participation and factors affecting participation in various areas. Analyze demand for school lunch and other child feeding programs and factors affecting participation along with a determination of short and long-run cost functions and economies of scale of alternative school lunch delivery systems. Provide technical assistance to Extension Service in monitoring the Expanded Food and Nutrition Education Program	[1] 123, 601

[1] $195,701 total Federal support.

[36] U.S. Congress. House. Committee on Appropriations. Agriculture and Related Agencies Appropriations For 1976. Part 4, Agricultural Program. Hearings, 94th Congress, 1st session. Washington, U.S. Government Printing Office, 1975. p. 760.

[37] Project data excerpted from four CRIS data sheets provided by Mr. John R. Myers, Director, CRIS, April 29, 1975.

(5) SUMMARY—USDA HUMAN NUTRITION RESEARCH

As a whole, the U.S. Department of Agriculture supports and performs human nutrition research pursuant to specific legislative authority. Individually, each agency within USDA administers this research in the context of its authority and its perceived mission. The missions of these agencies determine the scope of human nutrition research activities:

(*a*) Within ARS, the mission of human nutrition research is to apply the products of agriculture, namely foods, to the maintenance of health and the prevention of disease. The research is focused on the discovery of new nutrients, the determination of dietary levels of all nutrients, the investigation of actual food and nutrient consumption, and the application of research results to human dietary practices.

(*b*) CSRS does not conduct human nutrition research. The mission of CSRS is to administer funds and review research proposals and projects pursuant to specific public law. The intent of Congress and its influences on the development of the CSRS mission is expressed in the Hatch Act as amended:

> It is further the policy of the Congress to promote the efficient production, marketing, distribution, and utilization of products of the farm as essential to the health and welfare of our peoples and to promote a sound and prosperous agriculture and rural life as indispensable to the maintenance of maximum employment and national prosperity and security. It is also the intent of Congress to assure agriculture a position in research equal to that of industry, which will aid in maintaining an equitable balance between agriculture and other agencies of our economy. It shall be the object and duty of the State agricultural experiment stations through the expenditure of the appropriations hereinafter authorized to conduct original and other researches, investigations, and experiments bearing directly on and contributing to the establishment and maintenance of a permanent and effective agricultural industry of the Unlted States, including research basic to the problems of agriculture in its broadest aspects, and such investigations as have for their purpose the development and improvement of the rural home and rural life and the maximum contribution by agriculture to the welfare of the consumer. . . .[38]

Human nutrition research projects thereby funded and reviewed by CSRS are actually performed in the State Agricultural Experiment Stations, the Land Grant Colleges, and other cooperating institutions. While part of this research could be considered as basic, most research seems aimed at the determination of dietary intake in small, specific segments of the Nation's rural populations.

(*c*) For ERS, the mission of human nutrition activities is limited to economic analyses, that is, the definition of trends and relationships between food prices, family income, the cost and effectiveness of open-dating labeling, and factors which influence consumer choices in food purchasing.

Thus, ARS-supported research is primarily broad in scope, basic in nature, and applicable as baseline data in other targeted research projects both within the Department itself, and in other Federal agencies. CSRS administered human nutrition research could be characterized as applied research which is tailored to address problems such as assessment of food assistance programs, and the dietary needs of specific, more nutritionally vulnerable populations. Re-

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[38] 7 U.S.C. 361b.

search performed by ERS directly relates the economic factors influencing food purchasing habits, costs, and ultimately dietary patterns.

Coordination and cooperation between administrators and among scientists appear to depend on the nature of the human nutrition research. Basic research tends to be performed in USDA (Federal) facilities, and the usual forums, such as staff meetings, scientific conferences, and the exchanges of information via publication in technical journals, appear to permit a flow of research ideas and results. As the human nutrition activity becomes more applied and more removed from USDA facilities (i.e., performed in SAES, Land-Grant Colleges, and other cooperating institutions) the dissemination of information on project status and results appears more limited. Typically, each technical or professional journal serves a certain clientele, and the lag-time for publication of some research may be one to two years. Similarly, seminars and conferences seem to promote technical and highly specialized research contributions. Research on dietary intake and nutritional status of a specific, local population may receive little attention even though innovative methods which were developed to assess these problems might be applicable to similar regional or national studies.

USDA does not typically issue monographs or technical reports on otherwise unpublished research projects. In some instances, the information maintained and processed through the Current Research Information System was the only resource available to obtain detailed project descriptions and results. CRIS searches are performed by request and free of charge to agriculturally-affiliated institutions, which means that worthwhile research and exciting project results may not be advertised to the overall professional nutritional community. Also, the accuracy of CRIS project data is highly dependent on (1) the data provided to CRIS by project directors, (2) the extent to which various agencies within USDA respect, understand, and actively participate in the system, and (3) the inherent constraints imposed by the programming and upkeep of CRIS itself. The system appears well designed to serve an agriculturally-oriented researcher who knows that the system exists, and that certain kinds of information can be retrieved from it. Therefore, the meaningfulness of CRIS project data depends ultimately on the purpose and skill of its interpreter.

In preparing these sections on USDA-supported human nutrition research, no single administrator, scientist, or published source could provide overall human nutrition research policy, or detailed information on all research projects, facilities and scientists in USDA. Consequently, the background information and its analysis herein represent an accumulation of facts and figures from a wide variety of sources. Within a single agency or program, few inconsistencies existed between information gathered by means of interviews and that retrieved from published sources. Conflicting information appeared to surface only as this study attempted to synthesize the overall USDA human nutrition research perspective.

Nonetheless, USDA human nutrition research activities do encompass a broad spectrum of ideas and purposes, and together represent a unique effort in these fields. The activities are unique because USDA

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nutritionists maintain their underlying philosophy that people consume foods rather than nutrients per se and that to optimize the nutrient composition of foods is a deliberate means of promoting health and preventing disease.

However, the total FY 1974 Federal support of all USDA agricultural research was $372,901,000.[39] Data on Table I above indicate that total funds spent on human nutrition research represent about $10 million, or 2.6% of the total USDA agricultural research budget. In the same fiscal year, Federal support for all ARS research was $204,793,000; for all CSRS research, $85,489,000; and for all ERS research, $17,597,000.[40] Table I data can be employed to estimate the percentages of total support devoted to human nutrition research in these agencies as approximately 3.2 percent, 2.9 percent, and 2.5 percent, respectively.

These percentages may be regarded as rather small for a Department of the Federal Government which is so importantly placed in the center of the food enterprise. Moreover, the facilities, manpower, and funds seem minimal to support the only Federal department which both:

(1) sponsors basic research to discover new nutrients, to investigate foods for nutritive content, and to establish nutrient levels required for optimal health; and

(2) applies these research results to various studies on national food consumption patterns; on specific, nutritionally-vulnerable groups; and on improving foods and dietary habits.

C. The Department of Defense (DOD)

(1) overview

The United States Government, through its various branches, has contributed much of value to the science of nutrition. The War Department and the Navy Department, in their efforts to secure the most satisfactory diet for the soldiers and the sailors, have collected a great deal of information and conducted many investigations which have to do with the subject of dietetics, . . .[41]

A comprehensive history of nutrition research within the Army, Air Force, and Navy has not been compiled by any branch of the Department of Defense (DOD).[42] Consequently, the account provided in this study represents only that history of human nutrition research in this department which was available in parts.

As early as 1918 a Food Division existed within the Office of the Surgeon General, U.S. Army, to consult with the Subsistence Division in the U.S. Army Quartermaster Corps on matters relating to the

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[39] Inventory of Agricultural Research, FY 1974. Volume II. p. 1.

[40] The Budget of the United States Government, 1976—Appendix. Washington, U.S. Government Printing Office, 1975. p. 117, 125, 133.

[41] Langworthy, C. F., and R. D. Milner. Investigations on the Nutrition of Man in the United States. Washington, U.S. Government Printing Office, 1904. p. 5.

[42] In addition to searching the collections of the Library of Congress, the authors obtained a Report Bibliography on Nutrition Research from the Defense Documentation Center, September 24, 1975, and a search performed by the National Technical Information Service, U.S. Department of Commerce, on May 8, 1975, entitled, "Military Research on Human Nutrition". The authors also received personal communications on this inquiry from: (1) Ms. Sylvia W. Shaffer, Public Information Officer, Bureau of Medicine and Surgery, U.S. Navy, October 9, 1975; (2) Mr. Joseph Barry, Chief of Public Information, Brooks Air Force Base, San Antonio, Texas, October 8, 1975; and (3) Dr. John E. Canham, Commanding Officer, Department of the Army, Letterman Army Institute of Research, April 22, 1975.

nutritional adequacy of rations. The Food Division "was composed of exports in nutrition, food chemistry, food bacteriologists, and others with technical training relating to foods and food research, and its object was primarily to apply the sciences of nutrition and food technology to the problems of feeding the army, with the purpose of securing, so far as possible, for the soldier the best nutrition and the least possible waste."[43]

However, the Department's human nutrition research began in earnest in early 1941, when a laboratory "was established within the Army Medical School at Walter Reed General Hospital to provide instruction and training of Nutrition Officers."[44] Until 1942, this Division of Nutrition in the Army Medical School was the only Army medical services installation concerned with nutrition problems, but its functions were confined mostly to teaching. Then, in early 1942, studies were conducted on the nutritional requirements of troops, adequacy of Army rations, and problems relating to the feeding of civilian populations under Army control.[45] Space and facilities were limited at the Army Medical School, and in September 1944 the Army Medical Nutrition Laboratory was established in Chicago as a separate unit under the Office of the U.S. Army Surgeon General.[46]

In May 1947 a joint project was started between the Medical Nutrition Laboratory and Fitzsimons General Hospital [Denver, Colorado] to determine if bronchiectasis represented an abnormality of vitamin A metabolism and if massive doses of vitamin A would influence the course of bronchiectasis treated medically or surgically. . . . By 1950, the situation in Chicago had become difficult due to the lack of facilities for the conduct of clinical studies on normal humans, the limited physical space, the location of the laboratory in the stockyards, and the lack of a patient population to study. In the Fall of 1953, the [Army Medical Nutrition] Laboratory moved to Fitzsimons General Hospital, but in the process lost many of its productive civilian investigators and technicians. Staff rebuilding was gradually accomplished. In September 1958, the R & D unit at Fitzsimons General Hospital was combined with the Medical Nutrition Laboratory to form the Medical Research and Nutrition Laboratory (USAMRNL).[47]

In early 1972, a decision was made to incorporate USAMRNL into the new Letterman Army Institute of Research (LAIR) in the Presidio of San Francisco. The transfer of the laboratory occurred in 1973 and 1974, and the USAMRNL became the Department of Nutrition within LAIR.[48]

During the evolution of a nutrition laboratory within the Army Office of the Surgeon General, a related facility was also developing under the direction of the Quartermaster General. Although the Army organized a Subsistence Division as a separate branch of the Quartermaster Corps in 1818,[49] it was not until 1936 that the Quartermaster General established a Subsistence Research Laboratory (SRL) at the

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[43] Prescott, Samuel C. Troop Feeding Programs, A Survey of Rationing and Subsistence in the United States Army, 1775 to 1940; Final Report. Washington, National Defense Research Committee, Office of Scientific Research and Development, March 1944. p. V.-7.

[44] Kuemmerlin, Alda J., B. L. Wilson, Y. M. Rhodes, Col. J. E. Canham, MC. Three Decades of Endeavor, A Bibliography: 1944-1974. Denver, Colorado, U.S. Army Medical Research and Nutrition Laboratory, 1974. p. 4.

[45] Advisory Panel on Medical Sciences, Office of Director of Defense and Engineering. Facilities for Research and Development in the Medical Sciences within the Department of Defense. Washington, Department of Defense, 1959. p. 16.

[46] Kuemmerlin, Alda J., et al., op. cit., p. 4.

[47] Ibid., p. 5.

[48] Personal communication with Dr. John E. Canham, Commanding Officer, LAIR, April 22, 1975.

[49] Prescott, Samuel C., op. cit., p. V.-12.

Corps' depot in Chicago.[50] Under the impetus of an explosion of knowledge in nutrition and the anticipation of World War II, the facilities at Chicago in 1945 had expanded to 80,000 square feet of floor space, housing temperature and humidity control rooms, nutrition laboratories, food testing and acceptance units, a "guinea pig" hall, and nearly 300 personnel, most of whom were civilians.[51] In March 1946, the newly named Subsistence Research and Development Laboratory was designated the Quartermaster Food and Container Institute of the Armed Forces.[52]

The Institute awarded grants for university research and maintained a close working relationship with the other Services, the food industry, and a number of government agencies, including the Department of Agriculture. The Medical Nutrition Laboratory of the Army Surgeon General, as discussed above, was located at the Food and Container Institute from 1944 to 1950.[53]

In 1962 the Quartermaster Food and Container Institute was redesignated the Armed Forces Food and Container Institute.[54] In 1963 it was "relocated" in what was subsequently to become the U.S. Army Natick Development Center at Natick, Massachusetts. In 1974, a reorganization at Natick established: (1) the Food Science Laboratory which became responsible for food acceptance studies, and disciplinary research in nutrition, microbiology, and chemistry; and (2) the Food Engineering Laboratory which became responsible for research on food packaging and food services equipment.

As in the old Food and Container Institute, the Center at Natick also supports extramural nutrition research in the interest of subsistence and ration development. Nutritional and "wholesomeness" studies are contracted out by Natick to various not-for-profit research organizations. Natick also transfers funds to the Army Surgeon General for animal feeding studies which are usually performed by contractors following competitive bidding.

From the beginning, the U.S. Army, the first and oldest of the Armed Services, has always assumed the lead in nutrition research, subsistence, and ration development for all military personnel. Moreover, as a unit of the Department of Defense, the Army still has the prime responsibility to originate, plan, and execute the DOD nutrition and ration research programs.

Nevertheless, the authors are aware of Air Force and Navy nutrition programs, both in the past and present, which constitute a significant part of the history of nutrition and of nutrition practices in the Department of Defense.

Over one-hundred years ago, the Army of the New Frontier adopted the idea of desiccated vegetables long used in the Navy ration.[55] Such

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[50] The Growth of the Institute. Activities Report of the Quartermaster Food and Container Institute for the Armed Forces, v. I, no. 3, August 1948. p. 296.

[51] Ibid., p. 299.

[52] Part of a System. Activities Report, R & D Associates Food and Container Institute, Inc., v. IV, no. 1, April 1952. p. 55.

[53] The Growth of the Institute, op. cit., p. 299.

[54] Information on the history of the Institute was provided as unpublished notes and in personal communications by Ms. Alice Meyer, Chief, Military Requirements and Developments Projects Office, Food Engineering Laboratory, U.S. Army Natick Development Center, November 21, 24, and 25, 1975.

[55] Risch, Erna. Quartermaster Support of the Army; A History of the Corps 1775–1939. Washington, Office of the Quartermaster General, 1962. p. 326.

dry but improved provisions were still considered nutritious and palatable for naval units in 1944,[56] and probably even today. As other ration and food service protocols were being developed for long-term submarine operations at the Naval Submarine Medical Research Laboratory at Groton, Connecticut, fundamental research on malnutrition was underway at the Bureau of Medicine and Surgery's Naval Medical Research Institute at Bethesda, Maryland. From time to time other Naval Medical Research Units (NMRU) engaged in human nutrition research, such as the more recent studies on zinc dwarfs at NMRU No. 3 in Cairo, Egypt.

The Air Force Office of Scientific Research, Air Research and Development Command, which issued its first annual report in 1956, supported some basic nutrition research under contract as did the earlier established Office of Naval Research. The Aero Medical Research Unit of the Wright Air Development Center, Wright-Patterson Air Force Base, Dayton, Ohio, originally was established in 1932, and contained among its wide variety of research interests investigations of space-flight feeding and feeding systems criteria. This type of activity was emphasized during the 1959 time period.[57] The Arctic Aeromedical Laboratory at Ladd Air Force Base, Alaska, was established in March 1947 with personnel assigned from the Air Force School of Aviation Medicine, Randolph Air Force Base, Texas. The Biochemistry Branch of the Laboratory conducted studies on metabolic adaptations in isolated tissues to obtain basic data on cellular metabolism of protein, fat, and carbohydrate. Standard rations and arctic animal and plant food products were analyzed to determine nutrient requirements in survival situations. The research also included the study of the influence of nutrition in total human physiological adaptation to cold environments.[58]

(2) CURRENT REGULATION OF HUMAN NUTRITION RESEARCH IN THE DEPARTMENT OF DEFENSE

On June 20, 1975, the Department of Defense issued a series of identical regulations which centralized the human nutrition research programs of the Army, Navy, and Air Force.[59] On August 15, 1975, human nutrition research thereby became a part of the DOD Food Research, Development, Testing, and Engineering Program.

The regulations, and an accompanying manual [60] provide administrative procedures, agency names, research locations, and research and development terms which apply to the entire food service and nutrition research program in the Department.

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[56] Advance Base Dry Provisions Menu. Washington, U.S. Bureau of Supplies and Accounts (Navy Department), 1944. 36 p.

[57] Facilities for Research and Development in the Medical Sciences Within the Department of Defense, Washington, Office of Director of Defense Research and Engineering, 1959. p. 122.

[58] Ibid., p. 124.

[59] Research and Development. Department of Defense Food Research, Development, Testing, and Engineering Program. (Army Regulation No. 70-3; OPNAV Instruction No. 3900.26B; Air Force Regulation No. 80-52; Marine Corps Order No. 3900.9B; Defense Supply Agency Regulation No. 3200.4) June 20, 1975. Copies of AR 70-3 and the DOD Food Service Manual were provided by Richard F. Barquist, M.D., Col., MC, Deputy Commander, U.S. Army Medical Research and Development Command, in personal communication, July 25, 1975.

[60] Department of Defense. Manual for the Department of Defense Food Service Program. (DOD 1338.10-M), June 19, 1972.

The regulations define "nutrition" as "the body state resulting from food consumed and involves all those processes by which an organism receives and utilizes the materials necessary for growth, replacement or repair of wornout or injured structures, reproduction and transformation to energy." [61] Similarly, the regulation defines its use of the term "nutrition research program":

As used in this regulation, the nutrition research program includes The Surgeon General's research and development program related to—

a. Determination of nutritional and dietary standards for Armed Forces personnel subsisted under normal and special operating conditions.

b. Evaluation of nutritional adequacy of foods as consumed.

c. Evaluation of the nutritional status of Armed Forces personnel.

d. Establishment of sanitary and food hygiene standards for all food program activities.

e. Food aspects of preventive medicine.[62]

The scope of the human nutrition research in the DOD Food Research, Development, Testing, and Engineering Program is limited to the study of nutritional requirements, food wholesomeness and safety, consumer acceptance, and human factors psychology. "Dietary and metabolism studies performed in the course of experiments dealing with other than feeding programs is considered medical clinical research and therefore not part of the DOD Food RDT & Eng Program." [63]

The new regulations establish The Surgeon General (TSG) of the Army as the DOD Executive Agent for Nutrition. TSG has been assigned as the developing agency for the nutrition and wholesomeness portion of the program. "As directed by TSG, the US Army Medical Research and Development Command (USAMRDC) and its subordinate, Letterman Army Institute of Research (LAIR), will serve as performing laboratory." [64] While the regulations hold the Secretary of the Army responsible for prescribing nutritional standards and for establishing daily dietary allowances for members of the military services, The Surgeon General is designated the responsibility to:

(1) Provide an Executive Secretary for Nutrition as the point of contact for coordinating the services' nutritional requests and for integrating the nutrition program into the overall DOD Food RDT & Eng Program.

(2) Provide a technical advisor to the various administrative boards.

(3) Determine standards for wholesomeness at all points in the military food service system.

(4) Provide requirements for research and development of hospital food service systems.

(5) Provide the Navy and Air Force logistic support for a representative that they may assign for training, observation, or participation in studies of particular interest to that service.[65]

DOD has divided the management of the Food RDT & Eng Program into two portions. The long-range planning and coordination of the Program are termed "formulation"; the short-range budgeting and actual research processes for the Program are called "execution." [66]

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[61] Army Regulation No. 70-3. p. A-4.
[62] Ibid., p. A-4—A-5.
[63] Ibid., p. 1-2.
[64] Ibid.
[65] Ibid., p. 1-6.
[66] Ibid., p. 2-0.

Responsibility for administration of the Program, including formulation and execution, is outlined in the June 20, 1975 regulations. The entire DOD Food RDT & Eng Program is to be administered by a Joint Formulation Board, which is to be composed of a voting representative from each military service, and non-voting members from other Boards. The Joint Formulation Board is to serve as the coordinating body: (1) for integrating all requirements from the services and DOD components into a proposed program; (2) for assigning priorities to all requirements; and (3) for applying fiscal and programming guidance to the Program.[67]

Responsibility for formulating and executing the nutrition and wholesomeness portion of the DOD Food RDT & Eng Program is assigned to a Joint Nutrition Research Planning Board (JNRPB).[68] Membership on this Board is limited to one voting representative, either a physician or a Doctorate level scientist in the field of nutrition, from the Army, Navy, and Air Force. One representative of the JNRPB is also The Surgeon General's voting representative on the Joint Formulation Board. Chairmanship of the JNRPB is to be rotated annually among the military services. The JNRPB has been assigned the following tasks:

(1) Considering the nutrition and wholesomeness goals determined by each military service and formulating these goals into a joint program for submission to the Joint Formulation Board as a proposed DOD program;

(2) Assigning priorities to all work units of the joint program;

(3) Reviewing all nutrition and wholesomeness research efforts in DOD programs and providing recommendations to the Director of Defense Research and Engineering on duplicatory, unnecessary, or overlapping work efforts; and

(4) Following Department of the Army guidance, providing suggestions on funding of program work units according to set priorities.

The JNRPB will submit the joint nutrition and wholesomeness program to the Joint Formulation Board for review.[69]

Priorities assigned by the JNRPB in the joint program cannot be changed by the Joint Formulation Board. However, as the overall coordinating body, the Joint Forumlation Board may endorse the developed priorities and may provide comments or recommendations on this program. The Joint Formulation Board is to then submit the joint nutrition and wholesomeness program to the Commanding Officer, Letterman Army Institute of Research. The Institute must submit the nutrition and wholesomeness portion of the Program, including funded and unfunded projects, to the Director of Defense Research and Engineering for approval.[70]

Figure 7 presents the flow of activities described above for the formulation (long-range planning and coordination) of the DOD Food Research, Development, Testing, and Engineering Program. Figure 8 then maps the above described execution (short-term funding and conduct of the research) of the same DOD program. A list of abbreviations accompanies the figures.

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[67] Ibid., p. 1-2—1-3, 1-8, 2-0—2-1.
[68] Ibid., p. 1-8—1-9.
[69] Ibid., p. 2-1.
[70] Ibid., p. 2-1, 2-7—2-9.

FORMULATION FLOW CHART
DOD FOOD RDT&ENG PROGRAM

[LONG-RANGE PLANNING AND COORDINATION]

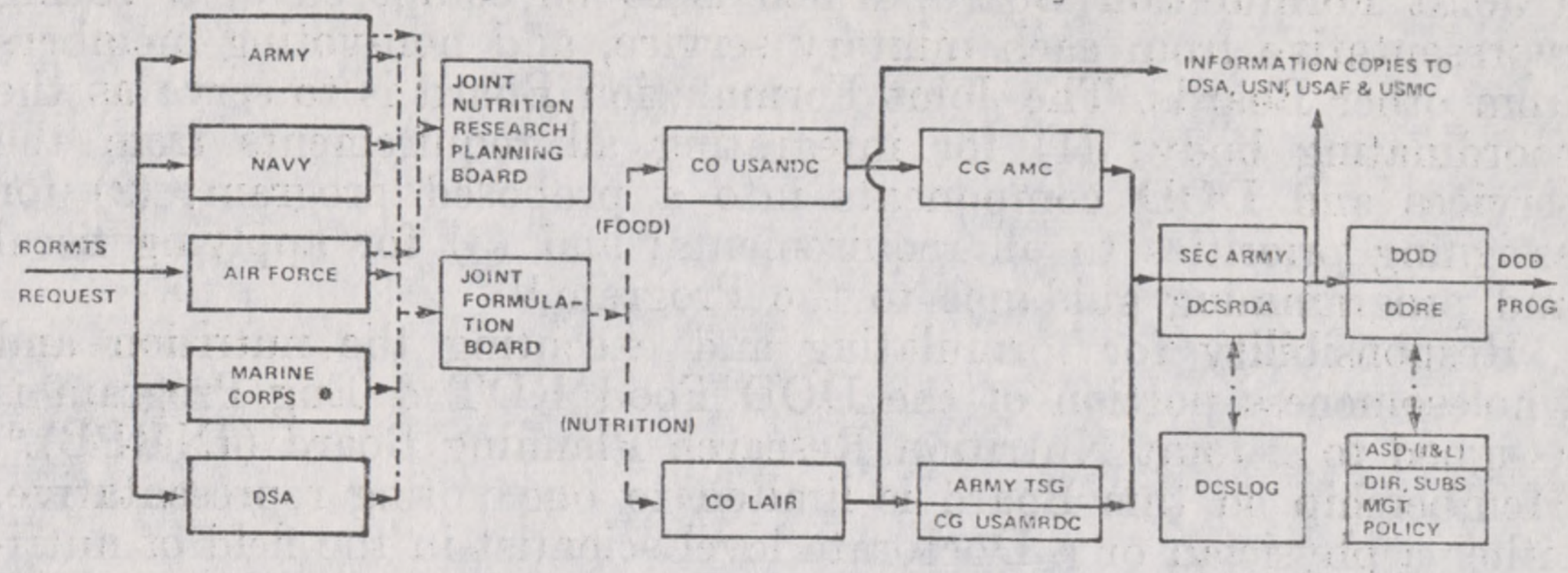


FIGURE 7

EXECUTION FLOW CHART
DOD FOOD RDT&ENG PROGRAM

[SHORT-RANGE FUNDING AND CONDUCT OF RESEARCH]

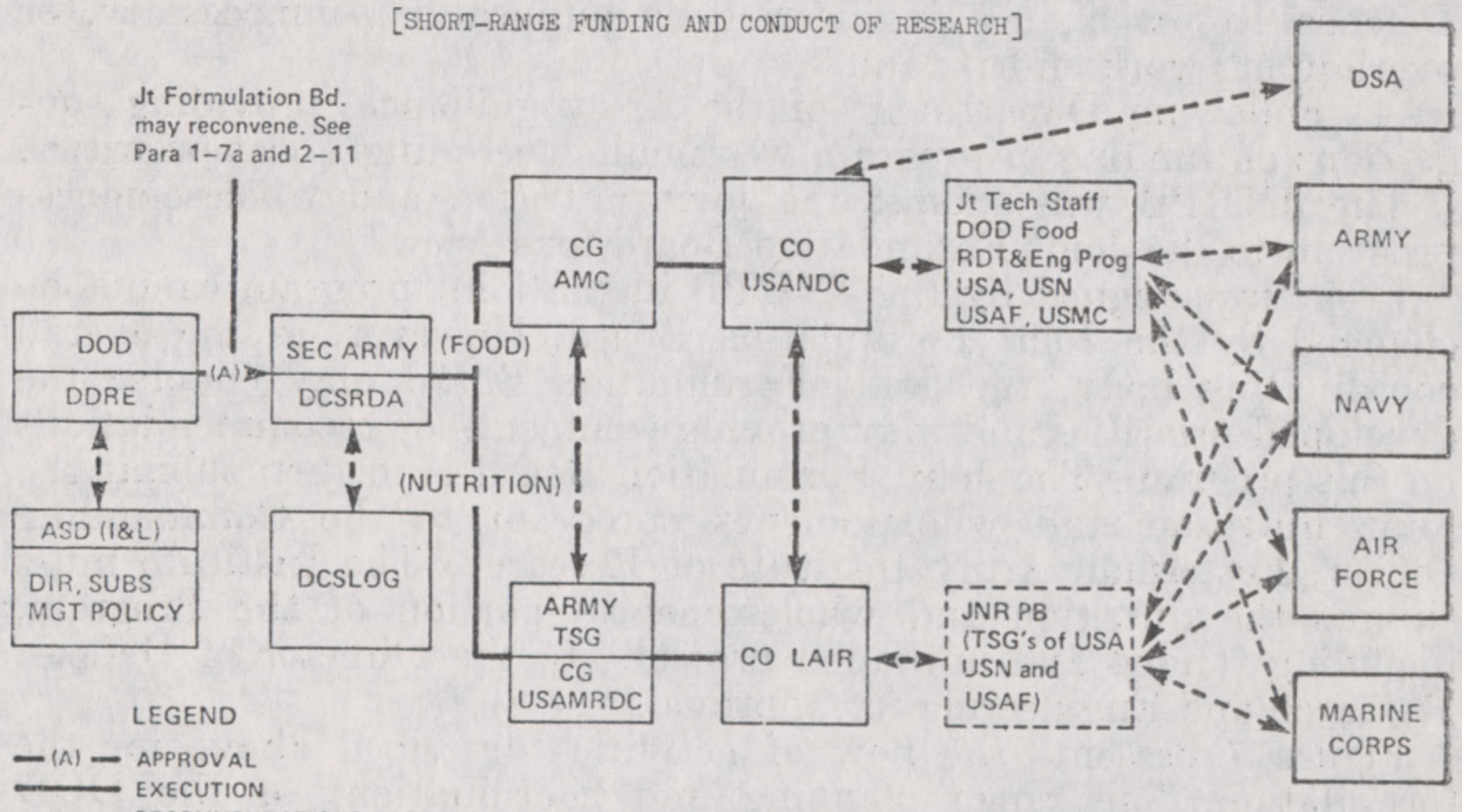


FIGURE 8

Abbreviations

AMC	US Army Materiel Command
ASD(I&L)	Assistant Secretary of Defense (Installations and Logistics)
BFY	Budget fiscal year
BRC	Budget Review Committee
CBE	Command Budget Estimates
CERL	Construction Engineering Research Laboratory
CFY	Current fiscal year.
CD	Contract definition
CG	Commanding general
CDR	Commander
COB	Command operating budget
DA	Department of the Army
DASC	Department of the Army Systems Coordinator
DCSLOG	Deputy Chief of Staff for Logistics
DCSOPS	Deputy Chief of Staff for Operations and Plans
DCSRDA	Deputy Chief of Staff for Research, Development, and Acquisition
DDRE	Director of Defense Research and Engineering
DEVA	Development acceptance
DGSC	Defense General Supply Center Dir Subs Mgt
Plcy	Director for Subsistence Management Policy
DPSC	Defense Personnel Support Center
DSA	Defense Supply Agency
DOD	Department of Defense
FGM	Fiscal guidance memorandum
FYDP	Five-Year Defense Program
IPR	In-process review
LAIR	Letterman Army Institute of Research
LOA	Letter of Agreement
LR	Letter Requirement
LP–U	limited production urgent
OMA	Operations and Maintenance, Army
OMB	Office of Management and Budget (formerly BOB)
PBAC	Program Budget Advisory Committee
PBD	program/budget decision
PCD	program change decision
PDM	program decision memorandum
PGRC	Program Guidance and Review Committee
POM	program objectives memorandum
PSC	protoype system characteristics
PV	production validation
PWR	project work review
R&D	research and development
RDTE	research, development test, and evaluation
RDT&Eng	research, development, testing, and engineering
SA	Secretary of the Army
SDP	system development plan
SECDEF	Secretary of Defense
SELCOM	Select Committee
sp	special
TDA	tables of distribution and allowances
TFGM	tentative five-year fiscal guidance memorandum
TFY	target fiscal year
TOE	tables of organizational and equipment
TSG	The Surgeon General
USA	United States Army
USAF	United States Air Force
USAMRDC	United States Army Medical Research and Development Command
USAN DC	United States Army Natick Development Center
USATRADOC	United States Army Training and Doctrine Command
USMC	United States Marine Corps
USN	United States Navy

(3) HUMAN NUTRITION RESEARCH SUPPORTED BY THE DEPARTMENT OF DEFENSE

Although the regulations described above were issued on June 20, 1975, and became effective on August 15, 1975, the actual centralization of the DOD human nutrition research program was accomplished before the regulations were issued. During FY 1974 and early FY 1975, the US Army Medical Research and Nutrition Laboratory at the Fitzsimons Army Medical Center in Denver was moved to the Letterman Army Institute of Research (LAIR) in the Presidio of San Francisco. Within the Institute a Department of Nutrition was established. As a result of the move and reorganization, "the productivity for FY 74 and the first part of 75 has been markedly reduced because of the loss of personnel . . . The productivity of the organization is still not back to the level desired, principally because of the difficulty in recruiting and San Francisco is not a good location to attract people for employment on government wages." [71] The new Department of Nutrition has been authorized 87 positions.

To obtain information on human nutrition research projects supported by DOD in FY 1975, seventy-six work unit summary sheets were obtained through a requested search of the DOD Research and Technology Work Unit Information System. The system is operated and maintained by the Defense Documentation Center For Scientific And Technical Information.[72]

Summary sheets were then classified by human nutrition research categories. Research projects funded through the military services but performed in university laboratories were considered and tabulated as extramural research. Research projects funded by the military services and conducted in military laboratories were considered and tabulated as intramural research.

Table II presents human nutrition research projects supported by DOD in FY 1975.

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[71] Personal communication with John E. Canham, M.D., Col. MC, Commanding Officer, Department of the Army, Letterman Army Institute of Research, Presidio of San Francisco, April 22, 1975.

[72] Requested search and subsequent system information provided by Dr. Vicent G. Waldron, Chief of Information Retrieval, Defense Documentation Center For Scientific And Technical Information, in personal communication May 8, 1975.

TABLE II.—HUMAN NUTRITION RESEARCH SUPPORTED BY THE DEPARTMENT OF DEFENSE, FISCAL YEAR 1975 [1]

Awarding organization	Nutrition requirements [2]		Food composition [3]		Dietary surveys and status [4]		Disease and diet [5]		Metabolic defects [6]		Total by category	
	Number of projects	Federal funds	Number of projects	Federal funds	Number of projects	Federal funds	Number of projects	Federal funds	Number of projects	Federal funds	Number of projects	Federal funds
I. Air Force:												
Intramural	2	$97,000					1	$43,000			3	$140,000
Extramural											0	0
Air Force subtotal	2	97,000					1	43,000			3	140,000
II. Army:												
Intramural	14	1,589,000	2	210,000	1	60,000	2	13,000			19	1,872,000
Extramural	2	65,000	1	30,000	1	14,000	3	129,000			7	238,000
Army subtotal	16	1,654,000	3	240,000	2	74,000	5	142,000			26	2,110,000
III. Navy:												
Intramural	2	77,000					1	81,000			3	158,000
Extramural	3	165,000					2	57,000			5	222,000
Navy subtotal	5	242,000					3	138,000			8	380,000
IV. Department of Defense totals:												
Intramural	18	1,763,000	2	210,000	1	60,000	4	137,000	0	0	25	2,170,000
Extramural	5	230,000	1	30,000	1	14,000	5	186,000	0	0	12	460,000
DOD total	23	1,993,000	3	240,000	2	74,000	9	323,000	0	0	37	2,630,000

[1] Information provided by Dr. Vincent G. Waldron, Chief of Information Retrieval, Defense Documentation Center for Scientific and Technical Information, May 8, 1975. 76 data sheets on nutrition projects were obtained as work unit summaries from the DOD research and technology work unit information system. These data were then classified by agency, category, and funding mechanism, then tabulated.

[2] What's needed: Optimum, normal human nutrition requirements, nutrient function and metabolism, malnutrition (nutrient deficiency or excess), neuroendocrine-nutrient interreactions, fundamental intermediary metabolism involving the role of 1 or more nutrients.

[3] What's available: Composition of foods, food cost plans, nutrient analysis of foods (old as well as new methods), National Nutrient Data Bank (NNDB).

[4] What's consumed: Dietary or food consumption surveys, current dietary practice or habits, nutritional surveillance and status, nutrition education.

[5] What's applied: Disease or clinical nutrition, dietary therapy, effect of disease on nutrition, environmental toxicants, alcohol and nutrition, nutrition and cancer, nutrition and vision research, etc.

[6] What's not utilized: Malabsorption syndromes, inborn errors of metabolism, familial or inherited nutritional defects.

(4) DISCUSSION AND COMMENTS—TABLE II

In FY 1975, the Department of Defense supported thirty-seven human nutrition research projects at a cost of $2,630,000. Intramural research comprised approximately 68 percent of the total program, and represented about 80 percent of the total project support.

The category of "Nutrition Requirements" described approximately 62 percent of the total number of research projects, and about 75 percent of all DOD nutrition research support. While DOD supported no projects that could be classified "Metabolic Defects", about 2 percent of all human nutrition research projects, and approximately 12 percent of total nutrition research support was devoted to projects on "Disease and Diet." Food composition studies and research on dietary status together represented less than 10 percent of all projects, and about 11 percent of all research support.

The Army supported 70 percent of all nutrition projects with an allocation of approximately 80 percent of total DOD human nutrition research funds. The Navy ranked second, sponsoring 21 percent of all projects with about 15 percent of total support. The Air Force performed 8 percent of this research at an expenditure which represented an estimated 5 percent of all DOD human nutrition research funds.

The data presented on Table II appear to reflect the administrative and executive responsibilities outlined in the June 20, 1975 regulations on the DOD Food Research, Development, Testing, and Engineering Program for the military services. The Army effort in human nutrition research, in numbers of projects and DOD funds, greatly exceeds that of the Navy and the Air Force combined. Furthermore, the Army is the only service to support studies on food composition and dietary status. The new regulations designate the Army, specifically The Surgeon General of the Army, as the DOD Executive Agent for Nutrition. Data on Table II appear to suggest that the Army had already assumed the functions of the DOD Executive Agent for Nutrition prior to the issuance of the new regulations.

(5) SUMMARY—DOD HUMAN NUTRITION RESEARCH

Today, as in the past, the underlying purpose of human nutrition research in the Department of Defense is the maintenance of health by means of feeding troops in military operational environments. Such research supported by the Army includes studies on nutrient requirements of sedentary, training, and combat military personnel in various climates. Human nutrition research administered or performed by the Navy emphasizes nutritional requirements of military personnel who are on, in, or under the sea. This research performed by the Air Force investigates the nutrients required by flight personnel.

An examination of the FY 1975 work unit summary sheets for human nutrition research in DOD provided an insight into the present administration and performance site for these research projects.

Four divisional branches of the Army Medical Research and Development Command (USAMRDC) administered six extramural human nutrition research projects. These divisions were: (1) Bio-

medical Stress Research Division; (2) Surgical Divisions; (3) Internal Medicine Research Division; and (4) Institute of Surgical Research. The Letterman Army Institute of Research, which is also part of the USAMRDC, administered 13 and conducted in-house 14 human nutrition research projects; similarly, the Institute of Surgical Research performed 2 in-house human nutrition experiments. The Army Research Office at Duke Station in North Carolina administered 1 extramural human nutrition investigation. The remaining extramural project on human nutrition was administered by Army Natick Development Center, which also performed three in-house studies. Natick uniquely administered an additional project which was conducted by the Letterman Institute.

The Naval Medical Research Institute administered and performed the three intramural human nutrition research studies for this service. The Office of Naval Research was the administrative subdivision for the Navy's five extramural nutrition projects.

A single facility, the School of Aerospace Medicine, was the responsible and performing organization for the three human nutrition research projects of the Air Force.

In FY 1975, the Letterman Institute did conduct the majority of intramural human nutrition research projects. The Natick laboratories appeared to be cooperating with Letterman as prescribed in the June 20, 1975 regulations. Overall, the nutrition research program of the Department of Defense is set forth in clear regulations which accurately describe its purpose, objectives, administrative approach, and underlying policy.

The relatively small level of recorded support provided for human nutrition research by the various units of the Department of Defense, as seen in Table II, does not adequately reflect the actual expenditures or interests of this Department in human nutrition research. The reason for this apparent inadequacy is that the cost of facilities and personnel, overhead, etc., are not included in Federal funds as identified in Table II for intramural projects. As already noted, intramural projects represented 80 percent of the total support of the DOD nutrition research program. It is true, however, that DOD activities in nutrition, food preservation, and specialized rations development is probably considerably less than it was a decade or so in the past.

D. The Department of Health, Education, and Welfare (DHEW)

(1) overview

Nutrition research activities at the Department of Health, Education, and Welfare (DHEW) originated in part from: (1) a prevailing weight of scientific opinion around the turn of the century that pellagra was an infectious disease, and (2) the ultimate findings during the early 1900's by Dr. Joseph Goldberger of the U.S. Public Health Service that pellagra was instead a nutritional deficiency disease.

This disease, manifested by stomach upsets, diarrhea, dizziness, and "flaming" skin became noticeably prevalent among the poor families of the Southern States immediately following the turn of the century. In 1914, already appointed as the leader of a 41-man Public Health

Service team to study the causes of pellagra, Dr. Goldberger was dispatched from Washington to advise the Mississippi State Health Department, at its request, on an outbreak of pellagra. Among other observations, Goldberger noted that the younger boys in a Mississippi orphanage were eating meals consisting mainly of carbohydrate, while the older boys who were engaged in heavy farm work consumed larger daily rations that included milk and meat. The latter group showed no evidence of pellagra.

On June 26, 1914, Goldberger announced his views that pellagra was a nutritional deficiency disease, and he spent the remainder of his life at the Hygenic Laboratory of the Public Health Service and in various studies in the South in search of an inexpensive pellagra-preventing factor. Dr. Goldberger believed that such a factor must exist, probably in brewer's yeast, which he accidently discovered as a source of the preventive factor in "blacktongue" experiments on dogs.[73]

The final identification of the anti-pellagra dietary deficiency factor, namely niacin, remained for others to discover, but the comprehensive study of nutrition as it related to disease prevention was thus begun and still continues within the Public Health Service.

Dr. Goldberger's research services around the country were drawn from the Public Health Service Commissioned Corps which had been authorized by Congress in 1889 as a mobile corps subject to duty anywhere upon assignment. In 1912, prior to Dr. Goldberger's pellagra assignment, the Public Health Service had already been expanded to provide for research on problems other than communicable diseases. Such research, including human nutrition research, was continued in the Nutrition Section of the Hygienic Laboratory at 25th and E Streets NW., Washington, D.C., where new buildings had been constructed in 1904.[74]

It was here that Drs. Sebrell, Isbell, Doft, Frazier, and Lilly were still conducting research on nutritional disorders and optimal diets for the prevention of diseases even as new and larger laboratories had been authorized by Congress for construction at Bethesda, Maryland, in 1938.[75] In the meantime, the Ransdell Act of 1930 had redesignated the Hygienic Laboratory as the National Institute of Health.[76]

In 1947, the old "Sebrell" Laboratories of Nutrition, Chemistry, and Pathology, by then located at Bethesda, were incorporated under the Experimental Biology and Medicine Institute. In 1950, both the Institute and the laboratories were authorized by the Omnibus Medical Research Act to become the National Institute of Arthritis and Metabolic Diseases. In 1953, the Laboratories of Nutrition, Chemistry, and Pathology became the Laboratory of Nutrition and Biochemistry. Between 1959 and 1960, some classical nutrition was slightly de-emphasized, and the Laboratory of Nutrition and Biochemistry became the Laboratory of Nutrition and Endocrinology. In the years 1961 through 1972, a proliferation of specialized

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[73] Williams, Ralph C. The United States Public Health Service, 1798–1950. Washington, Commissioned Officers Association of the United States Public Health Service, 1951, p. 270–279.

[74] National Institutes of Health. NIH Almanac 1974. Bethesda, Maryland, Department of Health, Education, and Welfare, 1974. p. 2–3.

[75] Information provided in personal communication with Ernest C. McDaniel, Biochemist, Public Health Service Officer, Laboratory of Nutrition and Endocrinology, National Institute of Arthritis, Metabolism, and Digestive Diseases, December 3, 1975.

[76] NIH Almanac, op. cit., p. 2–3.

laboratories ensued: these laboratories may have conducted some research on nutrition at the molecular, cellular, or metabolic levels. The establishment of these specialized laboratories included: (1) the Laboratory of Molecular Biology in 1961; (2) the Laboratory of Chemical Biology in 1963; and (3) the Laboratory of Chemical Physics in 1972.[77]

Although the nature of intramural nutrition research in the Public Health Service may be considerably different today than that initiated by Dr. Goldberger and later by Dr. Sebrell, the Laboratory of Nutrition and Endocrinology which remains in 1975 as a research facility at the National Institute of Arthritis, Metabolism, and Digestive Diseases, also appears to be the logical evolutionary descendent of the original United States Public Health Service Corps laboratories of the 1914 to 1938 time period.

In 1975, human nutrition research supported by DHEW is still concentrated within the agencies of the Public Health Service. Figures 9, 10, 11, 12, 13, and 14 present the organizational structure of the Public Health Service, and each of its agencies. Each figure has been highlighted to note the respective units within the agencies which either administer or perform this research.

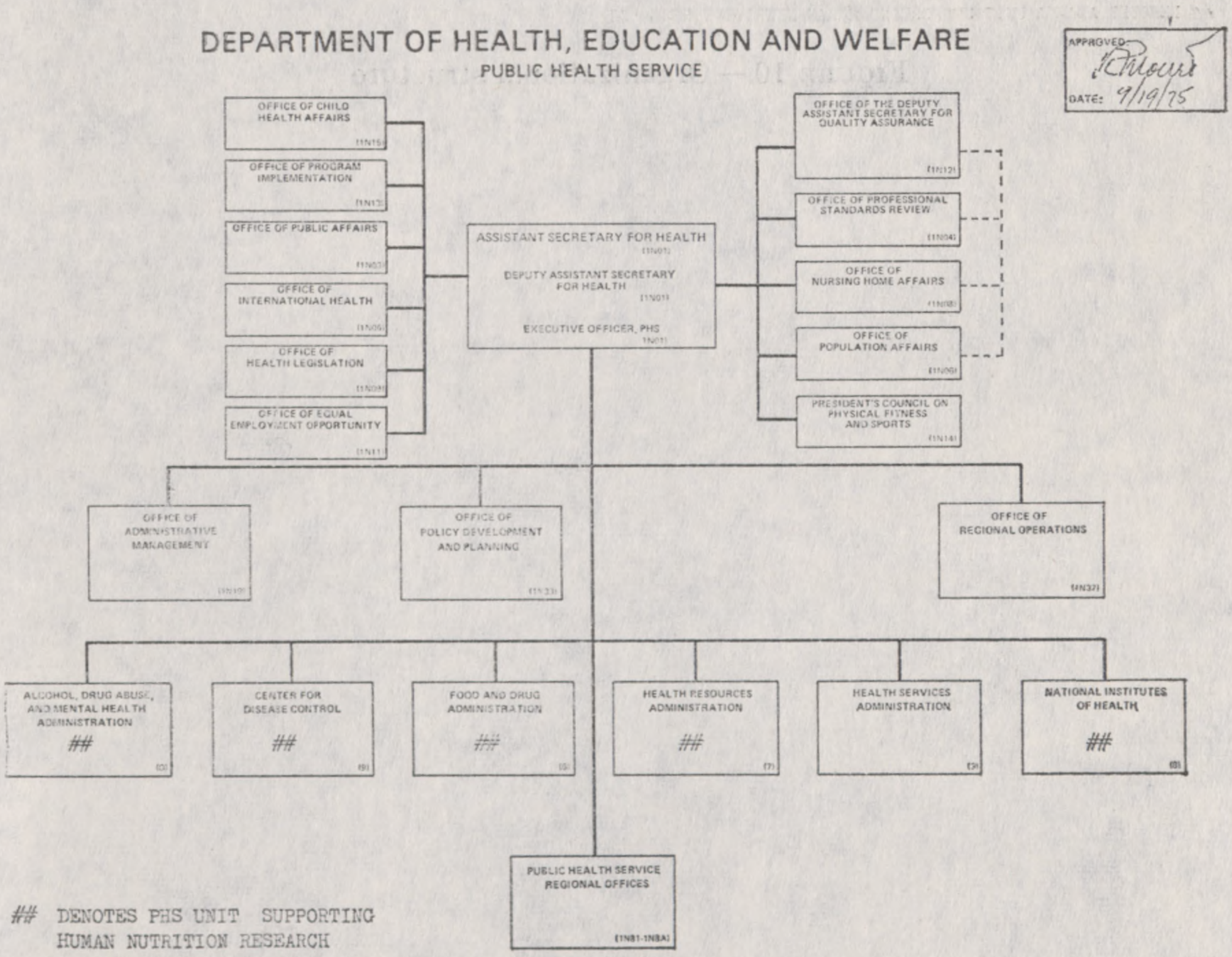


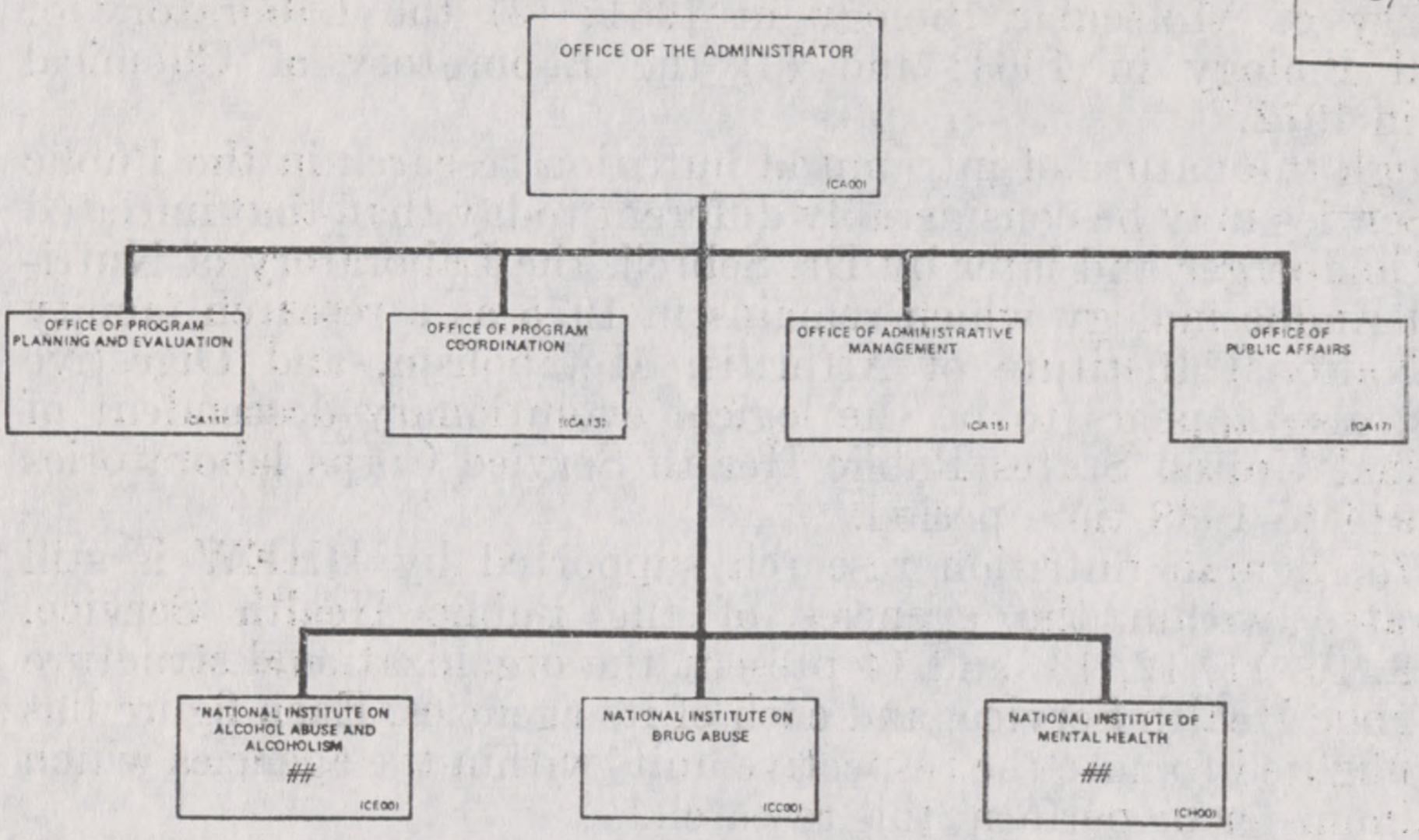
FIGURE 9.—Organizational structure

[77] Information provided in personal communication with Dr. Martin Rodbell, Chief, Laboratory of Nutrition and Endocrinology, National Institute of Arthritis, Metabolism, and Digestive Diseases, December 5, 1975.

DEPARTMENT OF HEALTH EDUCATION AND WELFARE
PUBLIC HEALTH SERVICE

Alcohol, Drug Abuse, and Mental Health Administration

APPROVED: [signature]
DATE: 8/4/75



DENOTES ADAMHA UNIT SUPPORTING HUMAN NUTRITION RESEARCH

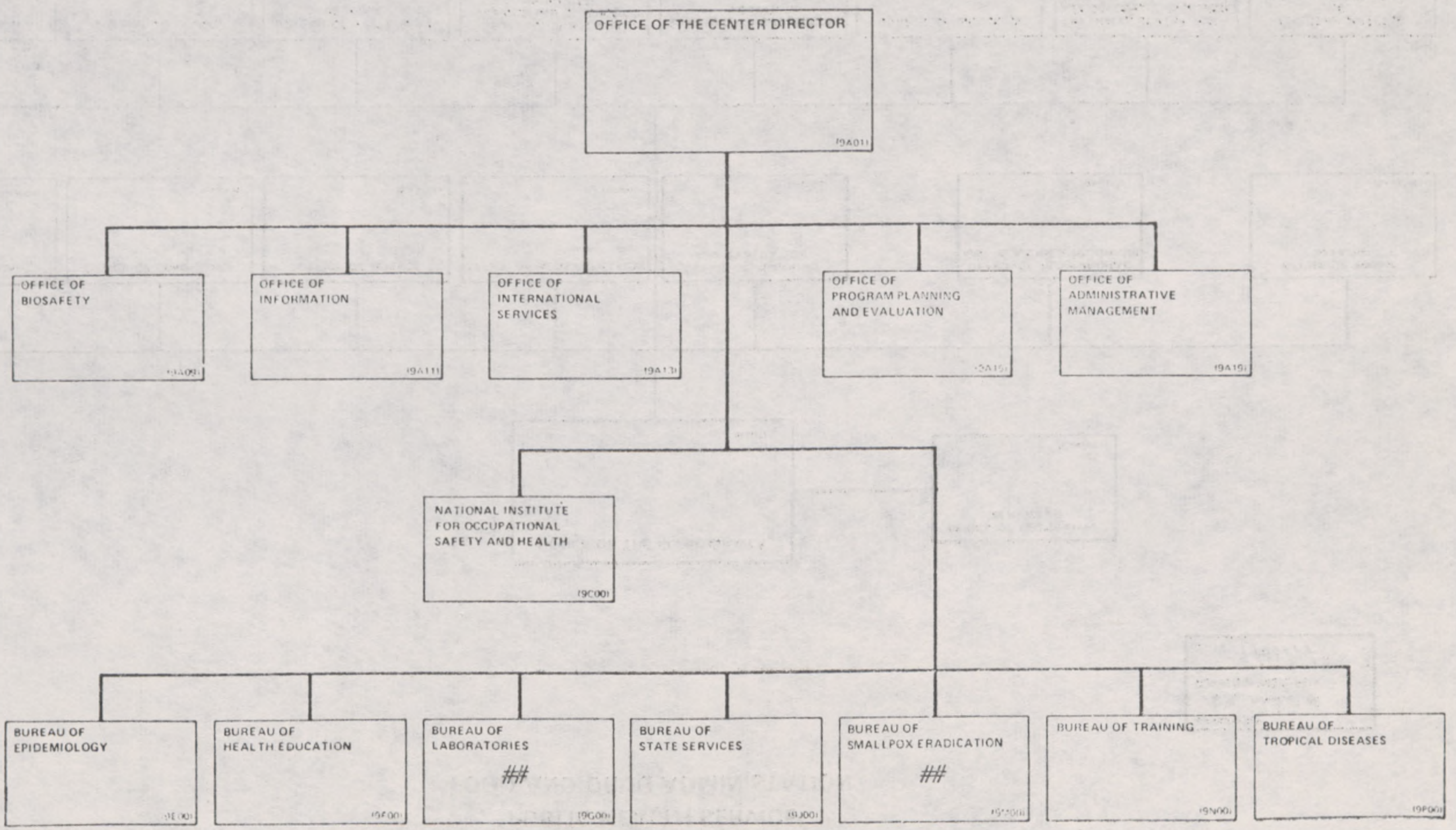
FIGURE 10.—Organizational structure

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

PUBLIC HEALTH SERVICE

CENTER FOR DISEASE CONTROL*

APPROVED CDC
David Kenner
DATE 9-30-74



*Located in Atlanta, Georgia

DENOTES UNIT OF CDC SUPPORTING HUMAN NUTRITION RESEARCH

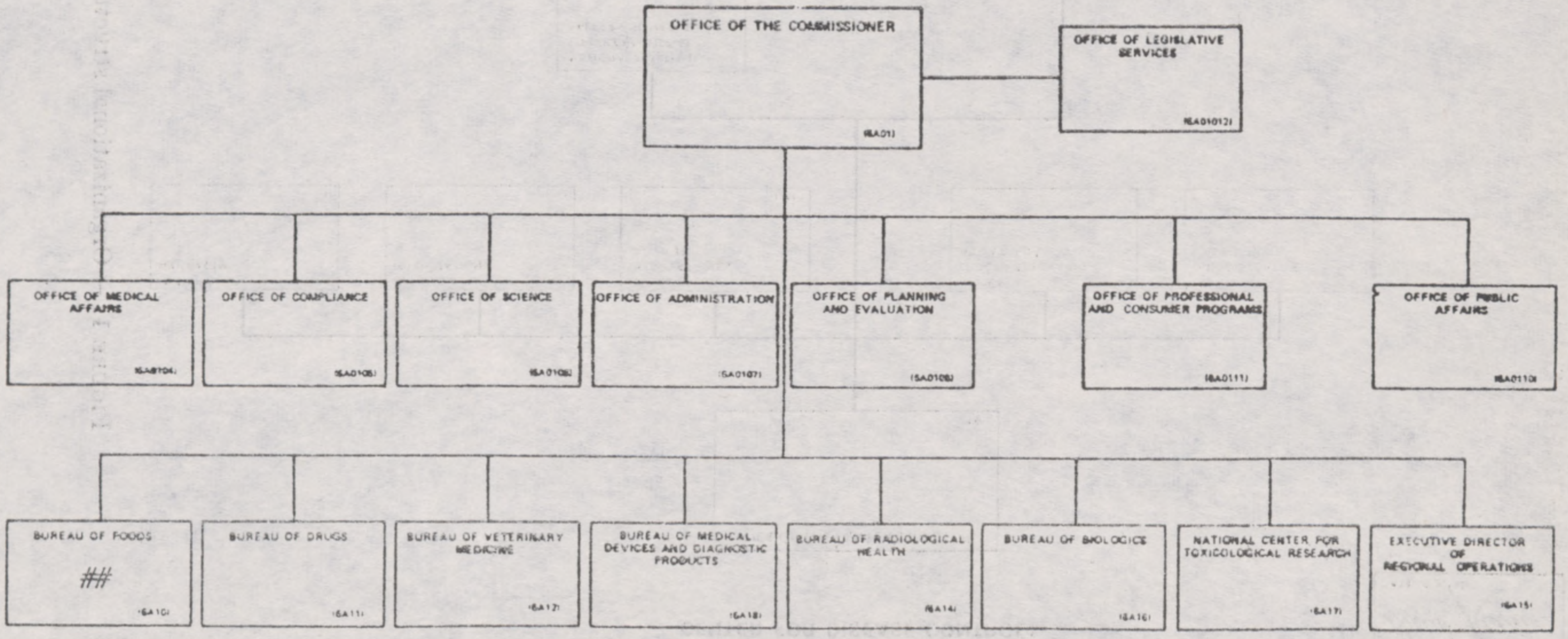
FIGURE 11.—Organizational structure

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

PUBLIC HEALTH SERVICE

FOOD AND DRUG ADMINISTATION

APPROVED:
COMMISSIONER, FDA
DATE: 7/31/74

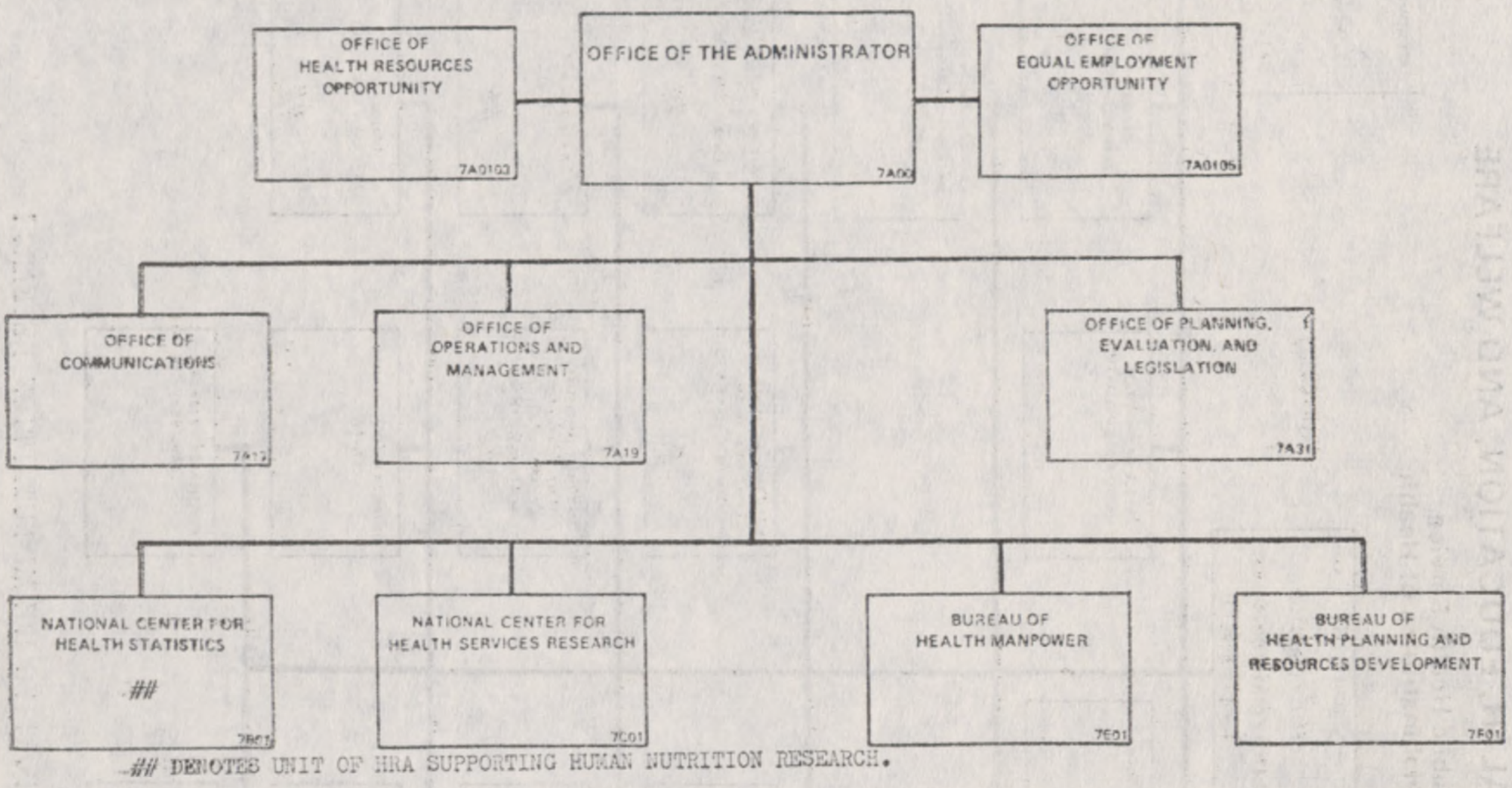


DENOTES UNIT OF FDA SUPPORTING HUMAN NUTRITION RESEARCH

FIGURE 12.—Organizational structure

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
HEALTH RESOURCES ADMINISTRATION

APPROVED: [signature]
DATE: 6/2/75



DENOTES UNIT OF HRA SUPPORTING HUMAN NUTRITION RESEARCH.

FIGURE 13.—Organizational structure

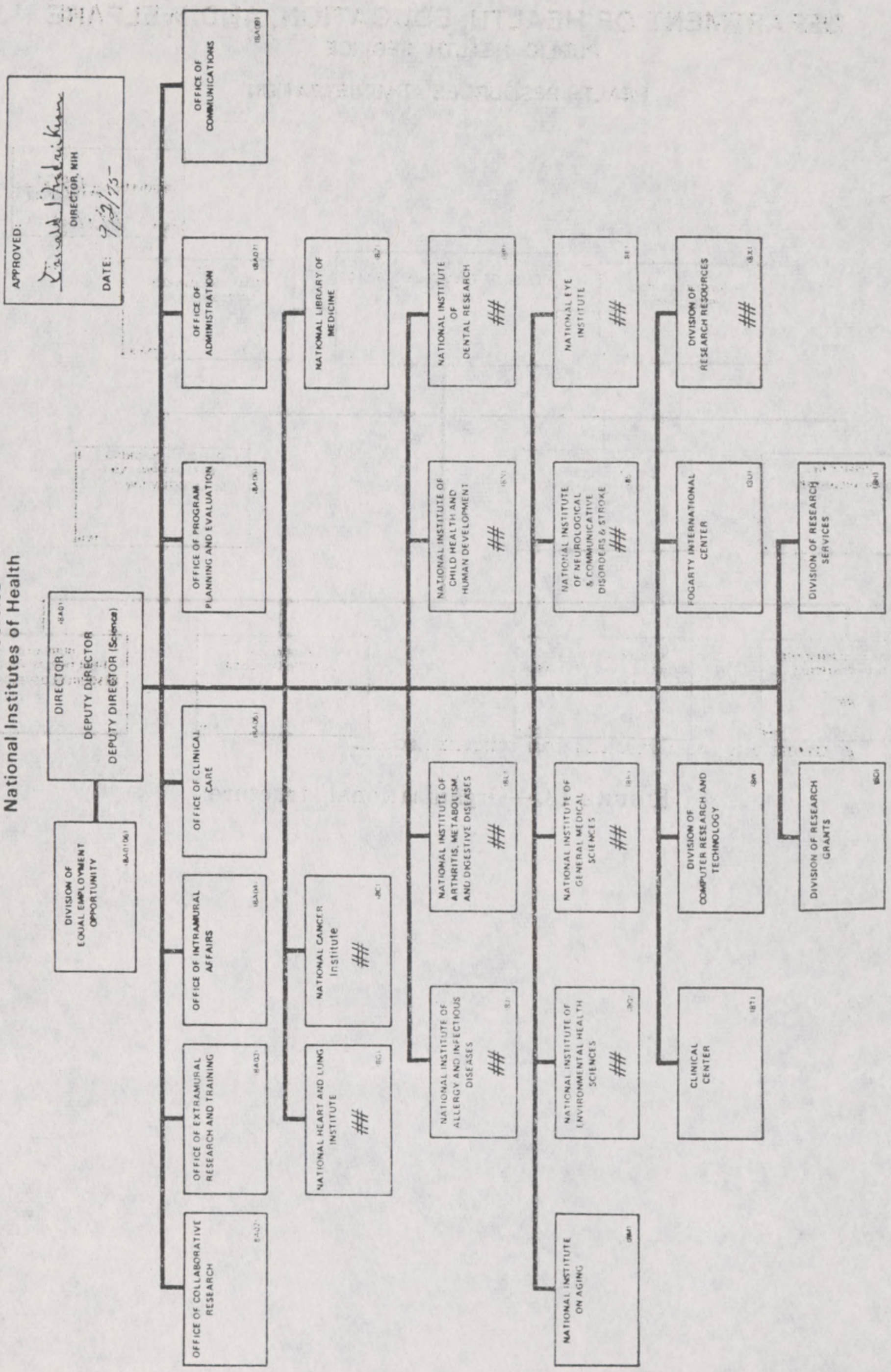


FIGURE 14.—Organizational structure

All of these agencies hold section 301, Research and Investigation in General, of the Public Health Service Act as the legislation under which human nutrition research is authorized. Section 301 does not specifically mention nutrition research, but does state in part that:

> The Surgeon General shall conduct in the Service, and encourage, cooperate with, and render assistance to other appropriate public authorities, scientific institutions, and scientists in the conduct of, and promote the coordination of, research, investigations, experiments, demonstrations, and studies relating to the causes, diagnosis, treatment, control, and prevention of physical and mental diseases and impairments of man . . .[78]

In addition to section 301 of the Public Health Service Act, each agency within the Service could perform human nutrition research pursuant to other sections of this Act, and also to various parts of the Food, Drug, and Cosmetic Act. Table D below presents some of the legislative authorities which have been cited by the agencies within the Public Health Service to perform human nutrition research.

TABLE D.—LEGISLATIVE AUTHORITIES OF THE DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE TO PERFORM HUMAN NUTRITION RESEARCH[1]

Organizational unit of DHEW	Legislative authority	Description
Alcohol, Drug Abuse, and Mental Health Administration (ADAMHA).[2]	Public Health Service Act	Sec. 301: Health research and investigation in general. Sec. 303: Mental health. Grants and traineeships provided for mental health pursuant to sec. 301.
Center for Disease Control (CDC)[3]	Public Health Service Act	Sec. 301: Health research and investigation in general. Sec. 308: International cooperation in health research and training.
Food and Drug Administration (FDA).[4]	Public Health Service Act	Sec. 301: Health research and investigation in general.
	Food, Drug, and Cosmetic Act	Sec. 401: Definitions and standards for food. Sec. 403: Misbranded food.
Health Resources Administration (HRA).[5]	Public Health Service Act	Sec. 301: Health research and investigation in general. Sec. 305: Health and nutrition examination survey (HANES).
National Institutes of Health (NIH).[6]	Public Health Service Act	Sec. 301: Health research and investigation in general. Sec. 413(a)(1): National heart, blood vessel, lung, and blood program. Coordination between National Heart and Lung Institute and all NIH shall provide for investigations into the nutritional influences involved in the epidemiology, etiology, and prevention of these diseases. Sec. 407(b)(4): National cancer program. Coordination between National Cancer Institute and all NIH shall provide for the collection, analysis, and dissemination, including information respecting nutrition programs for cancer patients and the relationship between cancer, useful in the prevention, diagnosis and treatment of cancer.

[1] Contents of this table have been verified by Mr. Joel M. Mangel, Deputy Assistant General Counsel for Public Health, in a written communication, Oct. 28, 1975. Mr. Mangel also noted: "I have not attempted to extend your list by adding any and all authorities which might deal with nutrition since this would require a major research undertaking. For example, sec. 319 of the PHS Act provides funds for health services to migrants. Under this authority, health services could be rendered to meet nutritional deficiencies. In addition, sec. 1003 of the PHS Act provides funds for research with respect to fertility control. Theoretically, nutrition research might have a bearing on fertility. Thus, nearly every categorical program may have a theoretical relationship to nutrition."

[2] Information verified by Mr. Joel M. Mangel, Deputy Assistant General Counsel for Public Health, in a written communication, Oct. 28, 1975.

[3] DHEW Memorandum to Dr. Myron A. Mehlman from Dr. Milton Z. Nichaman, Center for Disease Control representative, Nutrition Coordinating Committee, July 31, 1974.

[4] Personal communication with Mr. Terry Coleman, attorney, general counsel office, Office of the Secretary, DHEW, Oct. 22, 1975.

[5] DHEW Memorandum to Dr. Myron A. Mehlman from Dr. Daniel Whiteside, associate administrator for operations and management, Health Resources Administration, Aug. 5, 1974.

[6] Public Law 92–423, Sept. 19, 1972; Public Law 93–352, July 23, 1974.

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[78] U.S. Congress. House. Committee on Interstate and Foreign Commerce. [and] U.S. Congress. Senate. Committee on Labor and Public Welfare. Compilation of Selected Public Health Laws. (Joint Committee print) Washington, U.S. Government Printing Office, 1973. p. 33.

(2) EARLY EVOLUTION OF A DHEW POLICY ON THE HEALTH ASPECTS OF NUTRITION

(a) *Evaluation of human nutrition research activities in DHEW, 1973–75.*—On April 3, 1973, the Assistant Secretary for Health (Charles C. Edwards) formally established by memorandum a Nutrition Coordinating Committee of DHEW. The purpose of this Committee was to "provide a central focus for nutrition in the Department, and to promote research, policy, and program coordination." [79]

On May 2, 1974, Dr. Myron A. Mehlman, Chairman of the Nutrition Coordinating Committee of DHEW, prepared a memorandum which was forwarded to the directors of each agency within the Public Health Service. This memorandum requested information on the intramural and extramural human nutrition research, training, and service activities "currently underway" in these agencies.[80] The responses of the various agency directors to Dr. Mehlman's request were dissimilar in form, content, and interpretation of the "current" reporting time period. However, the information which was provided in response to Dr. Mehlman's inquiries was summarized early in 1975, and included information on nutrition research and training in the Public Health Service during FY 1973 and FY 1974.[81]

In FY 1974 the Health Services Administration (HSA) supported about 14 different research projects in human nutrition. These studies varied from investigations conducted by the National Academy of Sciences, to nutritional problems under research at leading American universities, to Public Law 480 nutrition research overseas, to ascorbic acid and malnutrition studies of Navajo Indians, to projects conducted for and funded by the National Aeronautics and Space Administration at the U.S. Public Health Service Hospital in San Francisco. The total recorded funds for these projects in FY 1974 were just over $500,000. Education and training activities in nutrition and dietetics in HRA consisted of numerous graduate level training projects, specialized internships, and workshops in public health and/or nutrition departments in American universities. In FY 1974 31 such extramural nutrition education projects were funded at a total cost of nearly $600,000 by HRA. Intramural projects in FY 1974 were largely those administered by the Indian Health Service, HRA, and included 11 such studies operating at a recorded cost of about $260,000.

For the same fiscal year, the costs of nutrition research and research training activities were determined for the Food and Drug Administration (FDA), the National Center for Health Statistics (NCHS), and the Center for Disease Control (CDC). The breakdown was reported as follows:

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[79] Personal communication with Ms. Laurel Carson, Program Analyst, Division of Health Protection Health Financing Staff, Office of the Assistant Secretary for Health, November 25, 1975. The last meeting of the Committee was held November 15, 1974.

[80] The 1974–1975 series of memoranda and background working papers between the agencies and the Office of Special Health Projects was initially provided on May 14, 1975 by Dr. Myron A. Mehlman, Special Associate Director for Program Planning and Evaluation, NIH, DHEW.

[81] Summary prepared by Drs. Mitchell, Mehlman, and McLaughlin, January 27, 1975.

Agency	Research	Education	Surveillance
FDA	$15,781,000 of which $1,000,000 was intramural.	$960,000	
CDC	$366,209		$1,061,000.
NCHS			$2,000,000 for fiscal year 1973 and fiscal year 1974.

The CDC supported research on nutritional status and surveys. The NCHS figure represented the costs of the Health and Nutrition Examination Survey (HANES). The nature of the relatively large sum reported for nutrition research within the FDA was not specified, but did relate to all FDA activities concerning food and nutrition, except regulation.

Human nutrition research projects supported by the National Institutes of Health (NIH) were analyzed and reported for FY 1973. The information was presented in text and tabular forms, and described the nutrition studies according to a group of categories in the Division of Research Grants reporting system.[82] The results of the FY 1973 NIH analysis of human nutrition research projects have been condensed and reproduced in Table E below:

TABLE E.—NIH NUTRITION RESEARCH BY CATEGORY, FISCAL YEAR 1973 [1]

Categories	Number of projects	Cost
Biomedical and metabolic studies: [2]		
Vitamins	101	$4,472,000
Lipid studies	51	2,581,000
Trace minerals	26	1,236,000
Insecticides and nutrition	2	70,000
Nutrition and "the pill"	14	773,000
Subtotal	280	12,372,000
Nutrition and diseased states: [3]		
Cardiovascular disease	31	2,651,000
Cancers	21	1,360,000
Diabetes	21	1,294,000
Other diseases	100	3,928,000
Obesity	15	766,000
Subtotal	188	9,999,000
Organ system function: [4]		
Growth and development	67	4,188,000
Other activities	102	4,241,000
Subtotal	169	8,429,000
Food products: [5]		
Carcinogenesis	10	654,000
Nutrient content	7	195,000
Toxicology studies	5	536,000
Subtotal	22	1,385,000
Multifacet heterogenous group [6] subtotal	57	3,733,000
NIH nutrition research total, fiscal year 1973	720	36,198,000

[1] Data assembled and forwarded to Dr. Myron A. Mehlman by Dr. DeWitt Stetten, Jr., Deputy Director for Science, National Institutes of Health, in a memorandum dated Jan. 3, 1975. These numbers of projects and cost represent only the extramural nutrition research program of NIH during fiscal year 1973.

[2] Biomedical and metabolic studies: Consists of studies concerned with nutritional biochemistry or metabolism in a normal or nondiseased state.

[3] Nutrition and diseased states: Consists of studies concerned with nutrition in a diseased state, or of specific nutritional disorders such as hypoglycemia, obesity, etc.

[4] Organ system function: Consists of studies concerned with the effects of nutritional factors on physiologic functions in specified organs in normal or diseased states, and the effects of organ system functions on nutrition such as food intake behavior, lactation, etc.

[5] Food products: Consists of studies concerned with the food product itself, and not nutrition per se.

[6] Multifacet heterogenous group: (a) Consists of broad studies of nutrition or malnutrition where many aspects of nutrition are examined; (b) Consists of studies involving 2 or more unrelated nutrition studies.

[82] The broad categories employed by NIH and Drs. Mitchell, Mehlman, and McLaughlin in their summaries of human nutrition research in NIH during FY 1973 do not coincide with the categories of human nutrition research defined by the authors of this report.

(*b*) *DHEW policy statement on the health aspects of nutrition.*—Paralleling the final evaluation of the Nutrition Coordinating Committee of DHEW, the Office of the Assistant Secretary for Health undertook the development of a DHEW Policy Statement on the Health Aspects of Nutrition. On February 7, 1975, the Acting Assistant Secretary for Health (Theordore Cooper) presented to the Secretary DHEW (Caspar W. Weinberger) such a statement. The document was proposed "as an informative expression of this Department's commitment to improving the nutritional status of all Americans and a step toward the development of a national policy on nutrition. . . . It is intended to provide a pattern of priorities to guide DHEW agencies in the planning and conduct of their nutrition-related programs." [83]

In March 1975, the proposed DHEW Policy Statement on the Health Aspects of Nutrition was adopted by the Secretary.[84] The Secretary also confirmed the responsibility of the Health agencies of the Department to coordinate the development of nutrition plans and policies for all DHEW, and requested that details outlining the translation of the policy statement into a coherent nutrition program plan be incorporated into the 1977–1981 revision of the Forward Plan for Health.[85] The policy statement has been reproduced verbatim below:

DHEW POLICY STATEMENT ON HEALTH ASPECTS OF NUTRITION

PURPOSE AND SCOPE

Adequate food and sound nutrition are essential to good health. Not only are they crucial for human survival and key factors in the prevention and recovery from illness, but they are prerequisites for improving the quality of life of Americans and other peoples of the world.

Enunciation of a nutrition policy at this time reflects the growing concern of the Department, the scientific community, and the public about the role of nutrition in human health and a greater recognition of the opportunities for enhancing the Nation's health through improved nutrition.

The health dimensions of nutrition range from problems of malnutrition, obesity, and the quality and safety of the food supply, to the links between the foods we eat and the development of disease. These and related problems can be addressed productively if the resources and energies of DHEW are focused more deliberately on achieving the objectives of a common nutrition policy and if communications among DHEW agencies and relationships with other Federal Departments are strengthened.

The policy statement describes the Department's major program objectives with respect to the health aspects of nutrition. The statement also serves as a framework around which DHEW agencies can shape program initiatives, increase or redirect resources, and establish more collaborative relationships among themselves, and other Departments, and with the non-Federal sectors.

OBJECTIVES

The goal of the nutrition policy is to improve the quality of life by enabling all Americans to reap the health benefits of sound nutrition.

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[83] Memorandum from Theodore Cooper, Acting Assistant Secretary for Health, to the Secretary, DHEW, dated February 7, 1975.

[84] Personal communication with Theodore Cooper, Assistant Secretary for Health, October 3, 1975.

[85] Memorandum from Theodore Cooper, Acting Assistant Secretary for Health, to all Public Health Service Agency Heads, dated April 2, 1975.

1. A high priority is to ensure that every American has access to an adequate supply of wholesome food which provides all nutrients known to be essential to maintain or improve health and vitality.

To the extent that the supplemental income programs of DHEW affect access to nutritious food, the Assistant Secretary for Health shall work with the Commissioners of the Social Security Administration and the Social and Rehabilitation Service to develop Departmental nutrition policy. Special attention shall be directed at the relationship between sound nutrition, the availability and cost of food, and policies of the Department of Agriculture.

2. Nutrition concerns shall permeate all health-related activities. Nutrition shall become a mandatory component of these programs of public education, primary care and comprehensive health care funded or supported by the Department:

In the planning, organization, and implementation of health care systems;

As a vital part of direct health services available throughout the United States;

In health planning and the provision of services to those population subsets at special risk of malnutrition and who have concomitant, special nutrition requirements: infants, young children, pregnant and lactating women, and the aged;

In the management of diseases or other health problems which are initiated or aggravated by inappropriate or poor diets—e.g. dental caries, diabetes mellitus, hypertension, obesity, iron deficiency anemia, and certain forms of food allergy, phenylketonuria and other inborn errors of metabolism; and

In the training of nutrition and health-related personnel.

3. Monitoring activities will be needed to establish:

The Nutritional Status of the Nation. This shall be accomplished through general surveillance activities at the national level, and through local surveys of high-risk populations. Such monitoring shall include the identification and full assessment of the extent and location of nutritional problems according to region, income, food availability, ethnicity, and sex. This shall also include monitoring trends of the eating habits of the American people, as well as determining the long-range effects of chronic ingestion of various nutrients. Studies shall explore the immediate and long-term linkages between dietary habit, nutrition, and health;

The results of surveillance and monitoring shall be linked programmatically to activities of the Department to promote and enhance the health and well-being of the population; and

Safe and High-Quality Food. To ensure the consumption of safe and wholesome food and nutrients, it is required that there be determined the nutrient composition of foods and the presence of potentially hazardous substances—additives, artificial coloring and fortifiers—as well as inadvertent contaminants, infectious agents, toxins, or other dangerous materials as might naturally occur in foods. This also recognizes potential problems associated with the entry into the marketplace of foods of uncertain composition as well as variations in the quality of food that can result from changing agricultural practices, preparation, processing, packaging, transportation, and storage. Such measures require monitoring of food safety, basic and toxicological research and technical and financial assistance of State, local, and Federal governments. Finally, in order that the public may make safe and intelligent selection of foods, full and accurate labeling must be assured.

4. New knowledge shall be developed in the areas of:

Biomedical research in order to increase our knowledge of human nutritional requirements and improve our understanding of the individual and complementary action of the more than 40 nutrients known to be essential in human growth and development;

Special attention shall be given to understanding the role of balanced nutrition in the prevention and treatment of disease, the improvement of maternal and child health, and its effect on the aging process. Research shall also be directed towards helping to resolve the controversy concerning true human protein needs and the feasibility of relying more heavily on grain as a source of protein. This not only provides an opportunity for possible improvement of health, but also offers an opportunity for more equitable and improved grain utilization in the face of increasing world demand for food;

Behavioral research shall be directed at the problem of over-nutrition, including the study of the social and psychological factors contributing to overeating, obesity, and the wasting of food. It shall also focus on nutritional deficiencies and behavioral aspects of problems, such as alcoholism.

Nutrition assessment. Critical to these efforts is the development of more effective and inexpensive methods of appraising the nutritional status of population groups. Additional research is needed to define human nutritional planning, food labeling, and the early detection of subclinical deficiency states. This new knowledge shall be brought into the realm of applied efforts in order to take on the task of ameliorating and preventing disease through improved diet.

Health service delivery in order to better understand and improve methods of organizing, financing, and delivering nutritional services in our multidisciplinary health system and diversified society. Improved nutrition programs run by health departments, schools, churches, and other community organizations shall be a part of the national commitment to comprehensive health care.

Methods of health education aimed at improving the widespread transfer and prompt application of old and new knowledge about nutrition. This knowledge must be judged valid and accepted as beneficial by the scientific nutrition community and pertinent Federal agencies. Further, nutrition information shall be presented to consumers in ways that are useful in selecting foods appropriate to individual nutritional needs. Finally, efforts shall be directed towards improved nutrition education for children in school, along with better nutrition counseling of mothers and pregnant and lactating women, as well as better provision of information to the medical community and to the population at large.

(c) *Responses of the Public Health Service Agencies to the DHEW policy statement on the health aspects of nutrition.*—Part 4, New Knowledge, of the DHEW policy statement on the health aspects of nutrition, included three broad areas which could be characterized as human nutrition research. The statement entitled these areas: (1) biomedical research; (2) behavioral research; and (3) nutrition assessment. Furthermore, the statement noted in Part 3, Monitoring Activities, two subjects intimately related to the three nutrition research areas: (1) determining the nutritional status of the Nation, and (2) determining the nutrient composition and the presence of potentially hazardous substances in foods.

The task of incorporating detailed program plans and new initiatives under these five areas into the FY 1977–1981 Forward Plan For Health was initially thrust upon the administrators of each health agency, and was to be accomplished in approximately three months.

The methods which the health agencies employed to determine detailed program plans and new initiatives for nutrition research under the policy statement are generally unknown. However, it appears that each agency of the Public Health Service did rely on certain provisions of law, i.e., their legislative authorities mentioned above, as an aid in determining the scope of these nutrition activities. Furthermore, the agencies which operated under a more specific authority appeared to have less difficulty in examining the policy statement and selecting those areas of nutrition research germane to these authorities.

For example, the areas of nutrition assessment and determining the nutritional status of the Nation were jointly described in re-

sponses to the policy statement by the Center For Disease Control (CDC), and the National Center for Health Statistics (NCHS). Similarly, the Food and Drug Administration (FDA) presented current activities and future plans in the areas of food safety, quality, and composition. FDA also supplied a description of activities in the areas of biomedical research, and behavioral research; these plans and on-going studies emphasized the authority of the FDA to assure the efficacy of nutrients, and to protect and aid consumers in nutritional matters. The responses of the CDC, NCHS, and FDA were excerpted and published as Appendix II of the *Forward Plan For Health FY 1977–1981.*[86]

However, while two institutes within the National Institutes of Health (NIH), namely, the National Cancer Institute (NCI) and the National Heart and Lung Institute (NHLI), may support nutrition research programs under specific legislative authorities, all eleven institutes in NIH could support nutrition research under the general research provision. The tasks of integrating current nutrition research activities and of proposing new initiatives in nutrition research according to the policy statement for incorporation into the FY 1977–1981 Forward Plan For Health required substantial effort.

On April 3, 1975 a memorandum was circulated within NIH to inform the Directors of Bureaus, Institutes, and Divisions (BID Directors) that Dr. Myron A. Mehlman had been appointed to the position of Special Assistant to the Associate Director for Program Planning and Evaluation, NIH. The memorandum stated in part:

> Regardless of the validity of their conclusions, many leaders within the Congress, the Administration, and various elements of our society perceive that there is a major problem in the coordination of programs within the National Institutes of Health and the ability of the NIH to coordinate its programs with other Federal programs. There is, therefore, a need for NIH to address this issue.
>
> Thus I have asked Dr. Mehlman to initiate a study of the activities of NIH in the area of program coordination so that we can evaluate our present efforts and develop a better understanding of how we might become more responsive to the perceived needs of society.
>
> It was suggested that the most effective way to begin would be to study in depth the past history, present state, and possible future activities in a specific program. Nutrition, which has been identified as a major priority area within the Department, would seem to be an obvious choice. I have therefore asked Dr. Mehlman to study the area of nutrition as the first example of the issue and one from which we can identify some of the major problems and begin to develop some of the solutions.[87]

On April 10, 1975 notice was again given to BID Directors that Dr. Mehlman had been designated as coordinator of the NIH response to the DHEW Policy Statement on the Health Aspects of Nutrition. This memorandum briefly specified the scope of the desired response:

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[86] Public Health Service. Forward Plan For Health FY 1977-1981. Washington, U.S. Department of Health, Education, and Welfare, August 1975. p. 234–254.

[87] Memorandum from Dr. Ronald W. Lamont-Havers, Acting Director, NIH to Directors of Bureaus; Institutes, and Divisions, NIH, dated April 3, 1975.

. . . identify activities and resource levels of each institute for nutrition (both intramural and extramural) . . . relate them to the goals and objectives of the . . . policy statement . . . [and develop] a 'nutrition program plan' for the NIH . . .[88]

Each institute was directed to respond by April 22, 1975, and to designate an individual as a representative for that institute to Dr. Mehlman.

On April 18, 1975, Dr. Mehlman provided to the institutes' representatives a draft copy of the report, entitled "NIH Extramural Support of Research in Nutrition in Fiscal Year 1973," initially prepared by Dr. Mehlman when he acted as Coordinator of the Nutrition Coordinating Committee of DHEW.

By April 25, 1975, eight of the institutes had responded to the policy statement. On April 28, 1975 Dr. Mehlman circulated to the respondents copies of all of the individual responses, and another version of the FY 1973 nutrition research report which included available FY 1974 project and funding data gleaned from the responses.

Not until May 21, 1975, was another memorandum routed to the institutes' representatives. In this message, Dr. Mehlman stated:

Your responses to the earlier (April 10) request for this information were circulated in my April 28 memorandum to you. But there were enough gaps, inconsistencies and differences of interpretation in the responses received that I thought further discussion and agreements were needed before we could come up with an agreed upon document. However, time has run out now, and I would appreciate your looking over your initial response and seeing what you can give me quickly on the following:

1. How does your Institute intend to help carry out the policy statement on nutrition?
2. Relate your Institute's nutrition activities to the goals and objectives of the policy statement.
3. Include specific proposals for new initiatives and their costs (money and manpower) which will help achieve these goals, including redirecting of resources.

Please let me have your comments by phone . . . or in writing . . . by Friday, May 23.[89]

Responses of the institutes to this final request for information generally reiterated the data originally provided in the April 1975 series of memoranda.[90]

Although a complex series of individual responses to the policy statement were accumulated, no comprehensive summary of current or past human nutrition research activities within NIH was prepared. Similarly, a "nutrition program plan" for NIH was not accomplished in time to be included into the FY 1977–1981 Forward Plan for Health.[91]

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[88] Memorandum from Dr. Ronald W. Lamont-Havers, Acting Director, NIH, to Directors of Bureaus, Institutes, and Divisions, NIH, dated April 10, 1975.

[89] Memorandum from Dr. Myron A. Mehlman, Special Assistant to Associate Director for Program Planning and Evaluation, NIH, to institutes' representatives, dated May 21, 1975.

[90] Copies of these memoranda were provided to the authors by Dr. Myron A. Mehlman, Special Assistant to the Associate Director for Program Planning and Evaluation, NIH, on June 17, 1975.

[91] Information provided in personal communication by Ms. Laurel Carson, Program Analyst, Division of Health Protection, Health Financing Staff, Office of the Assistant Secretary of Health, November 26, 1975. Ms. Carson was charged with compiling the Nutrition Plan in Appendix II of the FY 1977-1981 Forward Plan For Health from the individual forward plans of each Public Health Service agency. This information was also confirmed by Dr. Myron A. Mehlman, Special Assistant to the Associate Director for Program Planning and Evaluation, NIH, in a personal communication on November 28, 1975.

However, the process of communicating individual responses on the policy statement to Dr. Mehlman by means of designating a temporary body of "NIH Nutrition Program Coordination" representatives eventually led to the establishment of a "NIH Nutrition Coordinating Committee" in June 1975.[92]

While the NIH Nutrition Coordinating Committee has yet to complete its evaluation of existing extramural and intramural human nutrition research supported by NIH, the Committee meets bi-monthly to discuss on-going research activities. Furthermore, the Committee has established a Steering Subcommittee which has been delegated responsibility to: (1) develop a uniform system of reporting the on-going nutrition research in all NIH; (2) institute a comprehensive method for complete exchange of the information on nutrition research; (3) devise a means of interinstitute cooperation to prevent duplication in the individual nutrition programs; and (4) facilitate the identification of gaps in the overall NIH nutrition research effort.[93]

(3) HUMAN NUTRITION RESEARCH SUPPORTED BY DHEW, FY 1975

(*a*) *Intramural research.*—Data on in-house human nutrition research supported in FY 1975 have not been cumulatively analyzed or published by DHEW. Consequently, the information in this study on DHEW intramural nutrition research programs represents an accumulation of data from individual laboratory annual reports, and direct communications with administrators of overall intramural programs in the National Institutes of Health, and the Bureau of Foods, Food and Drug Administration.

Data extracted from individual annual reports included numbers of human nutrition research projects per laboratory and scientist man-years devoted to this research during FY 1975. For the National Institutes of Health (NIH) and the National Institute of Mental Health (NIMH), one scientist man-year was defined as one year of research performed by a professional scientist who had attained an educational level of at least the doctorate or doctor of medicine. For the Food and Drug Administration (FDA), a scientist man-year was defined as 1,700 hours of research per year per project regardless of educational levels attained by researchers.

Projects were then assigned to the nutritional categories previously defined in this study. Estimated cost was determined for intramural projects in NIH and NIMH by multiplying the numbers of scientist man-years for projects in each category by the estimated cost of one scientist man-year ($74,000 in FY 1975). Estimated cost was provided for intramural projects in FDA from cost data printed by the FDA Resource Use System Program Plan Analyzer.

This accumulation of data has been summarized on Table F below. Definitions of the nutrition research categories, scientist man-years, and methods of calculation for estimated cost are detailed as footnotes to Table F.

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[92] Information provided by Dr. Myron A. Mehlman, Special Assistant to the Associate Director for Program Planning and Evaluation, NIH, in a personal communication on November 28, 1975. See Appendix III of this study for the Committee's membership.

[93] Ibid.

TABLE F.—HUMAN NUTRITION RESEARCH SUPPORTED BY THE DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE—INTRAMURAL, FISCAL YEAR 1975

Agency performing intramural laboratory	Number of intramural human nutrition projects	Nutrition research category	Scientist man-years	Estimated cost
I. ALCOHOL, DRUG ABUSE AND MENTAL HEALTH ADMINISTRATION[1]				
National Institute of Mental Health (NIMH):				
Laboratory of Comparative Biochemistry	1	Nutrition requirements[2]	2.0	[3] $148,000
Laboratory of Neuropharmacology	1	Nutrition requirements	1.0	[3] 74,000
	1	Disease and diet[4]	.75	[3] 55,000
NIMH subtotal	3		3.75	[3] 277,500
II. FOOD AND DRUG ADMINISTRATION (FDA)[5]				
Bureau of Foods:				
Division of Pathology	3	Nutrition requirements	10.42	[6] 166,890
Division of Toxicology	[2]	[Nutrition requirements]	[NA]	[6] [172,500]
Division of Nutrition	4	Food composition[7]	17.95	[6] 251,236
Division of Food Technology	4	Dietary surveys and status[8]	2.95	[6] 48,040
	[2]	[Dietary surveys and status]	[NA]	[6] [112,000]
	1	Disease and diet	2.14	[6] 26,490
FDA subtotal	16		33.46	[6] 777,156
III. NATIONAL INSTITUTES OF HEALTH (NIH)[1]				
National Cancer Institute (NCI):				
Laboratory of Biology	2	Disease and diet	9.4	[3] 695,600
Dermatology Branch	1	Disease and diet	1.28	[3] 94,720
Office of the Director Metabolism Branch	2	Nutrition requirements	13.0	[3] 962,000
NCI subtotal	5		23.68	[3] 1,752,320
National Heart and Lung Institute (NHLI)				
Library of Biochemistry	4	Nutrition requirements	15.0	[3] 1,110,000
Laboratory of Cell Biology	1	Disease and diet	2.0	[3] 148,000
Hypertension and Endocrinology Branch	1	Disease and diet	2.0	[3] 148,000
	1	Nutrition requirements	8.0	[3] 592,000
	1	Dietary surveys and status	6.0	[3] 444,000
Molecular Diseases Branch	2	Disease and diet	3.0	[3] 222,000
	2	Nutrition requirements	3.0	[3] 222,000
Section on Experimental Atherosclerosis	5	Disease and diet	10.0	[3] 740,000
NHLI subtotal	17		49.0	[3] 3,626,000
National Institute of Arthritis, Metabolism, and Digestive Diseases (NIAMDD):				
Laboratory of Chemical Biology				
Laboratory of Chemistry	12	Nutrition requirements	24.0	[3] 1,776,000
Laboratory of Nutrition and Endocrinology	4	Disease and diet	2.3	[3] 170.200
Digestive Diseases Branch				
NIAMDD subtotal	16		26.3	[3] 1,946,200
National Institute of Child Health and Human Development (NICHD):				
Laboratory of Biomedical Science	1	Nutrition requirements	52.0	[3] 3,848,000
	1	Metabolic defects[9]	4.0	[3] 296,000
Reproduction Research Branch, Section on Endocrinology.	1	Nutrition requirements	2.0	[3] 148,000
	3	Disease and diet	52.8	[3] 3,907,200
Pregnancy Research Branch	1	Nutrition requirements	1.7	[3] 125,000
NICHD subtotal	7		112.5	[3] 8,325,000
NIH subtotal:				
	24	Nutrition requirements	118.7	[3] 8,783,800
	1	Dietary surveys and status	6.0	[3] 444,000
	19	Disease and diet	82.78	[3] 6,125,720
	1	Metabolic defects	4.0	[3] 296,000
NIH total	45		211.48	[3] 15,649.520
DHEW intramural totals, Human Nutrition Research:				
	29	Nutrition requirements	132.12	9,345,190
	4	Food composition	17.95	251,236
	5	Dietary surveys and status	8.95	604,040
	21	Disease and diet	85.67	6,207,710
	1	Metabolic defects	4.00	296,000
DHEW total	64		248.69	16,704,176

See footnotes on p. 75.

[1] On Oct. 6-7, 1975, 1 of the authors (FHQ) examined annual summaries of intramural programs for the National Institute of Mental Health, and the Institutes of the National Institutes of Health. These annual summaries described all intramural projects supported by the Institutes for fiscal year 1975 (July 1974 through June 1975). Access to the annual summaries was provided by Dr. Philip S. Chen, Jr., Assistant Director for Intramural Affairs, Office of the Director, NIH.

[2] Nutrition requirements—What's needed: Optimum, normal human nutrition requirements, nutrient function and metabolism, malnutrition (nutrient deficiency or excess), neuroendocrine-nutrient interreactions, fundamental intermediary metabolism involving the role of 1 or more nutrients.

[3] Information on fiscal year 1975 nutrition research project cost per scientific man-year provided by Ms. Joanne Panger Financial Management Programs Specialist, Division of Financial Management, Office of the Director, NIH. Cost per scientific man-year was calculated to be $74,000 in fiscal year 1975; a scientific man-year was defined as 1 year of research performed by a professional scientist who had attained an educational level of at least doctor or doctor of medicine. Cost per support man-year was calculated to be $40,000. Calculation of these costs for scientific man-years included direct expenditures for equipment, facilities, etc.; and direct and indirect overhead expenditures. On this table, estimated cost for fiscal year 1975 intramural human nutrition research projects was calculated by multiplying $74,000, the cost of a single scientific man-year of research, by the numbers of scientific man-years designated for each project in fiscal year 1975.

[4] Disease and diet—What's applied: Disease or clinical nutrition, dietary therapy, effect of disease on nutrition, environmental toxicants, alcohol and nutrition, nutrition and cancer, nutrition and vision research, etc.

[5] Information on the intramural programs in nutrition research supported by the Food and Drug Administration was provided by Mr. Charles W. Cooper, Chief, Program Planning Group, Bureau of Foods, in personal communication, Oct. 22, 1975. Data on scientist man-years and cost were provided by means of the FDA resource use system program plan analyzer. Projects noted in brackets ([]) are contracts made to complement or supplement certain inhouse research activities, i.e., these contracts appear to be funding collaborative research projects. FDA defines a scientist man-year to be 1,700 hours of research per year per project; all grades or educational levels are included in the FDA's calculations for man-years.

[6] Scientist man-years and costs were provided on the FDA resource use system program plan analyzer mentioned above.

[7] Food composition—What's available: Composition of foods, food cost plans, nutrient analysis of foods (old as well as new methods), National Nutrient Data Bank (NNDB).

[8] Dietary surveys and status—What's consumed: Dietary or food consumption surveys, current dietary practice or habits, nutritional, surveillance and status, nutrition education.

[9] Metabolic defects—What's not utilized: Malabsorption syndromes, inborn errors of metabolism, familial or inherited nutritional defects.

Table F, *Human Nutrition Research Supported by the Department of Health, Education, and Welfare—Intramural, FY 1975*, provides only an estimate of in-house human nutrition research projects in the Public Health Service Agencies. Intramural nutrition projects have been identified in three agencies: (1) the Alcohol, Drug Abuse and Mental Health Administration (ADAMHA): (2) the Food and Drug Administration (FDA); and (3) the National Institutes of Health (NIH).

For ADAMHA, two laboratories within the National Institute of Mental Health were identified as sponsoring three intramural human nutrition research projects. These projects represented approximately 4.7 percent of the total number of projects, 1.5 percent of the total scientist man-years, and 1.7 percent of the total estimated cost for all DHEW intramural human nutrition research.

For the FDA, four divisions of the Bureau of Foods were noted as performing about 25 percent of the total number of projects, consuming about 13.8 percent of the total scientist man-years, and 4.7 percent of the total estimated cost for all DHEW intramural human nutrition research. In addition, FDA was the only agency identified as supporting 4 of its intramural projects with collaborative contracts designed to complement or supplement in-house nutrition research.

The NIH appeared to perform the majority of intramural human nutrition research among all of the Public Health Service agencies. Four institutes, including 15 laboratories or divisions, performed about 70.3 percent of the total number of projects, employed approximately 84.7 percent of the total scientist man-years, and expended about 93.6 percent of the total estimated cost for all DHEW intramural nutrition research.

While Table F represents only those intramural human nutrition research projects which could be identified as distinct activities within DHEW, it may not represent the total intramural nutrition research effort within this department. From available sources, it was not possible to describe the extent to which support activities contributed

to this effort. Furthermore, the nature of some in-house activities which might be considered human nutrition research did not appear as distinct projects.

For example, a separate Associate Director for Nutrition and Consumer Sciences exists within the Bureau of Foods, FDA. This directorship is organized into the: (1) Division of Consumer Studies; (2) Division of Food Service; and (3) Division of Nutrition. Each of these divisions performs, on a continuing basis, functions which could be characterized as human nutrition research.[94] To illustrate: The Division of Nutrition maintains a Nutritional Sciences Branch which is divided into sections based on nutrient groups (Vitamins Section, Minerals Section, etc.), and which routinely originates, plans, and conducts research on (1) the chemical, biochemical, and metabolic reactions of nutrients, and (2) interrelationships of nutrients with other dietary components, The Division of Nutrition also contains a National Center for Nutrient Analysis which routinely maintains and advances the methodology and technology vital to the assay of nutrients. The funding levels and manpower necessary to continue this type of intramural human nutrition activity could not be determined.

(*b*) *Extramural research.*—Data on extramural grants, program grants, and contracts for human nutrition research have not been compiled, analyzed, or published by DHEW. Consequently, the information in this study on DHEW extramural nutrition research represents an accumulation of data from two-thousand sixty-one data sheets for major projects and parts of major projects. These project sheets were obtained as a computer print-out from the CRISP System of References to Currently Active (FY 1975) Public Health Service grant and contract supported research in the fields of nutrition.

Each project sheet was then analyzed and assigned to the nutrition research categories defined for this study; projects judged as not reflecting the defined human nutrition research categories were disregarded. Each remaining data sheet was then classified by awarding organization, funding mechanism, amount of Federal funds, and then tabulated.

During the course of analyzing these data, it was noticed that many data sheets described human nutrition research projects which were major research activities; other data sheets described human nutrition research projects which were actually small parts of other, non-nutrition extramural research activities. Furthermore, many projects were annotated to show that the Nutrition Study Section had approved the research. Consequently, three tables were constructed to present: (1) major projects on human nutrition; (2) major projects and parts of major projects on human nutrition; and (3) all human nutrition research project grants which were approved by the Nutrition Study Section.

Table III presents extramural major projects for human nutrition research supported by DHEW in FY 1975.

Table IV presents major projects and parts of major extramural projects for human nutrition research supported by DHEW in FY 1975.

Table V presents all human nutrition research project grants supported by DHEW in FY 1975 and approved by the Nutrition Study Section.

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[94] These functions are comprehensively described in: Organization Planning Branch. Staff Manual Guide. Washington, Food and Drug Administration, 1973. Guide FDA 1225.1–Guide FDA 1225.4.

TABLE III.—HUMAN NUTRITION RESEARCH SUPPORTED BY THE DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE, EXTRAMURAL. FISCAL YEAR 1975—MAJOR PROJECTS [1]

Awarding organization	Nutrition requirements [2]		Food composition [3]		Dietary surveys and status [4]		Disease and diet [5]		Metabolic defects		Total by category	
	Number projects	Federal funds	Number projects	Federal funds	Number projects	Federal funds	Number projects	Federal funds	Number projects	Federal funds	Number projects	Federal funds
I. Alcohol, Drug Abuse and Mental Health Administration: A. Research project grants: Subtotal	9	206,362					14	650,871			23	857,233
II. Center for Disease Control: A. Research project grants: Subtotal							1	45,490			1	45,490
III. Food and Drug Administration: A. Research project grants: Subtotal	7	232,880					1	65,039			8	297,919
IV. Health Resources Administration: A. Research contracts: Subtotal							1	10,000			1	10,000
V. National Institutes of Health:												
(1) National Cancer Institute:												
A. Research project grants	8	440,833					22	1,280,583			30	1,721,466
B. Research contracts			2	71,229			1	353,062			3	424,291
Subtotal	8	440,833	2	71,229			23	1,633,645			33	2,145,757
(2) National Eye Institute: A. Research project grants: Subtotal	6	349,965					2	99,059	1	61,156	9	510,180
(3) National Heart and Lung Institute:												
A. Research project grants	21	1,131,072					32	3,101,659	7	466,118	60	4,698,849
B. Program project and center grants							1	308,950			1	308,950
C. Research contracts							10	10,554,588			10	10,554,588
Subtotal	21	1,131,072					43	13,965,197	7	466,118	71	15,562,387
(4) National Institute of Allergy and Infectious Diseases: A. Research project grants: Subtotal	2	94,851					2	64,900			4	159,751

See footnotes at end of table, p. 79.

TABLE III.—HUMAN NUTRITION RESEARCH SUPPORTED BY THE DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE, EXTRAMURAL. FISCAL YEAR 1975—MAJOR PROJECTS[1]—Continued

Awarding organization	Nutrition requirements[2]		Food composition[3]		Dietary surveys and status[4]		Disease and diet[5]		Metabolic defects[6]		Total by category	
	Number projects	Federal funds	Number projects	Federal funds	Number projects	Federal funds	Number projects	Federal funds	Number projects	Federal funds	Number projects	Federal funds
V. National Institutes of Health—Con.												
(5) National Institute of Arthritis, Metabolism, and Digestive Diseases:												
A. Research project grants	165	8,366,082	1	19,369			44	2,664,712	31	1,950,240	241	13,000,403
B. Program project and center grants	1	175,479					1	215,111	1	97,366	3	487,956
C. Research contracts	3	89,030					3	160,333	2	91,950	8	341,313
Subtotal	169	8,630,591	1	19,369			48	3,040,156	34	2,139,556	252	13,829,672
(6) National Institute of Child Health and Human Development:												
A. Research project grants	56	3,103,111					6	380,659	6	246,619	68	3,730,389
B. Program project and center grants	1	490,077									1	490,077
C. Research contracts	10	1,147,124					2	199,665			12	1,346,789
Subtotal	67	4,740,312					8	580,324	6	246,61	81	5,567,255
(7) National Institute of Dental Research:												
A. Research project grants	10	523,006					2	89,994			12	613,000
B. Research contracts							2	290,921			2	290,921
Subtotal	10	523,006					4	380,915			14	903,921

See footnotes at end of table, p. 79.

(8) National Institute of Environmental Health Sciences: A. Research project grants: Subtotal	11	525,295					6	285,563			17	810,858
(9) National Institute of General Medical Sciences: A. Research project grants: Subtotal	30	1,866,422	1	11,962			5	261,557			36	2,139,941
(10) National Institute of Neurological, Communicative Diseases and Stroke: A. Research project grants: Subtotal	13	587,548	2	25,741	1	47,331	10	412,081	1	36,261	27	1,108,962
(11) NIH Subtotals:												
A. Research project grants	322	16,988,185	4	57,072	1	47,331	131	8,640,76/	46	2,760,394	504	28,493,749
B. Program project and center grants	2	665,556					2	524,061	1	97,366	5	1,286,983
C. Research contracts	13	1,236,154	2	71,229			18	11,558,569	2	91,950	35	12,957,902
NIH Total	337	18,889,895	6	128,301	1	47,331	151	20,723,397	49	2,949,710	544	42,738,634
VI. DHEW totals:												
A. Research project grants	338	17,427,427	4	57,072	1	47,331	147	9,402,167	46	2,760,394	536	29,694,391
B. Program project and center grants	2	665,556					2	524,061	1	97,366	5	1,286,983
C. Research contracts	13	1,236,154	2	71,229			19	11,568,569	2	91,950	536	12,967,902
DHEW total	353	19,329,137	6	128,301	1	47,331	168	21,494,797	49	2,949,710	577	43,949,276

[1] Information provided by Mr. Frederick M. Biggs, Head, Indexing and Search Unit, Research Documentation Section, Statistics and Analysis Branch, Division of Research Resources, April 18, 1975. 2,061 data sheets for major projects and parts of major projects were obtained as a computer printout from the CRISP system of references to currently active (fiscal year 1975), Public Health Service grant and contract-supported research in the fields of nutrition. These data sheets were classified by category, awarding organization, and funding mechanism, then tabulated.

[2] What's needed: Optimum, normal human nutrition requirements, nutrient function and metabolism, malnutrition (nutrient deficiency or excess), neuroendocrine-nutrient interreactions, fundamental intermediary metabolism involving the role of one or more nutrients.

[3] What's available: Composition of foods, food cost plans, nutrient analysis of foods (old as well as new methods), National Nutrient Data Bank (NNDB).

[4] What's consumed: Dietary or food consumption surveys, current dietary practice or habits, nutritional surveillance and status, nutrition education.

[5] What's applied: Disease or clinical nutrition, dietary therapy, effect of disease on nutrition, environmental toxicants, alcohol and nutrition, nutrition and cancer, nutrition and vision research, etc.

[6] What's not utilized: Malabsorption syndromes, inborn errors of metabolism, familial or inherited nutritional defects.

TABLE IV.—HUMAN NUTRITION RESEARCH SUPPORTED BY THE DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE, EXTRAMURAL, FISCAL YEAR 1975—MAJOR PROJECTS AND PARTS OF MAJOR PROJECTS [1]

Awarding organization	Nutrition requirements [2]		Food composition [3]		Dietary surveys and status [4]		Disease and diet [5]		Metabolic defects [6]		Total by category	
	Number Projects (Parts)	Federal funds	Number Projects (Parts)	Federal funds	Number Projects (Parts)	Federal funds	Number Projects (Parts)	Federal funds	Number Projects (Parts)	Federal funds	Number Projects (Parts)	Federal funds
I. Alcohol, Drug Abuse and Mental Health Administration:												
A. Research project grants	9 (4)	246,986					14 (2)	667,190			23 (6)	914,176
B. Program project and center grants	0 (1)	9,902									0 (1)	9,902
Subtotal	9 (5)	256,888					14 (2)	667,190			23 (7)	924,078
II. Center for Disease Control: A. Research project grants: subtotal							1 (0)	45,490			1 (0)	45,490
III. Food and Drug Administration: A. Research project grants: subtotal	7 (0)	232,880					1 (0)	65,039			8 (0)	297,919
IV. Health Resources Administration: A. Research contracts: subtotal							1 (0)	10,000			1 (0)	10,000
V. National Institutes of Health:												
(1) National Cancer Institute:												
A. Research project grants	8 (5)	519,697					22 (8)	1,435,790			30 (13)	1,955,487
B. Program project and center grants	0 (1)	88,545					0 (27)	1,043,174			0 (28)	1,131,719
C. Research contracts			2 (0)	71,229			1 (0)	353,062			3 (0)	424,291
Subtotal	8 (6)	608,242	2 (0)	71,229			23 (35)	2,832,026			33 (41)	3,511,497
(2) National Eye Institute:												
A. Research project grants	6 (0)	349,965					2 (0)	99,059	1 (0)	61,156	9 (0)	510,180
B. Program project and center grants	0 (2)	73,650									0 (2)	73,650
Subtotal	6 (2)	423,615					2 (0)	99,059	1 (0)	61,156	9 (2)	583,830
(3) National Heart and Lung Institute:												
A. Research project grants	21 (7)	1,220,857					32 (11)	3,239,575	7 (0)	466,118	60 (18)	4,926,550
B. Program project and center grants	0 (11)	254,669					1(121)	5,149,561			1(132)	5,404,230
C. Research contracts							30 (0)	25,057,589			30 (0)	25,057,589
Subtotal	21 (18)	1,475,526					63(132)	33,446,725	7 (0)	466,118	91(150)	35,388,369

See footnotes at end of table, p. 82.

(4) National Institute of Allergy and Infectious Diseases: A. Research project grants: Subtotal	2	(2)	333,182				2	(2)	175,290			4 (4) 508,472
(5) National Institute of Arthritis, Metabolism, and Digestive Diseases:												
A. Research project grants	165	(21)	8,493,041	1	(0)	19,369	44	(22)	2,977,868	31	(4) 2,044,008	241 (47) 13,534,286
B. Program project and center grants	1	(38)	953,533				1	(23)	773,831	1	(5) 202,666	3 (66) 1,930,030
C. Research contracts	3	(0)	89,030				3	(0)	160,333	2	(0) 91,950	8 (0) 341,313
Subtotal	169	(59)	9,535,604	1	(0)	19,369	48	(45)	3,912,032	34	(9) 2,338,624	252(113) 15,805,629
(6) National Institute of Child Health and Human Development:												
A. Research project grants	56	(12)	3,238,107				6	(0)	380,659	6	(0) 246,619	68 (12) 3,865,385
B. Program project and center grants	1	(33)	1,399,807				0	(5)	96,719	0	(5) 87,487	1 (43) 1,584,013
C. Research contracts	10	(0)	1,147,124				2	(0)	199,665			12 (0) 1,346,789
Subtotal	67	(45)	5,785,038				8	(5)	677,043	6	(5) 334,100	81 (55) 6,796,187
(7) National Institute of Dental Research:												
A. Research project grants	10	(1)	554,377				2	(0)	89,994			12 (1) 644,371
B. Program project and center grants	0	(18)	674,875				0	(1)	95,938			0 (19) 770,813
C. Research contracts							2	(0)	290,921			2 (0) 290,921
Subtotal	10	(19)	1,229,252				4	(1)	476,853			14 (20) 1,706,105
(8) National Institute of Environmental Health Sciences:												
A. Research project grants	11	(0)	525,395				6	(0)	285,563	0	(1) 21,209	17 (1) 832,167
B. Program project and center grants	0	(6)	244,584				0	(8)	330,998			0 (14) 575,582
Subtotal	11	(6)	769,979				6	(8)	616,561	0	(1) 21,209	17 (15) 1,407,749
(9) National Institute of General Medical Sciences:												
A. Research project grants	30	(7)	1,957,086	1	(0)	11,962	5	(0)	261,557			36 (7) 2,230,605
B. Program project and center grants	0	(25)	438,494				0	(1)	9,204	0	(4) 109,223	0 (30) 556,921
Subtotal	30	(32)	2,395,580	1	(0)	11,962	5	(1)	270,761	0	(4) 109,223	36 (37) 2,787,526

See footnotes at end of table, p. 82.

TABLE IV.—HUMAN NUTRITION RESEARCH SUPPORTED BY THE DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE, EXTRAMURAL, FISCAL YEAR 1975—MAJOR PROJECTS AND PARTS OF MAJOR PROJECTS [1]—Continued

Awarding organization	Nutrition requirements [2]		Food composition [3]		Dietary surveys and status [4]		Disease and diet [5]		Metabolic defects [6]		Total by category	
	Number Projects (Parts)	Federal funds	Number Projects (Parts)	Federal funds	Number Projects (Parts)	Federal funds	Number Projects (Parts)	Federal funds	Number Projects (Parts)	Federal funds	Number Projects (Parts)	Federal funds
(10) National Institute of Neurological Communicative Diseases and Stroke:												
A. Research project grants	13 (0)	587,548	2 (0)	25,741	1 (0)	47,331	10 (0)	412,081	1 (2)	50,403	27 (2)	1,123,104
B. Program project and center grants							0 (4)	113,903			0 (4)	113,903
Subtotal	13 (0)	587,548	2 (0)	25,741	1 (0)	47,331	10 (4)	525,984	1 (2)	50,403	27 (6)	1,237,007
(11) Division of Research Resources:												
(A) Program project and center grants: subtotal	0(93)	1,207,053					0(219)	2,568,108	0 (67)	1,028,304	0(379)	4,803,465
(12) NIH subtotals:												
A. Research project grants	322 (55)	17,779,255	4 (0)	57,072	1 (0)	47,331	131 (33)	9,357,436	46 (7)	2,839,513	504 (95)	30,130,607
B. Program project and center grants	2(227)	5,335,210					2(419)	10,181,436	1 (81)	1,427,680	5(727)	16,944,326
C. Research contracts	13 (0)	1,236,154	2 (0)	71,229			38 (0)	26,071,570	2 (0)	91,950	55 (0)	27,470,903
NIH total	337(282)	24,350,619	6 (0)	128,301	1 (0)	47,331	171(452)	45,610,442	49 (88)	4,409,143	564(822)	74,545,836
VI. DHEW totals:												
A. Research project grants	338 (59)	18,259,121	4 (0)	57,072	1 (0)	47,331	147 (35)	10,135,155	46 (7)	2,889,513	536(101)	31,388,192
B. Program project and center grants	2(228)	5,345,112					2(419)	10,181,436	1 (81)	1,427,680	5(728)	16,954,228
C. Research contracts	13 (0)	1,236,154	2 (0)	71,229	1 (0)	47,331	39 (0)	26,071,570	2 (0)	91,950	56 (0)	27,470,903
Total	353(286)	24,840,387	6 (0)	128,301	1 (0)	47,331	188(454)	46,388,161	49 (88)	4,409,143	597(829)	75,813,323

[1] Information provided by Mr. Frederick M. Biggs, Head, Indexing and Search Unit, Research Documentation Section, Statistics and Analysis Branch, Division of Research Resources, Apr. 16, 1975. 2,051 data sheets for major projects and parts of major projects were obtained as a computer printout from the CRISP system of references to currently active (FY 1975), Public Health Service grant and contract-supported research in the field of nutrition. These data sheets were classified by category, awarding organization, and funding mechanism, then tabulated.

[2] What's needed: Optimum, normal human nutrition requirements, nutrient function and metabolism, malnutrition (nutrient deficiency or excess), neuroendocrine-nutrient interreactions, fundamental intermediary metabolism involving the role of one or more nutrients.

[3] What's available, Composition of foods, food cost plans, nutrient analysis of foods (old as well as new methods), National Nutrient Data Bank (NNDB).

[4] What's consumed: Dietary or food consumption surveys, current dietary practice or habits, nutritional surveillance and status, nutrition education.

[5] What's applied: Disease or clinical nutrition, dietary therapy, effect of disease on nutrition, environmental toxicants, alcohol and nutrition, nutrition and cancer, nutrition and vision research, etc.

[6] What's not utilized: Malabsorption syndromes, inborn errors of metabolism, familial or inherited nutritional defects.

TABLE V.—HUMAN NUTRITION RESEARCH GRANTS APPROVED BY THE NUTRITION STUDY SECTION, DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE, FISCAL YEAR 1975 [1]

Awarding organization	Nutrition requirements [2]		Food composition [3]		Dietary surveys and status [4]		Disease and diet [5]		Metabolic defects [6]		Total by category	
	Number projects	Federal funds	Number projects	Federal funds	Number projects	Federal funds	Number projects	Federal funds	Number projects	Federal funds	Number funds	Federal projects
I. Food and Drug Administration	7	232,362									7	232,362
II. National Institutes of Health:												
(1) National Cancer Institute	2	52,036					1	53,837			3	105,873
(2) National Eye Institute	1	21,202									1	21,202
(3) National Heart and Lung Institute	6	293,691					8	558,209			14	851,900
(4) National Institute of Arthritis, Metabolism, and Digestive Diseases	70	[7] 3,074,588	1	19,369			6	359,808			77	3,453,765
(5) National Institute of Child Health and Human Development	21	[8] 1,072,564									21	1,072,564
(6) National Institute of Environmental Health Sciences	1	53,155									1	53,155
(7) National Institute of Neurological, Communicative Diseases and Strokes	3	122,509									3	122,509
(8) National Institutes of Health, subtotal	104	4,689,745	1	19,369	0	0	15	971,854	0	0	120	5,680,968
III. Nutrition study section, DHEW, total grants approved	111	4,922,107	1	19,369	0	0	15	971,854	0	0	127	5,913,330

[1] Information provided by Mr. Frederick M. Biggs, Head, Indexing and Search Unit, Research Documentation Section, Statistics and Analysis Branch, Division of Research Resources, Apr. 18, 1975. 2,061 sheets for major projects and parts of major products were obtained as a computer printout from the CRISP system of references to currently active (fiscal year 1975), Public Health Service grant and contract-supported research in the field of nutrition. These data sheets were classified by category, awarding organization, and funding mechanism, arranged by study section, then tabulated.

[2] What's needed: Optimum, normal human nutrition requirements, nutrient function and metabolism, malnutrition (nutrient deficiency or excess neuroendocrine-nutrient interreactions, fundamenta intermediary metabolism involving the role of 1 or more nutrients.

[3] What's available: Composition of foods, food cost plans, nutrient analysis of foods (old as well as new methods), National Nutrient Data Bank (NNDB).

[4] What's consumed: Dietary or food consumption surveys, current dietary practice or habits, nutritional surveillance and status, nutrition education.

[5] What's applied: Disease or clinical nutrition, dietary therapy, effect of disease on nutrition, environmental toxicants, alcohol and nutrition, nutrition and cancer, nutrition and vision research, etc.

[6] What's not utilized: Malabsorption syndromes, inborn errors of metabolism, familial or inherited nutritional defects.

[7] Includes 1 part of a major project at $17,505.

[8] Includes 1 part of a major project at $36,225.

Table III, *Human Nutrition Research Supported by the Department of Health, Education, and Welfare, Extramural, FY 1975—Major Projects*, probably represents the best measure of program content, extent, and cost for major extramural human nutrition research (hereinafter referred to as "extramural nutrition research") sponsored by the Public Health Service agencies during FY 1975. Table III also indicates that these agencies tended to support approximately 61 percent of the extramural projects and about 44 percent of total Federal funds in the "Nutrition Requirements" category, and about 29 percent of the projects and 49 percent of the total funds in the "Disease & Diet" category. As with the intramural human nutrition research programs, the National Institutes of Health (NIH) appeared to be sponsoring the majority, about 94 percent, of all DHEW extramural nutrition projects, and approximately 97 percent of all Federal funds for extramural nutrition research. Within NIH, the National Institute of Arthritis, Metabolism, and Digestive Diseases (NIAMDD) supported the largest number of extramural projects, about 46 percent of all NIH projects, with approximately 32 percent of all NIH funds devoted to extramural nutrition research. However, the National Heart and Lung Institute (NHLI), while supporting only about 13 percent of the number of extramural nutrition projects in NIH, allocated approximately 36 percent of all NIH funds for this research. This NHLI expenditure for fewer projects probably represents the high cost of funding major extramural research programs related to nutrition such as the NHLI Lipid Research Centers.

Table IV, *Human Nutrition Research Supported by the Department of Health, Education, and Welfare, Extramural, FY 1975—Major Projects and Parts of Major Projects*, probably represents the most inclusive account of extramural nutrition research for this department during FY 1975. However, Table IV also masks the extent to which parts of major projects, and the additional Federal funds allocated as a percentage of funds per respective major project, are actually recorded. That is, the nutritional "part" of a major disease-related project often appeared as requiring less funds than were actually assigned to it on the data sheet. Table IV is therefore presented to show that 829 nutritional parts of other research projects were underway during FY 1975, and that the amount of Federal funds, $31,864,047, probably exaggerates the level of support actually needed to perform these parts of major projects. Furthermore, in the NHLI, under the category "Disease & Diet," 20 major contracts representing about $25 million were recorded in total as major nutrition research on Table IV and not on Table III because these contracts funded entire disease-related research centers such as the Specialized Centers of Research (SCOR), and those operating the Multiple Risk Factor Intervention Trials (MRFIT) where nutrition research was only a component of the entire program. The cost of these nutritional parts could not be determined from the individual data sheets.

Table V, *Human Nutrition Research Grants Approved by the Nutrition Study Section, Department of Health, Education, and Welfare, FY 1975*, indicates that only 24 percent of all DHEW extramural nutrition research grants, representing about 20 percent of all Federal funds for these grants, were approved by the Nutrition Study Section. The Section approved 100 percent of the nutrition research grants ad-

ministered by the Food and Drug Administration, and about 30.5 percent of such grants awarded by the National Institute of Arthritis, Metabolism, and Digestive Diseases. For those grants approved by the Nutrition Study Section, approximately 87 percent of these projects, representing about 83 percent of the Federal funds for these grants, were classified in the "Nutrition Requirements" category. For the most part, only major projects on human nutrition which were awarded as grants, and not many parts of major projects, were approved by the Nutrition Study Section.

(4) SUMMARY—DHEW HUMAN NUTRITION RESEARCH

The broad purpose of human nutrition research supported or conducted by DHEW has always been to advance the knowledge necessary for the understanding, prevention, and treatment of diseases. Consequently, the agencies of the Public Health Service have been assigned the responsibilities associated with this purpose.

The agencies of the Public Health Service have been delegated by law both general and specific authority to perform nutrition research. Under the general authority of Section 301, Research and Investigation in General, of the Public Health Service Act, these agencies may:

(1) Conduct research;
(2) Publish or otherwise make available information on research results;
(3) Establish and maintain research fellowships;
(4) Award research grants and contracts to individuals and institutions;
(5) Secure as necessary the assistance of consultants;
(6) Maintain clinical facilities which admit and treat patients for the purpose of study; and
(7) Make available to the biomedical community technical advice and assistance on the application of statistical methods to experiments, studies, and surveys.

While specific authorities contained in other provisions of the Public Health Service Act and in the Food, Drug, and Cosmetic Act also permit human nutrition research, all agencies within the Service cite Section 301 as their primary legislative authority for the conduct and support of this research. Moreover, the human nutrition research activities reviewed in this study emphasized all points mentioned above except (2). The authors could not discover any publication or otherwise available single source of information on all human nutrition research activities supported by DHEW.

The DHEW Policy Statement on the Health Aspects of Nutrition contains at least five broad areas which could be characterized as applicable to human nutrition research: (1) biomedical research; (2) behavioral research; (3) nutritional assessment; (4) determining the nutritional status of the Nation; and (5) determining the nutrient composition and the presence of potentially hazardous substances in foods. These broad areas outline the objectives of Part 4, New Knowledge, and Part 3, Monitoring Activities, of the statement. The policy statement itself was written and adopted by DHEW before an inventory of all nutrition activities for the department, including

nutrition research efforts, had been completed. After the statement was formally issued in March 1975, the agencies of the Public Health Service were allowed approximately 3 months to individually assess their ongoing nutrition activities and to independently propose new initiatives based on the objectives of the policy statement. This process coincided with other administrative requirements, such as the annual presentation of the agencies' appropriations justifications before the Congress: apparently the amount of time available, and the overlap of this evaluation with the day-to-day responsibilities, limited the ability of the agencies to respond in a timely and comprehensive manner to the policy statement. Furthermore, while the statement does mention general steps to be implemented to achieve its goals, it does not delegate specific responsibilities to any of the agencies. Consequently, each agency appeared to have separately assessed its nutrition programs and proposed future nutrition plans according to its understanding of the policy and its traditional mission to perform these broad food and nutrition activities. Contrary to the policy's purpose, namely, to serve "as a framework around which DHEW agencies can shape program initiatives, increase or redirect resources, and establish more collaborative relationships among themselves, and other Department, and with the non-Federal sectors", it may have at least initially decentralized, fragmented, and confused program planning and cooperation among the Public Health Service agencies.

Neither DHEW, nor the individual Public Health Service agencies, seem entirely aware of the program or Federal support for human nutrition research in the department. Only one agency, the National Institutes of Health, appears to have established a visible organizational structure, namely, the NIH Nutrition Coordinating Committee, as a means to monitor and coordinate nutrition research within that agency. No such interagency group or office now acts to bring the agencies together for a coordinated and cooperative effort in human nutrition research. Consequently, the Nutrition Plan in the FY 1977–1981 Forward Plan For Health does not contain a current assessment or a detailed projection for the DHEW human nutrition research effort.

The information on program content and funding levels that was gathered for this study on human nutrition research in DHEW during FY 1975 has been summarized on Table G.

TABLE G—HUMAN NUTRITION RESEARCH SUPPORTED BY THE DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE, FISCAL YEAR 1975 [1]

Awarding organization	Nutrition requirements [2]		Food composition [3]		Dietary surveys and status [4]		Disease and diet [5]		Metabolic defects [6]		Total by category	
	No. Projects	Federal funds	No. Projects	Federal funds	No. Projects	Federal funds	No. Projects	Federal funds	No. Projects	Federal funds	No. Projects	Federal funds
Alcohol, Drug Abuse and Mental Health Administration (ADAMHA):												
Intramural	2	222,000					1	55,500			3	277,500
Extramural	9	206,362					14	650,871			23	857,233
Subtotal	11	428,362					15	706,371			26	1,134,733
Center for Disease Control (CDC):												
Intramural												
Extramural							1	45,490			1	45,490
Subtotal							1	45,490			1	45,490
Food and Drug Administration (FDA):												
Intramural	5	339,390	4	251,236	6	160,040	1	26,490			16	777,156
Extramural	7	232,880					1	65,039			8	297,919
Subtotal	12	572,270	4	251,236	6	160,040	2	91,529			24	1,075,075
Health Resources Administration (HRA):												
Intramural												
Extramural							1	10,000			1	10,000
Subtotal							1	10,000			1	10,000
National Institutes of Health (NIH):												
Intramural	24	8,783,800			1	444,000	19	6,125,720	1	296,000	45	15,649,520
Extramural	337	18,889,895	6	128,301	1	47,331	151	20,723,397	49	2,949,710	544	42,738,634
Subtotal	346	25,772,185	6	128,301	2	491,331	170	26,849,117	50	3,245,710	589	58,388,154
DHEW Human Nutrition Research:												
Intramural subtotal	31	9,345,190	4	251,236	7	604,040	21	6,207,710	1	296,000	64	16,704,176
Extramural subtotal	353	19,329,137	6	128,301	1	47,331	168	21,494,797	49	2,949,710	577	43,949,276
DHEW, total	384	28,674,327	10	379,537	8	651,371	189	27,702,507	50	3,245,710	641	60,653,452

[1] Information summarized on this table from table III and table F above.

[2] What's needed: Optimum, normal human nutrition requirements, nutrient function and metabolism, malnutrition (nutrient deficiency or excess), neuroendocrine nutrient interreactions, fundamental intermediary metabolism involving the role of 1 or more nutrients.

[3] What's available: Composition of foods, food cost plans, nutrient analysis of foods (old as well as new methods), National Nutrient Data Bank (NNDB).

[4] What's consumed: Dietary or food consumption surveys, current dietary practice or habits nutritional surveillance and status, nutrition education.

[5] What's applied: Disease or clinical nutrition, dietary therapy, effect of disease on nutrition, environmental toxicants, alcohol and nutrition, nutrition and cancer, nutrition and vision research, etc.

[6] What's not utilized: Malabsorption syndromes, inborn errors of metabolism, familial or inherited nutritional defects.

Table G, *Human Nutrition Research Supported by the Department of Health, Education, and Welfare, FY 1975*, probably provides the best estimate of numbers of projects, types of nutrition research, and Federal funds for intramural and extramural human nutrition sponsored by DHEW in FY 1975. Table G indicates that this department, through the Public Health Service agencies, supported 641 human nutrition research projects at a total cost of $60,653,452.

While only 10 percent of these projects were performed intramurally, they represented almost 28 percent of all DHEW funds allocated to human nutrition research. The accounting procedure for intramural projects included administrative and other overhead costs which are not similarly charged to the cost of extramural research; hence, the apparent excessive average cost per intramural project.

Table G also indicates that the National Institutes of Health ranked first in numbers of projects and in Federal support of human nutrition research for all of the agencies. Approximately 92 percent of all DHEW projects, representing 90 percent of all DHEW funds devoted to this research, were sponsored by NIH. While NIH supported about 59 percent of its projects, and allocated approximately 44 percent of its funds to research classified in the "Nutrition Requirements" category, the institutes supported only about 29 percent of their projects, but devoted approximately 46 percent of their funds to research classified in the "Disease and Diet" category. This slightly increased total cost for about half as many projects appears to indicate that research on the relationship between disease and diet, i.e., applied and clinical nutrition research, is about twice as expensive to support than is fundamental research on nutrient requirements.

Since the establishment of the NIH Nutrition Coordinating Committee in June 1975, NIH has: (1) estimated the support for training programs in the areas of nutrition sponsored by the institutes in FY 1975; and (2) outlined eleven objectives to be accomplished during FY 1976 to gradually implement nutrition coordination at NIH.[95]

During September, October, and November 1975, Dr. Myron A. Mehlman, Special Assistant to the Associate Director for Program Planning and Evaluation, NIH, requested that each institute prepare a list of its manpower support in the areas of nutrition during FY 1975. Between November 6 and 11, 1975, the institutes submitted their responses, which Dr. Mehlman summarized in tabular form. Table H has been reproduced below to present support of training in the areas of nutrition by the National Institutes of Health in FY 1975.

TABLE H.—NATIONAL INSTITUTES OF HEALTH, SUPPORT OF TRAINING IN THE AREA OF NUTRITION, FISCAL YEAR 1975 [1]

	Postdoctoral research training awards		Predoctoral research training awards		Fellowships (post)		Research career development awards	
	Funds	Awards	Funds	Awards	Funds	Awards	Funds	Awards
NHLI	$179,577	10	None	----------	$20,800	2	$47,176	2
NIGMS	(2)	3	[2] $667,000	96	None	----------	None	----------
NIDR	300,706	5	None	----------	13,000	1	None	----------
NIAMDD	558,939	10	None	----------	180,700	16	268,341	10
NICHD	788,027	16	None	----------	142,800	15	None	----------
NCI	None	----------	None	----------	None	----------	None	----------
Total	1,827,249	44	667,000	96	357,300	34	515,894	24

[1] Table provided in personal communication with Dr. Myron A. Mehlman, Special Assistant to the Associate Director for Program Planning and Evaluation, NIH, on Dec. 2, 1975.
[2] Not broken down by post and pre funds.

Note: Total nutrition training support, $3,367,443; total number of awards, 198.

[95] Information on estimated NIH support of training for nutrition during FY 1975, and a copy of the Objective and Operating Plan, FY 1976, was provided in personal communication by Dr. Myron A. Mehlman, Special Assistant to the Associate Director for Program Planning and Evaluation, NIH, on December 2, 1975.

Table H, *National Institutes of Health Support of Training in the Area of Nutrition, FY 1975*, was prepared by Dr. Mehlman in response to a request for such information by a chief of nutritional sciences at a prominent medical school. This chief expressed concern about the apparent lack of graduate level training and support in the subject areas of nutrition. Table H indicates that the FY 1975 support for training in the area of nutrition research was primarily post-doctorate, i.e., available to those professionals who had already attained an educational level of at least the doctorate.

The NIH nutrition objectives outlined for accomplishment during FY 1976 are scheduled to be completed between July 1975 and March 1976. By July 1975, the NIH Nutrition Coordinating Committee had been established and had held a meeting for nutrition program planning and review. During September 1975, NIH-wide program activities and support for inborn errors of metabolism and for dietary fiber studies was under review, while at the same time two subcommittees were to be established in order to define nutrition areas of interest for specific institutes and to evaluate the NIH needs for training in nutrition. In October 1975, NIH-wide program activities and support in parental nutrition were to be reviewed, and a subcommittee on workshops and conferences was to be established to coordinate mutual interests and responsibilities in nutrition. By December 1975, a coordinated "operational planning system" was to be underway for all bureau, institute, and division nutrition activities. By March 1976, a NIH nutrition plan is to be developed.

In order to accomplish these coordination objectives, NIH estimated that it would require: (1) the authority contained in Section 301 of the Public Health Service Act; (2) between $50 million and $75 million; and (3) .5 man year.[96] Apparently, the legislative authority and funds would continue to support nutrition research activities, and the .5 man year would be required for administering the cooperative nutrition objective and operating plan. The NIH Office of the Director's Justification and Approach document on the coordination of nutrition activities stated in part:

> The NIH support is in the amount of approximately $50–70 million per year for the study of nutrition activities. These studies are directed toward the understanding of the relationship between nutrition and a variety of diseases, . . . ; the effects of malnutrition and special nutritional requirements of [certain populations]; the treatment of diseases, . . . ; the interaction between nutrition, toxic chemicals, and trace elements. Behavioral studies are directed toward over and under nutrition, as well as a selection of certain foods and behavioral modification. Dietary requirements of both normal and selected population at risk are also being investigated.
>
> In the broadest sense, the goals of the NIH in the area of nutrition are to conduct and support programs of research and training in order to understand, prevent, and treat human diseases. This research and support for nutrition by NIH probably affects every American in one way or another.[97]

Both the numbers of projects and the levels of support for human nutrition research provided by DHEW represents the most comprehensive and varied set of nutrition research activities in the Federal

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[96] Objective for FY 1975, National Institutes of Health Office, of the Director, Nutrition, provided by Dr. Myron A. Mehlman, Special Assistant to the Associate Director for Program Planning and Evaluation, on December 2, 1975.

[97] Ibid.

government. These nutritional activities in FY 1975 did not represent a coordinated program; however, during that same year human nutrition research became the object of an extensive evaluation effort within each agency of the Public Health Service. The National Institutes of Health, the agency which performed, supported, and administered the majority of human nutrition research activities, initiated a continuing process which appears to be striving to unify and coordinate the individual nutrition research effort of each institute into a NIH nutrition research plan.

E. The Veterans Administration (VA)

(1) overview

Medical research was first incorporated officially into the basic mission of the Veterans Administration's medical care program on September 2, 1958, when the Congress enacted Public Law 85–857, which so amended Title 38 of the U.S. Code that Section 4101 would henceforth read: ". . . The functions of the Department of Medicine and Surgery shall be those necessary for a complete medical and hospital service, including medical research."

Medical research was a very modest program in the VA at the end of World War II. Such medical research as existed at that time was almost entirely conducted by contracts with members of medical schools which were affiliated with the VA. When the Congress made its first appropriation of VA funds earmarked for medical research in fiscal year 1955, the total research funding was a mere $4.8 million.

Greater promise seemed to lie in intramural research programs which were augmenting the medical research contract program, and in 1956, the contract program was entirely supplanted by intramural research projects. . . .

The early VA medical investigators were quick to discover and put to the test one of their most valuable assets—the cooperative study. In a cooperative study, investigators from any number of different VA stations may agree to study a selected problem under uniform guidelines. The unique quality of VA cooperative studies is that the investigators may rapidly amass significant statistics by drawing upon the largest volume of clinical records available to any single agency in the Western world.[98]

From the beginning, human nutrition research in the Veterans Administration (VA) has been a part of the programs of the Department of Medicine and Surgery. A general statement on the scope, objectives, and purpose of nutritional research supported by the VA is expressed by overall objectives of the VA's entire biomedical program.[99] "The mission of the Department of Medicine and Surgery of the VA is to provide quality medical care to eligible veterans. Research within the Department aims to improve the care by increasing, directly or indirectly, the capacity to deliver such care. The VA thus supports research by its professional staff that is directly applicable to patient care and research that is more basic, indirectly improves medical care, and supports the work of the professional staff." [100]

Figure 15 presents the organization of the Department of Medicine and Surgery of the VA. Figure 15 has been highlighted to note those units within the Department which administer human nutrition research.

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[98] U.S. Congress. House. Committee on Veterans' Affairs. Medical Research In The Veterans' Administration. (Committee print) Washington, U.S. Government Printing Office, 1975. p. 20–21.
[99] Personal communication with Dr. Lawrence B. Hobson, Deputy Assistant Chief Medical Director for Research and Development, VA, dated May 8, 1975.
[100] Ibid.

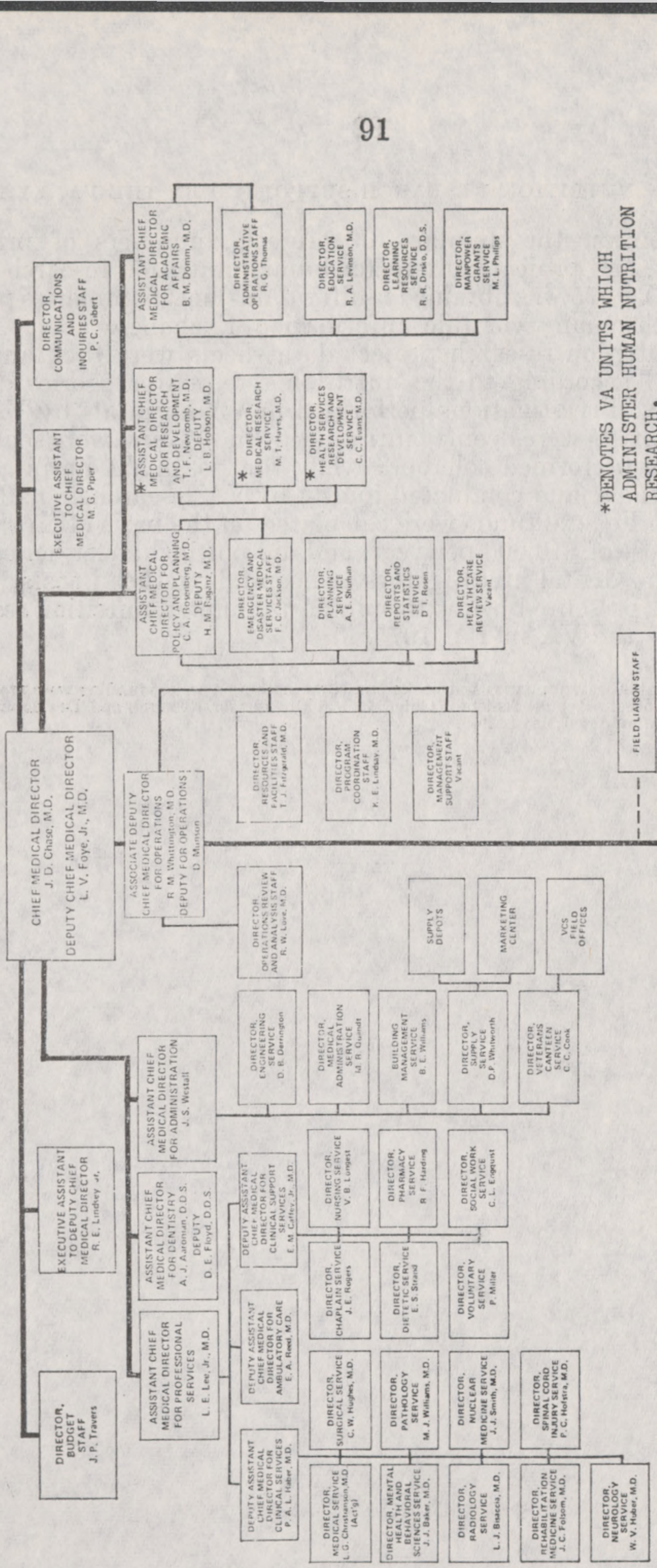

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A. J. Aaroman, D.D.S.
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D. E. Floyd, D.D.S.
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P. A. L. Haber, M.D.
DEPUTY ASSISTANT CHIEF MEDICAL DIRECTOR FOR AMBULATORY CARE
E. A. Reed, M.D.
DEPUTY ASSISTANT CHIEF MEDICAL DIRECTOR FOR CLINICAL SUPPORT SERVICES
E. M. Caffey, Jr., M.D.
DIRECTOR, MEDICAL SERVICE
L. G. Christianson, M.D. (Acting)
DIRECTOR, SURGICAL SERVICE
C. W. Hughes, M.D.
DIRECTOR, CHAPLAIN SERVICE
J. E. Rogers
DIRECTOR, NURSING SERVICE
V. B. Longest
DIRECTOR, MENTAL HEALTH AND BEHAVIORAL SCIENCES SERVICE
J. J. Baker, M.D.
DIRECTOR, PATHOLOGY SERVICE
M. J. Williams, M.D.
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J. J. Smith, M.D.
DIRECTOR, VOLUNTARY SERVICE
P. Miller
DIRECTOR, SOCIAL WORK SERVICE
C. L. Engquist
DIRECTOR, REHABILITATION MEDICINE SERVICE
J. C. Folsom, M.D.
DIRECTOR, SPINAL CORD INJURY SERVICE
P. C. Hofstra, M.D.
DIRECTOR, NEUROLOGY SERVICE
W. V. Huber, M.D.
*DENOTES VA UNITS WHICH ADMINISTER HUMAN NUTRITION RESEARCH.
FIELD LIAISON STAFF
MEDICAL DISTRICTS
CENTER (H-D)[1] DIRECTOR
CENTER (H ROI)[2] DIRECTOR
REGIONAL OFFICE[3] DIRECTOR
HOSPITAL DIRECTOR
DOMICILIARY WHITE CITY, OREGON DIRECTOR
OUTPATIENT CLINIC DIRECTOR
SOURCE: DM&S OFFICE OF POLICY AND PLANNING. 6-3-75.
2 Combined Hospital and Domiciliary.
3 Combined Hospital and Regional Office.
3 Outpatient Clinic where authorized.

FIGURE 15

(2) HUMAN NUTRITION RESEARCH SUPPORTED BY THE VA, FY 1975

Information on the numbers of projects, numbers of principal investigators, and project content for human nutrition research in the VA during FY 1975 was obtained as fifty data-sheet summaries printed by the Smithsonian Scientific Information Exchange.[101]

Human nutrition research project data sheets were then analyzed and classified according to the nutrition research categories defined for this study. Investigations performed in VA hospitals by VA professional scientists were deemed intramural studies, and were separated from research performed collaboratively, that is, in VA hospitals and other institutions, and conducted jointly by VA researchers and other investigators. Federal funds were calculated on the basis of an average per-project cost of $10,000 per year, and did not include either salaries of medical and dental investigators or hospital overhead costs.

Table VI is presented below to summarize human nutrition research supported by the VA in FY 1975.

---

[101] Copies of the data-sheet summaries and background information on project funding were provided by Dr. Lawrence B. Hobson, Deputy Assistant Chief Medical Director for Research and Development, in a personal communication dated May 8, 1975.

TABLE VI.—HUMAN NUTRITION RESEARCH SUPPORTED BY THE VETERANS ADMINISTRATION, FISCAL YEAR 1975 [1]

Awarding organization	Nutrition requirements [2]			Food composition [3]			Dietary surveys and status [4]			Disease and diet [5]			Metabolic effects [6]			Total by category		
	No. projects	Men	Federal funds	No. projects	Men	Federal funds	No. projects	Men	Federal funds	No. projects	Men	Federal funds	No. projects	Men	Federal funds	No. projects	Men	Federal funds
Veterans Administration:																		
Intramural	1	2	10,000	0	0	0	2	2	20,000	6	12	60,000	0	0	0	9	16	90,000
Extramural/collaborative	10	21	100,000	0	0	0	0	0	0	25	60	250,000	1	2	10,000	36	83	360,000
Veterans Administration total	11	23	110,000	0	0	0	2	2	20,000	31	72	310,000	1	2	10,000	45	99	450,000

[1] Information provided by Dr. Lawrence B. Hobson, deputy assistant chief medical director for research and development, Department of Medicine and Surgery, Veterans Administration, May 8, 1975. 50 data sheets for nutritional projects in Veterans Administration hospitals were obtained as Smithsonian science information exchange summaries for fiscal year 1975. Federal funds were calculated on the basis of an average per-project sum of $10,000 and does not include either salaries of medical and dental investigators or hospital overhead items: the sum is a minimal rather than a maximal estimate. Data sheets were classified by category and funding mechanism, then tabulated.

[2] What's needed: Optimum, normal human nutrition requirements, nutrient function and metabolism, malnutrition (nutrient deficiency or excess), neuroendocrine-nutrient interreactions, fundamental intermediary metabolism involving the role of 1 or more nutrients.

[3] What's available: Composition of foods, food cost plans, nutrient analysis of foods (old as well as new methods), National Nutrient Data Bank (NNDB).

[4] What's consumed: Dietary or food consumption surveys, current dietary practice or habits, nutritional surveillance and status, nutrition education.

[5] What's applied: Disease or clinical nutrition, dietary therapy, effect of disease on nutrition, environmental toxicants, alcohol and nutrition, nutrition and cancer, nutrition and vision research, etc.

[6] What's not utilized: Malabsorption syndromes, inborn errors of metabolism, familial or inherited nutritional defects.

Table VI, *Human Nutrition Research Supported by the Veterans Administration, FY 1975*, probably presents the minimal estimate for numbers of projects, numbers of professional investigators, and estimated costs for these projects during FY 1975. Table VI indicates that the VA supported about 45 human nutrition research projects at a minimum cost of about $450,000 in FY 1975.

Seventy-five per cent of the human nutrition research supported by the VA represented collaborative research projects. Approximately 68.8 per cent of the total number of projects were classified in the "Disease and Diet" category, and 24.4 per cent of all research represented studies on "Nutrition Requirements."

(3) SUMMARY—VA HUMAN NUTRITION RESEARCH

An examination of individual data sheets revealed that human nutrition research projects were performed with other academic, medical, and non-profit institutions by VA hospitals in 22 states. The VA human nutrition research effort does not appear to be a major area of emphasis within the Department of Medicine and Surgery, since it represents less than 1 per cent of the Department's appropriation during FY 1975.[102] However, the areas of concentration, the geographic distribution, and the collaborative nature of most human nutrition research supported by the VA in FY 1975 appears to fulfill the mission of the Department of Medicine and Surgery, that is, to perform research to improve patient care and to support the work of its professional staff.

Furthermore, during the examination of project data sheets for the National Institutes of Health, it was observed that professional scientists located in VA hospitals were awarded a number of research grants from NIH. These examples of collaboration between NIH and the VA were unique, that is, no other research projects were observed to be supported by grants awarded through one Federal agency and then performed by scientists in another Federal department. Table VII below presents the number of research grants, the categories of nutrition research, and the Federal funds awarded to VA scientists by NIH.

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[102] U.S. Congress. House. Committee on Veterans' Affairs. Medical Research In The Veterans' Administration, p. 21.

TABLE VII.—RESEARCH GRANTS AWARDED BY THE NATIONAL INSTITUTES OF HEALTH TO VETERANS' ADMINISTRATION SCIENTISTS, FISCAL YEAR 1975[1]

Awarding institute	Nutrition requirements[2]		Disease and diet[3]		Metabolic defects[4]		Total by category	
	Number projects	Federal funds	Number projects	Federal funds	Number projects	Federal funds	Number projects	Federal funds
National Cancer Institute (NCI)			1	$37,931			1	$37,931
National Heart and Lung Institute (NHLI)					2	$99,833	2	99,833
National Institute of Arthritis, Metabolism, and Digestive Diseases (NIAMDD)	5	$356,448			1	15,872	6	372,320
National Institute of General Medical Sciences (NIGMS)	2	69,753	2	55,799			4	125,552
Total NIH grants to VA	7	426,201	3	93,730	3	115,705	13	635,636

[1] Information provided by Mr. Frederick M. Biggs, Head, Indexing and Search Unit, Research Documentation Section, Statistics and Analysis Branch, Division of Research Resources, NIH, Apr. 18, 1975. 2,061 data sheets for major projects and parts of major projects were obtained as a computer print-out from the CRISP system of references to currently active (fiscal year 1975), public health service grant and contract-supported research in the fields of nutrition. These data sheets were classified by category, awarding organization, and funding mechanism, then tabulated.

[2] What's needed: Optimum, normal human nutrition requirements, nutrient function and metabolism, malnutrition (nutrient deficiency or excess), neuroendocrine-nutrient interractions, fundamental intermediary metabolism involving the role of 1 or more nutrients.

[3] What's applied: Disease or clinical nutrition, dietary therapy, effect of disease on nutrition, environmental toxicants, alcohol and nutrition, nutrition and cancer, nutrition and vision research, etc.

[4] What's not utilized: Malabsorption syndromes, inborn errors of metabolism, familial or inherited nutritional defects.

Table VII, *Research Grants Awarded by the National Institutes of Health to Veterans Administration Scientists, FY 1975*, provides data which demonstrate that four institutes of NIH awarded VA scientists 13 research grants representing $635,636 in FY 1975. While the total number of grants furnished by the institutes described only about 29 percent of the total number of projects supported by the VA itself, the amount of DHEW funds supplied as grants to the VA by NIH approximated 140 percent of the total estimated funds allocated by the VA itself to human nutrition research. About half of the awarded grants and $426,201 were provided for research in the "Nutrition Requirements" category. Six grants and $372,320 were awarded by the National Institute of Arthritis, Metabolism, and Digestive Diseases.

IV. A COMPARATIVE ANALYSIS OF HUMAN NUTRITION RESEARCH ACTIVITIES IN FOUR FEDERAL DEPARTMENTS

Detailed summaries have been written for the human nutrition research efforts of the Federal departments included in this study. Therefore, this analysis emphasizes the major similarities and differences in the purpose, content, and levels of support for nutrition research. The analysis concludes with an identification of apparent organizational problems in coping with cooperation and information exchange among the departments, and with the professional, legislative, and lay communities.

Each Federal department, that is, Agriculture (USDA); Defense (DOD); Health, Education, and Welfare (DHEW); and the Veterans Administration (VA), has been granted at least a general legislative authority that permits it to perform human nutrition research. For USDA, and two institutes of the National Institutes of Health (the National Cancer Institute, and the National Heart and Lung Institute) legislation has been enacted to specifically require the conduct of nutrition research.

Based in part on its traditional mission and its legislative authority, each department mainly concentrates on certain aspects of human nutrition research:

(1) USDA emphasizes nutrition research which seeks to determine the optimal nutrient requirements of "normal", healthy human beings; to discover the sources of these nutrients in foods; and to evaluate the dietary habits and nutritional value of foods consumed by the Nation's households;

(2) DOD supports nutrition research designed to provide optimal nutrition and high-quality feeding systems for military populations in various environmental situations;

(3) DHEW concentrates on nutrition research that would contribute to the understanding, prevention, and treatment of diseases; and

(4) VA sponsors nutrition research that attempts to increase the quality of patient care and that supports the research interests of its professional staff.

While each department promotes nutrition research in its particular areas of concentration, every department sponsors to some degree all aspects of human nutrition research.

Table VIII has been constructed to compare the numbers of projects, categories, and Federal funds for the total human nutrition research efforts in four Federal departments during FY 1975. The data were obtained from the detailed tables previously presented in this study. Although information on USDA human nutrition research projects and support was derived from FY 1974 data, this information probably is a close approximation of the Department's actual FY 1975 effort. Table VIII is presented below.

67-532—76——9

TABLE VIII.—HUMAN NUTRITION RESEARCH SUPPORTED BY FOUR MAJOR FEDERAL DEPARTMENTS, FISCAL YEAR 1975

Awarding organization	Nutrition requirements [1]		Food composition [2]		Dietary surveys and status [3]		Disease and diet [4]		Metabolic defects [5]		Total by category	
	No. Projects	Federal funds	No. Projects	Federal funds	No. Projects	Federal funds	No. Projects	Federal funds	No. Projects	Federal funds	No. Projects	Federal funds
I. Department of Agriculture: [6]												
A. Agricultural Research Service	35	4,148,307	11	1,182,092	9	928,822	6	497,899			61	6,757,120
B. Cooperative State Research Service	62	557,979	11	140,117	115	1,606,743	9	201,461	1	1,565	198	2,501,865
C. Economic Research Service					4	453,472					4	453,472
USDA total	97	4,706,286	22	1,322,209	128	2,983,037	15	699,360	1	1,565	263	9,712,457
II. Department of Defense: [7]												
A. Air Force	2	97,000					1	43,000			3	140,000
B. Army	16	1,654,000	3	240,000	2	74,000	5	142,000			26	2,110,000
C. Navy	2	242,000					3	138,000			8	380,000
DOD total	23	1,993,000	3	240,000	2	74,000	9	323,000	0	0	37	2,630,000
III. Department of Health, Education, and Welfare: [8]												
A. Alcohol, Drug Abuse, and Mental Health Administration	11	428,362					15	706,371			26	1,134,733
B. Center for Disease Control							1	45,490			1	45,490
C. Food and Drug Administration	12	572,270	4	251,236	6	160,000	2	91,529			24	1,075,075
D. Health Resources Administration							1	10,000			1	10,000
E. National Institutes of Health	346	25,772,185	6	128,301	2	491,331	170	26,849,117	50	3,245,710	589	58,388,154
DHEW total	384	28,674,327	100	379,537	8	651,371	189	27,702,507	50	3,245,710	641	60,653,452
IV. Veterans' Administration: [9]												
A. Intramural	1	10,000			2	20,000	6	60,000			9	90,000
B. Extramural/collaborative	10	100,000					25	250,000	1	10,000	36	360,000
VA total	11	110,000	0	0	2	20,000	31	310,000	1	10,000	45	450,000
V. Federal total	515	35,483,613	35	1,941,746	140	3,728,408	244	29,034,867	52	3,257,275	986	73,445,909

[1] What's needed: Optimum, normal human nutrition requirements, nutrient function and metabolism, malnutrition (nutrient deficiency or excess), neuroendocrine-nutrient interreactions, fundamental intermediary metabolism involving the role of 1 or more nutrients.

[2] What's available: Composition of foods, food cost plans, nutrient analysis of foods (old as well as new methods), National Nutrient Data Bank (NNDB).

[3] What's consumed: Dietary or food consumption surveys, current dietary practice or habits, nutritional surveillance and status, nutrition education.

[4] What's applied: Disease or clinical nutrition, dietary therapy, effect of disease on nutrition, environmental toxicants, alcohol and nutrition, nutrition and cancer, nutrition and vision research, etc.

[5] What's not utilized: Malabsorption syndromes, inborn errors of metabolism, familial or inherited nutritional defects.

[6] See table I.

[7] See table II.

[8] See table G.

[9] See table VI.

Table VIII, *Human Nutrition Research Supported by Four Federal Departments, FY 1975*, indicates that a total Federal expenditure was estimated at about $73 million for nutrition studies of one kind or another during FY 1975. Furthermore, all but about $13 million of this total research effort was conducted or supported by a single department, namely DHEW, which devoted most of its funds to metabolic studies of specific nutrients and to research on the role of nutrients in disease. While many of the eminent nutritionists in the United States received grants from this Department based upon unsolicited competitive nutrition research proposals, most of DHEW's $60 million expenditure for extramural and intramural research was in a disease, clinical, or therapeutic context.

Even if the figures in Table VIII were only roughly comparable by reason of the departments' nutrition research being mainly grants in one case and largely in-house studies in the others, the National Institutes of Health (NIH), DHEW, financially led the Federal nutrition research enterprise—about 82 percent of it, according to the table. Even the funds devoted by NIH alone on hereditary defects affecting nutrition, together with those devoted to the defined categories by other DHEW organizations, nearly equaled those of the Agricultural Research Service (ARS), USDA, in all categories in FY 1974.

The Department of Defense, charged with research in the interest of optimum nutrition for troops under various military environments and operating conditions, expended some $2.6 million for nutrition research. While this did not include the costs of ration development, new food preservation technology, etc., the research figure appears small for a specialized population exposed to so many changing nutritional risks.

The Veterans Administration's nutrition research, which very likely varies from year to year based upon the interests of its investigators rather than specific appropriations, identified $500,000 in FY 1975 nutrition research which was reduced to $450,000 following a study of the project sheets for relevance to the defined categories. Table VII, above, showed that an additional $635,636 was provided to the VA in FY 1975 for nutrition research by NIH, demonstrating again the aforementioned financial influence that NIH exerts on the Nation's nutrition research enterprise.

Federal funds for nutrition research in the Department of Agriculture in all defined categories in FY 1974 was divided between two essentially independent USDA organizations, the Agricultural Research Service (ARS) which conducted intramural nutrition research and the Cooperative State Research Service (CSRS) which administered support for nutrition research performed in the State Agricultural Experiment Stations and the Land-Grant Colleges. Federal funds for nutrition research in all categories in each of these agencies were $6,757,120 and $2,501,865, respectively.

Although all of the nutrition research categories were represented in the CSRS effort, most of the work appeared to be aimed at the determination of dietary intake in small, specific segments of the Nation's rural population. The intent of the Hatch Act, which established the CSRS mission, is that research in the Agricultural Experiment Stations contribute in part directly to the development and improve-

ment of the rural home and rural life, including optimum nutritional status. Consequently, it was observed that the CSRS nutritional activities in the "Dietary Surveys and Status" category had 115 projects with a total Federal contribution of $1,606,743.

The Agricultural Research Service operated a seemingly vigorous and productive in house effort in all the nutrition research categories, but with emphasis on the nutrient properties of foods and the availability of nutrients in foods, that is, "Food Composition". The research mission in these regards is unique among the departments in that it seeks to maintain health and prevent disease with the products of agriculture, namely foods, rather than with nutrients per se. The operative assumption is that new nutrients remain to be discovered, especially trace elements, and that the most available forms of some established elements, such as iron, also remain to be discovered and their levels determined in food products. ARS sets its overall mission in nutrition in sharp contrast to the activities of the other Federal departments:

> Among the Federal agencies only USDA is charged with providing food for the nation. Thus, ARS research in food and nutrition gives high priority to research on nutrient requirements of all age groups, and the foods needed to attain and maintain a well-nourished, healthy population. Research at Beltsville, Maryland, and Grand Forks, North Dakota is directed to the broad areas of nutrient requirements of all age groups; the amounts, forms, and availability of nutrients in foods; and improvement of methods for assessing nutritional health. Research at Hyattsville, Maryland is directed toward the assessment of the nutritive quality of diets of U.S. households and individuals; development of tables of nutrient composition of foods; nutrient data bank; preparation of practical nutritional guidelines for consumers; development of guidance materials for nutrition education: and provision of research-based guidance for food use in the Department's child feeding and food distribution programs.[103]

It is a matter of record, as described in pages 23 to 33 of this study that the ARS nutrition research activities are accomplished with relatively few scientists and technicians in a series of small and rather old laboratories. The U.S. Plant, Soil, and Nutrition Laboratory, constructed in 1939–41 seems almost a shoestring operator in regard to both staff and budget. The Human Nutrition Laboratory at Grand Forks, North Dakota, was constructed in 1970, but the number of technical personnel on staff is still small compared to other complexes where research on human subjects is performed.

These limitations, if properly assessed as such, are matched by the fact that funds were not available for a supporting research program of grants in nutrition research sponsored by USDA. ARS is thus denied the mix and flow of new ideas which have enriched the quality and influence of the National Institutes of Health over the past many years. Under an initial modest grant program of one or two million dollars, nutritionists and biochemists in Land-Grant Colleges, which have become full scale universities with Departments of Nutrition and with affiliated medical schools, could seek support from ARS as well as NIH and thus become an integral part of the unique nutrition research system of USDA. Such an expansion of extramural grants, contracts, and cooperative agreements for nutrition research

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[103] U.S. Congress. House. Committee on Appropriations. Agriculture-Environmental and Consumer Protection Appropriations For 1975. Part 4, Agricultural Program. Hearings, 93d Congress, 2d session. Washington, U.S. Government Printing Office, 1974. p. 796.

was proposed by ARS in 1963, because "[e]xtramural work done at universities affords special opportunities to support basic research, to assist in the training of research scientists, and to enlist the interest of scientific leadership the country over." [104] The expansion was intended to bring non-government nutritionists into the ARS orbit, and at the same time effectively alter the nature of university research to reflect the problems in food and nutrition research as perceived by the Federal department most intimately concerned with the Nation's food-producing enterprise.

While this study has synthesized a comprehensive picture of the human nutrition research efforts in four Federal departments from thousands of pieces of data, the data do not describe the amount of information exchange nor the degree of ccoperation relative to the research.

Indeed, the most frequently encountered stumbling-block to this study was the persistent lack of sources of comprehensive information. From the bringing together of historical background to the collection of current project data, no single person, publication, computerized data base, office, agency, or department could provide the authors with certain essential facts. Perhaps the multidisciplinary nature of nutrition research contributes to its fragmented and obscure administration. At any rate, the planning and conduct of human nutrition research is scattered throughout complex and diversified Federal organizations.

There is no doubt that the administrators and investigators at all levels of the Federal Government experience, and fully recognize, problems in communicating the content and results of their nutrition research. As already mentioned, the degree of information exchange and the means by which it takes place often depend on the fundamental or applied character of the research, and upon the particular interests of the persons involved. Fundamental research and applied clinical nutrition investigations tend to be discussed among professional scientists via traditional methods of communication such as publication in specialty journals and presentations at either formal scientific conferences or informal professional meetings. As the research results are incorporated into new technical procedures, into studies on food assistance programs, into estimates of food supply, etc., the methods of continuing information exchange become more limited, and may not even exist at all. Administrators mainly comprehend the content of nutrition research efforts in which they are professionally involved, are personally interested, or are organizationally responsible.

These problems of information exchange at all organizational levels would seem ultimately to affect the ability of the Federal departments to know the details of each others' nutrition research efforts; to cooperate in planning future nutrition research goals; and to adequately respond to increasing demands on the part of the professional, legislative, and lay communities for sources of information on nutritional knowledge and on nutrition research.

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[104] U.S. Dept. of Agriculture. Agricultural Research Service. Proposed Program For Expanded Research In Food And Nutrition. Washington, U.S. Government Printing Office, 1963. p. 23–24. (Published as Senate Document No. 35, 88th Congress, 1st session).

Since both scientists and administrators within the Federal departments have noted that information exchange and cooperative planning activities could be improved, certain initial attempts have been made to remedy these problems. Coordinating committees in USDA, DOD, DHEW, and in the National Institutes of Health, have been established, deactivated, reformed, and continue to operate within the departments. To date, these departmental coordinating committees have begun to assess their own ongoing nutrition research activities. The more difficult high-level interdepartmental communication directed toward achieving broad nutrition research goals has yet to be established within the framework of available resources in manpower and funds. Without such interdepartmental communication, the objective of an efficient and cohesive Federal nutrition research plan appears seriously jeopardized.

Nonetheless, at the lower organizational levels, four striking examples of communication, cooperation, and coordination were observed:

(1) The office of the Associate Director for Nutrition and Consumer Sciences within the Food and Drug Administration's Bureau of Foods, DHEW, and the Consumer and Food Economics Institute within the Agricultural Research Service, USDA, are working together to design, establish, and maintain the National Nutrient Data Bank while employing the resources and professional talent of both agencies.

(2) The National Institutes of Health within the Public Health Service, DHEW, awarded grants to professional investigators located in Veterans Administration hospitals to augment the resources available for nutrition research in primarily clinical situations.

(3) By means of an interagency agreement, the National Heart and Lung Institute within the National Institutes of Health, DHEW, supports fundamental lipid research at the Nutrition Institute within the Agricultural Research Service, USDA, which utilizes the special expertise of the Lipid Nutrition Laboratory.

(4) The Food and Drug Administration, the Social Security Administration, the Administration on Aging, and the Social and Rehabilitation Service of DHEW are participating in the design and funding of the forthcoming Household Food Consumption Survey conducted by the Consumer and Food Economics Institute of the Agricultural Research Service, USDA.

Evidence provided in this study indicates that the four Federal departments have recently revived their long-standing interests in human nutrition research. The departments have begun to assess their nutrition research efforts in terms of purpose, content, scope, relevance, information exchange, and possible collaboration so that they might more effectively direct the research with the currently available manpower and funds. Furthermore, USDA, DHEW, and DOD have proposed new initiatives for nutrition research and training which would be undertaken if and when financial resources were increased and nutrition research activities were conducted in the context of common National objectives.

APPENDIXES

APPENDIX I: A HISTORY OF SELECTED HUMAN NUTRITION ACTIVITIES IN THE FEDERAL GOVERNMENT

Date and event

1867—The Office of Education was established. The broad mandate of this office included the collection and dissemination of information on, and methods to achieve, educational development in the United States. Nutrition education within the public school system was one of its earliest responsibilities. In 1946, this office began the wider use of the School Lunch Program as the educational instrument for improving nutrition of the families in the community.

1889—Congress authorized the Public Health Service Commissioned Corps as a mobile corps subject to duty on communicable, nutritional, and other diseases as assigned.

1893—Congress authorized agricultural research, including human nutrition research, in the Department of Agriculture.

1904—The Hygienic Laboratory, including the Nutrition Section, moved into newly constructed facilities on 25th and E Streets, N.W., Washington, D.C.

May 8, 1914—The Cooperative Extension Service was created as part of USDA by the Smith-Lever Act, and was subsequently amended (1947, 1954). The Extension Service was designated as the agency through which the public might learn and apply to everyday activites the latest technology developed through USDA-sponsored research. Major areas of assistance included agricultural production and marketing, home economics and nutrition, 4-H youth development, and rural development.

1914—Dr. Joseph Goldberger, a member of the Public Health Service Commissioned Corps, announced his views that pellagra was a nutritional deficiency disease.

August, 1917—Congress passed the Lever Act that established the U.S. Food Administration. Under the direction of Herbert Hoover, this agency undertook the difficult task of supervising the food supply—from production through sale—during World War I.

1918—A Food Division was established within the Office of the Army Surgeon General to cooperate and consult with the newly created Subsistence Division under the direction of the Army Quartermaster General on matters relating to the nutritional adequacy of rations.

1930—The Federal government began food relief through the USDA, and the Federal Emergency Relief Administration's incorporation of the Federal Surplus Relief Corporation. The Corporation bought and distributed surplus agricultural commodities to state and local relief agencies.

1930—The Ransdell Act redesignated the Public Health Service Hygienic Laboratory, including its Nutrition Section, as the National Institute of Health.

1933—The Bureau of Home Economics (USDA), the Public Health Service, the Extension Service (USDA), the Children's Bureau (Social Security Administration), and the Agricultural Adjustment Administration cooperated in initiating a comprehensive nutrition and home economics program by means of cookbooks, buying guides, and radio broadcasts. *Diets at Four Leveles of Nutrient Content and Cost* was published as an aid to consumers and food producers. It was distributed to welfare workers, teachers, home economists, and others.

1935—The Federal Surplus Relief Corporation was placed under the direction of USDA, and its name was changed to the Federal Surplus Commodities Corporation. Congress recognized the Corporation in 1937, and provided for its continued operation until 1942. Surplus commodities were purchased and provided to state welfare agencies for distribution to the needy.

1935—President Roosevelt created the Interdepartmental Committee to Coordinate Health and Welfare Activities. Part of this Committee, namely, the Technical Committee on Food and Nutrition, represented 21 Federal government bureaus. The Technical Committee outlined a comprehensive program that coordinate nutritional research activities, consumption pattern studies, food production, and methods to incorporate the results of these activities into educational, administrative, and development programs by Federal-State cooperation, and grants-in-aid.

1936—The Army Quartermaster General established a Subsistence Research Laboratory (SRL) at the Quartermaster Corps' depot in Chicago. In 1945, the SRL was renamed the Subsistence Research and Development Laboratory.

1938—Congress authorized the construction of new laboratory facilities for the National Institute of Health in Bethesda, Maryland.

May 16, 1939—The Federal Surplus Commodities Corporation initiated an experimental food-stamp program. The needy and employees of the WPA were paid in script vouchers that were exchangeable at stores for commodities. Storekeepers could redeem the vouchers at governmental agencies. Only foods designated as surplus could be bought with free script (blue). Other colored script was sold to relief clients in amounts proportionate to respective family size. This script could be used to buy any available foods.

1940—President Roosevelt established the National Defense Advisory Commission. The consumer commission of NDAC drew attention to the extent of malnutrition in the United States, and appointed the USDA director of extension work as nutrition advisor for the adoption of a National Nutrition Program. The program was implemented by Paul V. McNutt, Federal Security Administrator and Coordinator of Health, Welfare, and Related Activities through the National Nutrition Advisory Committee.

December 7, 1940—The National Academy of Sciences. National Research Council, Division of Biology and Agriculture established the Committee on Food and Nutrition. By early 1941, this Committee was renamed the Food and Nutrition Board, and was to focus the science of nutrition upon national health problems and to offer advice on and cooperate in international nutrition programs. Members of the Board included representatives from nongovernmental industry and trade organizations, government agencies, and from scientific societies. In March 1941, the Board issued the first Daily Nutrient Allowances, the precursor to the Recommended Daily Dietary Allowances of nutrients today.

May 26, 1941—President Roosevelt called the National Nutrition Conference for Defense. Delegates were charged with preparing a planning report that outlined ways to combine U.S. agriculture and public health in the interest of national nutrition, i.e., to secure a national nutrition program of policy and action.

1941—A laboratory was established within the Army Medical School at Walter Reed General Hospital to provide instruction and training to Nutrition Officers. In 1944 this laboratory was established in Chicago, and became known as the Army Medical Nutrition Laboratory, a separate unit under the Army Surgeon General.

1941—The Food and Drug Administration promulgated standards for the enrichment of flour and bread with B-complex vitamins. These standards were formulated jointly by the FDA, the American Bakers' Association, the Millers' National Federation, and the Food and Nutrition Board. This action set a precedent for enrichment of other foods by the industry, with the FDA serving as the control agency.

1943—The Food and Nutrition Board of the National Academy of Sciences published "Tables of Food Composition Giving Proximate, Mineral and Vitamin Components of Foods" as an official classified document for use by the U.S. Office of War Information.

1946—The Research and Marketing Act of 1946 provided specific legislative authority and directed the Secretary USDA "to conduct and to stimulate . . . research into the problems of human nutrition and the nutritive value of agricultural commodities, with particular reference to their content of vitamins, minerals, amino and fatty acids, and all other constituents that may be found necessary for the health of the consumer and to get gains or losses in nutritive value that may take place at any stage in their production, distribution, processing, and preparation by the consumer. . . ."

1946—The Army Subsistence Research and Development Laboratory in Chicago was redesignated as the Quartermaster Food and Container Institute of the Armed Forces.

1947—The Laboratories of Nutrition, Chemistry, and Pathology of the National Institute of Health were incorporated into the Experimental Biology and Medicine Institute.

1947—The Food and Nutrition Board of the National Academy of Sciences began a series of surveys on food and nutrition research in the United States. These surveys were continued at two-year intervals through 1953.

1950—The Omnibus Medical Research Act authorized that the Experimental Biology and Medicine Institute, and its laboratories of nutrition, to become the National Institute of Arthritis and Metabolic Diseases.

1953—The Army Medical Nutrition Laboratory in Chicago was moved to the Fitzsimons General Hospital in Denver, Colorado.

1953—The Laboratories of Nutrition, Chemistry, and Pathology within the National Institute of Arthritis and Metabolic Diseases became the Laboratory of Nutrition and Biochemistry.

July 10, 1954—Public Law 480, the Agricultural Trade Development and Assistance Act of 1954, was signed by President Eisenhower. The purpose of this law was to check the accumulation of U.S. agricultural surpluses by creating new markets for U.S. agricultural products, and by assisting friendly nations, especially during times of emergency.

1955—The Interdepartmental Committee on Nutrition for National Defense (ICNND) was established by a memorandum of agreement by the Departments of Defense; State; Agriculture; Health, Education, and Welfare; plus the International Cooperation Administration, and later, the Atomic Energy Commission. The purpose of the Committee was to deal with nutrition problems of technical, military, and economic importance in foreign countries where the U.S. was providing assistance.

September 2, 1958—Congress enacted Public Law 85-857 which authorized the Department of Medicine and Surgery of the Veterans Administration to perform functions necessary for complete medical and hospital service, including medical (and therefore nutrition) research.

1958—The Army Medical Nutrition Laboratory in Denver was combined with the R & D unit at Fitzsimons General Hospital to become the Medical Research and Nutrition Laboratory (USAMRNL).

1959-60—The Laboratory of Nutrition and Biochemistry within the National Institute of Arthritis and Metabolic Diseases became the Laboratory of Nutrition and Endocrinology.

March 16, 1961—In a special message to the Congress on agriculture, President Kennedy outlined a program for expanding the use of food and farm abundance to improve the distribution of food and nutrition at home and to improve nutrition among needy peoples abroad. This speech also announced the beginning of eight pilot food-stamp programs as one of the methods considered for achieving the goals of ample and adequate food for the Nation's poor.

March 29, 1961—In a letter to the President of the Senate on increasing the national effort in oceanography, President Kennedy outlined the possible food and nutritional implications for harvesting the sea. This statement was part of a justification to double Federal funds for the study of the oceans and their potential.

1962—The Army Quartermaster Food and Container Institute was redesignated as the Armed Forces Food and Container Institute.

June 4, 1963—In his remarks at the opening session of the World Food Congress, President Kennedy pledged that the United States would fully support the United Nations' Freedom From Hunger Campaign by using the Food For Peace shipments, Alliance For Progress operations, the Peace Corps, and its related activities with the United Nations and the Organization of American States.

1963—The Armed Forces Food and Container Institute was relocated at the U.S. Army Natick Development Center in Natick, Massachusetts.

1965—USDA completed a series of surveys on food consumption in U.S. households. The surveys were performed in 1936, 1942, 1948 (urban only), 1955, and 1965. In 1965, data were collected on the amounts of food consumed by individuals in addition to total household consumption. For the first time, the analysis of this data provided national information on food intake and nutritive value of diets for men, women, boys, girls, and infants.

February 2, 1966—In a special message to the Congress, President Johnson proposed International Education and Health Programs. Included in this message was an outline for an expansion of the Food for Peace program to begin foreign "head start" nutritional programs and a program to train nutritionists from developing countries in the United States. The expansion of research on malnutrition was also emphasized.

February 10, 1966—President Johnson outlined his program for a "war on hunger" in a special message to the Congress entitled, The Food for Freedom Program. The program emphasized a concern for problems of hunger and malnutrition throughout the world and proposed a series of steps in foreign aid whereby the United States would attempt to limit hunger and malnutrition in the world. The Food for Freedom Program evolved from recommendations of the White House Conference on International Cooperation, which was convened by President Johnson in November 1965.

June, 1967—The President's Science Advisory Panel on the World Food Supply published three volumes of studies on representative factors of major importance in the description of, and possible contributions toward, the problems of food supply and nutritional requirements for populations in the world's developing nations. Membership in the Panel's studies included representatives of the USDA,

AID, other government agencies, and national and international representatives from universities, industry, and foundations. President Johnson prepared the foreword to this report.

July, 1967—The Citizen's Crusade Against Poverty formed the Citizen's Board of Inquiry into Hunger and Malnutrition in the United States in response to the Senate Subcommittee on Manpower, Employment and Poverty's findings of gross malnutrition and hunger in Mississippi. In 1968, the Board published a report of its findings in *Hunger U.S.A., A Report,* which described national malnutrition and poverty in every part of the United States despite available food assistance programs.

July 30, 1968—Senate Resolution 281 established the Senate Select Committee on Nutrition and Human Needs with the mandate to evaluate food, nutrition, education, health, and welfare programs in the United States, including the policy implications of these programs, and to report back to the appropriate committees of the Senate the results of its evaluations. This committee has been the primary Congressional forum for investigations into the state of nutrition among the various peoples of the Nation.

May 6, 1969—In a special message to the Congress, President Nixon recommended a program to end hunger in the United States. In addition to expanding food assistance programs, the President established a sub-Cabinet working committee of the Urban Affairs Council to promote coordination between the food and nutrition programs and other health, educational, and anti-poverty programs.

May 7, 1969—President Nixon announced plans for the White House Conference on Food, Nutrition, and Health, The purpose of the Conference was to advise the President, the Congress, and the American people on the development of a national policy aimed at eliminating hunger and malnutrition caused by poverty, and at improving the nutritional health of all Americans. On June 11, 1969, Dr. Jean Mayer was appointed Special Consultant to President Nixon and charged with organizing the Conference.

August 8, 1969—The Secretary of Agriculture established the Food and Nutrition Service to be exclusively concerned with the administration of Federal food assistance programs. These programs include: the Food Stamp Program (est. 1964), the National School Lunch Program (est. 1946), the Food Distribution Program (est. 1935), the School Breakfast Program (est. 1966), the Equipment Program (est. 1966), and the Special Milk Program (est. 1954).

November 30, 1969—The White House Conference on Food, Nutrition, and Health held preliminary sessions. The full conference began on Dec. 5, 1969. This conference consisted of over 5,000 participants who were organized into 26 panels and 8 task forces of academic, medical, industry, and agriculture experts as well as concerned American citizens. The Final Report of the conference contains many recommendations for surveillance and evaluation of the nutritional status of the Nation, food safety and availability, the nutrition of special groups, and nutrition education.

1970—The Center for Disease Control completed the Ten-State Nutrition Survey. A preliminary report to the Congress on the results of this survey was presented in 1971. Full analysis of the survey was published in 1972. This was the largest survey performed in the United States to determine the magnitude and location of pockets of malnutrition. The ten states included in the survey were: Washington, California, Texas, Louisiana, South Carolina, Kentucky, West Virginia, Michigan, Massachusetts, and New York. The sample population consisted of primarily low-income groups. The results of the survey indicated that a significant proportion of the population surveyed was malnourished or was at high risk of developing nutrition problems.

1972—The Citizens' Board of Inquiry into Hunger and Malnutrition in the United States published *Hunger U.S.A. Revisited.* This publication criticized the budgetary constraints used to stymie the activities of the Federal government programs for food assistance and nutrition since 1968. It also provided one of the best compilations on Federal funding and food assistance program statistics for 1961 to 1972.

1972—A Committee on Food and Nutrition Research was established in USDA by Secretary's Memorandum No. 1773, revised October 1973. The Committee was inactive from March 1974 through June 1975 when it was reactivated.

April 3, 1973—The Assistant Secretary for Health, DHEW, formally established by memorandum a Nutrition Coordinating Committee of DHEW. The last meeting of the Committee was held on November 15, 1974.

October 1–4, 1973—The Cooperative State Research Service, USDA, and the National Association of State Universities and Land Grant Colleges cosponsored the "Workshops On The Role of Land Grant Institutions In Applied Nutrition" in Greensboro, North Carolina.

1973—The U.S. National Center for Health Statistics completed the First Health and Nutrition Examination Survey (HANES) begun in 1971. A preliminary report on the dietary intake and biochemcial findings was published in Jan. 1974. The HANES is the first step in the efforts of the Department of Health, Education, and Welfare to establish a national nutrition surveillance system that has as its purpose the measuring of nutritional status for the U.S. population and the monitoring of changes in this status over time. HANES is designed to sample a population representative of the U.S. civilian, non-institutionalized population in a range of ages from 1 to 74 years.

1973–74—The U.S. Army Medical Research and Nutrition Laboratory (USA MRNL) was transferred to the Letterman Army Institute of Research in the Presidio of San Francisco. The USAMRNL became the Department of Nutrition in Letterman.

June 19–21, 1974—The Senate Select Committee on Nutrition and Human Needs held three days of National Nutrition Policy Study Hearings. The purposes of the hearings were to estimate the progress in nutrition since 1969; and to provide, through the recommendations of six panels, various methods to formulate a National Nutrition Policy.

1974—A reorganization within the U.S. Army Natick Development Center in Natick, Massachusetts, established a Food Science Laboratory and a Food Engineering Laboratory.

March 1975—The Secretary DHEW approved the DHEW Policy Statement on the Health Aspects of Nutrition to act as a framework within which the agencies of the Department could plan and conduct coordinated nutrition activities.

June 1975—The National Institutes of Health established the NIH Nutrition Coordinating Committee to evaluate nutrition research in NIH, and to develop a continuing method for interinstitute cooperation in nutrition and an ongoing operation plan for nutrition research in all institutes.

July 7–11, 1975—The Cooperative State Research Service, USDA, and the National Association of State Universities and Land Grant Colleges cosponsored the "Working Conference on Research To Meet U.S. And World Food Needs" in Kansas City, Missouri.

August 15, 1975—Army Regulation 70–3 became effective. This revision incorporated modifications to the procedures by which DOD administers the Food Research, Development, Testing, and Engineering Program. AR 70–3 also corrected agency names, research and development terms, and procedures created by the Department of the Army staff. In essence, this regulation centralized the DOD human nutrition research program and superseded AR 70–3, OPNAVINST 3900.26A, AFR 80–52, MCO 3900.9A, and DSAR 3200.4, dated August 26, 1974.

August 1975—A Nutrition Plan for DHEW was included in the FY 1977–1981 Forward Plan For Health.

APPENDIX II: MEMBERS OF THE COMMITTEE ON FOOD AND NUTRITION RESEARCH, DEPARTMENT OF AGRICULTURE, FISCAL YEAR 1975–76 [1]

Mr. Paul A. Vander Myde, Chairman
Deputy Assistant Secretary
Room 212, Admin. Bldg.
Washington, D.C.
Phone: 447–7107

Dr. W. A. Gortner, Executive Secretary
National Program Staff, MNES, ARS
Bldg. 005, Room 228
Beltsville, Maryland
Phone: 344–2743

Dr. James Iacono
Deputy Asst. Administrator, MNES, ARS
Room 338, Admin. Bldg.
Washington, D.C.
Phone: 447–6128

Dr. Walter Mertz
Chairman, Nutrition Institute, ARS
Room 223, Bldg. 308
Beltsville, Maryland
Phone: 344–2157

Dr. William H. Walker III
Deputy Admin., Program Operations, AMS
Room 3079, South Bldg.
Washington, D.C.
Phone: 447–4016

Dr. Stephen J. Hiemstra
Director, Economic Analysis and Program Evaluation Staff, FNS
724 500 12th St., S.W.
Washington, D.C.
Phone: 447–8044

Dr. Grace Ostenso,
Director, Nutrition and Technical Services Staff, FNS
556 500 12th St., S.W.
Washington, D.C.
Phone: 447–9081

Dr. Lenora Moragne
Head, Nutrition Education & Training Group, FNS
571 500 12th St., SW.
Washington, D.C.
Phone: 447–8286

Dr. Evelyn Johnson
Nutritionist, ES
Room B–17, Audit. W. Bldg.
Washington, D.C.
Phone: 447–3261

Dr. Elizabeth Davis
Family and Consumer Services, CSRS
Room 402–W, Admin. Bldg.
Washington, D.C.
Phone: 447–4329

Dr. Alden C. Manchester
National Economic Analysis Div., ERS
Room 260C 500 12th St., SW.
Washington, D.C.
Phone: 447–8707

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[1] This list of membership was provided in personal communication by Ms. Freda Wallace, National Program Staff, ARS, USDA, on September 16, 1975.

APPENDIX III: NIH NUTRITION COORDINATING COMMITTEE, FY 1976 [1]

Chairman
Dr. Harold P. Roth
Associate Director for Digestive Diseases and Nutrition
NIAMDD
WB/603 496–7455

Executive Secretary
Dr. Myron A. Mehlman
Special Assistant to Associate Director for Program Planning & Evaluation
OPPE/OD
1/138 496–3155

Representatives

CC
Ms. Merme Bonnell
Chief of Patient Dietetic Service
10/1S263 496–3311

DCRT
Dr. Arnold W. Pratt
Director, Division of Computer Research & Technology
12A/3033 496–5703

DRG
Dr. John R. Schubert
Executive Secretary Nutrition Study Section
WB/204 496–7178

DRR
Dr. William DeCesare
Chief, General Clinical Research Centers Branch
31/4B13 496–6595

Alternates
Dr. Ronald M. Barton
Medical Officer
General Clinical Res. Centers Branch
31/4B13 496–6595

FIC
Dr. Fred R. McCrumb
Special Assistant to Director
31/2C15 496–4331

NCI
Dr. Gio B. Gori
Deputy Director
Division of Cancer Cause & Prevention
31/11A03 496–6616

Dr. Irvin C. Plough
Associate Director for Program Planning
Division of Cancer Biology and Diagnosis
31/3A04 496–3251

DRS
Dr. Joseph J. Knapka
Nutritionist
496–4481

Dr. Kenneth M. Nelson
Associate Director for Supportive Services
Division of Cancer Control & Rehabilitation
Blair Bldg., Rm. 726
Silver Spring 427–8080

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[1] This list of membership was provided in personal communication by Dr. Myron A. Mehlman, Special Assistant to Associate Director for Program Planning and Evaluation, NIH, on November 28, 1975.

Representatives	*Alternates*
NHLI Dr. Robert I. Levy Director, Division of Heart and Vascular Diseases 31/4A19 496–5437	Ms. Barbara Dennis Nutritionist, USSR Cooperation Problem, Area 1 31/4A18 496–1682 Ms. Nancy D. Ernst Nutritionist, Metabolism Branch 31/4A22 496–1681
NIAID Dr. Howard A. Minners Associate Director for Collaborative Research 31/7A–03 496–6721	
NIAMDD Dr. Gerald F. Combs Nutrition Program Director WB/604 496–7823	Dr. John G. Bieri Section on Nutritional Biochemistry Laboratory of Nutrition & Endocrinology 10/5N102 496–5536
NICHD Dr. Merrill Read Acting Deputy Director Center for Research for Mothers & Children Lan/C718 496–5097	Dr. John McKigney Health Scientist Administrator Growth & Development, CRMC Lan/C718 496–6591
NIDR Dr. Paul D. Frazier Chief of Soft Tissue Stomatology and Nutrition Program NIDR Extramural Programs WB/525 496–7707	Dr. Matthew A. Kinnard Health Scientist Administrator Div. Soft Tissue Stomatology and Nutrition Program Branch NIDR Extramural Programs WB/525 496–7807
NIEHS Dr. David P. Rall Director, National Environmental Health Sciences Center P.O. Box 12233, Res. Triangle Pk., N.C. 27709 919–549–3201	Dr. Carol Schiller Environmental Toxicology Branch, NIEHS Building 4, Room 414 P.O. Box 12233, Res. Triangle Pk., N.C. 27709 919–549–3298
NEI Mr. Julian M. Morris Chief of Scientific Reports and Program Planning Coordination 31/6A25 496–5248	
NIGMS Dr. James Dickson Director, Biomedical Engineering Program 31/4A27 496–5538	
NINCDS Dr. Eldon L. Eagles Deputy Director, National Institute of Neurological & Communicative Disorders & Stroke 31/8A52 496–4581	Dr. Zekin A. Shakhashiri Special Assistant OPE 31/8A22 496–3297
NLM Dr. Harold M. Schoolman Assistant Deputy Director 38/M140 496–4725	

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