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With the disappearance of major nutritional deficiency diseases in the United States, nutrition research has turned to more elusive pursuits, such as the effects of diet on human intellect and life span. As a consequence, human nutrition research has become complex and multidisciplinary, involving dietetics, biochemistry, physiology, medicine, microbiology, genetics, endocrinology, food technology, and agricultural science. The Government spends about $80 million per year on human nutrition research. None of the Federal organizations involved in nutrition research provides comprehensive nutrition information, and comprehensive information for determining the direction and focus of Federal human nutrition research is lacking at this time. The four broad areas of research needs which are important for sound nutrition planning are human nutritional requirements; food composition and nutrient availability; diet, disease causation, and food safety; and food consumption and nutritional status. The principal Federal agencies supporting human nutrition research are the Agricultural Research Service and the National Institutes of Health. In addition, the Health Resources Administration conducts the Health and Nutrition Examination Survey, which is a major research project designed to measure and monitor the nutritional status of the American people over time. (SC)

UNITED STATES GENERAL ACCOUNTING OFFICE

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STATEMENT FOR THE RECORD

BY

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FOR THE
SUBCOMMITTEE ON DOMESTIC AND INTERNATIONAL
SCIENTIFIC PLANNING, ANALYSIS AND COOPERATION
OF THE HOUSE COMMITTEE ON SCIENCE AND TECHNOLOGY

ON
FEDERAL HUMAN NUTRITION RESEARCH

Mr. Chairman and members of the Subcommittee:

I am pleased to submit this statement for your consideration during these hearings on human nutrition. The information presented is based on our ongoing review of Federal human nutrition research activities which is being done at the request of the Chairman, Senate Select Committee on Nutrition and Human Needs.

The Select Committee asked us to report on human nutrition research gaps and needs and on changes needed to facilitate progress. In examining into these matters, we (1) obtained the views of 32 individuals active in research, teaching, or clinical practice, (2) examined major studies of nutrition research and manpower needs, (3) reviewed information obtained by the Office of Technology Assessment in its study of human nutrition research, and (4) interviewed officials at and obtained data from the various Federal agencies supporting human nutrition research.

First I would like to review the changing nature of human nutrition research and the Federal role in support of such research, and then present our findings on research gaps, needs, and barriers to progress.

Human nutrition research traditionally has been concerned with identifying essential nutrients, defining the role of nutrients in the human organism, and preventing nutritional deficiency diseases. Effective nutrition has been taken for granted if the individual gets the nutrients deemed essential. Little attention has been given to environmental factors influencing an individual's consumption patterns, the substances he ingests, aside from particular nutrients, or the long-term health implications of his dietary practices.

Today it is recognized that nutrition plays a vital role in health status throughout life and that good nutrition is more than simply getting those nutrients considered essential. With the disappearance of major nutritional deficiency diseases in the United States, nutrition research has turned to more elusive pursuits such as the effects of diet on human intellect and life span. While the job of identifying and characterizing specific nutrients is an important and uncompleted task, the concept of malnutrition now includes food and nutrient excesses as well as deficiencies. As a consequence, human nutrition research has become complex and multidisciplinary, involving dietetics, biochemistry, physiology, medicine, microbiology, genetics, endocrinology, food technology, and agricultural science.

Three factors underlie and emphasize the broadening scope of human nutrition in the United States. First, it is apparent that the best hope for achieving any significant extension of life expectancy lies in the area of disease prevention. Diet and nutrition are major factors in preventing disease and other health problems. Second, the economic costs of health care and disease are a large and growing burden on the Nation's resources. Improving the American diet could help ease that burden. Finally, an American public sensitive to health and nutrition is vulnerable to unsupportable claims promoting various dietary substances and practices. As a matter of public health policy, consumers should be provided authoritative dietary guidance.

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Each year the Federal Government spends about $80 million on human nutrition research, a sum representing less than 3 percent of the $3 billion it spends annually on all research in agriculture and health. Several Federal departments and agencies support human nurition research, although no department or agency has human nutrition as its primary mission. A recent report by the Congressional Research Service found that the planning and conduct of human

nutrition research is scattered throughout complex and diversified Federal organizations, none of which provides comprehensive nutrition information. Although congressional interest in human nutrition is increasing, comprehensive information for determining the focus and direction of Federal human nutrition research is lacking.

MAJOR NUTRITION KNOWLEDGE GAPS AND RESEARCH NEEDS

We have classified the major knowledge gaps together with related research needs into four broad and interrelated areas which we believe are important for sound nutrition planning whether the target of a nutrition program is an entire population, a population subgroup, or a specific individual. These areas include (1) human nutritional requirements, (2) food composition and nutrient availability, (3) diet, disease causation, and food safety, and (4) food consumption and nutritional status.

Human Nutritional Requirements

Although much information is available about the essential nutrients and calories, quantitative standards of human requirements are not well established in several population groups. Additional knowledge is needed regarding the dietary nutrients required for promoting or maintaining growth, development, or well-being during pregnancy, infancy, and lactation, and during childhood and adolescence. More knowledge is also needed regarding the needs of women, the elderly, and

those with disease and stress, and those persons taking drugs and vitamins.

Research needs for filling the knowledge gaps include (1) long-term studies of human subjects across the full range of both health and disease, (2) comparative studies in groups of differing geographic, cultural, and genetic backgrounds, and (3) basic studies of functions and interactions of dietary components.

Food Composition and Nutrient Availability

It is estimated that 60,000 processed food items are available to the American consumer. These foods are subject to considerable variation in nutrient composition due to genetic and climatic factors and are exposed to techniques of modern food processing as well as storage and cooking which can affect their composition and nutritional contribution to the diet. If standards for human requirements are to have practical applications, more current knowledge is essential on the nutrient composition of foods as consumed and the extent to which nutrients are biologically available for absorption and digestion. Research is needed to update and expand food composition data and to develop improved methods for determining composition of foods and the biological availability of nutrients.

Diet, Disease Causation, and Food Safety

Given the present state of nutrition knowledge, it is not possible to say what constitutes a fully adequate diet. Studies have found great diversity among world cultures in dietary practices and adaptations to food sources. Eskimos, for example, traditionally consumed large quantities of animal fat and protein, yet experienced little of the heart disease normally associated with such a diet. On the other hand, persons in New Guinea have been observed to consume high carbohydrate-low protein diets with no apparent problems. Compared to previous generations, Americans today consume a diet higher in protein, fat, sugar and salt and lower in fresh fruits and vegetables, whole grains and cereals. Most of our foods come in cans and boxes with over half the diet being comprised of processed foods.

Only since the end of World War II have people been systematically exposed to diets of processed, fabricated and fortified foods. The nutritional impact of this experience has never been adequately evaluated. Evidence is accumulating that among the consequences of modern dietary practices are several diseases and disorders arising in part from dietary excesses and imbalances. Evidence also indicates that, despite a plentiful food supply, many Americans

apparently suffer from undernutrition with respect to some essential nutrients, particularly iron.

Increased knowledge of the consequences of dietary intakes and practices is important for improving the quality and safety of the food supply. Research is needed to (1) identify and describe the processes by which dietary constituents lead to the onset and development of disease, (2) evaluate the effects of dietary modifications proposed as preventive measures, and (3) develop improved techniques of assessing toxicological risks.

Food Consumption and Nutritional Status

While it is evident that large numbers of Americans have developed or are at risk of developing health problems related to dietary imbalances and excesses, knowledge is lacking on the current nutritional status of the Nation; the location, prevalence, and magnitude of marginal as well as acute nutritional inadequacies; and the relationship between nutritional status at one period of life on health in subsequent periods.

Knowledge of the relationships among food consumption, nutritional status, and health problems of the general population and population subgroups is important for effective nutrition planning at the Federal, State, and local levels. To establish priorities and utilize limited resources effectively, policy makers need to know the magnitude of

nutritional problems, the identity of those persons who can best be helped by intervention, and the success of past assistance programs. Although the Federal Government in 1976 spent $7.8 billion on assistance programs having a nutrition component, the long-term impact of such programs on nutritional status has rarely been evaluated.

To provide the required information, research is needed to (1) continuously monitor the food consumption, nutritional status, and health of representative sample populations; (2) develop more reliable techniques of measuring food consumption and faster, readily reproducible, and inexpensive methods of assessing nutritional status; (3) identify the determinants of nutritional status and their significance for improving health; and (4) identify through studies of the relationship between diet and the aging process the effect of nutritional status in one period of life on subsequent periods.

NUTRITION RESEARCH PROGRAMS OF FEDERAL AGENCIES

As previously noted, several agencies of the Federal Government support human nutrition research. Much of the research addresses major gaps in nutrition knowledge.

The principal agencies supporting human nutrition research are the Agricultural Research Service, U.S. Department

of Agriculture (USDA), and the National Institutes of Health, Department of Health, Education, and Welfare (DHEW). The Agricultural Research Service is primarily concerned with the food and nutrient needs of the normal, healthy population. The National Institutes of Health focuses on nutritional needs of certain age groups and prevention and treatment of disease through diet.

The Health Resources Administration, DHEW, conducts the Health and Nutrition Examination Survey, a major research project intended to measure and monitor over time the nutritional status of the American people.

In addition human nutrition research is conducted or sponsored by the:

--Food and Drug Administration (DHEW);

--Center for Disease Control (DHEW);

--Health Services Administration (DHEW);

--Alcohol, Drug Abuse, and Mental Health Administration (DHEW);

--Department of Defense;

--Agency for International Development;

--National Science Foundation;

--Cooperative State Research Service (USDA);

--National Aeronautics and Space Administration; and

--Veterans Administration.

BARRIERS TO PROGRESS IN HUMAN NUTRITION RESEARCH

Based on the written comments of persons active in the nutrition field, nutrition manpower studies, and discussions with nutrition researchers, university nutrition department heads, representatives of nutrition professional societies, and Federal officials, we identified three principal barriers to progress in human nutrition research. These barriers are (1) lack of central focus and coordination, (2) shortage of nutrition scientists, and (3) instability of federally funded extramural research.

Various proposals have been made to overcome these barriers. Currently, the proposed Food and Agriculture Act of 1977 (S.275) includes several provisions addressing the barriers.

Lack of Central Focus and Coordination

Human nutrition research is not a well defined discipline. Instead, it is a multidisciplinary field related to both food and health which has broadened substantially as the importance of diet in disease has gained recognition.

While NIH and the Agricultural Research Service provide the bulk of research funds, neither of these agencies has human nutrition research as its primary mission.

NIH is concerned with biomedical nutrition research as part of its overall mission of fostering, supporting, and conducting laboratory and clinical research to increase

understanding of the life processes and the causation, treatment, and prevention of disease. Nutrition research programs are disseminated throughout individual Institutes which are categorically organized to include disease entities. Only the National Institute of Child Health and Human Development and the National Institute on Aging have a life-cycle perspective on research.

In seeking to insure an abundant and economical food supply, the Agricultural Research Service is concerned with human nutrition apart from disease entities. However, the Service has not given human nutrition research high priority.

Several persons we contacted cited fragmentation of human nutrition research among Federal agencies as a barrier to progress and called for greater focus on human nutrition and improved coordination of research programs. Fragmentation and lack of focus and coordination are perceived to result in (1) the likelihood that important areas are not receiving adequate emphasis and (2) the support of overlapping and possibly redundant research.

For example, the division between USDA and DHEW of national food consumption and nutritional status surveys is seen to result in information that is inadequate for sound nutrition planning. Neither department provides the comprehensive nutritional surveillance of the Nation

relating diet to health on a continuous, long-term basis. Examples of overlapping research include studies of obesity and food fortification. Obesity research is supported by NIH, the National Science Foundation, and the Alcohol, Drug Abuse, and Mental Health Administration. Research on food fortification is supported by USDA, the Food and Drug Administration, and the Agency for International Development.

Shortage of Nutrition Scientists

Many members of the scientific community believe that there is a shortage of scientists capable of operating effectively in nutrition. Thus, manpower could be a barrier to substantial progress in human nutrition research. Existing manpower information is inadequate for delineating nutrition manpower shortages by specialty areas. Forecasting manpower needs is extremely difficult because little accurate information exists on the number of nutrition researchers, nutritionists, food technologists, and dietitians employed in the United States, the jobs held, their degree of training, and their scientific specialty. However, during our review we noted that certain manpower areas are perceived as being of particular concern.

One area is in clinical nutrition research, in which individuals trained in health related areas of nutrition are needed. More clinical researchers are believed to be

needed in defining the roles of various nutrients, investigating nutritional causes of and contributions to diseases, and exploring appropriate nutrition treatment methods.

Nutritionists, who have the background and experience in nutrition to teach at universities and medical schools, also are cited as a shortage area. In the broad medical area, the demand for clinical faculty in medical schools has been increasing and is expected to increase at an annual rate of between 5 and 8 percent up to 1980. There are presently far more openings for academic nutritionists than candidates to fill them, and several university department heads and professors said they are having difficulty finding qualified candidates.

Another area of concern to some nutrition administrators is that the number of graduate students enrolled in nutrition programs is low compared to the need. As an academic discipline, nutrition may be found among departments of biological science, animal science, home economics, public health, medical science, and food science. Only during the past 10 or 15 years have universities consolidated nutrition-related areas in comprehensive departments and programs.

The Federal Government, through the National Academy of Sciences/National Research Council, has begun to focus

on determining manpower in specialty areas and on improving abilities to forecast manpower requirements. These efforts could be important in determining the personnel shortages which impact on the Nation's nutrition research capabilities and the types of Federal manpower development actions which may be needed.

Instability of Federally Funded Extramural Research

Several of the persons providing written comments to us on nutrition knowledge gaps expressed concern over the instability of federally funded extramural research. This issue is not unique to nutrition. The President's Biomedical Research Panel reported that the necessity of achieving funding stability was a recurring theme among the 160 witnesses it consulted. The Panel noted that stable funding involved stability within a given year, stability from year to year, and sufficient stability of program content to permit effective planning and performance.

Funding stability appears especially pertinent to nutrition, however, since filling gaps in knowledge may require long-term research. For example, epidemiological studies and clinical trials often require several years before results are obtained. Similarly, development and utilization of animal models for long-term studies may

involve substantial space requirements, environmental controls, and measures to protect against infectious disease.

POTENTIAL SOLUTIONS TO RESEARCH BARRIERS

Several potential solutions exist for overcoming the barriers to progress in human nutrition research. A national nutrition institute has been proposed by some, under which all nutrition-related activities of the Government would be centralized and research grants would be provided. An alternative would be to create a central planning and coordinating office which would oversee all nutrition-related activities of Federal agencies and provide guidance on research funding. Several persons we contacted commented on establishing regional nutrition research centers or research laboratories, possibly in conjunction with selected universities and colleges.

A study now underway by the Office of Science and Technology Policy and the proposed Food and Agriculture Act of 1977 (S-275) and other congressional proposals address the issues of research focus, direction, emphasis, and organization.

Establishing a Central Focus and Improving Coordination

Federal support of varied interests in human nutrition research is a reflection of our decentralized or pluralistic system which encourages each agency to support research essential to its primary mission without direction from one

central authority. While the pluralistic system generally is believed to have enabled the United States to maintain a strong scientific leadership, it can result in unwarranted overlap or duplication in some areas and insufficient coverage in others. Some agencies support overlapping and possibly redundant research, while no agency conducts the comprehensive nutritional surveillance of the nation relating diet to health on a continuous, long-term basis.

The overlapping areas of interest of the various agencies involved in human nutrition make a central focus and coordination essential to insure mutually compatible and coherent research programs. The proposed Food and Agriculture Act of 1977, by establishing inter-agency coordinating groups and vesting responsibility for a human nutrition research program in USDA, could result in improved coordination among Federal agencies and greater focus on human nutrition research. The proposal also would provide mechanisms for identifying overall nutrition research priorities and centralizing comprehensive research information. In addition, it would provide for competitive extramural nutrition research through USDA. The proposal does not fully address the nutrition research roles of Federal agencies outside USDA.

Defining Research Areas and Responsibilities of the Agencies

One complicating aspect of human nutrition research is that it is not a well-defined discipline. Instead, it is a multidisciplinary field related to both food and health that traverses the missions of several agencies. Under the pluralistic system, some research overlap among the agencies is inevitable. For example, with the Agricultural Research Service seeking to promote health through diet and NIH seeking to prevent disease through diet, human nutritional requirements will continue to be an area of mutual interest. This is not necessarily an inefficient arrangement provided that coordination exists assuring that duplicate or unnecessary research is eliminated and areas needing greater emphasis are identified and supported. To facilitate effective coordination, the roles of the various Federal agencies involved in food and health research should be clearly defined.

The proposed Food and Agriculture Act of 1977 would include NIH on the coordinating body identifying research priorities and would establish human nutrition research as a separate and distinct mission of the Agricultural Research Service. However, in specifying research areas to be addressed by USDA, the proposal does not fully address biomedical nutrition research. Thus, the

proposal might not assure that important biomedical nutrition research areas receive adequate emphasis.

To assure that duplicate or unnecessary research is reduced and that areas identified as needing additional emphasis will be addressed, we believe the subject areas comprising human nutrition research should be defined and, where practicable, each area should be assigned to a lead Federal agency. We also believe that by identifying key subject areas of human nutrition research, the potential for meaningful analysis of the Nation's nutrition manpower shortages and needs, would be enhanced.

Establishing Regional Research Centers

The proposed Food and Agriculture Act of 1977 would require the Secretary, USDA, to assess the potential value and costs of establishing regional food and nutrition research centers.

If established in conjunction with universities and colleges having comprehensive nutrition departments and programs, regional food and nutrition research centers may afford several advantages. First, such centers could help increase participation by the extramural research community, enable investigators trained in various disciplines to collaborate on research projects, and provide research training and development to help meet the Nation's nutrition manpower needs. Second, the centers could be

utilized to promote long-term research, including comprehensive nutrition surveillance of representative population groups.

Research centers also could serve to identify unique regional food and nutrition problems and evaluate the effectiveness of dietary modifications for preventing and treating those problems. In addition, the centers could serve as vehicles for cooperatively funded projects among Federal agencies having common nutrition interests.

We believe that in any assessment of the feasibility of establishing regional food and nutrition research centers, accessibility by colleges and universities having comprehensive nutrition departments and programs should be an evaluation criteria.

CONCLUSIONS

In summary, we believe that human nutrition research has entered a new era. This era is marked by growing evidence crediting diet for helping stem many of the Nation's health problems, by the rise in health care costs, and by increasing public concern with nutrition. Nutrition research faces complex challenges needing long-term and interdisciplinary investigation. These challenges are to:

--define human nutritional requirements for specific groups and conditions;

--determine the nutrient composition of the current food supply and the biological availability of the nutrients in foods;

--evaluate the health consequences of the modern diet; and,

--monitor on a continuous basis the Nation's nutritional status and determine the relationship between nutritional status at one period of life on health in subsequent periods.

To help meet these challenges, action is needed to (1) establish a central focus for human nutrition research and provide Government-wide coordination of research programs, (2) define the subject areas comprising human nutrition research and the responsibilities of Federal agencies involved in such research, and (3) assess the need for establishing regional nutrition research centers in conjunction with colleges and universities having comprehensive nutrition departments and programs.

To accomplish these objectives, we believe that the Director, Office of Science and Technology Policy, should work with the Federal agencies to define the subject areas comprising human nutrition research and make recommendations to the Director, Office of Management and Budget, for

--assigning, where practicable, each area to a lead Federal agency,

--reducing unnecessary research that may exist among Federal agencies, and

--promoting Government-wide human nutrition research planning, coordination, and reporting.

The Congress, in its delibe ons on the need for legislation promoting the central focus and coordination of Federal human nutrition research, should make sure that:

--responsibility for reporting of Federal human nutrition research is vested in a single Federal department;

--a means is established for maintaining a current inventory of all nutrition research projects funded by the Federal Government;

--all Federal departments and agencies supporting human nutrition research are represented on Government coordinating groups established to identify nutrition research priorities; and

--the Secretary, USDA, in assessing the value and costs of establishing regional food and nutrition research centers in the United States, considers establishing such centers in conjunction with universities and colleges having comprehensive nutrition departments and programs.

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