
March 1986

Prepared for
CENTER FOR FOOD SAFETY AND APPLIED NUTRITION
FOOD AND DRUG ADMINISTRATION
DEPARTMENT OF HEALTH AND HUMAN SERVICES
WASHINGTON, D.C. 20204

under
Task Order #9
Contract No. FDA 223-83-2020
A REPORT OF THE SCIENTIFIC COMMUNITY'S VIEWS
ON
PROGRESS IN ATTAINING THE PUBLIC HEALTH SERVICE
OBJECTIVES FOR IMPROVED NUTRITION IN 1990

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edited by
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FOREWORD

The Life Sciences Research Office (LSRO), Federation of American Societies for Experimental Biology (FASEB), provides scientific assessments of topics in biomedical sciences. Reports are based on comprehensive literature reviews and the scientific opinions of knowledgeable investigators engaged in work in relevant areas of biology and medicine.

This report was developed for the Center for Food Safety and Applied Nutrition, Food and Drug Administration (FDA) in accordance with the provisions of Task Order #9 of Contract No. 223-83-2020. The report was prepared by an ad hoc Review Panel on National Nutrition Objectives and edited by Kenneth D. Fisher, Ph.D., Director, and Robert B. Bennett, M.B.A., Senior Scientific Consultant, LSRO, FASEB, under direction of the ad hoc Review Panel. Scientists selected as members of the Panel were chosen for their qualifications, experience, and judgment, with due consideration for balance and breadth in the appropriate professional disciplines. Members of the Panel and others who assisted in preparation of the report are identified in Chapter VII.

As announced by FASEB and by FDA in the Federal Register, the ad hoc Review Panel held an open meeting on October 31 and November 1, 1985. The open meeting provided an opportunity for interested organizations and persons to appear before the ad hoc Review Panel to make oral presentations of data, information, and views on progress since 1980 in attaining the National Nutrition Objectives for 1990. Organizations and individuals who made oral presentations are identified in Chapter VII-A. In addition, the ad hoc Review Panel solicited data, information, and views from 66 scientific societies and organizations interested in nutrition and public health. Written comments, information, and data were received from 29 of these scientific societies and organizations. Organizations that provided written materials are identified in Chapter VII-B.

The data, information, and comments provided in the oral presentations and the written statements were considered by the ad hoc Review Panel in reaching its conclusions. Copies of oral and written statements are available for public inspection at LSRO, FASEB, and the Dockets Management Branch, FDA (Docket No. 85N-0452).

The ad hoc Review Panel's evaluation of available information and data was made independently of FDA and any other group, governmental or nongovernmental. The ad hoc Review Panel members and LSRO accept responsibility for the accuracy of the report; however, listing of these individuals in Chapter VII does not imply that individual panel members specifically endorse each
study conclusion. This report was reviewed and approved by the LSRO Advisory Committee (which consists of representatives of each constituent Society of FASEB) under authority delegated by the Executive Committee of the Federation Board. Upon completion of these review procedures, the report was approved and transmitted to FDA by the Executive Director, FASEB.

While this is a report of the Federation of American Societies for Experimental Biology, it does not necessarily reflect the opinion of each individual member of the FASEB constituent Societies.

February 28, 1986
Date

Kenneth D. Fisher, Ph.D.
Director
Life Sciences Research Office
EXECUTIVE SUMMARY

In 1980, the U.S. Public Health Service, Department of Health and Human Services published a major treatise, Promoting Health/Preventing Disease: Objectives for the Nation. The report contained objectives to be attained by 1990 for 15 topics of public health concern. One topic was Objectives for Improved Nutrition. In 1985, the DHHS undertook an evaluation of progress in achieving the Objectives for the Nation and sought information on possible midcourse correction of the Objectives.

This report was prepared for the Center for Food Safety and Applied Nutrition, Food and Drug Administration, the agency responsible for evaluating midcourse progress on the Objectives for Improved Nutrition. It was prepared by an ad hoc Panel of scientists and contains information, data, and views of the scientific community on progress in attaining the Objectives for Improved Nutrition in 1990. For each of the 15 Nutrition Objectives, the report comments on the original statement of the objective, identifies pertinent sources of data related to progress, evaluates the status of program implementation and additional data needs, suggests appropriate programs and strategies for continued progress, and makes recommendations on possible modification of each objective.

The report recommends that none of the Objectives for Improved Nutrition in 1990 be deleted. The ad hoc Panel suggested no change in two objectives as follows:

Objective #6:

- By 1990, the average daily sodium ingestion (as measured by excretion) by adults should be reduced to the 3 to 6 gram range.

Objective #15:

Because of the widespread support for the concept of a National Nutrition Monitoring System, the Panel suggests that Objective #15 is attainable by 1990 through increased support for expansion and integration of components now in existence. The Panel suggests restating the Objective more positively:

- By 1990, a comprehensive National Nutrition Monitoring System should be in place and operational. The system should be capable of detecting nutritional problems in special population groups and of providing data to federal, state, and local agencies for decisions on nutrition policies as well as program planning, implementation, and evaluation.
Based on an evaluation of progress since 1980 and a perceived need to identify quantifiable indicators and attainable endpoints, the report recommends that 13 of the objectives be modified or the language be clarified. The objectives, as restated, are as follows [those identified by an asterisk (*) represent a majority, but not a unanimous, recommendation of the ad hoc Panel]:

Objective #1:

- By 1990, the prevalence of impaired iron status defined as low iron stores in pregnant women in the U.S. population will not be a significant public health problem.*

- By 1990, prevalence of impaired iron status as defined by low iron stores in children aged 1 to 2 years, in males aged 11 to 14 years, and in females aged 15 to 44 years should be reduced to at least 50% of those levels estimated for these population groups in NHANES II.

- By 1990, efforts should be established to identify additional population subgroups at risk of impaired iron status.

Objective #2:

- By 1990, less than 10% of children in the general population or in any identifiable subgroup of the population should be below the 5th percentile for height-for-age because of dietary inadequacy.

Objective #3:

- By 1990, the prevalence of overweight (BMI of 27.8 or higher for men and 27.3 or higher for women) among the U.S. adult population should be reduced without impairment of nutritional status to approximately 18% of men and 21% of women.

Objectives #4 and #10:

- By 1990, 90% of adults should understand that to lose weight people must either consume diets lower in calories or increase physical activity, or both.
a) By 1990, 90% of adults with acceptable weights will maintain their desired weight by adopting a nutritionally adequate caloric intake balanced with physical activity.

b) By 1990, 90% of overweight adults should have adopted an appropriate balance of caloric intake and physical activity to achieve and maintain desirable weight.

Objective #5:

- By 1990, the proportion of adults with serum cholesterol levels above 220 mg/dl for adults aged 24 to 29 years, above 240 mg/dl for adults aged 30 to 39 years, above 260 mg/dl for adults over 40 years should be reduced by 50% compared with that observed in 1971-1974.

- By 1990, the proportion of children and young adults (2 to 24 years of age) with high-risk serum cholesterol levels (>170 mg/dl) should be reduced significantly.

Objective #7:

- By 1990, the proportion of women who exclusively or partially breastfeed their babies immediately postpartum as reflected by hospital discharge data should be increased to 75%; and 50% of these mothers should continue to breastfeed until the infants are 3-4 months of age.*

Objective #8:

- By 1990, at least 75% of the adult population will be aware of the seven major recommendations in Dietary Guidelines for Americans and will follow those guidelines in relation to their own personal risk profile.*
Objective #9:

- By 1990, at least 75% of the adult population will be knowledgeable about the food choices recommended in Dietary Guidelines for Americans and will be able to identify the major nutrients provided by those food choices.*

Objective #11:

- By 1990, 90% of packaged foods should have labels that provide information on caloric content and nutrient composition in a form that enables consumers to select diets that promote and protect health as suggested in Dietary Guidelines for Americans. In addition, by 1990, voluntary nutrition labeling of fresh meats, poultry, and produce at point of retail purchase should encompass 25% of sales of these foods.*

Objective #12:

- By 1990, food service operations should provide food choices that make it possible for persons to follow the Dietary Guidelines for Americans.*

Objective #13:

- By 1990, all states should document the inclusion of a nutrition education component in their K to 12 curriculum.

- By 1990, all states will include in certification requirements for elementary and selected secondary school teachers, the completion of at least a 1 semester college-level course in nutrition beyond 1 year of biological sciences. For secondary school teachers of health, physical education, and athletics, training in the basic biological sciences should be required for certification.

Objective #14:

The Panel recommends reconsideration as a goal because progress is unmeasurable. The goal would read:
By 1990, 95% of all encounters with primary health care professionals by individuals who are at risk because of age, physiological, or disease-related factors will include (or will make referrals to) nutrition education or nutrition counseling, as appropriate.

The ad hoc Panel also identified two additional areas of nutrition and public health concern for which Objectives for Improved Nutrition in 1990 should be established. These are:

Nutrition and Cancer:

- By 1990, public and private sector support for biomedical research on interrelationships of dietary factors, dietary patterns, specific nutrients, and related nutritional factors with cancer should be increased over that designated in 1985.

- By 1990, educational and informational programs on the influence of diet and nutrition on cancer should have reached 95% of all adults in the United States. Programs in the public and private sectors should be coordinated to provide information that is scientifically sound, definitive, and consistent with research findings.

Nutrition and Skeletal Integrity:

- By 1990, public and private sector support for biomedical research on the interrelationships of dietary factors and specific nutrients with osteoporosis should be increased over that designated in 1985.

- By 1990, scientific knowledge on the role of nutritional factors in the etiology and prevention of osteoporosis should be sufficient to support coordinated public and private sector educational and informational programs to increase public awareness of the nutritional risk factors associated with development of the disorder.
The ad hoc Panel concluded that selection of Objectives for Improved Nutrition as one of the 15 topics in Objectives for the Nation in 1990 is laudable. The Objectives have served to focus attention on key areas related to nutrition, diet, and public health. In addition, acceptance and implementation of the Objectives for Improved Nutrition have had a beneficial effect on nutritional awareness and the overall health of the U.S. population. However, the available data are not sufficient to permit the conclusion that documented health improvements can be attributed directly to the 15 Objectives for Improved Nutrition.

The Panel also concludes that efforts should be initiated in 1986 to develop Objectives for the Nation in 2000. Dietary claims and health fraud, hypervitaminosis, anorexia nervosa and bulimia, nutrition in pregnancy, and nutrition in the elderly are suggested as topics for additional Objectives for Improved Nutrition in 2000.
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I. INTRODUCTION

A. BACKGROUND

In 1979, the Surgeon General issued the report Healthy People: The Surgeon General's Report on Health Promotion and Disease Prevention (U.S. Department of Health, Education, and Welfare, 1979). The report reviewed the major advances in health of the U.S. population over the previous century. Fifteen topics were identified as major foci for programmatic efforts of government, professional groups, and the private sector to encourage individuals to improve the quality of their own lives. One of the target areas for program development was Improved Nutrition.

A public conference was convened in Atlanta, Georgia in 1979 to place the 15 topics identified by the U.S. Public Health Service (PHS)* into a framework for implementation. The major thrust of the conference was health promotion and disease prevention in contrast to cure of specific diseases as the theme for future health policy direction. The report of this 1979 conference included detailed objectives for each of the 15 major topics. This report, Promoting Health/Preventing Disease: Objectives for the Nation (U.S. Department of Health and Human Services, 1980), was supplemented by publication of additional information on implementation plans and strategies developed by the U.S. Public Health Service, Public Health Service Implementation Plans for Attaining the Objectives for the Nation (U.S. Department of Health and Human Services, 1983).

These latter two reports listed 15 specific objectives that dealt with improved nutrition. The Objectives for Improved Nutrition focused on enhancing health status, reducing risk factors, increasing public and professional awareness, improving services and protection, and improving nutrition monitoring. It should be noted that the 1983 publication of the objectives and implementation plans did introduce some changes in the language of the objectives as published in 1980. In addition, certain objectives were deleted; these are discussed in Chapter III. Each Objective for Improved Nutrition was presented as a 10-year plan with a designated target to be achieved by 1985 or 1990. The 15 PHS Nutrition Objectives for the Nation (U.S. Department of Health and Human Services, 1983) state:

Objective #1 "By 1990, the proportion of pregnant women with iron deficiency anemia (as estimated by hemoglobin concentrations early in pregnancy) should be reduced to 3.5 percent.

* Acronyms used in this report are listed in Appendix B.
Objective #2 "By 1990, growth retardation of infants and children caused by inadequate diets should have been eliminated in the United States as a public health problem.

Objective #3 "By 1990, the prevalence of significant overweight (120 percent of "desired" weight) among the U.S. adult population should be decreased to 10 percent of men and 17 percent of women, without nutritional impairment.

Objective #4 "By 1990, 50 percent of the overweight population should have adopted weight loss regimens, combining an appropriate balance of diet and physical activity.

Objective #5 "By 1990, the proportion of adults aged 18 to 74 with mean serum cholesterol above 230 mg/dl should be (reduced) by at least 50 percent.

Objective #6 "By 1990, the average daily sodium ingestion (as measured by excretion) by adults should be reduced at least to the 3 to 6 gram range.

Objective #7 "By 1990, the proportion of women who breast-feed their babies at hospital discharge should be increased to 75 percent and 35 percent at 6 months of age.

Objective #8 "By 1990, the proportion of the population which is able to correctly associate the principal dietary factors known or strongly suspected to be related to disease should exceed 75 percent for each of the following diseases: heart disease, high blood pressure, dental caries, and cancer.

Objective #9 "By 1990, 70 percent of adults should be able to identify the major foods which are: low in fat content, low in sodium content, high in calories, high in sugars, good sources of fiber.

Objective #10 "By 1990, 90 percent of adults should understand that to lose weight people must either consume foods that contain fewer calories or increase physical activity -- or both.

Objective #11 "By 1990, the labels of all packaged foods should contain useful caloric and nutrient information to enable consumers to select diets that promote and protect good health. Similar information should be displayed where nonpackaged foods are obtained or purchased.
Objective #12 "By 1985, the proportion of employee and school cafeteria managers who are aware of, and actively promoting, USDA/DHHS dietary guidelines should be greater than 50 percent.

Objective #13 "By 1990, all States should include nutrition education as part of required comprehensive school health education at the elementary and secondary levels.

Objective #14 "By 1990, virtually all routine health contacts with health professionals should include some element of nutrition education and nutrition counseling.

Objective #15 "Before 1990, a comprehensive National nutrition status monitoring system should have the capability for detecting nutritional problems in special population groups, as well as for obtaining baseline data for decisions on National nutrition policies."

The Office of The Assistant Secretary for Health (OASH), Department of Health and Human Services (DHHS), designated the Center for Food Safety and Applied Nutrition (CFSAN), FDA as the lead agency in the monitoring of the course of activities designed and implemented by PHS agencies toward the achievement of the National Nutrition Objectives for 1990. This past year (1985) marked the mid-point in the 10-year plan. CFSAN was asked to provide OASH with a report on the status of the nation with respect to the 15 Nutrition Objectives. A DHHS Task Force, led by CFSAN, is conducting a midcourse review of the 15 Objectives for Improved Nutrition. A report of this DHHS Task Force is being prepared.

B. SCOPE OF WORK AND PANEL APPROACH

The Life Sciences Research Office (LSRO), Federation of American Societies for Experimental Biology (FASEB), is under contract to CFSAN to assist in preparation of materials to be included in the above-mentioned report. Specifically, LSRO was asked to prepare an assessment of the 15 Objectives for Improved Nutrition and those activities undertaken by PHS agencies that focus on improved nutrition. The 15 Objectives are discussed subsequently (Chapter III) in the order of their presentation in the 1983 PHS report on implementation plans (U.S. Department of Health and Human Services, 1983). This latter PHS publication should be consulted for details of the implementation plans proposed.
To accomplish the review of the 15 Objectives for Improved Nutrition, LSRO established an ad hoc Review Panel on National Nutrition Objectives to address the following questions related to progress in achieving the 15 Objectives (1980-1985) and issues related to their attainment (1985-1990):

1. Will the programs which are in place or which are planned result in achievement of the Nutrition Objectives within the remaining 5-year time-frame allotted?

2. For each of the Nutrition Objectives, is the information presented as the assessment of status by the DHHS Task Force valid with respect to what is currently thought by the scientific community to be the current status? If the data presented are not correct, what is the correct information?

3. Should any of the Nutrition Objectives be deleted? Why?

4. Should any of the Nutrition Objectives be modified? How?

5. Should any new Nutrition Objectives be added? Identify and explain.

6. Should any of the programs associated with any of the Nutrition Objectives be modified or deleted, or new programs developed to improve the assurance of successful attainment of the Nutrition Objectives? If so, identify and explain.

7. Are there approaches to individual Nutrition Objectives that balance the health aspects of the Objective and the social implications of adopting the Objective?

To assist the LSRO ad hoc Review Panel in its efforts to provide CFSAN with appropriate background material, views, comments, information, and data on each of the 15 Objectives have been solicited from a broad range of scientific societies and organizations whose interests relate to nutrition and public health. The scientific societies and organizations contacted are listed in the Appendix A. Those that presented information and views at a public meeting on October 31, 1985 and those that provided written statements for consideration by the ad hoc Review Panel are noted in Chapter VIII.

Following the public meeting, the ad hoc Review Panel met to examine materials submitted, review pertinent scientific literature and data, and to prepare its evaluation report on the 15 Nutrition Objectives for 1990. The report is being submitted to CFSAN for transmittal to the DHHS Task Force.
II. GENERAL DISCUSSION

A. SCOPE OF NUTRITION OBJECTIVES

Human nutrition in its broadest perspective may be defined as those interrelated processes by which food is chosen, assimilated, and utilized for growth, development, and maintenance of good health. The science of human nutrition involves supportive, preventive, and therapeutic activities. Pioneering efforts of nutrition research in past decades led to cure and prevention of the nutritional deficiency diseases and disorders. In recent years, nutritional science has been utilized to promote health through preventive approaches in public health and by dietary management to ensure maintenance of health, address certain chronic conditions, and support medical treatment.

Great strides have been made in development and delivery of nutritional services that focus on preventive approaches. As noted previously, a major theme of Promoting Health/Preventing Disease: Objectives for the Nation (U.S. Department of Health and Human Services, 1980) was individual and public self-responsibility for prevention rather than high technology and medical intervention for therapy of specific diseases. The 15 Objectives for Improved Nutrition in the late 1970s were based on promotion of health and prevention of disease.

While 15 specific Objectives for Improved Nutrition were identified as one major focus, nutritional approaches and strategies were identified in the other 14 sections of the Public Health Service Implementation Plans for Attaining the Objectives for the Nation (U.S. Department of Health and Human Services, 1983). The Panel has reviewed the several PHS documents and has identified a number of objectives in other sections that relate to nutrition. These are:

- **High Blood Pressure Control**
  - "By 1990, the average daily sodium ingestion (as measured by excretion) for adults should be reduced at least to the 3 to 6 gram range. (In 1979, estimates ranged between averages of 4 to 10 grams of sodium. One gram salt provides approximately .4 grams sodium.)*
  - "By 1990, the prevalence of significant overweight (120 percent of "desired" weight) among the U.S. adult population

* Same objective as in Improved Nutrition.
should be decreased to 10 percent of men and 17 percent of women, without nutritional impairment. (In 1971-74, 14 percent of adult men and 24 percent of women were more than 120 percent of "desired" weight.)*

- "By 1990, at least 50 percent of adults should be able to state the principal risk factors for coronary heart disease and stroke, i.e., high blood pressure, cigarette smoking, elevated blood cholesterol levels, diabetes. (Baseline data unavailable.)"*

- **Pregnancy and Infant Health**

  Improved health status includes eight specific objectives, six of which address reduction of infant mortality. Reduced risk factors include two objectives that focus on reducing occurrence of low-birth weight infants. Increased public/professional awareness emphasizes ability of women of childbearing age to choose foods wisely. For example, one Objective states: "By 1990, 85 percent of women of childbearing age should be able to choose foods wisely (state special nutritional needs of pregnancy) ... ." (U.S. Department of Health and Human Services, 1983). Finally, improved services/protection contains objectives that identify prenatal, maternal, and perinatal health services. Such activities include nutrition education, dietary supplementation, and support for breast feeding.

- **Toxic Agent Control**

  The several objectives identify control of preventable contamination or exposure to toxic substances through water, soil, and air. Such goals would contribute to enhanced safety of the nation's food supply.

- **Occupational Safety and Health**

  - "By 1985, workers should be routinely informed of lifestyle behaviors and health factors that interact with factors in the work environment to increase risks of occupational illness and injuries. (Baseline data unavailable.)"
  
  [The Panel assumes lifestyle and health factors include dietary information and nutrition education]."

* Same objective as in **Improved Nutrition**.
**Fluoridation and Dental Health**

- "By 1990, no public elementary or secondary school (and no medical facility), should offer highly cariogenic foods or snacks in vending machines or in school breakfast or lunch programs.

- "By 1985, systems should be in place for determining coverage of all major dental public health preventive measures and activities to reduce consumption of highly cariogenic foods."

**Surveillance and Control of Infectious Diseases**

The several objectives directed toward improved health status, and improved surveillance/evaluation systems include emphasis on reduction of food-borne diseases, as well as systems for their identification.

**Physical Fitness and Exercise**

Among the 12 Objectives, promotion of health and prevention of cardiovascular disease by means of exercise and physical fitness are emphasized. Programs for such activities include a major focus on proper nutrition in concert with physical fitness and exercise as preventive approaches.

On the other hand, within the 15 Objectives for Improved Nutrition, some implementation plans and programs require broad approaches that are interrelated with other topical areas. For example Objective #4 focuses primarily on adoption of weight loss regimens which include physical fitness and exercise and possibly high blood pressure control. Objective #15, while focused on monitoring nutritional status, is primarily a systems development and management issue. The Panel recognizes that these facets of a coordinated effort to improve nutrition logically fall into the topical area of nutrition. However, their implementation and attainment by 1990 require concerted efforts and resources that go beyond the public and private sectors of the nutrition community.

**B. AVAILABILITY OF DATA**

In reviewing the three PHS documents prepared in 1979-1983, the Panel found that in many instances, baseline data supporting the need for the objective were unavailable (for example, Objectives #4, 8, 9, 10, 11, 12, and 14). In other cases, the objectives were based on what the Panel considers inadequate data (Objectives #2 and 13). Finally, in undertaking its evaluation, the Panel was unable to obtain the published reports or documents that should have confirmed certain
baseline data utilized in formulating the several objectives (#1 and 3). The Panel noted that many of the data cited in Healthy People (U.S. Department of Health, Education, and Welfare, 1979) and Promoting Health/Preventing Disease: Objectives for the Nation (U.S. Department of Health and Human Services, 1980) were derived from the Ten-State Nutrition Survey (1968-1970) and the first National Health and Nutrition Examination Survey (NHANES I, 1971-1974). Thus, in part, objectives for 1990, formulated in 1980, were based on data collected from 1970 to 1974.

The current midcourse evaluation process has similar constraints. Efforts to determine progress on several objectives during the period 1979-1985 have been hampered by lack of available data for the period 1982-1985. Most data available to, and cited by, the Panel have come from the second NHANES, termed NHANES II (1976-1980), the Southwest portion of Hispanic HANES (1982-1983), Centers for Disease Control (CDC) Surveillance reports on populations within participating states for the period through 1983, or research studies conducted between 1975 and 1983.

The Panel realized that collection, analysis, interpretation, and publication of data from large surveys or nationwide surveillance efforts can be expected to require 2 to 3 years. Thus, documentation of progress during the period 1980-1985 per se is difficult. If similar evaluation efforts are undertaken in the future, it is important that this lag time for availability of analyzed data be considered. The Panel's assessment of progress from 1980 to 1985 is derived primarily from informed scientific opinion and data bases that provide the opportunity to estimate changes in measured variables during the period 1971-1983.* The 1983 PHS implementation report (U.S. Department of Health and Human Services, 1983) was used as a starting point. Data from 1983 to 1985 are fragmentary.

In preparing this report, the Panel had a limited time to identify, obtain, and evaluate data and information received from the scientific community and the DHHS Task Force. Indeed, several scientific organizations indicated their inability to respond to the Panel's request for information because of the limited time frame provided by the LSRO Review Panel.

* The Report of the Secretary's Task Force on Black and Minority Health (Malone, 1985) contains additional data, but was received after the completion of the Panel's deliberations. It includes reference to and discussion of Objectives for the Nation for 1990.
C. OTHER CONSIDERATIONS

Since development and publication of the Objectives for the Nation in 1980, numerous changes have occurred in policies of the federal government that have affected nutrition implementation and service delivery programs. Most notably, federal and state changes in fiscal policies have impacted on programs identified in the implementation plans (U.S. Department of Health and Human Services, 1983). Some programs have not been implemented and the scope of others has been curtailed. While the voluntary and private sector has assumed a greater role, in part as a consequence of urging by the public and the federal government, it is not able to replace fully those federal programs providing nutrition services at the local level. Procedures for evaluation of progress or success of many programs in the voluntary and private sector are almost nonexistent or only now being developed. Many efforts by local community, county, and state agencies or voluntary groups are either not reported to federal agencies or are not utilized by federal agencies assessing programs. Thus, evaluation of some state and local efforts by federal agencies that collect data on such programs (CDC, NCHS, etc.) is inconsistent or incomplete. In addition, government surveillance and monitoring efforts themselves have experienced budgetary constraints.

In 1977, Title 14 of the National Agricultural Research, Extension, and Teaching Act designated United States Department of Agriculture (USDA) as the lead agency of the federal government for research, extension, and teaching in the food and agricultural sciences. This definition included nutrition, except for the biomedical aspects of human nutrition concerned with diagnosis or treatment of disease, which were assigned to the National Institutes of Health (NIH) and related DHHS agencies. The 1977 Act also indicated that the Secretary of Agriculture jointly with the Secretary of DHHS should establish procedures for coordinating nutrition research and related activities in areas of mutual interest.

Following passage of the 1977 Act and explicit designation of the role of USDA in nutrition research and education, both Congressional and Executive Branch agencies prepared numerous reports on the need for expansion of research on human nutrition. These reports carried the imprimatur of USDA, DHHS, NIH, Office of Technology Assessment (OTA), Office of Science and Technology Policy (OSTP), and the General Accounting Office (GAO), and others. A number of these reports addressed responsibilities of various federal agencies and departments in "nutrition"; unique among them was the first joint effort, publication of the first edition of Nutrition and Your Health: Dietary Guidelines for Americans by USDA and DHHS in 1980. A revised edition was released in 1985 (U.S. Department of Agriculture/ U.S. Department of Health and Human Services, 1985).
Despite numerous efforts on the part of the agencies involved, most notably USDA and DHHS, the degree of cooperation in regard to programmatic development, support, and evaluation is perceived as less than adequate. Numerous barriers to communication of programmatic intent, results, and data remain as impediments to clear definition of the responsibilities of the various federal agencies in nutrition research, program development, and education.

Existing barriers appear to have interfered with progress on attainment of Objectives for Improved Nutrition and were evident in the Panel's efforts to obtain data for evaluation. For example, several organizations responding to the Panel's request for information identified the need for greater cooperative efforts and communication between DHHS and USDA. Further, the Panel observed that many of the DHHS implementation efforts identified in the PHS Nutrition Objectives mention USDA programs. Evaluation of progress on certain objectives requires data from USDA, yet that Department is not represented on the DHHS Task Force. The absence of direct access to USDA program data via the DHHS Task Force has hindered the Panel's efforts. The Panel also notes that despite introduction of federal legislation to implement nutrition monitoring on a national level, the Interagency Task Force charged with developing the plan for implementation has yet to issue its report on the implementation plans for a joint USDA/DHHS National Nutrition Surveillance System (Objective #15).

Another concern of the Panel is the paucity of data on the status of various DHHS programs related to the 15 Objectives for Improved Nutrition available to the Panel from the DHHS Task Force. Of particular concern to the Panel has been the lack of documentation on what programs have been initiated since 1980, the lack of data on resources committed to ongoing implementation programs and efforts, and the absence of data related to evaluation of programs identified as components of 15 Objectives for Improved Nutrition. The absence of data on NIH activities that relate to nutrition research and education, other than those of the National Heart, Lung, and Blood Institute (NHLBI), was a major omission. In addition, the Panel was not provided with documentation of the rationale for alteration of the objectives between 1979 and 1983.

Additional considerations of the Panel relate to the lack of attention in the existing objectives to emerging problems of this decade. For example, nutrition-related problems in the elderly are a public health issue. Many chronic degenerative diseases have a dietary component and potentially may be modulated by intervention at an early age. At this time (circa 1985), more attention needs to be focused on the very old (>74 years) since this segment of the population is increasing rapidly.
D. CONCLUDING STATEMENT

As indicated in the preceding paragraphs of this chapter, the Panel's evaluation of the 15 Objectives for Improved Nutrition has been constrained by a number of factors. Central to this issue is the absence of a well-defined framework for formulating, implementing, and evaluating these public policy pronouncements in the planning and implementation documents of 1979-1980 (Hetherington and Caldesone, 1985). Theoretically, efficient management suggests that one objective should focus on one topic and identify a measurable endpoint or endpoints. The implementation plans should include provision for collection of measurements specified in the objective. Evaluation of achievement should include analysis of data from implementation plans and comparison with the baseline data upon which the objective was originally built. Additionally, this process of management by objectives requires dissemination of information on data needs to the local level where the data on measured endpoints are to be collected. Similarly, evaluation of progress must be available at the local level in order that planning or modification of programs can occur (Peoples-Sheps, 1985).

Throughout its deliberations and review of progress, the Panel was confronted by several dilemmas associated with both this ability to analyze systematically and evaluate the contemporary state of nutrition as a science. The Panel recognizes that past intervention programs in both industrialized and developing countries have not always been effective. Discussion of strategies on improving nutritional well-being may be intellectually stimulating, but employing such strategies may be detrimental to the populations served (Wyse et al., 1985). These two central issues must be considered in this midcourse review as well as in future efforts to develop scientifically sound and programmatically achievable nutrition objectives for the nation. In this context, the Panel has three major points that the reader should consider:

1) While the scope and pace of nutrition research have expanded in recent years, many areas remain controversial. Because of these scientific controversies, the science of nutrition has been exploited by promoters of misinformation. It is important that public policies in nutrition be based on current scientific knowledge. The Objectives for Improved Nutrition include topics that were, and are today, still controversial. Indeed, for several, no consensus is evident among qualified scientists. Attempts to reconcile conflicting data and interpretations require both mention and careful discussion in order to avoid further confusion by omission or misinformation because of incomplete discussion.
2) Stating measurable objectives requires baseline data and an endpoint data collection system to measure progress against the baseline data. Neither the DHHS Task Force nor the Panel has available the built-in monitoring system necessary for midcourse evaluation and correction. While components of a National Nutrition Monitoring System have been in place since 1980, their efforts have not provided 1980 baseline data. Further, the data bases indicated in the implementation plans do not uniformly reflect appropriate representative populations and/or do not provide data for the index years 1980 and 1985. Unless this situation changes, it will persist until 1990, making evaluation as difficult then as it is now.

3) Achievement of Objectives for Improved Nutrition requires comprehensive and coordinated implementation plans with built-in evaluation systems. These involve networking of public and private sector initiatives at the national, state, and local levels. Mobilizing and pooling of resources directed to specific objectives would be required, particularly during periods when priorities of all involved parties focus on cost-containment, cost-effectiveness, and cost-benefit. Despite recent suggestions to the contrary (McGinnis, 1985), a systems approach to assessing achievement of Objectives for Improved Nutrition was not evident in materials provided to the Panel.

Recognizing these constraints on their task, the Panel was challenged to review carefully the wording, current research base, available programs, and data systems. This report reflects this analytical scheme. While making recommended changes for the midcourse review, the Panel considers the 1990 objectives and the midcourse review a valuable learning experience to use in developing more precise objectives for the year 2000.
III. EVALUATION OF PROGRESS ON THE FIFTEEN
NATIONAL NUTRITION OBJECTIVES

This chapter presents the Panel's evaluation of each of
the 15 Objectives. In general, the presentation covers five
major points.

A) Analysis of Objective as Stated

This portion of the Panel's evaluation relates to the
content and wording of the objective. The Panel has pointed out
unclear language or possible confusion because of phrasing or use
of numerical data.

B) Pertinent Sources of Data

The Panel has identified sources of baseline data
available in 1979 and subsequent years. In addition, pertinent
sources of other data or more current information known to the
Panel or identified by various scientific organizations are
noted.

C) Program Implementation and Additional Data Needed

The Panel has evaluated data on progress toward imple-
mentation that were supplied by the DHHS Task Force or by other
sources. In addition, data needs for assessment of progress
during the period 1980 to 1990 are identified.

D) Suggested Programs and Strategies

In this section, the Panel tried to suggest programs
in place or strategies that might be emphasized or developed
if additional progress on the objective is expected by 1990.

E) Panel Recommendations on the Objective

This synoptic statement is based on the Panel's assess-
ment of available data, gaps in information, and progress or
needs related to implementation and attainment of the goal by
1990.

Within this chapter each of the Objectives for Improved
Nutrition is evaluated; however, the references cited with each
objective are listed in Chapter VI (see p.131).
OBJECTIVE #1: "By 1990, the proportion of pregnant women with iron deficiency anemia (as estimated by hemoglobin concentrations early in pregnancy) should be reduced to 3.5 percent."

A. ANALYSIS OF OBJECTIVE AS STATED

The focus of the Objective as written is limited to the iron nutritional status of pregnant women as determined by hemoglobin concentration. The Panel concurs with the intent of the Objective but concludes that the scope is too limited. First, iron deficiency anemia is but one of the several nutritional problems that may occur in pregnancy. Second, anemia in pregnant women and others may involve nutrient deficiency other than iron. Third, population groups other than pregnant women may have impaired iron status and possibly iron deficiency or other forms of anemia. For example, recent analyses of iron nutritional status data from NHANES II indicate that pregnant women are not the only population group at risk of compromised iron status (Expert Scientific Working Group, 1985). Finally, within the population subset of women who are pregnant, the nutritional status of the fetus, and that of newborn infants are also important; iron nutrition is only one aspect of infant health. Another section of the Objectives for the Nation (U.S. Department of Health and Human Services, 1983) deals with pregnancy and infant health. Specific objectives in that section do include emphasis on nutrition.

Another aspect of the Panel's concern is its awareness of the continuing dialogue among knowledgeable investigators concerning the precise definition and functional consequences of iron deficiency, iron-deficiency anemia, and anemia. The normal hemodilution that occurs in the second trimester of pregnancy is, in fact, a physiologically predictable form of anemia. Further, a diagnosis of iron-deficiency anemia should not be based on reduction of hemoglobin concentration alone because reduced hemoglobin concentration may result from conditions other than iron deficiency, such as folate deficiency (Bailey et al., 1980).

B. PERTINENT SOURCES OF DATA

Data on iron nutritional status of pregnant women in the U.S. population are not available in a single data base that is representative of the entire population and its subsets. The Panel believes that considerable data on pregnant women such as hemoglobin and hematocrit values are collected in clinics, during prenatal care, and by hospitals. However, these data are not collated for possible determination of national norms. The CDC Pregnancy Nutrition Surveillance System provides some data on risk factors in pregnancy (including hemoglobin values and hematocrits), breast-feeding frequency, and infant birthweights
for women and their children. The data are collected in states that voluntarily share data with CDC from low-income women, infants, and children participating in the USDA-funded Special Supplemental Food Program for Women, Infants, and Children (WIC).

In regard to the U.S. population, the NHANES II data (1976-1980) have provided considerable information on the iron nutritional status of a representative sample of persons aged 6 months through 74 years. In addition, the CDC Pediatric Nutrition Surveillance System provides data on hemoglobin and hematocrit of children from birth through 9 years of age. Vazquez-Seoane et al. (1985) have reported recently on increases in hemoglobin concentrations of 324 children (aged 9 to 36 months) receiving iron supplementation in the WIC Program during the period 1971-1984. These data may be representative of changes in iron nutrition status of children receiving iron-fortified dietary supplements.

Another source of hemoglobin and hematocrit data of pregnant women is the National Collaborative Perinatal Program (NCPP) of the National Institute of Neurological and Communicative Disorders and Stroke (NINCDS). However, the Panel has neither received nor analyzed any data from this program beyond those published in 1972 (Niswander and Gordon, 1972).

C. PROGRESS ON IMPLEMENTATION AND ADDITIONAL DATA NEEDED

A number of programs of the DHHS and USDA (e.g., those of the Division of Maternal and Child Health and WIC, respectively) as well as those of state health departments emphasize improvement of the health and nutrition of pregnant women, infants, and children. Most programs emphasize iron nutrition and include a broad range of activities such as educational measures, diet counseling on iron supplementation, food and service delivery, technical assistance, incentives, research, and surveillance. However, the Panel was provided with few data on evaluation of any of these several programs, especially as they may have altered iron nutritional status.

Available data suggest some progress by the nutrition community in communicating public health information relating to prevention of compromised iron status. For example, the Hearst Corporation (1985) recently commissioned a telephone survey of a representative sample of 998 adult women. The survey determined that 79% were aware that consumption of adequate amounts of dietary iron is the best "treatment" for common forms of "anemia." However, the survey also noted that 70% could not identify correctly the quantity of dietary items such as spinach or liver that contribute to meeting the Recommended Dietary Allowance (RDA) for iron.
Evolving scientific knowledge suggests that any single measure of iron status may be inadequate as an indicator of impaired iron status (Expert Scientific Working Group, 1985). Three developmental stages in iron deficiency have been described. In the first stage there is a substantial reduction in the normal iron stores which average about 1000 mg in the adult male and 300 mg in the adult menstruating female (Brittenham et al., 1981). Plasma or serum ferritin is a useful assay for storage iron in normal subjects. When iron stores are depleted and before anemia can be identified by decreased hemoglobin levels, the second stage of iron deficiency, a state of iron-deficient erythropoiesis, is evident. This moderate degree of iron deficiency can be determined by assay of plasma iron supply to erythropoietic cells (reflected by decreases in transferrin saturation) and of iron availability for hemoglobin synthesis (reflected by increases in erythrocyte protoporphyrin). The third and most severe degree of iron deficiency involves overt hypochromic microcytic anemia. This stage is identified by decreased hemoglobin concentration (or hematocrit) and a decrease in mean corpuscular volume (MCV). Although the status of iron stores is important to iron nutrition, the degree of iron depletion characterized above as iron-deficient erythropoiesis has usually been taken to indicate iron deficiency; that is, the level of serum ferritin indicating depleted iron stores, low transferrin saturation values, and elevated erythrocyte protoporphyrin levels. The use of several indicators of iron status appears to provide a better assessment of deficiency. Cook et al. (1976) found the prevalence of anemia among individuals with only one abnormal indicator of iron metabolism (ferritin, transferrin saturation, or erythrocyte protoporphyrin) was 10.9%, only slightly higher than the 8.3% found in the entire population studied. However, anemia was found in 28% of the individuals with two abnormal indicators and 63% of those with three abnormal indicators.

Recently, the data on iron status from NHANES II have been examined in considerable detail (Expert Scientific Working Group, 1985). Five measures of iron status (serum ferritin, transferrin saturation, erythrocyte protoporphyrin, MCV, and hemoglobin) were used to estimate the prevalence of impaired iron status. The prevalence analyses of two or three abnormal values were determined using two models. The ferritin model utilized data on serum ferritin, transferrin saturation, and erythrocyte protoporphyrin while the MCV model was based on mean corpuscular volume, transferrin saturation, and erythrocyte protoporphyrin. The selected age-specific cutoff values are given in Table 1.1. In addition, the Expert Scientific Working Group determined the shift in median hemoglobin concentrations of populations after exclusion of individuals with one or more abnormal iron status indicators. Dallman et al. (1984) have also utilized this hemoglobin shift model on the NHANES II data to estimate the prevalence of anemia resulting from iron deficiency or disease.
Table 1.1. Cutoffs for abnormal values of iron status indicators used in the analysis of NHANES II data (Expert Scientific Working Group, 1985).

<table>
<thead>
<tr>
<th>Age (yr)</th>
<th>Serum Ferritin (ng/ml)</th>
<th>Transferrin Saturation (%)</th>
<th>Erythrocyte Protoporphyrin (μg/dl RBC)</th>
<th>MCV (fl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1- 2</td>
<td>&lt;10</td>
<td>&lt;12</td>
<td>&gt;80</td>
<td>&lt;73</td>
</tr>
<tr>
<td>3- 4</td>
<td>&lt;10</td>
<td>&lt;14</td>
<td>&gt;75</td>
<td>&lt;75</td>
</tr>
<tr>
<td>5-10</td>
<td>&lt;10</td>
<td>&lt;15</td>
<td>&gt;70</td>
<td>&lt;76</td>
</tr>
<tr>
<td>11-14</td>
<td>&lt;10</td>
<td>&lt;16</td>
<td>&gt;70</td>
<td>&lt;78</td>
</tr>
<tr>
<td>15-74</td>
<td>&lt;12</td>
<td>&lt;16</td>
<td>&gt;70</td>
<td>&lt;80</td>
</tr>
</tbody>
</table>

As indicated in Figure 1.1, the prevalence estimates of impaired iron status derived from the three models did not exceed 2% for males aged 15 through 64 years, 6.1% for children aged 3 through 10 years, females aged 11 through 14 years and 45 through 74 years, and males aged 65 through 74 years. Several groups in the population exhibited relatively high prevalence of impaired iron status: children aged 1 through 2 years (9.2-9.4%), males aged 11 through 14 years (3.5-12.1%), and females aged 15 through 44 years (2.5-14.2%).

The Expert Scientific Working Group (1985) analyses also indicated that blacks tended to have slightly higher prevalence estimates for impaired iron status than did whites. However, differences were statistically significant only for children aged 3 through 4 years, females aged 15 through 19 years, and persons aged 45 through 74 years.

Economic status below the poverty level was associated with higher prevalence estimates, most notably in preschool children aged 1 through 4 years, females aged 15 through 19 years, and persons aged 45 through 74 years. In nonpregnant women aged 20 through 44 years and persons aged 45 through 74 years, the prevalence of abnormal values tended to decrease with increasing levels of education. Greater parity in women was also associated with evidence of poor iron status.

The NHANES II data provide limited information on iron status of pregnant women. The numerical size of the sample of pregnant women aged 15 through 19 years was not large enough to permit calculation of a reliable estimate of prevalence of impaired iron status. For the 61 pregnant women aged 20 through 44 years whose serum ferritin was analyzed, the prevalence of two or three abnormal values in the ferritin model was 25.5 ± 8.3%, and for the 91 pregnant women aged 20 through 44 years in the MCV sample, the prevalence of two or three abnormal values in the MCV model was 10.7 ± 3.5%. These data were obtained from women in various months of pregnancy.
Although the occurrence of two or three abnormal values for iron status indicators in an individual provides presumptive evidence of impaired iron status, such an occurrence cannot be taken as the basis for a definitive diagnosis of iron deficiency. Erythrocyte protoporphyrin, transferrin saturation, and to a lesser extent MCV, do not distinguish between changes resulting from iron deficiency and the effects of infection or inflammation. Data on occurrence of infection and inflammation for persons examined in NHANES II, including pregnant women, are not available.

The CDC Pediatric Nutrition Surveillance System has collected data from 29 states and the District of Columbia up to 1983. Similarly, the CDC Pregnancy Nutrition Surveillance System has collected data from 14 of these states and the District of Columbia through 1983. Data related to iron status include hemoglobin values for 22.5% and hematocrit for the other 77.5% of the population studied (Centers for Disease Control, 1985). CDC defines low hemoglobin values and hematocrit below the 5th percentile for age in the CDC reference population (NHANES I data).

In regard to the pediatric data, CDC reported:

According to data in Table 13 of the report (Centers for Disease Control, 1985), decreases in percentage low hemoglobin ranged from 1.4% to 3.9% between 1979 versus 1983. Overall, a modest decrease in the prevalence of anemia, when measured by hemoglobin, was apparent among black, white, Native American, and Asian children 6 months through 9 years of age. Trends in the prevalence of anemia, assessed by hematocrit, initially showed a decrease for Hispanic and white children in the same age group. However, this trend was reversed and there was a modest increase in the prevalence of low hematocrits for Hispanics during 1980-83 and for whites during 1981-83. The trends were inconsistent for Native Americans and Asians.

In the survey of pregnant women, CDC reported that low hemoglobin values were evident in 17.3% and low hematocrits were observed in 25.8% of all pregnant women. Pregnant black females had the highest prevalence values for low hemoglobin (26.6%) and low hematocrit (35.9%).

These data on pregnant women must be interpreted with caution for several reasons. The women included are not a representative sample of pregnant women in the U.S. population. Data were collected in only 14 states and the District of Columbia. Data cover the 3 trimesters of pregnancy, not just the first trimester. The data were collected from the Maternal and Child Health (MCH), WIC, and Early and Periodic Screening, Diagnosis, and Treatment (EPSDT) programs. Perhaps more critical is the fact that hemoglobin or hematocrit values represent a single
measure, and the Panel concurs with the Expert Scientific Working Group (1985) in that no single biochemical indicator is consistently diagnostic of iron deficiency. Inflammation, infection, folate deficiency, compromised vitamin B-12 status, altitude, and other factors limit the usefulness of hemoglobin or hematocrit as absolute diagnostic indicators of iron-deficiency anemia.

While the recently reported study of Vazquez-Seaone et al. (1985) involved only infants at risk of iron-deficiency anemia, the Panel believes the results are important in regard to reduction of prevalence of anemia. These investigators reported changes in distribution of hemoglobin values obtained from infants in 1971 and 1984. The populations studied were inner-city children enrolled in the WIC program in New Haven, Connecticut. In 1971, mean hemoglobin value for 258 children 9 to 36 months of age was 11.1 ± 1.7 g/dl with 23% below 9.8 g/dl. In 1984, in a cohort of 324 similar children, the mean value was 11.8 ± 0.9 g/dl but only 1.0% were below 9.8 g/dl. Vazquez-Seaone et al. (1985) noted that the only logical explanation for the upward shift in the distribution of hemoglobin values was the initiation of the WIC program and the provision of iron-fortified foods for the population under study. The Panel observes that this study documented the beneficial effects of targeted nutritional intervention.

Despite the prevailing opinion of probable reduction of impaired iron status within segments of the U.S. population between 1970 and 1984, numerous data gaps exist. For example, the number of pregnant women included in NHANES II, while a nationally representative sample, was relatively small; in particular, the number of pregnant women aged 15 through 19 years was limited. Similarly, blood folate levels were determined for only a small subgroup of the NHANES II population, precluding determination of other causes of anemia, e.g., anemia associated with folate deficiency. In addition, the analyses of NHANES II data indicate clearly that population subgroups considered to be at risk of compromised iron status and possibly iron-deficiency anemia include more than pregnant women, for example, young children, adolescent males and females, and women of childbearing age. Finally, the CDC Pediatric and Pregnancy Surveillance Systems do not include all states or a nationally representative sample of the population in the participating states. Therefore, data relevant to impaired iron status are incomplete.

Socioeconomic status is not always taken into account in examining the causes and targeting intervention programs that address impaired iron status in the population. In addition, factors related to socioeconomic status may be associated with the existing anemia in low-income population subgroups. Data on factors associated with socioeconomic status are useful in targeting intervention and education programs. More emphasis on
collection of data on indicators of iron status from local intervention programs and from hospital and private physicians would identify factors possibly associated with socioeconomic status.

The Panel holds that while one measure of iron status, such as hemoglobin or hematocrit, is insufficient to diagnose iron-deficiency anemia, collection of such information is economical and useful in assessing trends. The value of such data would be enhanced by multiple sample collections from each individual as well as collection and reporting from all states. The value would also be enhanced if the CDC Surveillance System data could use NHANES data as reference data for selected subsets of the population as well as the entire population.

Garn et al. (1981) have suggested that additional data are needed on pregnancy outcomes and iron nutritional status of infants born to women with abnormally elevated hemoglobin or hematocrit values. Data from the National Collaborative Prenatal Program (Niswander and Gordon, 1972) demonstrated an increased incidence of fetal deaths, short gestation lengths, low birth weights, and medical abnormalities at both ends of the hematological distributions. These observations support the need for more data on pregnancy outcomes of women whose hematological values are at the high and low ends of the range. These data, as well as all data, should be collected during the 3 trimesters in order that appropriate norms for the trimesters can be developed with due consideration for the hemodilution that occurs normally in mid-pregnancy.

D. SUGGESTED PROGRAMS AND STRATEGIES

The Panel's suggestions on programs and strategies for the period 1985 to 1990 are based on the need to expand intervention and educational efforts to include not only pregnant women, but also other at-risk groups already identified.

There is a need to continue and consider expansion of federal programs that provide support, incentives, services, and educational assistance to local jurisdictions and their efforts, including:

- Continued emphasis on the Healthy Mothers - Healthy Babies Coalition program which coordinates public and private sector efforts and focuses on education of the entire public.

- Continued development of educational materials on iron nutrition and the possible need for iron supplementation during pregnancy by various DHHS agencies and their distribution through local programs.
• Expanded support for the USDA-funded WIC program including better coordination with DHHS-funded MCH Programs at the state and local levels.

• Assignment of PHS personnel to state and regional programs.

• Coordination of training, workshops, and educational efforts with nutrition education, food assistance, as well as diet and iron supplementation in public health programs, as appropriate.

• Use of recent analyses of NHANES II data on impaired iron status in implementing educational and intervention efforts with at-risk groups.

• Use of recent analyses of NHANES II data to justify expansion of efforts to measure iron status indicators in NHANES III.

• Research to develop rapid low-cost measures for assessing iron status which can improve data collection in service agencies.

There is a need to increase the number of states included in the CDC Pediatric and Pregnancy Surveillance Systems. It is currently uneconomical to conduct the full range of biochemical analyses (e.g., ferritin, transferrin saturation, erythrocyte protoporphyrin, blood folate levels) for all persons in such systems. Therefore, the Panel supports efforts to collect data on hemoglobin levels rather than hematocrits in these and other systems as they can be used to identify population subgroups with potential for impaired iron status. Individuals in these groups at risk can be referred for more extensive diagnostic tests as appropriate in either private or public programs.

The Panel suggests that physicians in private practice and public health clinics may be sources of data on hemoglobin and hematocrit of persons in high-risk groups and appropriate control groups. Another potentially useful source of such data would be information on iron status (e.g., hemoglobin values) of children entering elementary school. Such data, if collected and reported in a uniform manner, would complement those data collected by the CDC Pediatric Nutrition Surveillance System.

The Panel recognizes that inclusion of large numbers of pregnant women in NHANES III may not be possible and suggests the other approaches noted above address this group. However, the population surveyed in NHANES III should be expanded to include larger numbers of children and adolescents as well as adults over 74 years of age. Multiple biochemical indicators of iron status (serum ferritin, transferrin saturation, erythrocyte protoporphyrin, MCV, hemoglobin, etc.), should be measured on population groups considered at risk. In addition, biochemical indicators
of other possible causes of anemia, such as serum and erythrocyte folate and vitamin B-12 should be measured. Additional data on use of iron-containing supplements and/or iron-containing over-the-counter medications should be collected on a nationally representative sample of children and adults. Such data are needed to assess self-imposed iron medication of children, adolescents, and older adults who suspect, rightly or wrongly, impaired iron status.

The definition of anemia as it relates to impaired iron nutrition is a topic of continuing scientific discussion and research. There is a need for development of, and agreement upon, terms that relate to iron nutritional status including both "overload" and "deficiency". While "iron deficiency" is generally acknowledged to be the most common single nutritional deficiency worldwide, no clear definition is accepted uniformly. Both the International Nutritional Anemia Consultative Group (Bothwell and Charlton, 1981) and the Expert Scientific Working Group (1985) have proposed definitions that are useful in describing the continuum of iron deficiency.

Additional research is needed on bioavailability of various forms of iron used in mandated fortification programs and interactions of other nutrients, dietary components, and changes with bioavailability of iron. Revision or modification of fortification guidelines should include specific information and data on bioavailability as well as efficacy and safety of various inorganic and organic forms of iron.

E. PANEL RECOMMENDATIONS ON THE OBJECTIVE

While some progress in attaining the objective is evident, supporting data are imprecise. NHANES II data were collected on only a small sample of pregnant women and other possible causes of anemia were not excluded. CDC Surveillance System data are not representative of the U.S. population of pregnant women. In addition, both NHANES II and CDC data suggest other population subgroups are at risk of impaired iron status and possibly iron-deficiency anemia.

Therefore, the Panel recommends that Objective #1 be restricted to iron nutritional status, but be expanded to include population groups beyond pregnant women. Objective #1 restated, would read:
By 1990, the prevalence of impaired iron status defined as low iron stores in pregnant women in the U.S. population will not be a significant public health problem.*

By 1990, prevalence of impaired iron status as defined by low iron stores in children aged 1 to 2 years, in males aged 11 to 14 years, and in females aged 15 to 44 years should be reduced to at least 50% of those levels estimated for these population groups in NHANES II.

By 1990, efforts should be established to identify additional population subgroups at risk of impaired iron status.

The Panel recognizes that evaluation of progress in achieving these three revised objectives in 1990 will require additional efforts to collect serum ferritin data. The Panel recommends efforts to obtain such data be initiated in 1986.

As noted in the preceding discussions, the Panel has additional concerns regarding impaired iron nutrition in infants and the possible involvement of other nutrients in anemia of pregnant women and other high-risk population subgroups. Some members of the Panel, but not a majority, conclude that an additional objective related to folate involvement in anemia should be established. The rationale for this recommendation is described below.

Assessment of the folate status of a representative sample of the entire U.S. population has never been undertaken. Folate data were collected for a subset of the NHANES II population. Blood folate levels were only measured in this survey as a means to interpret iron data. Different analytical assays were used to measure the folate levels during the survey; therefore, the data could not be merged over a wide range of values. However, these limited folate data do identify the specific groups that should be thoroughly assessed in future surveys.

* A minority of the Panel members suggested that a defined percentage of the population should be specified, but no agreement on the figure was reached.
The age range that appears to be at greatest risk for developing folate deficiency are adults (20 through 44 years of age). Within this group, pregnant women are likely to be at greatest risk even though NHANES II data related to folate status during pregnancy were too limited to be conclusive. Folate deficiency during pregnancy is of particular concern in the low-income population since prenatal care and thus folate supplementation is often delayed until late in pregnancy. The low-income pregnant teenager is at high risk of developing a folate deficiency because of the increased metabolic demands of her own growth coupled with those of the fetus. The low-income pregnant woman is of particular concern since poor prenatal care may be coupled with drug, alcohol, and tobacco use, complicating nutritional status in general and folate status in particular. At the present time, data are insufficient to make definitive statements regarding the folate status of pregnant adolescents and adult women in the United States. Routine prenatal practice often involves the use of therapeutic iron supplementation when anemia is diagnosed based on reduction in hematocrit or hemoglobin levels. Because of the potential health risks associated with folate deficiency during pregnancy, it is important first to characterize the origin and magnitude of the problem and then to develop preventive strategies.

Another age group whose folate status should be fully characterized is infants and young children. Folate data for infants and children are inconclusive, but suggest that blood levels go down as children age. It is uncertain whether these changes result from dietary or developmental factors. In view of the findings that a large percentage of the NHANES II sample of young children in poverty had impaired iron status (Pilch and Senti, 1984), the prevalence of low folate values should be examined in this group.

In addition, there are at the present time very limited data on the prevalence of folate deficiency in the elderly including those over 74 years of age. Smaller surveys have identified the elderly from low socioeconomic backgrounds to be at risk of developing folate deficiency. Because of recognized impairment in folate status associated with use of prescription and over-the-counter drugs, this age group is of particular concern. Reduced caloric intake in the elderly is often coupled with multiple drug use as well as tobacco and alcohol use. The interrelationships of these factors should be studied in future evaluations of folate status of the elderly.

Despite the rationale presented in support of this position, the majority of the Panel concluded that folate nutritional status is best addressed by targeted studies and intervention efforts. In this perspective, folate nutritional status is clearly a public health issue for certain segments of the population, but is not a national nutritional public health problem.
OBJECTIVE #2: "By 1990, growth retardation of infants and children caused by inadequate diets should be eliminated in the United States as a public health problem."

A. ANALYSIS OF THE OBJECTIVE AS STATED

Data from the National Health and Nutrition Examination Survey (NHANES I, 1971-1974) indicated that mean heights of children in families at or above the poverty level were greater than mean heights of children of families below the poverty level (Abraham et al., 1975). Background information (U.S. Department of Health, Education, and Welfare, 1979) does not clearly identify the source of data on "infants and children among migratory mothers and certain rural poor populations" although the Ten-State Nutrition Survey (1968-1970) reported that 18 to 46% of the children surveyed were below the 15th percentile for height (U.S. Department of Health, Education, and Welfare, 1972). Children from families with a lower Poverty Income Ratio were more frequently undersized than were children from families with a higher Poverty Income Ratio.

Physical growth is the focus of Objective #2, yet the complex nutritional influences on mental and emotional development of normal children have also been a subject of concern and research (Dobbing, 1984; Fomon, 1974). The Panel recognizes that nutritional influences on infant and early childhood growth are not the only factors affecting normal growth and development. Habicht et al. (1974) reported well-nourished children with different ethnic backgrounds exhibited mean differences in height of 6%. Children of similar ethnic and geographic origins who lived in poor rural or urban areas of developing countries exhibited 12% mean differences in heights. Variations in weights were greater, but weight as a sole criterion of maturity was confounded by obesity, overweight, underweight, and malnutrition. Nevertheless, Habicht et al. (1974) indicated that racial or ethnic differences in height for age are less significant than social, including dietary, differences.

The etiology of growth retardation is complex. Causes may be either primary or secondary in origin (Williams, 1962). Primary causes are related to insufficient quantities of food available to support normal growth and development. Intervention strategies to alleviate these conditions usually focus on the food supply and distribution systems, such as improving agriculture or trade to increase food supply. On the other hand, secondary causes are conditioned by a host of nondietary factors. Included among these factors are those intraindividual causes such as malabsorption syndromes, inborn errors of metabolism, or those conditions characterized by increased metabolic demands, such as pregnancy, or periods of rapid growth in infancy, childhood, and adolescence. Also included among the secondary or
conditioned causes of inadequate nutrition leading to growth retardation are environmental factors such as poverty which interferes with the purchase of adequate food, or lack of knowledge to make food choices appropriate to health. Strategies to alleviate these secondary causes of inadequate nutrition take the form of programs aimed at targeted population groups, such as income-transfer programs or provision of food commodities to individuals and families. Also included among such interventions are medical treatments which alleviate malabsorption or impaired utilization of nutrients. In these secondary or conditioned situations, the total quantity of the food supply is not limited; rather, it is the individual's ability to make use of the food which is available.

In the very young child, the "failure-to-thrive" syndrome has been described (Brown, 1979; Leonard et al., 1966). This syndrome usually results from caloric insufficiency secondary to nutritional deprivation, faulty feeding techniques, environmental deprivation, disturbed infant-mother relationships, or a combination of these causes. Its diagnosis must delineate the boundary between normal and abnormal rate of growth (Fomon, 1974). When no organic causes of the failure-to-thrive syndrome can be found, the condition is typically reversible with increased caloric intake (Whitten et al., 1969).

When growth retardation resulting from "psychosocial dwarfism" is found among older children, the role of nutrition as an underlying cause is much more controversial. Some groups have found undernutrition to be causative; others have not (Thompson, 1981). In these cases, however, the role of adequate nutrition is a necessary component of the rehabilitative therapy. Therefore, environmental and social variables as well as dietary sufficiency must be addressed when the causes of growth retardation are examined (Thompson, 1981).

A multiplicity of preventable factors may affect adversely the nutritional status of the child with special developmental and health needs. Handicapped children may experience special difficulties with respect to eating-related growth and development tasks, such as ability to sit, chew, swallow, and achieve independence in self-feeding skills at usual ages. In addition, usual diets may require modifications to meet their special needs (American Dietetic Association, 1981). Nutrient intake is an important factor in both the primary and secondary prevention of malnutrition among handicapped children (Wallace, 1972). Indeed, inadequate intakes are frequently cited as a major factor limiting the growth and development of handicapped children (Brown, et al., 1979; Gouge and Ekwall, 1975; Kitzinger, 1980; Parsons et al., 1983; Roberts and Clayton, 1969). That is, the concomitant growth retardation is not an inevitable result of the handicapping condition, but rather, in some cases, a contributory secondary problem resulting from poor diet and malnutrition (Calvert et al., 1976; Cullen et al., 1981). Handicapped children whose growth retardation is secondary
to inadequate diet have a preventable condition which needs to be remedied by the provision of an adequate diet fed in a form appropriate to the child's individual problems.

The operational definition of "inadequate diet" is unclear. The term "inadequate diet" may imply insufficient food supply or not meeting certain guidelines for nutrient intakes by infants and children such as those contained in the RDA's (National Research Council, 1980).

B. POTENTIAL SOURCES OF DATA

There are several sources of data that provide information on progress related to reduction in occurrence of subnormal physical growth (height for age) for children in the general population. These include:

- the CDC Pediatric Nutrition Surveillance System;
- NHANES II;
- WIC Program (although most data are reported through the CDC Pediatric Nutrition Surveillance System);
- Early and Periodic Screening, Diagnosis, and Treatment Program (EPSDT) data systems.

In 1983, the CDC Pediatric Nutrition Surveillance System operated in the District of Columbia and 29 states. While it provides the most extensive data set, the data are not representative of the entire U.S. population of infants and children because data collection is limited to children receiving health services in clinics participating primarily in the WIC and secondarily in the EPSDT programs. EPSDT data are collected only for children of families participating in medical assistance programs. While CDC has reported some of these data, the entire data set is not accessible for evaluation purposes. The Panel is not aware of efforts to collect, collate, and analyze data on infants who evidence less than normal growth rates regardless of income group.

NHANES II, conducted in 1976-1980, was based on a representative sample of the U.S. population, but numbers of infants sampled were low and the sample may not be representative. The WIC and EPSDT data are based on low-income segments of the population and are typically reported through the CDC Pediatric Nutrition Surveillance System. Presumably, those children at risk of growth retardation or failure-to-thrive from inadequate nutrition are more likely to occur in such groups.
The original objective was written to focus attention on migrant children and those from poor rural areas whose growth or ability to thrive might be compromised by inadequate diets. Data are not available in such a way to single out these particular groups for attention (Wotecki, 1986).

C. PROGRESS ON IMPLEMENTATION AND ADDITIONAL DATA NEEDED

The assessment of growth in children is one of the simplest, least costly, most reliable, and important tools available as an index of nutritional status (Jackson, 1966). Currently, most experts agree that weight, recumbent length, and standing height (stature) are the most useful indices of physical growth of infants and children for use as reference data (Roche and Himes, 1980) and as measures of nutritional status (Anonymous, 1984). While weight is used as a standard reference point, it is generally a poor index of maturity, growth, or body composition. Although substandard weight or stature of children are dismissed all too frequently as characteristic of his or her family, ethnic group, or country, subnormal weight or height offer the first or perhaps the only clinical indicators that abnormality may be present.

Data from 32 states participating in the 1982 CDC Pediatric Nutrition Surveillance System show that 6 to 16% of children from birth to 4 years showed some evidence of linear growth stunting (defined as height-for-age below the 5th percentile of the reference population) (Trowbridge, 1982). Overall, the prevalence of stunting tended to increase after 1 year of age except in black children. Native American and Hispanic children showed the highest prevalence of stunting. The prevalence of growth stunting and obesity in the populations under surveillance was greater than the 5% level "expected" when compared with the reference population, suggesting that low income and certain minority groups' children attending publicly supported health programs are at increased nutritional risk. However, the prevalence of low weight-for-height was generally less than the 5% level, suggesting that thinness or malnutrition is not a significant public health problem in the populations under surveillance at that time (Trowbridge, 1982). Such surveys may identify evidence of prolonged malnutrition but probably do not identify intermittent or repeated undernutrition.

The 1983 CDC Pediatric Nutrition Surveillance System report provides additional data on nutrition-related abnormalities (low height-for-age; low weight-for-height; and high weight-for-height) for children enrolled in the WIC and EPSDT programs. In each case, the 5th or 95th percentile value of the CDC reference population was the criterion (Centers for Disease Control, 1985). The Summary of Findings states:
"In 1983, 29 States and the District of Columbia submitted data on 539,322 children from birth through 9 years of age to the Pediatric Nutrition Surveillance System coordinated by the Centers for Disease Control (CDC). Seventy-eight percent of the children were screened as part of the Special Supplemental Food Program for Women, Infants, and Children (WIC), and 16.7% were examined in the Early and Periodic Screening, Diagnosis, and Treatment (EPSDT) program. The majority of children screened were white (56.1%), followed by blacks (30.3%) and Hispanics (10.3%). Nearly 94% of the children in the surveillance system were preschoolers under 6 years of age. The tabulated data represent the results of initial screening examinations at the time a child entered a health or nutrition program included in the surveillance system.

"Nutrition-related abnormalities were identified in 15.7% to 33.4% of screened children. Multiple abnormal indices potentially related to nutrition were observed in approximately 1% to 5% of the children. The highest prevalence of abnormalities was found among Asian children because of the inclusion of Southeast Asian refugees.

"The most prevalent nutrition-related problems defined by anthropometry were short stature (height-for-age below the 5th percentile) and overweight (weight-for-height above the 95th percentile). For most ethnic groups, the prevalence of short stature was highest in infants and children under 2 years of age. Among Hispanics, the prevalence of low height-for-age remained relatively high in children over 2 years of age. Trends toward a modest decrease in the prevalence of short stature among white, black, Hispanic, and Asian children were noted over the period 1979-83 among children less than 2 years of age.

"The prevalence of overweight also tended to be greatest among infants and children under 2 years of age. Beyond infancy, the prevalence of overweight tended to be relatively high among Hispanic and Native
American children. A trend toward a modest decrease in the prevalence of overweight among white, black, Hispanic, Native American, and Asian children was noted over the period 1979-83 among children less than 2 years of age.

- "The prevalence of low weight-for-height (below the 5th percentile) was consistently at or below the 5% level for all age and ethnic groups except 12- to 23-month-old Asian children and black infants less than 6 months old. These data suggest that thinness, as a reflection of undernutrition, is not a major public health problem among children included in CDC's Pediatric Nutrition Surveillance System."

Prevalence estimates for low height-for-age, low weight-for-height, and high weight-for-height for ethnic and age groups as reported by CDC are provided in Table 2.1. While low height-for-age prevalences for infants less than 3 months of age are below the 5th percentile, prevalences are above the expected value in all ethnic groups of children aged 3 months through 5 years, and in Hispanic and white children aged 6 through 9 years.

Trends in changes of prevalence estimates from the CDC Pediatric Surveillance System data for 1979 to 1983 are noted in Table 2.2. These data indicate some decrease in short stature among Hispanic and Asian American children, but not white, black, or Native American groups. Further analysis of data by age groups is given in Table 2.3 (children less than 2 years of age) and in Table 2.4 (children 2 through 5 years of age). Within ethnic groups of children less than 2 years of age, all except Native Americans show modest decreases in prevalence of low height-for-age. For children 2 through 5 years of age, over the same 5-year period, only Asian American children show decreases in low height-for-age prevalence.

The Panel notes that the data in the CDC Pediatric Nutrition Surveillance System surveys only include children who are receiving health care and nutrition supplements in local, state, and federally funded health clinics. Analogous data on children from below-poverty-level families who do not receive such health care assistance are not available. Possibly, these children are at even greater risk.

Jones et al. (1985) have provided analyses of NHANES I and II data that confirm the trends reported from the CDC Pediatric Surveillance System studies. They observed that children of families living above the poverty level tended to be taller, heavier, and fatter than children living below the poverty level.
Table 2.1. Prevalence of selected subnormal anthropometric indices among children through 9 years of age in selected States, 1983 (CDC Pediatric Nutrition Surveillance System) (modified from Centers for Disease Control, 1985; Table 7, p.16).

<table>
<thead>
<tr>
<th>Age Group and Ethnic Origin</th>
<th>Number Examined</th>
<th>Height-for-Age % Below 5th Percentile</th>
<th>Weight-for-Height % Below 5th Percentile</th>
<th>% Above 95th Percentile</th>
</tr>
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<tr>
<td>&lt;3 Months</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>59,887</td>
<td>4.2</td>
<td>4.6</td>
<td>4.3</td>
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<tr>
<td>Black</td>
<td>24,856</td>
<td>5.3</td>
<td>6.5</td>
<td>5.5</td>
</tr>
<tr>
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<td>11,586</td>
<td>3.8</td>
<td>4.8</td>
<td>4.2</td>
</tr>
<tr>
<td>Nat. Amer.</td>
<td>2,088</td>
<td>4.7</td>
<td>3.4</td>
<td>5.7</td>
</tr>
<tr>
<td>Asian</td>
<td>1,011</td>
<td>3.9</td>
<td>4.0</td>
<td>4.2</td>
</tr>
<tr>
<td>3-5 Months</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>17,557</td>
<td>12.0</td>
<td>2.2</td>
<td>10.2</td>
</tr>
<tr>
<td>Black</td>
<td>6,422</td>
<td>16.0</td>
<td>2.2</td>
<td>13.6</td>
</tr>
<tr>
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<td>11.2</td>
<td>2.5</td>
<td>10.1</td>
</tr>
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<td>Nat. Amer.</td>
<td>614</td>
<td>10.9</td>
<td>2.0</td>
<td>14.0</td>
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<td>Asian</td>
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<tr>
<td>6-11 Months</td>
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<td></td>
</tr>
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</tr>
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<tr>
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<td>3.5</td>
<td>9.2</td>
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<tr>
<td>Nat. Amer.</td>
<td>811</td>
<td>11.6</td>
<td>3.1</td>
<td>10.6</td>
</tr>
<tr>
<td>Asian</td>
<td>388</td>
<td>15.7</td>
<td>4.6</td>
<td>7.2</td>
</tr>
<tr>
<td>12-23 Months</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>White</td>
<td>36,158</td>
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</tr>
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</tr>
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</tr>
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<td>3.1</td>
<td>15.0</td>
</tr>
<tr>
<td>Asian</td>
<td>488</td>
<td>23.6</td>
<td>8.0</td>
<td>4.1</td>
</tr>
<tr>
<td>2-5 Years</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>77,455</td>
<td>9.4</td>
<td>2.2</td>
<td>4.9</td>
</tr>
<tr>
<td>Black</td>
<td>29,002</td>
<td>5.9</td>
<td>2.8</td>
<td>5.9</td>
</tr>
<tr>
<td>Hispanic</td>
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<td>2.4</td>
<td>7.5</td>
</tr>
<tr>
<td>Nat. Amer.</td>
<td>1,620</td>
<td>8.2</td>
<td>1.3</td>
<td>8.8</td>
</tr>
<tr>
<td>Asian</td>
<td>911</td>
<td>22.4</td>
<td>4.1</td>
<td>4.3</td>
</tr>
<tr>
<td>6-9 Years</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>13,021</td>
<td>6.0</td>
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</tr>
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<td>9,347</td>
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<td>2.9</td>
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<td>16.6</td>
<td>2.0</td>
<td>13.7</td>
</tr>
<tr>
<td>Nat. Amer.</td>
<td>128</td>
<td>4.7</td>
<td>1.6</td>
<td>10.2</td>
</tr>
<tr>
<td>Asian</td>
<td>69</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

1 Nat. American = American Indian or Alaskan Native; "Asian" includes Southeast Asian refugees.
* Insufficient subjects to estimate.
Table 2.2. Prevalence (expressed as percentage) of selected anthropometric indices among children through 9 years of age in selected States, 1979-1983 (CDC Pediatric Nutrition Surveillance System) (modified from Centers for Disease Control, 1985; Table 8, p.17).

<table>
<thead>
<tr>
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<th></th>
<th></th>
</tr>
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<tbody>
<tr>
<td>White</td>
<td>No. of Subjects</td>
<td>131,282</td>
<td>180,063</td>
<td>150,265</td>
<td>182,939</td>
<td>232,452</td>
<td>877,001</td>
</tr>
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<td>Low Ht-Age(^1)</td>
<td>8.7</td>
<td>8.4</td>
<td>8.5</td>
<td>8.2</td>
<td>8.6</td>
<td>8.5</td>
<td></td>
</tr>
<tr>
<td>Low Wt-Ht(^2)</td>
<td>2.5</td>
<td>2.8</td>
<td>2.7</td>
<td>3.0</td>
<td>3.3</td>
<td>2.9</td>
<td></td>
</tr>
<tr>
<td>High Wt-Ht(^3)</td>
<td>7.4</td>
<td>7.1</td>
<td>6.5</td>
<td>6.3</td>
<td>6.4</td>
<td>6.7</td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>No. of Subjects</td>
<td>50,423</td>
<td>74,971</td>
<td>66,784</td>
<td>86,248</td>
<td>92,844</td>
<td>371,270</td>
</tr>
<tr>
<td>Low Ht-Age</td>
<td>7.4</td>
<td>7.3</td>
<td>7.6</td>
<td>7.7</td>
<td>7.4</td>
<td>7.5</td>
<td></td>
</tr>
<tr>
<td>Low Wt-Ht</td>
<td>3.1</td>
<td>3.2</td>
<td>3.5</td>
<td>4.1</td>
<td>4.1</td>
<td>3.7</td>
<td></td>
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<tr>
<td>High Wt-Ht</td>
<td>8.0</td>
<td>7.9</td>
<td>7.6</td>
<td>7.7</td>
<td>7.4</td>
<td>7.7</td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>No. of Subjects</td>
<td>13,095</td>
<td>21,653</td>
<td>16,750</td>
<td>24,722</td>
<td>28,315</td>
<td>104,535</td>
</tr>
<tr>
<td>Low Ht-Age</td>
<td>10.2</td>
<td>9.5</td>
<td>9.1</td>
<td>9.2</td>
<td>8.8</td>
<td>9.3</td>
<td></td>
</tr>
<tr>
<td>Low Wt-Ht</td>
<td>3.3</td>
<td>3.6</td>
<td>3.4</td>
<td>3.6</td>
<td>3.7</td>
<td>3.6</td>
<td></td>
</tr>
<tr>
<td>High Wt-Ht</td>
<td>8.7</td>
<td>8.6</td>
<td>7.5</td>
<td>7.9</td>
<td>7.2</td>
<td>7.9</td>
<td></td>
</tr>
<tr>
<td>Native</td>
<td>No. of Subjects</td>
<td>6,789</td>
<td>9,601</td>
<td>3,938</td>
<td>4,087</td>
<td>6,094</td>
<td>30,509</td>
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<td>7.8</td>
<td>8.2</td>
<td>7.5</td>
<td>8.6</td>
<td>8.1</td>
<td>8.1</td>
<td></td>
</tr>
<tr>
<td>Low Wt-Ht</td>
<td>3.3</td>
<td>3.4</td>
<td>3.3</td>
<td>2.8</td>
<td>2.6</td>
<td>3.1</td>
<td></td>
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<tr>
<td>High Wt-Ht</td>
<td>10.4</td>
<td>10.8</td>
<td>10.1</td>
<td>8.6</td>
<td>9.4</td>
<td>10.0</td>
<td></td>
</tr>
<tr>
<td>American(^4)</td>
<td>No. of Subjects</td>
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<td>4,644</td>
<td>2,770</td>
<td>2,876</td>
<td>3,113</td>
<td>14,871</td>
</tr>
<tr>
<td>Low Ht-Age</td>
<td>28.5</td>
<td>31.7</td>
<td>22.8</td>
<td>20.6</td>
<td>15.3</td>
<td>24.1</td>
<td></td>
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<td>4.4</td>
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<td>4.8</td>
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</tr>
<tr>
<td>Asian(^5)</td>
<td>No. of Subjects</td>
<td>1,468</td>
<td>4,644</td>
<td>2,770</td>
<td>2,876</td>
<td>3,113</td>
<td>14,871</td>
</tr>
<tr>
<td>Low Ht-Age</td>
<td>28.5</td>
<td>31.7</td>
<td>22.8</td>
<td>20.6</td>
<td>15.3</td>
<td>24.1</td>
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<tr>
<td>Low Wt-Ht</td>
<td>4.4</td>
<td>4.8</td>
<td>4.5</td>
<td>6.1</td>
<td>4.5</td>
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<tr>
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<td>5.2</td>
<td>4.4</td>
<td>5.3</td>
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</tbody>
</table>

\(^1\) **Low Height-for-Age**: Height-for-age less than the 5th percentile for children of the same sex and age in the reference population. This indicator describes short stature for age. In the present report the term "height" refers to measurements of length in recumbent children through 24 months of age and upright stature in children over 24 months of age.

\(^2\) **Low Weight-for-Height**: Weight-for-height less than the 5th percentile for children of the same sex and height in the reference population. This indicator describes thinness.

\(^3\) **High Weight-for-Height**: Weight-for-height greater than the 95th percentile for children of the same sex and height in the reference population. This indicator describes overweight.

\(^4\) American Indian or Alaskan Native.

\(^5\) Includes Southeastern Asian refugees.
Table 2.3. Prevalence (expressed as percentage) of selected anthropometric indices among children through 2 years of age in selected States, 1979-1983 (CDC Pediatric Nutrition Surveillance System) (modified from Centers for Disease Control, 1985; Table 9, p.19).

<table>
<thead>
<tr>
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<td>6.9</td>
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<td>No. of Subjects</td>
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<td>6,699</td>
<td>2,686</td>
<td>2,864</td>
<td>4,346</td>
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<tr>
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<tr>
<td>Asian&lt;sup&gt;5&lt;/sup&gt;</td>
<td>No. of Subjects</td>
<td>707</td>
<td>1,722</td>
<td>1,772</td>
<td>1,919</td>
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<td>5.8</td>
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</tbody>
</table>

<sup>1</sup>Low Height-for-Age: Height-for-age less than the 5th percentile for children of the same sex and age in the reference population. This indicator describes short stature for age. In the present report the term "height" refers to measurements of length in recumbent children through 24 months of age and upright stature in children over 24 months of age.

<sup>2</sup>Low Weight-for-Height: Weight-for-height less than the 5th percentile for children of the same sex and height in the reference population. This indicator describes thinness.

<sup>3</sup>High Weight-for-Height: Weight-for-height greater than the 95th percentile for children of the same sex and height in the reference population. This indicator describes overweight.

<sup>4</sup>American Indian or Alaskan Native.

<sup>5</sup>Includes Southeastern Asian refugees.
Table 2.4. Prevalence (expressed as percentage) of selected anthropometric indices among children 2 to 5 years of age in selected States, 1979-1983 (CDC Pediatric Nutrition Surveillance System) (modified from Centers for Disease Control 1985; Table 10, p.20).

<table>
<thead>
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<td>White</td>
<td>No. of Subjects</td>
<td>44,805</td>
<td>61,156</td>
<td>49,934</td>
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<td>9.5</td>
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<td></td>
<td>Low Wt-Ht 2</td>
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<td>2.0</td>
<td>2.3</td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td>High Wt-Ht 3</td>
<td>5.2</td>
<td>5.2</td>
<td>4.9</td>
<td>5.0</td>
<td>4.8</td>
<td>5.0</td>
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<tr>
<td>Black</td>
<td>No. of Subjects</td>
<td>15,859</td>
<td>25,208</td>
<td>21,422</td>
<td>25,896</td>
<td>26,324</td>
<td>114,709</td>
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<tr>
<td></td>
<td>Low Ht-Age</td>
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<td>6.3</td>
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<td>6.1</td>
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<tr>
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<td>2.9</td>
<td>2.9</td>
</tr>
<tr>
<td></td>
<td>High Wt-Ht</td>
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<td>5.2</td>
<td>5.7</td>
<td>6.0</td>
<td>5.8</td>
<td>5.6</td>
</tr>
<tr>
<td>Hispanic</td>
<td>No. of Subjects</td>
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<td>6,861</td>
<td>4,117</td>
<td>6,785</td>
<td>6,572</td>
<td>28,335</td>
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<tr>
<td></td>
<td>Low Ht-Age</td>
<td>12.3</td>
<td>12.2</td>
<td>12.7</td>
<td>11.9</td>
<td>12.0</td>
<td>12.2</td>
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<tr>
<td></td>
<td>Low Wt-Ht</td>
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<td>2.0</td>
<td>1.8</td>
<td>2.2</td>
<td>2.4</td>
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<tr>
<td></td>
<td>High Wt-Ht</td>
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<td>Native American</td>
<td>No. of Subjects</td>
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<td>1,087</td>
<td>1,043</td>
<td>1,570</td>
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<td>1.2</td>
<td>1.6</td>
</tr>
<tr>
<td></td>
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<td>11.2</td>
<td>10.5</td>
<td>8.7</td>
<td>10.7</td>
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<td>33.1</td>
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<td>32.5</td>
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<td></td>
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<td>2.9</td>
<td>3.6</td>
<td>4.8</td>
<td>7.4</td>
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<td>2.9</td>
<td>4.0</td>
<td>3.2</td>
<td>4.3</td>
<td>3.3</td>
</tr>
</tbody>
</table>

1 Low Height-for-Age: Height-for-age less than the 5th percentile for children of the same sex and age in the reference population. This indicator describes short stature for age. In the present report the term "height" refers to measurements of length in recumbent children through 24 months of age and upright stature in children over 24 months of age.

2 Low Weight-for-Height: Weight-for-height less than the 5th percentile for children of the same sex and height in the reference population. This indicator describes thinness.

3 High Weight-for-Height: Weight-for-height greater than the 95th percentile for children of the same sex and height in the reference population. This indicator describes overweight.

4 American Indian or Alaskan Native.

5 Includes Southeastern Asian refugees.
They also reported that the differences in growth could not be associated directly with measures of dietary intake. Jones et al. (1985) concluded that while statistically significant differences for height and weight were evident for above and below poverty level groups of children, the magnitude of poverty-related differences decreased between the time of NHANES I (1971-1974) NHANES I (1971-1974) and NHANES II (1976-1980). However, these decreases were not statistically significant. Jones et al. (1985) concluded that while their data analyses indicated differences in children's growth associated with poverty had not been eliminated, some progress had occurred between 1971 and 1980. However, Zee et al. (1985) have reported that there were no significant differences in the percentile distributions of heights and weights of preschool children of 1219 families surveyed in 1977 and in 1983. These data imply no improvement in growth status over the six year period in a large sample of preschool children living in an urban poverty area.

Taken together, these data suggest progress since 1971 in regard to deficits in children's growth as measured by height-for-age. However, the available data cover only the period 1971-1983 and data are not yet available for the period 1983-1985. The data include population groups likely to contain children whose dietary intakes are compromised, but data for children of migrant workers per se were not available to the Panel. Witteki (1986) has suggested that special surveys may be needed to obtain these data.

Several scientific organizations provided comments on Objective #2 including the American Dietetic Association (ADA), American Institute of Nutrition (AIN), American Medical Association (AMA), American Nursing Association (ANA), International Life Sciences Institute (ILSI), and Society for Nutrition Education (SNE) (see Chapter VIII). Comments in general reflected the Panel's discussions. These organizations noted that growth retardation was not solely the result of inadequate nutrition. In addition, they were uniformly in support of programs such as WIC, family assistance, EPSDT, and CDC nutrition surveillance efforts, and some organizations recommended their expansion.

For improved program implementation, the ADA recommended that opportunities for sponsoring in-service training for health care providers, which will improve screening and assessment skills, recordkeeping, and follow-up procedures, should be extended to the private sector via existing state programs. The ADA also suggested that public schools be included in the implementation step, "Assure that growth assessment is included in health care programs administered by DHHS in cooperation with state and local health agencies (Title V, EPSDT, IHS)." The ADA suggested further that meal service programs should be promoted in day care and preschool settings and nutrition services should be focused on highest health risk groups (Owen and Haynes, 1985).
Several scientific organizations suggested that greater emphasis should be placed on devising methods to report and investigate cases of undernutrition and that the CDC nutrition surveillance activities should be expanded. A recent evaluation of the WIC program is reported to conclude that participation in WIC has little influence on height or weight of children (Anonymous, 1986a). However, this evaluation study did not provide for collection of longitudinal data that could be obtained by CDC nutrition surveillance surveys.

D. SUGGESTED PROGRAMS AND STRATEGIES

Several programs now in place act to increase food availability by income transfer or food supplementation, and to provide nutrition education and/or health services. These federally funded programs include: WIC (USDA), food stamps (USDA), commodity food supplementation programs (USDA), MCH block grants (e.g., maternal and child health programs as well as others for pregnant women, infants and handicapped children) (DHHS), Head Start (DHHS), Indian Health programs (DHHS), migrant health programs (DHHS), and child care feeding programs, e.g., the several school food service programs (USDA). A number of these programs are administered at the state and local level, e.g., the WIC and school feeding programs. This provides an opportunity to obtain data on large numbers of children.

The Panel concludes that these programs, if supported adequately, would provide services which assist in implementation of Objective #2. Additional surveillance data on high risk groups are needed, e.g., children who present with failure-to-thrive, handicapped children, and low-income children not receiving governmentally funded health care. Currently, no efforts are being made to collect such data and the Panel recommends that special efforts be made to obtain such data. The Panel concludes further that data collected by CDC, NCHS, and USDA can be used to measure progress toward this Objective.

E. PANEL RECOMMENDATIONS ON THE OBJECTIVE

It is evident from available data that since 1971 progress on reduction of the population of children with height-for-age below the 5% percentile has occurred. However, in terms of probability alone, 5% of all children would be below the 5th percentile for height-for-age. The Panel recommends modification of Objective #2 to read:

- By 1990, less than 10% of children in the general population or in any identifiable subgroup of the population should be below the 5th percentile for height-for-age because of dietary inadequacy.
OBJECTIVE #3: "By 1990, the prevalence of significant overweight (120 percent of "desired" weight) among the U.S. adult population should be decreased to 10 percent of men and 17 percent of women without nutritional impairment."

OBJECTIVE #4: "By 1990, 50 percent of the overweight population should have adopted weight loss regimens, combining an appropriate balance of diet and physical activity."

OBJECTIVE #10: "By 1990, 90 percent of adults should understand that to lose weight people must either consume foods that contain fewer calories or increase physical activity -- or both."

The Panel and several scientific organizations providing written comments (American Medical Association, International Life Sciences Institute, Produce Marketing Association, Society for Nutrition Education) noted that while differing in focus, Objectives #3, #4, and #10 are closely related. Objective #10 focuses on education and knowledge about weight regulation on the part of the entire U.S. population; Objective #4 speaks to that segment of the adult population which is overweight; and, Objective #3 addresses the subset of that overweight adult population which is "significantly" overweight.

The Panel observed that any implementation plans would involve efforts common to the three Objectives. Therefore, the Panel's evaluation addresses the three Objectives under one overall goal focused on the state of being overweight and the control of obesity.

A. ANALYSIS OF THE OBJECTIVES AS STATED

1) Objective #3: Healthy People (U.S. Department of Health, Education and Welfare, 1979) introduces the obesity issue with reference to NCHS figures showing that for women 45 to 64 years of age, 35% below the poverty level and 29% above the poverty level are "considered obese". Comparable figures for males are 5 and 13%, respectively. Subsequently, the implementation plans (U.S. Department of Health and Human Services, 1983) refer to NHANES I (1971-1974) data that indicate 14% of male and 23.8% of female adults (20 to 74 years of age) are obese (defined as 120% or more of desirable weight). The stated objective of reduction to 10% for males and 17% for females was apparently derived from the NHANES I data.

The Panel's concern with using these data as a baseline for targeted reductions is associated with the evolving definition of the terms "overweight" and "obese". The definition of "overweight" suggested by NCHS based on NHANES II data was body mass index (weight in kilograms divided by height in meters
squared) equal to or greater than that of the 85th percentile of
20 to 24 year-old males and females (National Center for Health
Statistics, 1981). "Severe overweight" was defined as body mass
index greater than the 95th percentile; however, "obesity" and
"severe obesity" were defined using the sums of indices for tri-
ceps and subscapular skinfold thicknesses. Thus, a person with
a given body mass index could be either overweight or obese (or
both) depending on muscle and adipose tissue masses. A person
can be overweight and not obese, or obese but not overweight.
Obviously, a person who is severely obese would be overweight
(National Center for Health Statistics, 1983).

More frequently, height-weight tables are used to
determine the relationship between an individual's height and
weight. There are a number of complex issues associated with
development of height-weight tables including data quality,
sampling and design limitations, attention to confounding vari-
able, relation of weight to obesity, and selection of weight
indices (Harrison, 1985). Further, studies relating body weight
with mortality are inconsistent; some show a relation between
overweight and increased mortality; others do not (Harrison,
1985).

2) Objective #4: No baseline data for 1979 were
noted. Further, the Panel observes that adoption of weight loss
regimens does not speak to continuation and/or maintenance of
such regimens over time sufficient for achievement of desired and
sustained weight loss. Scientific organizations commenting on
Objective #4 indicated both of these points, but also noted that
the Objective as stated was neither measurable nor attainable by
1990.

3) Objective #10: No baseline data were provided for
Objective #10. Thus, measurement of progress since 1979 in terms
of 90% of adults having an understanding of the role of calorie
consumption and physical exercise in weight reduction is not
possible.

B. PERTINENT SOURCES OF DATA

Since the publication of the Objectives for Improved
Nutrition, information and data from NHANES II on prevalence
of the overweight state of the U.S. population in 1976-1980
have been calculated and published. In addition, Larsson et al.
(1981) reviewed and summarized data from a number of earlier
epidemiological investigations of body weight and morbidity and
mortality associated with heart disease. Finally, the health
implications of obesity have been the subject of an NIH Consensus
Conference in which most available data on aspects of obesity
were discussed. The papers presented at the NIH Consensus
Conference have been published (Foster and Burton, 1985).
1) **Objective #3:** While not a representative sample of infants and children in the U.S. population, the CDC Pediatric Nutrition Surveillance System data indicate that between 5 and 11% of children in various ethnic groups through 2 years of age have weights-for-heights greater than the 95th percentile of the reference population (Centers for Disease Control, 1985). For children up to 9 years of age, about 4 to 10% of the several ethnic groups are overweight (see Tables 2.2 and 2.3).

The data on overweight cited by Van Itallie (1985) indicate increased prevalence of overweight in both white and black males between ages 25 and 55 years when data from 1976-1980 are compared with those from previous years. The overall prevalence is higher in black males. After 55 years of age the prevalence of overweight declines. In contrast to the patterns exhibited by males, prevalence of overweight in both white and black females increases steadily from age 25 years to age 65 years. Again, prevalence in black women is significantly higher than in white women. Further, overweight is more prevalent in females living on incomes below the poverty index; the reverse is true for males (Van Itallie, 1985).

The NHANES II definition of overweight was based on body mass indices of 27.8 kg/m² or greater for men and 27.3 kg/m² or greater for women. Based on these criteria, the NHANES II data show 26% of adults (20 to 75 years of age), or an estimated 34 million people, are overweight. While NHANES I and NHANES II utilized different definitions of "overweight," Van Itallie (1985) has pointed out that the data sets can be compared indirectly by deriving body mass indices from NHANES I data. The Panel's analyses of these data suggest that the number of "overweight" adults observed in 1971-1974 (NHANES I) and 1976-1980 (NHANES II) either increased slightly or remained about the same. Similar conclusions have been published (U.S. Department of Health and Human Services, 1984a) (Table 3.1). These observations suggest little reduction of the prevalence of overweight between 1971-1980 and suggest little progress on **Objective #3** between 1980 and 1985.

2) **Objective #4:** While no baseline data were available in 1979, awareness of the need for both caloric restriction and increased physical activity in weight loss regimens is widespread. Within the scientific, nutritional, and medical communities there is almost universal agreement on inclusion of exercise in programs for prevention of obesity (Foster and Burton, 1985; U.S. Department of Health and Human Services, 1984b).

Data from the general public are incomplete but indicate a trend of greater awareness of the importance of caloric restriction and increased physical exercise. Stewart and Brook (1983) collected data on 5817 persons aged 16 to 71 years in a study of the effects of being overweight. Subjects were
Table 3.1. Overweight persons 25-74 years of age, according to race, sex, and age: United States, 1960-62, 1971-74, and 1976-80 (Data are based on physical examinations of a sample of the civilian noninstitutionalized population).

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<th>Sex and age</th>
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<th>Race and period</th>
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<tr>
<td>Both Sexes</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>All ages, 25-74 years&lt;sup&gt;2&lt;/sup&gt;</td>
<td>25.4</td>
<td>26.7</td>
<td>27.0</td>
<td>24.2</td>
</tr>
<tr>
<td>25-34 years</td>
<td>17.7</td>
<td>19.9</td>
<td>19.3</td>
<td>16.4</td>
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<tr>
<td>35-44 years</td>
<td>22.6</td>
<td>27.3</td>
<td>27.0</td>
<td>20.6</td>
</tr>
<tr>
<td>45-54 years</td>
<td>27.9</td>
<td>29.2</td>
<td>30.6</td>
<td>26.8</td>
</tr>
<tr>
<td>55-64 years</td>
<td>32.3</td>
<td>30.4</td>
<td>31.1</td>
<td>31.4</td>
</tr>
<tr>
<td>65-74 years</td>
<td>30.7</td>
<td>29.2</td>
<td>29.3</td>
<td>30.9</td>
</tr>
</tbody>
</table>

Male

| All ages, 25-74 years<sup>2</sup> | 23.1    | 24.8    | 25.3    | 23.3  | 24.8  | 25.2  | 22.5  | 27.0  | 30.0  |
| 25-34 years | 20.6    | 21.6    | 19.0    | 20.1  | 21.6  | 19.6  | 31.7  | 24.6  | 16.6  |
| 35-44 years | 21.8    | 28.2    | 27.3    | 20.9  | 27.6  | 26.5  | 28.0  | 38.9  | 39.0  |
| 45-54 years | 26.8    | 27.0    | 29.7    | 27.7  | 27.6  | 29.1  | 18.5  | 22.0  | 41.4  |
| 55-64 years | 25.0    | 23.8    | 26.6    | 26.5  | 23.8  | 26.9  | 15.8  | 25.6  | 25.5  |
| 65-74 years | 20.6    | 22.0    | 23.7    | 21.3  | 22.1  | 24.3  | *11.7 | 21.1  | 25.1  |

1. Includes all other races not shown separately.
2. Age adjusted by the direct method to the 1970 civilian noninstitutionalized population 25-74 years of age, using 5 age groups.

NOTE: Overweight is defined for men as body mass index greater than or equal to 28 kilograms/meter<sup>2</sup> and for women as body mass index greater than or equal to 25 kilograms/meter<sup>2</sup>. These cut points were used because they represent the sex specific 85th percentiles for persons 20-29 years of age in the 1976-80 National Health and Nutrition Examination Survey.

SOURCE: Division of Health Examination Statistics, National Center for Health Statistics: Unpublished data.
Table 3.1 (continued). Overweight persons 25-74 years of age, according to race, sex, and age: United States, 1960-62, 1971-74, and 1976-80. (Data are based on physical examinations of a sample of the civilian noninstitutionalized population).

<table>
<thead>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Female</td>
<td></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>All ages, 25-74 years</td>
<td></td>
<td>27.4</td>
<td>28.4</td>
<td>28.6</td>
<td>24.9</td>
<td>26.4</td>
<td>26.3</td>
<td>47.1</td>
<td>46.8</td>
<td>48.1</td>
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<tr>
<td>25-34 years</td>
<td></td>
<td>15.1</td>
<td>18.4</td>
<td>19.6</td>
<td>13.0</td>
<td>16.9</td>
<td>18.1</td>
<td>28.5</td>
<td>31.2</td>
<td>30.4</td>
</tr>
<tr>
<td>35-44 years</td>
<td></td>
<td>23.4</td>
<td>26.4</td>
<td>26.8</td>
<td>20.3</td>
<td>23.7</td>
<td>24.5</td>
<td>45.6</td>
<td>48.5</td>
<td>41.6</td>
</tr>
<tr>
<td>45-54 years</td>
<td></td>
<td>29.0</td>
<td>31.2</td>
<td>31.5</td>
<td>25.9</td>
<td>28.7</td>
<td>29.1</td>
<td>50.9</td>
<td>54.2</td>
<td>59.6</td>
</tr>
<tr>
<td>55-64 years</td>
<td></td>
<td>39.1</td>
<td>36.3</td>
<td>35.9</td>
<td>35.8</td>
<td>34.6</td>
<td>32.6</td>
<td>71.0</td>
<td>54.3</td>
<td>60.0</td>
</tr>
<tr>
<td>65-74 years</td>
<td></td>
<td>38.7</td>
<td>34.8</td>
<td>33.5</td>
<td>38.6</td>
<td>33.5</td>
<td>31.5</td>
<td>*43.8</td>
<td>49.2</td>
<td>56.0</td>
</tr>
</tbody>
</table>

1 Includes all other races not shown separately.
2 Age adjusted by the direct method to the 1970 civilian noninstitutionalized population 25-74 years of age, using 5 age groups.

NOTE: Overweight is defined for men as body mass index greater than or equal to 28 kilograms/meter$^2$, and for women as body mass index greater than or equal to 35 kilograms/meter$^2$. These cut points were used because they represent the sex specific 85th percentiles for persons 20-29 years of age in the 1976-80 National Health and Nutrition Examination Survey.

SOURCE: Division of Health Examination Statistics, National Center for Health Statistics: Unpublished data.
participants in the Rand Health Insurance Experiment, a cross-sectional study of health care delivery and financing conducted at six sites in four states. While 41% of the population perceived themselves as overweight, Stewart and Brook (1983) found 10% were moderately overweight and 12% were severely overweight (total 22%). Criteria used to define these conditions were BMI* as follows:

<table>
<thead>
<tr>
<th></th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>&lt;27.0</td>
<td>&lt;33.0</td>
</tr>
<tr>
<td>Moderately Overweight</td>
<td>27.0-29.3</td>
<td>33.0-36.0</td>
</tr>
<tr>
<td>Severely Overweight</td>
<td>&gt;29.3</td>
<td>&gt;36.0</td>
</tr>
</tbody>
</table>

Of those who perceived themselves as overweight, Stewart and Brook (1983) found that 54% were not attempting to reduce, but 32% were reducing caloric intake and 26% were exercising in order to lose weight.

Provisional data from the NCHS supplement to the 1985 National Health Interview Survey (National Center for Health Statistics, 1985a) provide further information on perceptions of the noninstitutionalized adult U.S. population using weight loss regimens. Responses from one adult in each of 8350 households indicated that 27% of males and 46% of females were trying to lose weight. Of those who responded affirmatively in regard to losing weight, figures for eating fewer calories were 77% (males) and 85% (females), and for increased physical activity, percentages were 58 and 57% for males and females, respectively.

The National Health Interview Survey (National Center for Health Statistics, 1985a) reported that 45% of all males and females considered themselves to be a little to very overweight. On the other hand, the 1985 Hearst Corporation survey of 998 adult females revealed that 53% were not aware that obesity can be defined as 120% of recommended weight. The Panel notes this question focused on definition of obesity, which is not necessarily indicative of perceiving oneself as overweight or obese, or knowing that reduced caloric intake and exercise are components of weight loss regimens.

The data cited from the above studies generally exclude the severely obese and/or persons under a physician's care. Further, as noted previously, the definitions of "overweight" and "obese" are not uniform. Nevertheless, the Panel suggests that the awareness of the need for both caloric reduction and

* Males BMI = Weight ÷ Height^2
Females BMI = Weight ÷ Height^1.5
increased physical exercise among the adult U.S. population is greater now than a decade ago. Such a conclusion is consistent with the general observation of greater public awareness of the association of good nutritional practices with maintaining health and preventing disease. Available data do not provide sufficient information for the Panel to suggest a quantitative estimate of increased awareness or knowledge on the part of the U.S. adult population.

3) **Objective #10:** Data and comments cited in the previous paragraphs on Objectives #3 and #4 relate to Objective #10 as well. Dennis et al. (1985) have analyzed energy intakes of adult men and women in the LRCs' Prevalence Study. They found that relatively low energy intakes particularly among women, were associated with increasing body weight. While reducing the energy level of diets to control weight is a common practice, especially among women, this approach appears ineffective by itself. Dennis et al., (1985) concluded that the LRC data suggest more emphasis should be directed toward adjusting activity levels upward rather than continuing to decrease energy intakes.

Information and views received by the Panel from several scientific organizations [ADA, AIN, American Home Economics Association (AHEA), AMA, ILSI, National Dairy Council (NDC), SNE] point out the evolving interest of the general public in maintenance of good health. Several organizations note the explosive growth in numbers of, and interest of the public in, fad diets for weight reduction, commercial spas and gymnasiums, as well as exercise equipment for home use. They note the wide interest in jogging or other forms of exercise, purchasing of reduced and low calorie foods, and media attention occurring over the past decade. Several respondents noted that emphasis on weight reduction may be more related to concern for physical appearance than to promotion of better health. There is an increasing number of educational materials and programs available from scientific organizations as well as from the public (federal and state) and private sector that stress maintenance of desirable weight by means of controlling diet and exercise.

In summary, based on the information available, the Panel concludes that:

- the prevalence of obesity and overweight among the adult population in 1980-1985 is either the same or somewhat increased over the prevalence for 1970-1980;
• there is a widespread awareness among the general public that the state of being overweight has undesirable health consequences and that weight reduction involves consumption of fewer calories and increased levels of physical activity. This awareness may be misdirected to body image rather than promotion of good health. Despite this awareness and knowledge, overweight and obesity continue to be public health problems;

• an increasing number of overweight and obese persons are aware of the health complications from their conditions and are attempting to reduce weight by regimens that include reduced caloric intake and increased physical exercise or both. However, the percentage of such persons appears to be less than 50% of those who are overweight.

C. PROGRESS ON IMPLEMENTATION AND ADDITIONAL DATA NEEDED

1) **Objective #3**: Obesity is a recognized public health problem. The recent NIH Consensus Conference (Foster and Burton, 1985) has developed strategies for dealing with obesity which appear reasonable and well-conceived. Nevertheless, focus on medical intervention in treatment of obesity will not provide data on progress in reaching **Objective #3**. At this time, NHANES III appears to be the most logical tool to assess progress in attaining **Objective #3**. The Panel recommends that body mass index data be collected on all persons to be sampled in the forthcoming National Health and Nutrition Examination Survey. If collection begins in 1988 as planned, data should be available in 1990 to assess progress on **Objective #3**.

2) **Objective #4**: The National Health Interview Survey and NHANES III appear to be logical vehicles to assess progress in attaining **Objective #4** by 1990. Currently, data on progress are being collected by NCHS in the National Health Interview Survey.

3) **Objective #10**: The Panel suggests that widespread dissemination of Dietary Guidelines for Americans either directly to every household, or indirectly by informational, educational, and mass media programs is a desirable and practical strategy. Particular programs targeted to high-risk segments of the population may also be effective, but since 1980, their development has been slow, uneven, or interrupted. Their efficacy in terms of assessing progress has not been, but should be, evaluated.
D. SUGGESTED PROGRAMS AND STRATEGIES

The majority of implementation programs identified in 1980-1983 include education of consumers by means of information distribution, labeling of caloric content of foods, and other approaches that involve programs and mass media efforts to enhance public awareness. While appropriate to Objective #10 and partially to Objective #4, recent studies suggest strongly that these approaches would not be of sufficient magnitude and success to achieve the outcome specified in Objective #3.

Braitman et al. (1985) have reexamined data on food intake of obese and nonobese persons in NHANES I. They report no increased caloric intakes by obese subjects even when caloric intakes are adjusted for physical activity or age. Further, Stunkard et al. (1986) have studied 3580 Danish adoptees (mean age 42 years) and have provided persuasive evidence that genetic influences play an important role in determining the extent of overweight or obesity in adults. This conclusion is not in itself unexpected (Van Itallie, 1985); however, Stunkard et al. (1986) were able to show conclusively that genetic factors had a greater role than environmental factors in determining thinness, desirable weight, overweight, or obesity in adults. This definitive study suggests that strategies for implementation of Objectives #3 and #4 may need modification to address educational and informational programs to a more targeted at-risk population, i.e., those who may be genetically predisposed to being overweight.

In addition to those considerations, the Panel has several suggested strategies that relate to the Objectives as restated below.

E. PANEL RECOMMENDATIONS ON THE OBJECTIVES

The expected outcome of efforts directed toward reduction of overweight is that:

- By 1990, the prevalence of overweight (BMI of 27.8 or higher for men and 27.3 or higher for women) among the U.S. adult population should be reduced without impairment of nutritional status to approximately 18% of men and 21% of women. (Restated Objective #3).

This will also require that public health issues and educational efforts associated with overweight and obesity be addressed. The specific objectives to be realized include:
By 1990, 90% of adults should understand that to lose weight people must either consume diets lower in calories or increase physical activity, or both.

a) By 1990, 90% of adults with acceptable weights will maintain their desired weight by adopting a nutritionally adequate caloric intake balanced with physical activity.

b) By 1990, 90% of overweight adults should have adopted an appropriate balance of caloric intake and physical activity to achieve and maintain desirable weight. (Restated Objectives #10 and #4).

To accomplish these restated objectives, ongoing implementation programs and strategies will need to be reorganized to reflect data needs for evaluation of progress by 1990. These include emphasis on the following activities over the next 4 years:

- Data on weight status and trends of children and adolescents from Hispanic HANES and the NHANES III surveys should be analyzed and published.

- Designated federal agencies should conduct training and implement surveillance networks for use by state and local health and nutrition agencies to document the prevalence and incidence of obesity and overweight for all at-risk populations, e.g., adolescents, children with family history of diabetes mellitus or heart disease, and the elderly. (See also Objective #15).

- Most primary health care providers should include accurate measurement of weight, height, blood pressure, blood sugar, and blood lipid levels. In addition, they should provide appropriate recommendations and information to individuals on risks associated with overweight.

- NCHS should develop systems for obtaining information on height and weight of institutionalized populations by using health services in colleges, universities, the Veterans Administration system, and geriatric health facilities where data may be available.
• Hospital discharge surveys should be used to document the morbidity, mortality, and health care costs of severely overweight persons (i.e., the morbidly obese).

• NCHS should provide published data analyses by prevalence and degree of severely overweight on proportions of individuals in the U.S. population above an established value which defines severely overweight, such as BMI of 31.1 for men and 32.2 for women (Van Itallie, 1985).

• The CDC Behavior Risk Factor Survey should collect data on representative populations that document changes in lifestyle factors, for example, use of caloric control and exercise in weight control.

• The Dietary Guidelines for Americans should be distributed to all families in the United States directly or indirectly by means of public or private sector educational efforts and mass media exposure. The 1990 U.S. Census could include assessment of the progress on this specific strategy.
OBJECTIVE #5: "By 1990, the proportion of adults aged 18 to 74 with mean serum cholesterols above 230 mg/dl should be (reduced) by at least 50 percent."

A. ANALYSIS OF OBJECTIVE AS STATED

The above objective was published in the PHS implementation plans (U.S. Department of Health and Human Services, 1983). However, in Promoting Health/Preventing Disease: Objectives for the Nation (U.S. Department of Health and Human Services, 1980), the text of the Objective included both reference to cholesterol values below 200 mg/dl and a separate Objective for children. The two Objectives as stated in 1980 read:

- "By 1990, the mean serum cholesterol level in the adult population aged 18 to 74 should be at or below 200 mg/dl. (In 1971-74, for male and female adults aged 18 to 74, the mean serum cholesterol level was 223 mg/dl. For a smaller population sample in 1972-75, mean blood plasma cholesterol levels were about 211 mg/dl for males aged 40 to 59 and about 210 mg/dl for females aged 40-59.)"

- "By 1990, the mean serum cholesterol level in children aged 1 to 14 should be at or below 150 mg/dl. (In 1971-74, children aged 1 to 17, the mean serum cholesterol level was 176 mg/dl. For a smaller population sample in 1972-75, the mean blood plasma cholesterol level for children aged 10 to 14 was about 160 mg/dl.)"

The Panel is unaware of the reasons for modification of "below 200 mg/dl" to "above 230 mg/dl" or deletion of the Objective for children. As originally stated, the mean cholesterol level referred to population means. As rephrased in 1983, mean serum cholesterol refers to a value for an individual. This change introduced some confusion of terms.

More importantly, other widely quoted federal publications also provide mean figures, ranges, or cutoff values for elevated levels for serum cholesterol values which are inconsistent and appear to lead to further confusion. For example, Health: United States: 1984 (U.S. Department of Health and Human Services, 1984a) references trends in elevated serum cholesterol values of "at least 260 mg/100 ml"; Dietary Guidelines for Americans indicates "high serum cholesterol levels"; Charting the Nation's Health: Trends since 1960 (National Center
for Health Statistics, 1985b) provides mean serum cholesterol values (mg/dl) for 1960-1980; and a recent NIH Consensus Conference (Steinberg, 1985) defines values of 220, 230, and 240 mg/dl as elevated values for age groups 20 to 29 years, 30 to 39 years, and 40 years and over, respectively. Grundy et al. (1985) have published a set of ranges for middle-aged adults that relates plasma total cholesterol with risks of cardiovascular disease. These values were derived for middle-aged adults and Grundy et al. (1985) state that the same percentiles hold for young adults but the associated cholesterol values are lower:

<table>
<thead>
<tr>
<th>Risk Category</th>
<th>Plasma Total Cholesterol (mg/dl)</th>
<th>Population Percentile</th>
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</thead>
<tbody>
<tr>
<td>Desirable Range</td>
<td>&lt;200</td>
<td>&lt;40th</td>
</tr>
<tr>
<td>Mildly Increased</td>
<td>200-240</td>
<td>40-75th</td>
</tr>
<tr>
<td>Moderately Increased</td>
<td>240-265</td>
<td>75-95th</td>
</tr>
<tr>
<td>High</td>
<td>&gt;265</td>
<td>&gt;95th</td>
</tr>
</tbody>
</table>

The Panel recognizes that the weight of evidence supports reduction of the serum cholesterol levels found in the U.S. population as an approach to reducing risks of coronary heart disease (CHD). The Panel also recognizes that there is little evidence of adverse health effects associated with serum cholesterol levels of 140-180 mg/dl in ostensibly normal adults. Nevertheless, the Panel has several concerns with Objective #5.

Issues discussed by the Panel in regard to Objective #5 centered on the selected cutoff values for high levels of plasma total cholesterol, their derivation primarily from data on middle-aged white men, and application of this numerical value to all adults 18 to 74 years of age; the percentage reduction to be achieved by 1990; the validity of specifying a percentage reduction for the population as a whole when the types of hyperlipidemia which may be present are undetermined; the validity of specifying a number of persons whose serum cholesterol levels should be reduced below a selected value; and the elimination of the second Objective focusing on reduction of serum cholesterol levels in children and adolescents.

A major concern to the Panel is that inclusion of Objective #5 in the nutrition section of the Objectives for the Nation may suggest dietary modification alone will produce the desired serum cholesterol reduction. Most experts agree that individuals at increased risk for CHD can be identified by several characteristics related to lifestyle (Ernst and Levy, 1984). Those conditions and factors associated epidemiologically with increased risk include hypertension, obesity, elevated serum cholesterol, sex, age, cigarette smoking, lack of physical exercise, as well as dietary factors. Several of these factors are amenable to dietary modification, but the underlying genetic factors and the interrelationships involved are exceedingly complex.
B. PERTINENT SOURCES OF DATA

When the Objectives were prepared in 1979, data on serum cholesterol values were available from NHANES I and various epidemiological studies (Klemman, 1979). Since that time, data have been generated from a number of surveys and risk-reduction intervention trials in this country and throughout the world. Considerable data on the cardiovascular disease status, blood lipids, and dietary lipids of the U.S. population have been derived from NHANES II, Hispanic HANES, the Multiple Risk Factor Intervention Trial (MRFIT), and the Lipid Research Clinics' Coronary Primary Prevention Trial (LRC-CPPT) studies. Additional information has been provided by longitudinal studies of large populations, for example, the Dupont employees study (Pell and Fayerweather, 1985), the Ireland-Boston Diet-Heart study (Kushi et al., 1985), and others (Grundy, 1984). Taken together these sources provide considerable, although fragmented, data on serum cholesterol levels, their relation to cardiovascular disease, and considered medical opinion on optimal serum cholesterol levels for avoidance of cardiovascular disease. However, few data sources document reduction of CHD risks as a direct result of reducing serum cholesterol levels by dietary modifications alone.

C. PROGRESS ON IMPLEMENTATION AND ADDITIONAL DATA NEEDED

Cardiovascular diseases are recognized as the major cause of morbidity and mortality in the United States (National Center for Health Statistics, 1985b; U.S. Department of Health and Human Services, 1984a). Prevention of these diseases by risk reduction has received major emphasis in the public and private sectors for several decades. Because epidemiological studies provide considerable evidence of linkage between diet and CHD, modification of dietary practices has been a component of many risk reduction efforts.

As noted in a critical review of the effects of diet on heart disease (Samuel et al., 1983), few issues in medicine and public health have generated more discussion, argument, and controversy over the past 30 years. One aspect of the continuing controversy is the type and strength of scientific evidence required to demonstrate that a reduction in serum cholesterol level will prevent CHD. This continuing controversy has influenced public and private sector support for intervention studies and implementation of programs that might demonstrate clearly the reduction of serum cholesterol levels as an approach to prevention of CHD. Although NIH has held Consensus Conferences on major topics in medicine and public health for several years, a consensus conference on lowering serum cholesterol to prevent heart disease was not organized until late 1984, even though epidemiological evidence associating lower serum cholesterol levels with reduced incidence of CHD had been accumulating for
several decades. The conclusions of the NIH Consensus Conference on lowering serum cholesterol are, in themselves, a topic of continuing scientific discussion (Ahrens, 1985; Oliver, 1985).

A central issue of the continuing scientific debate is the strength of association between reduction of serum cholesterol levels by dietary intervention and decreased risk of CHD (Ahrens, 1985; Glueck, 1986; Grundy et al., 1985; Harper, 1983; Samuel et al., 1983; Steinberg, 1985). Components of programs to manage the several types of hyperlipidemia are another matter of concern (Hoeg et al., 1986; Samuel et al., 1983). The Panel was confronted with the dilemma of evaluating progress on Objective #5 while being mindful of the continuing controversy concerning the strength of scientific evidence supporting the basis of the Objective and the approaches to management of the disease process as associated with undesirable serum cholesterol levels.

Evaluation on progress toward achieving Objective #5 is limited by the availability of data on serum cholesterol values for subsets of the U.S. population. For example, NHANES I (1971-1974) provides data on serum cholesterol levels of persons aged 4 to 74 years, but the previous Health Examination Survey (1960-1962) and NHANES II (1976-1980) have data on adults 18 to 74 years of age. Thus, trends from 1960-1962 and 1976-1980 for serum cholesterol values of a representative sample of the U.S. population are available for some adults 18 to 74 years old, but there is a paucity of data on serum cholesterol values during these years for other segments of the U.S. population including:

* children and adolescents up to age 18 years;
* adult females 18 to 74 years of age; and,
* older males and females, aged 74 years and above.

The manner in which data are reported is another factor associated with assessment of progress on Objective #5. For example, the MRFIT utilized a cutoff value of 250 mg/dl for "high risk" in the males studied (Multiple Risk Factor Intervention Trial Research Group, 1982). Published data from this study do not indicate the proportion of the population studied with serum total cholesterol levels over 230 mg/dl (the value identified in Objective #5).

Published data from the Health Examination Survey (1960-1962) and NHANES I and II use 260 mg/dl as the cutoff value for high risk (U.S. Department of Health and Human Services, 1984a). Data from the LRC Program (Rifkind and Segal, 1983) and the LRC-CPPT (Lipid Research Clinics Program, 1984) are quoted widely and have been used in developing recommendations for serum cholesterol levels, even though the latter intervention trial was conducted on males aged 35 to 59 years whose initial serum cholesterol levels were in the upper 5% of the cholesterol distribution curve (265 mg/dl or greater).
Finally, hypercholesterolemia is now recognized as a heterogeneous group of genetic and nongenetic disorders that differ in clinical manifestations, prognosis for control, and response to various forms of therapy (Ernst and Levy, 1984). It is well recognized that fasting serum total cholesterol values increase with age (Rifkind and Segal, 1983) and that atherosclerosis may be initiated early in childhood (Newman et al., 1986). The LRC reference values for mean plasma total cholesterol in white male subjects increased from 155 mg/dl at age 0 to 19 years to 205 mg/dl at age 70 years or older. Mean value increases for white females were from 160 mg/dl (aged 0 to 19 years) to 230 mg/dl (over 55 years of age). NHANES I data (1980) exhibit analogous increases for both white and black males and females from 4 to 74 years of age. The NIH Consensus Conference Panel (Steinberg, 1985) acknowledged the importance of age-related changes in its categorization of severe and moderate hypercholesterolemia as follows:

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-29</td>
<td>&gt;200</td>
<td>&gt;220</td>
</tr>
<tr>
<td>30-39</td>
<td>&gt;220</td>
<td>&gt;240</td>
</tr>
<tr>
<td>≥40</td>
<td>&gt;240</td>
<td>&gt;260</td>
</tr>
</tbody>
</table>

The Panel recognizes the validity of using age-specific cutoffs for serum total cholesterol but is concerned that the derived cutoff values are based on data from white males and females only. Analogous current data for other ethnic subsets of the U.S. population are limited; preliminary analyses of Hispanic HANES data on Mexican Americans suggest that about 15% of this segment of the Hispanic population exhibited severe hypercholesterolemia in 1982-1984 based on the above consensus-derived criteria (Fulwood et al., 1985). Analogous data in 1976-1980 (NHANES II) for whites and blacks were 21.9 and 22.8%, respectively (U.S. Department of Health and Human Services, 1985a).

Recently published data (Newman et al., 1986) support strongly the hypothesis that the atherosclerotic process begins in childhood. Glueck (1986) has suggested that in view of these findings, there is a need to reconsider the guidelines for diagnosis and management of hypercholesterolemia in children. The Panel concurs.

D. SUGGESTED PROGRAMS AND STRATEGIES

The Panel received more comments on Objective #5 from the scientific community than on other Objectives for Improved Nutrition. Comments and suggestions ranged from questions on the scientific basis for Objective #5 to recommendations for additional objectives focusing on reduction of dietary fat intakes and expanded federal and private sector implementation programs. Most organizations called for greater emphasis on
distribution of information and educational efforts concerning
the role of diet in prevention of heart disease or the effects of
dietary modifications on serum cholesterol values. Few new data
were submitted in either oral presentations or written comments.

Based on information and comments received, the Panel
perceives a need to improve educational and informational meas-
ures related to factors involved in both the health implications
of elevated serum cholesterol levels and the relation of dietary
factors to alteration in serum cholesterol levels. Education of
health professionals and the public is equally important.

Public and professional awareness of the relation of
diet to blood lipid levels and of blood lipid levels to athero-
sclerosis is inadequate. For example, Heimbach (1985) surveyed
public perceptions of diet and cardiovascular disease in late
1982 and found that the degree of awareness of possible relation-
ships was high. Over 75% of approximately 4000 persons surveyed
were aware that hypertension may be related to diet, and about
60% were aware of linkages between cardiovascular diseases and
fats or cholesterol. There appears to be widespread confusion
among the public with respect to the difference between dietary
lipids and blood lipids -- especially cholesterol. While most
persons are aware of their height and weight, and some know their
blood pressure, few know their serum cholesterol value and/or its
interpretation.

While the American Heart Association (AHA) has developed
a number of educational programs, the Panel notes that many
implementation plans for Objective #5 identify efforts not yet
implemented. For example, the National Heart, Lung, and Blood
Institute (NHLBI) National Cholesterol Education Program is
currently in the early stages of implementation (Lenfant, 1986;
Marwick, 1986). In the Panel's view, the programs referred to
under implementation of Objective #5 in Public Health Reports
1983 have been compromised by budgetary constraints and lack of
agreement or commitment among government agencies. This latter
point may also reflect the ongoing scientific controversy con-
cerning the strength of evidence for reduced risk of CHD by
dietary modifications alone as a means to lower serum cholesterol
values. The Panel concludes that intervention strategies and
programs focusing on risk reduction should include the inter-
active aspects of lifestyle modification, e.g., smoking, alcohol
use, exercise, etc., and not just dietary modification.

Questions have been raised as to the cost effectiveness
of some implementation plans. The ADA (Owen and Haynes, 1985)
pointed out that in Texas, use of the "Healthy Heart" nutrition
education program in schools was expensive. In the ADA's view,
current data do not adequately support the need for children to
reduce intake of dietary lipids. The ADA suggested that bringing
the school food service/nutrition education coordinator -- the
primary provider of nutrition education for this age group --
into the planning process would be a better strategy. (Such a
suggestion is equally applicable to Objective #6.) Additional data on school health and nutrition education programs are needed.

On the other hand, programs of the AHA do stress the need for children to reduce total fat, saturated fat, and cholesterol intake. The AHA educational programs are considered successful and cost-effective (American Heart Association, 1985).

There are five classes of lipoproteins present in blood serum (Ernst and Levy, 1984). Evidence is accumulating that suggests several should be evaluated in determination of hypercholesterolemia. Most experts agree both serum total cholesterol and serum high density lipoprotein cholesterol should be measured, as well as serum triglycerides. This permits calculation of serum low density lipoprotein cholesterol, the atherogenic component.

Dietary measures to reduce risk of CHD include attention to total caloric intake, dietary fat and cholesterol intake, the ratio of saturated to unsaturated fatty acids, as well as alcohol, fiber, and sources of protein and trace mineral intakes. Education and information implementation programs should focus first on those factors known or strongly suspected to affect favorably decreased risk of CHD. Research efforts should encompass all possible dietary factors and interactions. There is a continuing need to separate application of what is known from exploratory and confirmatory research on risk factors and their interactions.

The existence of the continuing debate within the biomedical community is a clear indication that additional research is needed. Evidence is accumulating that risk factors are not the same for women and blacks as for white males. More research and data are needed in those groups. For children, it is important to identify those at high risk of cardiovascular disease because of their own health status or because of evidence of predisposing risk factors in parents and grandparents, including family history of CHD before age 60 years, hypertension, diabetes mellitus, or hyperlipidemia (Glueck, 1986). Whether serum cholesterol and lipoprotein values should be measured in children is also a matter of considerable debate. Some authorities favor screening all children; others suggest screening only those at high risk. The Panel recognizes the strength of both opinions. The Panel recommends that the consequences of nutritional intervention in children should be monitored to address concerns for those dietary modifications that may affect growth and development.

The Panel did address the designation of values for desirable as well as undesirably high serum total cholesterol levels for population subgroups rather than for individuals in such groups. As noted in previous paragraphs, age-related guidelines are more realistic than a single value (e.g.,
230 mg/dl) for the adult population. The NIH Consensus Development Conference Statement on Lowering Blood Cholesterol (Steinberg, 1985) recommended goals of 200 mg/dl in the population (<180 mg/dl in those under 30 years of age) to be accomplished by a long range goal of lowering fat in the diet to 30% of total calories. The NIH Panel cited evidence that serum cholesterol levels of 200 to 230 mg/dl are associated with increased risk of CHD. Other values of the population defining "severe", "high", "excessive", or "medically significant" risk have been suggested, for example, 295 mg/dl (Multiple Risk Factor Intervention Trial Research Group, 1982), 270 mg/dl (Miettinen et al., 1985), 265 mg/dl (Lipid Research Clinics Program-CPPT, 1984), and 260 mg/dl (U.S. Department of Health and Human Services, 1984a).

Setting values above which greater risk is evident for large populations is confounded by two additional factors. First, most evidence confirms that mean serum total cholesterol levels of U.S. adult men have fallen from 235-245 mg/dl in the 1940s-1950s to 210-215 mg/dl in the early 1980s, and the prevalence of CHD has also changed (Stamler, 1985). Information provided by ADA (Owen and Haynes, 1985) indicates that serum cholesterol values in Oregon are already below this level and a goal of 180 mg/dl has been set for that state. Secondly, as noted previously, there is a tacit assumption that all individuals in a population with serum cholesterol levels greater than 230 mg/dl maintain the higher levels because of the nature of their diets. A further assumption is that dietary modifications by that population can reduce serum cholesterol levels sufficiently to below 230 mg/dl. These assumptions need further investigation because of the occurrence of various forms of hyperlipidemia and the diversity of diet in any large population.

In summary, the Panel concludes that there is need for better agreement on acceptable serum cholesterol ranges, for more information on genetics and family history as determinants of serum cholesterol levels, and health consequences associated with various levels. Some members of the Panel agree on a need to obtain further data on saturated fatty acids in the diet and dietary cholesterol as significant risk factors of and by themselves. Other Panel members conclude sufficient evidence is already extant. There is also a need to determine to what degree serum total cholesterol levels can be lowered by both standard and free-choice diets. Rather than mounting a major effort to survey or measure serum cholesterol in the population as a whole, strategies should include an initial campaign for all high-risk adults and children to know their serum cholesterol values. Such a campaign may be more cost-effective and reach more persons (Berwick, 1980).

This strategy would include efforts to reduce risk of CHD without adversely affecting health by providing information on risk factors and their avoidance. Concomitantly or subsequently, routine encounters with health professions such as
periodic medical examinations, employee screening programs, etc. could include measurements of serum cholesterol. Cholesterol levels should be monitored at appropriate intervals such as every 3 to 5 years.

E. PANEL RECOMMENDATIONS ON THE OBJECTIVE

The Panel suggests modification of Objective #5 as follows:

- By 1990, the proportion of adults with serum cholesterol levels above 220 mg/dl for adults aged 24 to 29 years, above 240 mg/dl for adults aged 30 to 39 years, above 260 mg/dl for adults over 40 years should be reduced by 50% compared with that observed in 1971-1974.

- By 1990, the proportion of children and young adults (2 to 24 years of age) with high-risk serum cholesterol levels (>170 mg/dl) should be reduced significantly.

The Panel recommends that planning be initiated in 1986 to develop an integrated and coordinated national goal on reduction of risk factors associated with cardiovascular diseases. Such a goal should include measurable objectives for those nutritional, dietary, and other lifestyle factors that are known to affect risks of cardiovascular disease in children, adolescents, and adults and reflect recent advances in the understanding of atherogenesis (Ross, 1986). Such a long range goal might include the following statements:

- The diet-related risk factors for CHD and hypertension should be decreased as evidenced by reduced incidence of hyperlipidemia, and measurably increased knowledge and behavior concerning diet-related and other risk factors.

- Dietary approaches should be included as one of the early and continuing components in the treatment of high blood pressure.

- The proportions of adults consuming an average of more than 4 grams of sodium per day should be reduced by 50%.

- Adults who are significantly overweight and hypertensive should be informed that their weight, energy intake/output, smoking status, blood sugar, and serum total cholesterol levels may be increasing their risk of cardiovascular disease.
• The prevalence and severity of diagnosed hyperlipidemias should be reduced by medical intervention that includes appropriate dietary measures.

• The majority of the adult population should be able to identify that dietary intake of total calories, total fat, saturated fat, and/or cholesterol are known or strongly suspected to be related to heart disease and high blood pressure.
OBJECTIVE #6: "By 1990, the average daily sodium ingestion (as measured by excretion) by adults should be reduced to the 3 to 6 gram range."

A. ANALYSIS OF THE OBJECTIVE AS STATED

The Objective stated above was published in the PHS implementation plans (U.S. Department of Health and Human Services, 1983). However, in Promoting Health/Preventing Disease: Objectives for the Nation (U.S. Department of Health and Human Services, 1980), two objectives that related to sodium were established. The second read:

"By 1990, sodium levels in processed foods should be reduced by 20 percent from present levels."

No baseline data were indicated in the 1980 document.

The thrust of Objective #6 is reduction of sodium ingestion as a dietary modification in the management of hypertension, and, ultimately, reduction of risks of cardiovascular disease. Implementation plans and strategies focus on educational measures to inform the public of sodium content of foods and increase the extent and awareness of sodium labeling as well as programs directed to reduction of hypertension and risks of cardiovascular disease.

The Panel is concerned with the focus of Objective #6; that is, treating hypertension exclusively in terms of reducing sodium ingestion. It is generally accepted that blood pressure is controlled by a complex interaction of genetic and environmental factors (Ernst and Levy, 1984). Sodium and potassium balance, as well as arterial blood pressure, are regulated primarily by renin, angiotension, and aldosterone (Laragh, 1985). While epidemiological studies show a correlation between high sodium intake and hypertension (Fries, 1976), individual variation in blood pressure in response to differing levels of sodium intake is broad (Hypertension Task Force, 1979). The relation of sodium intake to calcium and potassium intake, and perhaps to chloride intake, is important in hypertension (Kaplan, 1985). Because sodium intake is related to calcium homeostasis, sodium homeostasis may be a factor in development of osteopenia. For example, urinary excretion of sodium and calcium rises in postmenopausal women (Goulding, 1981), and there is evidence that increases in dietary sodium are associated with increased calciumuria, increased secretion of parathyroid hormone, and bone loss (Breslau et al., 1982). Thus, sodium nutritional status may affect not only cardiovascular, but also renal function and bone integrity.
The range of daily sodium intake (3 to 6 g) suggested in Objective #6 far exceeds physiologically required amounts (~200 mg/day); some experts have advocated an upper limit of 4 g sodium for the daily needs, except for individuals working in very hot or dry environments (Fregly, 1984). Even in such environments, water intake is more critical than sodium intake. Because reduction of risks of hypertension and risks of cardiovascular diseases is an accepted medical goal, most scientists agree that reduction of dietary sodium intake is desirable. However, whether a high dietary sodium intake is a causative factor for hypertension and whether restriction of dietary sodium alone is an effective therapeutic approach depends upon the individual (Ernst and Levy, 1984; Fregly, 1984; Kaplan, 1985). Clinical studies indicate that about one-third of hypertensive patients treated by restriction of sodium intake alone exhibit lowered blood pressures (Kaplan, 1985). Apparently healthy populations worldwide have become adapted to very wide ranges of sodium intake.

B. PERTINENT SOURCES OF DATA

Sodium chloride and other sodium salts occur naturally in foods; in addition, sodium salts are added to foods for flavoring and in processing. Discretionary use as a flavoring agent is common. Thus, determination of total sodium intake is difficult. Sodium intake is usually derived from either estimates of actual intakes of salt (Table 6.1) or calculation from sodium excretion data. In population surveys, individual intakes are estimated from excretion data as implied in Objective #6.

Dahl and Love (1957) studied daily sodium intake of 1124 employees of Brookhaven National Laboratories by monitoring 24-hour urine collections over a 3-year period. They calculated sodium chloride intakes of 4 to 24 g/d (mean = 10 g/d). This is equivalent to an ingestion of about 4 g of sodium/day. Several studies quoted by Altman and Dittmer (1974) indicate a mean sodium excretion of 3.6 g/day for a 60 kg adult. Estimated sodium intakes derived from the data for total sodium intake in Table 6.1 are 4.0 to 6.8 g/day. The estimated sodium intake of the FDA total diet study in 1977-1980 was 6.7 g/day from a 3900 kcal diet (Shank et al., 1982).

Shank et al. (1982) determined the following sodium intakes (mg/day) from analysis of typical "total diet" food samples:

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Infants (6 mo) 880 kcal</td>
<td>887 ± 471</td>
<td>798 ± 363</td>
<td>706 ± 304</td>
</tr>
<tr>
<td>Toddlers (2 yrs) 1300 kcal</td>
<td>1605 ± 281</td>
<td>1718 ± 183</td>
<td>1805 ± 226</td>
</tr>
<tr>
<td>Males (15 to 20 yrs) 3900 kcal</td>
<td>6706 ± 653</td>
<td>6851 ± 640</td>
<td>6692 ± 767</td>
</tr>
<tr>
<td>Sodium Intake (expressed as sodium g/d)</td>
<td>Comment on Source of Data</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>---------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>A. Nondiscretionary sources of sodium</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Naturally occurring sodium in foods</td>
<td>1.0 - 1.8</td>
<td>Estimated food composition Chemical analysis (institutional diet)</td>
<td></td>
</tr>
<tr>
<td>2. Sodium added by industrial processing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Salt</td>
<td>2.8</td>
<td>1970 NRC estimate (~3200-kcal diet)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.2</td>
<td>1966-70 Bureau of Mines data</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.4</td>
<td>Total 1975 usage by food industry</td>
<td></td>
</tr>
<tr>
<td>b. Other sodium-containing ingredients</td>
<td>0.4</td>
<td>Calculated from 1970 NRC survey</td>
<td></td>
</tr>
<tr>
<td>3. Total nondiscretionary sodium</td>
<td>4.8 - 5.0</td>
<td>Calculated from 1972-73 and 1976 FDA Selected Minerals in Food Survey (~3900-kcal diet)</td>
<td></td>
</tr>
<tr>
<td><strong>B. Discretionary addition of salt to foods by the consumer</strong></td>
<td>1.4</td>
<td>1968 retail sales</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.8 - 2.4</td>
<td>1965 USDA survey</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.6</td>
<td>1966-70 Bureau of Mines data</td>
<td></td>
</tr>
<tr>
<td><strong>C. Total salt usage</strong></td>
<td>3.6</td>
<td>1977 sales of food-grade salt</td>
<td></td>
</tr>
<tr>
<td><strong>D. Total sodium intake</strong></td>
<td>4.0</td>
<td>Urinary excretion</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.4</td>
<td>Urinary excretion</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.8</td>
<td>1966-70 Bureau of Mines data</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.4</td>
<td>Urinary excretion</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.8</td>
<td>Estimated from review of literature in 1976</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6.8</td>
<td>1976 FDA Selected Minerals in Food Survey (~3900-kcal diet)</td>
<td></td>
</tr>
</tbody>
</table>

* These values are not necessarily additive.
The above data include discretionary salt use; the following exclude table salt usage. NHANES I (1971-1974) dietary recall studies show mean sodium intake for males 1 to 74 years of age was 2.52 g/day and for females 1 to 74 years of age, 1.84 g/day (Abraham and Carroll, 1979). Data collected in the spring of 1985 in the USDA NFCS Continuing Survey of Food Intakes by individuals (U.S. Department of Agriculture, 1985) indicate that sodium intake, calculated from dietary recalls, averaged about 2.6 g/day for females (19 to 50 years) and about 2.0 g/day for their children (1 to 5 years).

While fragmentary in terms of similarity of population groups sampled, and not strictly comparable because of differences in collection and calculation methods, taken as a group, most data collected over the past 20 years appear to confirm that sodium intakes exceed the amount required physiologically by several-fold but that in recent years, average intakes are in the range of 4 to 6 g/day or below. Less definitive data suggest no trend for increasing consumption.

C. PROGRESS ON IMPLEMENTATION AND ADDITIONAL DATA NEEDED

Few data on the range of salt and sodium intakes by age, sex, ethnic groups, and other demographic variables were provided to the Panel. The only specific levels of intake established are the minimal physiological requirement (~200 mg/day) and the estimated safe and effective daily intake for adults (1.1 to 3.3 g/day) (National Research Council, 1980). Several organizations providing materials to the Panel suggested that consideration be given to collecting data on sodium intake in NHANES III by assessing both dietary intake and urinary excretion of a representative sample of infants, children, and adults. The Panel concurs.

During the past 5 years, significant changes have occurred in the sodium content of processed foods, beverages, and drugs with the introduction of "reduced" and "low" sodium foods. Product labeling and public information programs have created a high order of public awareness about sources of sodium and recommended intakes. Since 1981 regulatory efforts have focused on five major programmatic areas (Novitch, 1981). These include efforts (a) to provide more information on food packages concerning sodium content; (b) to decrease the amount of sodium used in processed foods; (c) to improve consumer understanding of sodium labeling; (d) to provide more knowledge about the relationship between sodium and hypertension; and, (e) as a result, to lower the aggregate sodium consumption by the general public.

FDA monitoring of labeling of processed foods (Schucker and Stewart, 1984) indicates that between 1978 and 1984, the percentage of all types of packaged foods that contained quantitative sodium information rose from 7.5 to 39.6%. Surveys of
public interest and awareness indicate a trend of an increasing level of consumer awareness of the relationship between salt (or sodium) and hypertension. Heimbach and Orwin (1984) noted that 14% of consumers avoided salt or sodium in 1978, but 40% indicated avoidance in 1982. Major contributors to public awareness include a program of labeling the sodium content of foods (Food and Drug Administration, 1984a) and wide dissemination of informational and educational materials (for example, the pamphlets, brochures, and mass media materials of the AHA).

However, the effectiveness of some educational programs and the voluntary nature of sodium labeling of foods have been subjects of continuing debate among public interest groups, industry, scientific organizations, and the federal government. Recent reports suggest use of salt in food and sodium content of processed foods are not declining (Anonymous, 1986b,c). Several organizations providing information to the Panel supported the need for mandatory sodium labeling (AHA, CSPI); others indicated support or recommended expanded efforts for labeling initiatives (ADA, AHA, AHEA). The AMA suggested targeted efforts for sodium-sensitive hypertensive persons. Other organizations questioned the need for or effectiveness of labeling the sodium content of foods [National Food Processors Association (NFPA)] or meals [National Restaurant Association (NRA)].

D. SUGGESTED PROGRAMS AND STRATEGIES

The Panel concludes that sodium intake must be considered along with intakes of potassium, calcium, and magnesium in programs designed to reduce risk or prevent cardiovascular, renal, and skeletal diseases. Evidence supports the view that a maximum intake of 4 g sodium daily is safe and would be prophylactic for hypertension (Fregly, 1984). Most experts believe that about 30% of the hypertensive population could be helped in this way. Processed foods account for about 40% of usual salt intake in the United States; salt added in cooking or at the table accounts for 15 to 20% (see Table 6.1). Thus, the salt content of the unprocessed foods eaten is usually less than half the salt consumed. A program to reduce salt intake requires that participants have data on sodium content of foods, either by accurate sodium labeling or from data provided by health professionals. The former approach appears more cost-effective, but no firm data on this conclusion were available to the Panel. Further, the extent of sodium labeling of foods would need to be expanded. Within the scientific community there is a wide diversity of opinion on the efficacy of voluntary labeling as a strategy and even more diverse opinion on mandating labeling.

If the 1979 Objective of sodium intake for the American public is to be realized, a more vigorous educational campaign will need to be conducted. It will also require the types of detailed sodium labeling noted in the preceding paragraph. The costs and benefits of such a campaign are not clearly predictable.
at this time. Several scientific and food industry organizations are strongly opposed to a program of mandatory sodium labeling of all foods. Other organizations are equally strong in their support of a mandated program.

E. PANEL RECOMMENDATION ON THE OBJECTIVE

Available information indicates that average daily sodium ingestion far exceeds minimal physiological needs of adults and children. Reduction of sodium intake may be effective in hypertensive persons where it is a contributory causal factor. The Panel is not aware of any evidence that reduction of sodium intake to recommended levels would affect adversely the health of adults in the U.S. population.

The Panel suggests no modification of Objective #6. The Panel concludes that Objective #6 could be realized, but is not unanimous in its support for mounting a major effort to determine whether the Objective is attainable. Most Panel members believe strongly that public education on the several Nutrition Objectives should be coordinated and encompass all risk factors known to be associated with disease, e.g., sodium labeling and dietary restriction of intake are but one component of an approach to health promotion and disease prevention. Additional research emphasis on determining the role of sodium metabolism in hypertension is needed. Greater benefit might be derived from expanded educational efforts throughout the public and private sector in regard to the influence of total caloric intake, alcohol consumption, and other nutrients on hypertension.

In regard to the 1980 Objective on 20% reduction of sodium content of processed foods, the Panel has not received any data on overall reduction of sodium in processed foods. Some Panel members noted that reduction of sodium content of processed foods could make a more substantial contribution to reduced sodium intake than reductions of discretionary uses of salt. The Panel is aware that FDA has a program to decrease the amount of sodium in processed foods (Shank et al., 1983) and that regulations for "reduced", "low", "very low", and "sodium free" labeling have been promulgated (Food and Drug Administration, 1984). The Panel is also aware of suggestions that sodium content of processed foods may not be decreasing (Anonymous, 1986b,c).
OBJECTIVE #7: "By 1990, the proportion of women who breast-feed their babies at hospital discharge should be increased to 75 percent and 35 percent at 6 months of age."

A. ANALYSIS OF OBJECTIVE AS STATED

The Panel, as with the majority of scientific organizations providing views, considers the concept espoused by Objective #7 a desirable component of national nutrition policy. The Panel has several concerns with the specific wording. First, as stated, the Objective pertains to healthy infants capable of nursing at birth and healthy mothers capable of lactation. For various personal, socioeconomic, and medical reasons, not all mothers should, or are able to breastfeed. Second, Objective #7, as written, omits reference to the common practice of partial breastfeeding or supplemented breastfeeding after 2 or 3 months. Third, by stipulating hospital discharge, a percentage, albeit small, of women who give birth at home are not included (National Center for Health Statistics, 1985c). This language probably resulted from the considered opinions (in 1979) that hospital discharge data would be the most logical source of data. Finally, the Panel questions whether the 35% figure means 35% of all new mothers, or 35% of mothers who are breastfeeding at hospital discharge; that is, it is not clear if the authors meant to imply some new mothers who do not breastfeed at hospital discharge, but try to do so later.

B. PERTINENT SOURCES OF DATA

There are a number of data sources on infant feeding practices. These include the National Natality Surveys (NNS) of NCHS, the annual surveys of Ross Laboratories (Martinez and Krieger, 1985), other surveys of NCHS (Eckhardt and Hendershot, 1984), and the CDC Coordinated Nutritional Status Surveillance System. There are other surveys of feeding practices and child nutrition education programs from which inferential data can be drawn (Association of State and Territorial Health Officials Foundation, 1985). The Panel is aware that the 1985 NCHS Health Interview Survey will collect data on breastfeeding practices.

Most available data are derived from information collected at hospital discharge except for data from the Ross Laboratories surveys and those from CDC. However, the latter gathers data primarily on persons in the WIC program. Collection of valid data on a representative sample of the U.S. population after hospital discharge and prior to cessation of breastfeeding (circa month 1 to month 12) continues to be difficult. Currently, there is no system to collect, aggregate, and analyze such data. The data collected by Ross Laboratories and the NNS comprise the most adequate data base for estimating post-hospital
discharge breastfeeding practices. While there are some questions on response rates of unwed mothers in the Ross Laboratories surveys (Hendershot, 1984), Forman et al. (1985) excluded data on unwed mothers from their analyses. Martínez and Krieger (1985) have published data from Ross Laboratories surveys during the period 1980-1985.

C. PROGRESS ON IMPLEMENTATION AND ADDITIONAL DATA NEEDED

Martínez and Dodd (1983) reviewed data from 1955 to 1981 surveys and reported on trends in breastfeeding practices for 1971 to 1981. They indicated that the number of infants breastfed in the hospital increased steadily during that decade to 58%. Subsequent figures were: 44% after 2 months and 27% after 5 to 6 months; these estimates represent 12 and 17% rates of increase, respectively, over the period (1971-1981). Data from the NNS support these trends (Fetterly and Graubard, 1984) (Figure 7.1). The increase for exclusive breastfeeding of newborn infants between 1969 and 1980 was from 19 to 51% for white women and from 9 to 25% for black women. The Panel notes that approximately 8 to 14% of women surveyed in both 1969 and 1980 supplemented breastfeeding with bottle-feeding (or vice versa). Thus, the NNS data suggest approximately 60% white and 40% black infants were nursing immediately after birth in 1980.

![Figure 7.1. Comparison of breast- and bottle-feeding practices of white and black women immediately after infant birth: 1969 and 1980 (from Fetterly and Graubard, 1984).](image-url)
The Panel observes that available data support the conclusion that the prevalence of nursing was increasing during the decade in which National Nutrition Objectives were formulated; however, the trend for increased acceptance of breastfeeding practices appears to have slowed. Evidence for continuation of this trend has been published recently by Martínez (1984).

Martínez and Krieger (1985) have reported that since 1982 the increase in breastfeeding at hospital discharge has been minimal (1982: 61.45% versus 1984: 62.5%) and breastfeeding of infants at ages 3 to 6 months has declined slightly:

<table>
<thead>
<tr>
<th>Age Group</th>
<th>1982</th>
<th>1984</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 to 4 months of age</td>
<td>37.5%</td>
<td>37.0%</td>
</tr>
<tr>
<td>5 to 6 months of age</td>
<td>28.8%</td>
<td>27.5%</td>
</tr>
</tbody>
</table>

The Panel has been unable to locate data on partial breastfeeding or supplemented breastfeeding practices of new mothers for infants aged 3 to 6 months.

A major shift in patterns of full-time employment by women of childbearing years has occurred in the past decade. Arango (1984) and Koop and Brannon (1984) have suggested that this shift is influencing breastfeeding practices. Data collected since 1970 suggest an increasing impact of sociodemographic factors on patterns of breastfeeding (Forman et al., 1985; Martínez and Krieger, 1985). These factors include maternal age at delivery, maternal education, family income, and maternal employment. For example, Forman et al. (1985) noted the influence of maternal education on breastfeeding practices (Table 7.1).

<table>
<thead>
<tr>
<th>Table 7.1. Percentage of infants breastfed as affected by maternal education (Ross Laboratories and National Natality Survey data) (modified from Forman et al., 1985).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ross Laboratories Surveys (1)</td>
</tr>
<tr>
<td>Breastfed*</td>
</tr>
<tr>
<td>Parity</td>
</tr>
<tr>
<td>First</td>
</tr>
<tr>
<td>Multiple</td>
</tr>
<tr>
<td>Education</td>
</tr>
<tr>
<td>≤12 yr</td>
</tr>
<tr>
<td>13 + yr</td>
</tr>
</tbody>
</table>

* Breastfed includes exclusive and partial breastfeeding.
Available data on infant feeding practices were reviewed by a Task Force of the American Academy of Pediatrics (1984), which stated:

"Starting from high levels of practice in the 1940s, breast-feeding declined steadily to low levels in the early 1970s and then began an upward trend that apparently has continued to the present. Although in the 1940s breast-feeding was more common among disadvantaged women (black, poor, and uneducated), the subsequent decline was more rapid among this group. Thus, by the early 1970s, disadvantaged women were more likely to bottle-feed than breast-feed and, among the breast-feeding women, disadvantaged women breast-fed for a shorter average duration.

"Conversely, the increase that has occurred since the early 1970s has not been as pronounced among the disadvantaged. Thus, recent information indicates that black and poorly educated women are less likely to breast-feed than are white women; within racial groups, poorly educated women are less likely to breast-feed than are highly educated women."

The Panel concludes that the available data suggest a slowing of the upward trend of breastfeeding since 1980, compared with the rapid rate of increase noted for the previous decade. This altered trend appears to be related to socio-demographic factors and continuation of socioeconomic and ethnic barriers to breastfeeding during the infant's first year (Arango, 1984). The trend may be related to the reported policy of certain supplemental food programs that provide infant formula, but no food supplements, to partial breastfeeding mothers (Guiry and Olson, 1985). That is, only mothers who breastfeed exclusively receive food supplements.

Most evidence on patterns of breastfeeding practices of various groups of the U.S. population since 1980 suggests educational efforts should be targeted to older adolescent mothers as well as to economically and educationally disadvantaged women. While there are major continuing efforts to provide nutritional information, education, and actual food supplements to this group (e.g., WIC), few data are available on how programs such as WIC influence the number of mothers who initiate or continue nursing. Decisions on breastfeeding are typically made prenatally but may change during pregnancy (Hoffman et al., 1985); thus, older adolescent and/or economically disadvantaged women may be more difficult to reach and influence than other socioeconomic groups (Martinez and Krieger, 1985).
The Panel also concludes that it would be most useful to continue and improve collection, analysis, and dissemination of data on patterns of breastfeeding during the period 1985 to 1990. If such data are available by 1990, sufficient information will have been collected and analyzed to provide a meaningful comparison between 1971-1980 and 1981-1990.

The time at which data on breastfeeding is collected after hospital discharge is itself a major issue. The Ross Laboratories surveys collect data at 3 to 4 months and 5 to 6 months. The Panel suggests these intervals are appropriate. If collection of data at both intervals is negated by economic constraints, either 3 or 6 months would be desirable in order that comparisons can be made with extant data.

To date, WIC data appear too inconsistent to use as a monitoring tool because the point of contact with the breastfeeding mother ranges from 1 to 6 weeks postpartum. A 6-week period is about the maximum time the clinic has to recertify the woman for WIC assistance. In actual practices, it is usually done on the first visit to the clinic after delivery. Data on the actual date of visit after delivery could be used to monitor changes in the low-income population, but to compare these data with other data for 3 to 4 months or 5 to 6 months postpartum would be desirable. Collection of data could be made at 5 to 6 months when the breastfeeding mother is due to be recertified.

D. SUGGESTED PROGRAMS AND STRATEGIES

There is a need for a concerted effort to encourage breastfeeding and to provide more education and support for prospective mothers, especially those who are economically and/or educationally disadvantaged. But the Panel also concludes that younger adolescent mothers may need special consideration because breastfeeding may adversely influence growth, education, or work capacity of the young mother. More study of this issue is needed.

In addition, efforts to modify routines and practices of the health care profession, improvement in support systems for nursing mothers, education of the general public, and acceptance of breastfeeding in the work environment are needed if attainment of Objective #7 is to be achieved by 1990.

Arango (1984) has summarized the strategies necessary for realization of the goal of widespread adoption and acceptance of breastfeeding in the United States. She identified seven strategies of critical importance that should be considered in public and private health care services to pregnant and breastfeeding women.

1. Increase the education of pregnant women and their families concerning breastfeeding in a manner that is easily understood and culturally relevant.
2. Change the routines and practices in hospitals, so that breastfeeding mothers are properly instructed and supported in their efforts.

3. Improve the support systems available to breastfeeding women in the early postpartum period to provide encouragement and help solve common problems.

4. Inform all health professionals in maternal and infant health care about the practical aspects of establishing and managing breastfeeding.

5. Increase the scope of efforts and media used to educate the general public on the benefits of breastfeeding with emphasis on the integration of breastfeeding into all aspects of daily life.

6. Increase the acceptance by employers of the need for workplace accommodation for breastfeeding women, and teach breastfeeding women the necessary skills to make a successful transition from full-time to part-time breastfeeding.

7. Continue research efforts and, in particular, identify effective strategies to promote breastfeeding.

The Panel agrees with these recommendations on implementation program and strategy needs for 1985 to 1990. The Panel recommends that emphasis be placed on informational and educational efforts targeted toward those groups of mothers in which breastfeeding is less prevalent, including older adolescent, low-income, unwed, and minority women. Current efforts should be expanded to include mass media (radio and television) because those sources are more likely to influence these target groups. Efforts by the public and private health care sectors should focus on the well-recognized institutional and societal constraints which militate against partial or complete breastfeeding until infants are 3 to 6 months of age. The socioeconomic barriers faced by the single mother are of particular concern. With increasing numbers of mothers of young infants reentering the workforce when infants are 4 to 6 weeks of age, opportunities for partial breastfeeding should be encouraged. On-site day care facilities where mothers can breastfeed infants are rare, but could be expanded by programs of education, information, and economic incentives.

E. PANEL RECOMMENDATIONS ON THE OBJECTIVE

A majority of the Panel suggests that the Objective be modified to reflect more realistically the present trends and barriers to breastfeeding:
By 1990, the proportion of women who exclusively or partially breastfeed their babies immediately postpartum as reflected by hospital discharge data should be increased to 75%; and 50% of these mothers should continue to breastfeed until the infants are 3-4 months of age.

This modification is based on the observations that:

a) in some segments of the population, more than 35% of mothers are nursing infants aged 3 to 6 months;

b) more data are available for infants aged 3 to 4 months than for infants aged 5 to 6 months; and,

c) evidence suggesting partial breastfeeding may be an important component of continued breastfeeding.

Other members of the Panel support modification of the Objective with emphasis on continuation by 50% of all mothers (partially or exclusively breastfeeding) until infants are 5 to 6 months of age. This approach is based on evidence that continued breastfeeding has positive effects on both the mother and the infant.
OBJECTIVE #8: "By 1990, the proportion of the population which is able to correctly associate the principal dietary factors known or strongly suspected to be related to disease should exceed 75 percent for each of the following diseases; heart disease, high blood pressure, dental caries and cancer."

A. ANALYSIS OF OBJECTIVES AS STATED

The Panel observed, as did several scientific organizations that provided comments, that numerous risk factors are considered or strongly suspected to be associated with heart disease, high blood pressure, and cancer. Scientific evidence of causality is lacking in most associations of these diseases with dietary factors, except for the relation of excessive, prolonged consumption of diets high in fermentable, sticky simple sugars to increased incidence of dental caries. A National Objective dealing with chronic degenerative diseases should focus on all risk factors. Prevention and reduction of risk of these diseases involve genetic, lifestyle, and environmental factors such as family history, use of alcohol and tobacco, occupation, and exposure to sunlight. The Panel suggests that emphasis on dietary relationships without emphasis on equally important nondietary risk factors is misleading.

The Panel is not aware of the rationale for stating the Objective in such a precise manner. There are no baseline data upon which the Objective was based; the implementation plans contain no mechanisms for assessing progress on the Objective. Awareness is considered necessary for action, but awareness by itself is a matter of education and public understanding. Without action on reduction of risks, including dietary and other factors, there can be little progress in preventing disease and maintaining health.

In the context of current knowledge, a campaign to increase public knowledge of the role of genetic and environmental factors (including diet) in preventing or treating diseases should also include diabetes mellitus, alcoholism, obesity, and osteoporosis.

B. PERTINENT SOURCES OF DATA

The Panel members are aware that their expertise does not include extensive experience with assessing the public’s perceptions of the possible role of dietary components and nutrients in various diseases. Similarly, time and resources have not permitted collation of public and private sector public opinion surveys. The Panel was informed by several organizations that such data are available, but only a few data were presented to the Panel. A number of surveys have been conducted in the private sector; however, most are proprietary and are not available.
While direct measures of the nutrition knowledge of American consumers are not available, one surrogate measure which signifies how consumers have translated their knowledge into behavior is trends in food consumption patterns. Research on long-term trends in food consumption shows that while some changes have evolved over many years, other eating habits have changed more rapidly and some habits have even reversed in recent years (Marston and Welsh, 1984; Welsh and Marston, 1982). There have been long-term trends toward greater consumption of poultry, fish, citrus fruits, dark green and yellow vegetables, oils, sugars, and sweeteners. Long-term decreases in consumption have been reported for flour and cereal products, potatoes, and butter. In recent years, there has been a notable increase in total fruit and vegetable consumption, as well as significant reductions in consumption of eggs, dairy products, tea, and coffee. These dietary changes signify that changes in patterns of food consumption are occurring in the U.S. population and that many of the changes are consistent with current recommendations for improved nutrition.

The Food Marketing Institute (FMI) commissioned a Harris Poll survey on food safety in early 1984 (Anonymous, 1985a). A 1008-person telephone survey revealed that 77% were concerned with chemical residues, 45% with cholesterol, 37% with salt, and 31% with sugars, in foods. FMI officials are quoted as noting that consumers do not distinguish issues of food safety and nutrition very well. More interest in, and concern for, nutrition was evident in urban than in rural respondents.

The Gallup Organization, Inc. conducted a survey of changes in consumer eating habits in mid-1983 for the NRA (1983). The survey included a national probability sample of 1035 adults 18 years of age or older. Questions were designed to assess changes in eating habits both at home and in restaurants. Questions did not make reference to whether such changes were prompted by interest in disease prevention. Six in ten adults (60%) said they have changed their eating habits at home by either increasing their consumption of fruits, vegetables, or whole grains, or by decreasing their consumption of refined sugar, animal fats, or salt. The results also indicated more positive responses in regard to improved nutritional practices by women and persons in the upper socioeconomic groups. These 1983 survey data are similar to earlier surveys that showed two-thirds of U.S. adults were changing dietary patterns in the late 1970s because they were concerned with preventing disease and promoting health (National Heart, Lung, and Blood Institute, 1981; Stamler, 1983).

Four in ten (40%) said they had changed their eating habits when dining at a restaurant or other eating place away from home by either increasing their consumption of fruits, vegetables, or whole grains, or by decreasing their consumption of refined sugar, animal fats, or salt. The most frequently
mentioned changes in restaurant eating behavior were reduction in use of salt (25%), ordering seafood more often (20%), using less sugar (20%), and eating more vegetables and salads (18%).

Heimbach (1985) reported results of the 1982 FDA/NHLBI Multipurpose Consumer Survey on public views on cardiovascular diseases and diet. Questions asked included the relation of dietary factors to disease and also the association of diseases with certain dietary factors. In response to questions on dietary factors as they relate to disease, 54% indicated sodium, salt, or salty foods were related to hypertension, but for cardiovascular disease other than hypertension only 26, 18, and 5% identified cholesterol, fat, and saturated fat, respectively, as related to heart or cardiovascular problems. Because saturated fat is considered to have a greater role in heart disease than dietary cholesterol, these figures suggest the public is not well informed about this aspect of diet and heart disease. The higher perception of dietary cholesterol being the most important factor reflects a widespread confusion in the mind of the public between dietary cholesterol and serum cholesterol. It is discouraging that only 5% of the people identified excessive caloric consumption as associated with heart disease.

Respondents were also asked what disease they associated with cholesterol and saturated fat. Forty-two and 26% replied heart problems and atherosclerosis, respectively. In regard to diet and hypertension, 54% of those surveyed perceived salt, sodium, or salty foods as being associated with hypertension, and 78% surveyed perceived diet to be related in some way with hypertension. Heimbach (1985) concluded that the degree of public perception of possible relationships between diet and cardiovascular disease, especially hypertension, is high. However, the results suggest that the public's perception of the role of diet in disease needs to be improved, especially in view of the confusion in regard to relative roles of dietary cholesterol and saturated fat in cardiovascular disease.

Nevertheless, consumer interest in nutrition per se appears widespread. A 1983 study conducted by the Wheat Industry Council found 85% of adults believed they were nutritionally well-informed (National Restaurant Association, 1983). A 1980 Women's Day/FMI survey of consumer attitudes on nutrition and inflation found 65% of respondents agreeing that the primary importance of nutrition was to avoid future health problems (National Restaurant Association, 1983). Similarly, public support for organizations that voice consumer concerns such as the CSPI, the Community Nutrition Institute (CNI), and the Food Research and Action Center (FRAC), continues to grow. Finally, a recent Hearst Corporation Survey (1985) found that over 75% of 998 adult women interviewed by telephone were aware of the basic requirements for good nutrition although they were less familiar with the quantitative information needed to meet these requirements.
In an effort to obtain data useful in assessing progress on the Objectives for the Nation, the NCHS has initiated inclusion of a special supplement on health promotion and disease prevention in the 1985 National Health Interview Survey (National Center for Health Statistics, 1985a). This supplement will be used again in 1990 to evaluate progress in the upcoming 5-year period (1985-1990).

In the National Health Interview Survey carried out in the United States from January through March of 1985, information was obtained concerning a number of dietary and health practices potentially related to chronic disease. This nationwide survey was conducted on a probability basis and involved approximately 9000 households. In this survey the following percentages of those respondents interviewed identified each stated factor as increasing the risk of heart disease:

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Percentage Responding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Being very overweight</td>
<td>94</td>
</tr>
<tr>
<td>High blood pressure</td>
<td>92</td>
</tr>
<tr>
<td>High serum cholesterol</td>
<td>86</td>
</tr>
<tr>
<td>Family history of heart disease</td>
<td>82</td>
</tr>
<tr>
<td>A diet high in animal fat</td>
<td>80</td>
</tr>
<tr>
<td>Diabetes</td>
<td>60</td>
</tr>
</tbody>
</table>

In this survey 59% of respondents associated sodium or salt in food as being most often associated with high blood pressure; however, 24% of the respondents also indicated that cholesterol in foods is most often associated with high blood pressure. The significance of this association is not stated, but suggests confusion of dietary with serum cholesterol and misconceptions about the relationships of dietary cholesterol to cardiovascular diseases.

In connection with drinking alcohol, 84, 85, and 85% of respondents under 45 years of age believe that heavy drinking during pregnancy causes mental retardation, low birth weight, and birth defects, respectively. In addition, a surprisingly high 58% of the respondents have heard of the fetal alcohol syndrome. For all respondents, 30 to 66% related heavy drinking to some type of cancer. In connection with the question of sugar in the diet and dental caries, 90% of the respondents believe that they should avoid between-meal sweets to reduce the incidence of dental caries.

This recent survey shows a surprisingly high awareness on the part of the general public of risk factors associated with heart disease, fetal and infant health, and the role of between-meal foods high in sugar in dental caries.
The Panel concludes that a majority of adults in the U.S. population are aware of the importance of nutrition in promoting good health and preventing disease. However, the Panel is less certain about the accuracy and objectivity of the knowledge about the interactions between diet and disease and the effects of such knowledge on modification of dietary behavior of the general public.

C. PROGRAM IMPLEMENTATION AND ADDITIONAL DATA NEEDED

With the exception of preparation and widespread dissemination of Dietary Guidelines for Americans in 1980 and again in 1985, most of the implementation plans of the PHS (U.S. Department of Health and Human Services, 1983) suggest initiatives that were in the formation stages in 1980-1983. The Panel observes that many of the implementation plans appear to equate nutrition education with consumer awareness of possible relationships between food components and disease. These concepts should be distinguished in order to avoid the notion on the part of the public that the sole function of diet is to prevent disease.

A number of activities underway in the scientific community relate to broadening awareness and discussion of the interactions between diet and disease. For example, NIH has held Consensus Conferences on obesity, cholesterol and heart disease, and osteoporosis. NIH is developing a major public educational program on the role of diet in heart disease, and the National Cancer Institute (NCI) is encouraging public educational programs on the role of diet in cancer. Both the DHHS and the USDA are making about one million copies of the revised Dietary Guidelines for Americans available at no cost. The Panel suggests that the original negatives or plates be available to the private sector and other governmental agencies in order that additional copies may be reproduced and distributed to the 90 million households in the United States. Further, the Cooperative State Extension Service, and various health-related organizations of the private sector should be encouraged to disseminate these guidelines widely in their educational programs. Greater efforts should be directed to broadcasting these guidelines in mass-media programs and public service announcements because these communication media reach most Americans and circumvent the continuing problem of adult illiteracy. For example, a National Nutrition Quiz was recently aired on public television (PTV Publications, 1985). Such efforts should be encouraged and supported by the public and private sectors.

The Panel observes that as a result of the initiatives of governmental agencies, major food companies are taking a more aggressive stance in informing the public about possible diet-health links. The most significant example is an advertising campaign portraying a bran cereal product as a food that can reduce the risk of cancer. This campaign is supported by NCI
but is viewed with considerable concern by FDA and many nutrition scientists because of the therapeutic claims made. Other examples are advertisements for high calcium cereals to prevent osteoporosis and "cholesterol free" vegetable oils to reduce the risk of heart disease. Clearly, the potential for influencing the emotions of consumers as well as providing misleading information and for misuse of dietary products and supplements is considerable. The need for responsible, factual, and objective presentation of nutrition information is critical. The continuing controversies about diet and disease within the nutrition community itself erode its scientific reputation and the public's confidence in nutritional information promoting health and preventing disease.

D. SUGGESTED PROGRAMS AND STRATEGIES

Emphasis on programs and strategies in 1985-1990 related to Objective #8 should ensure that information provided to consumers by federal and local governments, as well as that originating in the private sector, be factual and unbiased. However, the Panel recognizes that no efforts are in place that will provide a basis for evaluating these programs. NCHS has initiated efforts to assess public knowledge of nutrition principles that promote health and prevent disease. A National Nutrition Monitoring System (Objective #15) would add to this data base. But additionally there is need to develop strategies and programs to assist the public in evaluating information for accuracy and applicability, as a basis for wise decision-making in regard to diet, nutrition, and the benefits and risks of their dietary habits and practices.

E. PANEL RECOMMENDATIONS ON THE OBJECTIVE

During the period 1985 to 1990, and again in planning of Objectives for the Nation for future decades, emphasis should be placed on public education programs on diet-related risks of the several chronic degenerative diseases. These risks should be presented in the context of all important risk factors for those diseases. Public health agencies, government agencies, the private sector, and individuals should be encouraged to have each person identify his or her own personal risk profile (lifestyle, genetic, and environmental factors that are known to increase risk of chronic degenerative disease). This means being aware of such factors as his or her own state of health and the family health history, as well as risks associated with lifestyle. Physicians should encourage and help their patients to understand the results of regular physical examinations including height and weight, serum cholesterol levels, blood pressure, blood sugar, and other biological indicators. Strategies and programs should be developed to assist consumers in evaluating the accuracy and validity of information and in gaining the knowledge base for wise personal decision-making in regard to diet, nutrition, and health.
A minority of the Panel members conclude that progress has been made on Objective #8 and suggest that modification is unnecessary. A majority of the Panel members recommend modification of Objective #8 to reflect progress made to date and to indicate a more measurable objective for 1990. They suggest restatement of the Objective as follows:

- By 1990, at least 75% of the adult population will be aware of the seven major recommendations in Dietary Guidelines for Americans and will follow those guidelines in relation to their own personal risk profile.
OBJECTIVE #9: "By 1990, 70 percent of adults should be able to identify the major foods which are: low in fat content, low in sodium content, high in calories, high in sugars, good sources of fiber."

OBJECTIVE #11: "By 1990, the labels of all packaged foods should contain useful caloric and nutrient information to enable consumers to select diets that promote and protect good health. Similar information should be displayed where nonpackaged foods are obtained or purchased."

Objective #11 is discussed with Objective #9 because labeling of packaged foods has emerged as a major effort of the federal government to provide nutrient information and has contributed to many educational efforts in both the public and private sectors in addressing Objective #9.

A. ANALYSIS OF OBJECTIVES AS STATED

The Panel concurs with the intent of Objective #9 but suggests that it could be clarified. The modifiers used with each dietary component "low", "high", and "good" are imprecise and are not measurable. Use of such terms presents a simplistic approach to food constituents that perpetuates a concept that "good" foods are "low", and "bad" foods are "high" in those constituents to be avoided. The Panel also has reservations about the identification of foods "high in calories" and "low in fat content" as foods high in fat and are high in calories. Furthermore, the concept of good versus bad foods impacts on dietary choices and frequency of consumption of certain foods by individuals who are uninformed. The composition of any food as consumed depends on many factors, including how it is processed and prepared for serving. For example, total fat content of deep fat fried chicken can be greater than that of an equal quantity of trimmed broiled lean beef or pork. Generalizations identifying dairy products such as cheese as high in sodium content do not indicate such foods are high in calcium or fat. As sources of calcium, such foods supply a nutrient considered important in relation to osteoporosis and hypertension. As sources of saturated fat, cheeses may be less desirable dietary constituents than other sources of similar quantities of calories and calcium. Over 90% of the dry weight of grapes is fructose and related simple sugars. The Panel would question the purpose of labeling fresh fruits solely as foods high in simple sugars and ignoring the other nutritional qualities. For these reasons, the Panel rejects the notion of "good" or "bad" and "high" or "low". The two terms "high" and "low" can be useful, if defined quantitatively.
The Panel notes that no baseline data were available in 1979 for Objective #9. The Panel recognizes that the public awareness specified in Objective #9 would require consensus on what constitutes "low" or "high". FDA has established certain definitions for "very low", "low", and "reduced" in its labeling program [21 CFR 101]. The definitions are related to quantities of nutrients found in "normal portions" of such foods.

Despite these efforts, the regulatory implications of such definitions are exceedingly complex. For example, public interest in the fiber content of foods is widespread. But the exact definition of dietary fiber, agreement on methodology to quantify fiber content of foods, and available data on the amounts of fiber in foods, make precise and meaningful labeling difficult. Furthermore, the possible health effects of several types of dietary fiber vary. Insoluble fibers appear to be more important than soluble fibers in regard to colon physiology while the converse may be true in regard to cholesterol homeostasis.

Another aspect of consumer awareness is the complexity of nutrient and food effects that are not conveyed by abbreviated presentation of nutritionally useful information. For example, wheat bran may have little effect on serum cholesterol, while other forms of dietary fiber may. The value of purified cellulose in relation to either heart disease or cancer remains to be determined, but it may be included on a food label as dietary fiber.

A further aspect of consumer awareness is effectiveness of information and education on behavior modification. That is, consumers may be aware of benefits or detriments associated with certain foods, but the knowledge has little impact on food purchasing or consumption behavior. These issues are also quite complex. For example, Levy et al. (1984) have presented data to show "Special Diet Alert" information available in grocery stores did alter consumer food purchase behavior in regard to purchasing low or reduced sodium or low or reduced fat and cholesterol foods. Other investigators (Jeffery et al., 1982; National Heart, Lung, and Blood Institute, 1983; Olson et al., 1982) have reported that in-store nutrition education programs have failed to produce noticeable changes in consumer behavior.

The FDA introduced a food and nutrient labeling program in 1975 based in part on recommendations of the 1969 White House Conference on Food, Nutrition and Health (Food and Drug Administration, 1973a,b,c; Heimbach and Stokes, 1982). The initiative took several years to develop and since 1975 has undergone a series of evaluations related primarily to identification of what constitutes "useful caloric and nutrient information" and to define further what constitutes "packaged foods". These evaluations have occurred with considerable public debate and occasional acrimony among participants representing food industry groups, consumer representatives, and federal government agency
staffs. The issue of displaying nutrient information where non-packaged or nonprocessed foods are obtained or purchased has yet to be resolved.

The Panel notes that Objective #11 as originally stated is all-encompassing and subject to considerable interpretation. However, these concerns are more related to methods of implementing the Objective than to the wording of the Objective itself.

B. PERTINENT SOURCES OF DATA

Sources of baseline data were identified in 1979 for Objective #9 (U.S. Department of Health and Human Services, 1983); certain of these that relate to both Objectives, have already been discussed by the Panel (see Objective #8). In regard to Objective #9, Heimbach (1985) reported that in a 1982 survey of public opinion, the adults responding approached nutrition and diet modification to avoid health risks rather than to seek health benefits. However, data from the Hearst Corporation (1985) survey, the Gallup Organization, Inc. 1983 poll (National Restaurant Association, 1983), the 1983 Wheat Industry Council survey (National Restaurant Association, 1983), and the 1980 Women's Day/Food Marketing Institute polls suggest that a majority of U.S. adults know about nutrition and presumably nutrient content of foods to some degree.

As evidenced by the proliferation of nutrition- and diet-related articles in newspapers across the country and in national magazines, as well as nutrition-related spot announcements on television and radio, the Panel concludes that public awareness of diet, as well as associated risks and perhaps benefits, has increased since 1980. Data from national surveys on the public's knowledge of food composition were not made available to the Panel.

FDA has collected data on the extent of nutrition labeling compliance and use that relate to progress on Objective #11. Since 1978, FDA has conducted the Food Label and Package Survey (FLAPS) and prepared several reports on the results (Food and Drug Administration, 1984a, c; Schucker, 1984; Schucker and Stewart, 1984). In 1984 and 1985, approximately 55% of packaged processed food sales consisted of products bearing nutrient information on labels. Of 52 food groups surveyed in 1984, 46 included products bearing nutrient information panels. This figure is up from 40 food groups in 1978. The FDA also has surveyed the status of sodium labeling of retail processed foods from 1978 to 1984. As a percentage of sales dollars, the extent of sodium labeling of all food groups increased from 7.5% in 1978 to 39.6% in 1984. In 1984, of the 51 processed food groups for which sales volume data were available, 46 carried some sodium labeling whereas only 17 did in 1978. Although the overall increase in sodium labeling as a percentage of the sales
dollar went from 7.5% in 1978 to 39.6% in 1984, some groups showed very high increases. For example, during the 6-year period, sales of sodium labeled dried vegetables increased from 0 to 99%, canned vegetables from 0 to 60%, and canned seafoods from 0 to 56.4%. Because sodium labeling is not required, these increases demonstrate considerable voluntary compliance on the part of the food industry, most likely in response to public awareness and market demand for information on sodium content of foods.

C. PROGRAM IMPLEMENTATION AND ADDITIONAL DATA NEEDED

Publication, dissemination, and widespread use of the 1980 edition and 1985 revision of Dietary Guidelines for Americans have provided some impetus to increased consumer awareness of nutrition and possibly food composition even though no quantitative guidelines are given. In the Panel's view, the issues related to definitions of "low" and "high" as well as the controversies surrounding the associations of dietary components with disease prevention or health promotion continue to be contemporary topics of scientific, public, and political debate.

The Panel is not aware of the extent to which the public perceives quantitative aspects of food composition (e.g., mg sodium per serving) in relation to promotion of health. Such data would be useful, but would require considerable effort if different interpretations are to be avoided.

Some progress toward achievement of Objective #11 is evident. Nutrient labeling regulations as amended [21 CFR 101] cover packaged foods that carry voluntary nutrient labeling, are fortified, or for which nutrition claims are made. The USDA proposed nutrient regulations for meat and poultry products, but a final rule has not been issued (U.S. Department of Agriculture, 1974).

Current nutrient labeling regulations require that the label must state the serving size; the amounts of protein, carbohydrate, and fat in grams per serving; and the amounts of protein, vitamin A, vitamin C, thiamin, riboflavin, niacin, calcium and iron as percentages of the U.S. RDA per serving. Listing of the percentages of the U.S. RDA for 12 other vitamins and minerals is optional. Information on the cholesterol, saturated fat, polyunsaturated fat, and sodium content of food is voluntary.

Since 1974, considerable attention has been directed to several issues related to nutrient labeling of foods. These include: formats for package labels, nutrients for which labeling should be required, and specifications for label contents. The FDA has worked with nutrition professionals, consumer groups, and the food industry. Public hearings were held in
late 1978. Considerable differences of opinion were voiced about the information that should be presented and on the format for nutrient information labels.

Heimbach and Stokes (1979) reported results of a consumer food labeling study carried out in 1978 by means of a national probability sample. They reported the consumers 1) found difficulty with the complexity of nutrient labeling; 2) want more detailed information on the nutritional value of their food with particular interest in calories, sodium, sugars, and fatty acids; and 3) are more interested in the dietary constituents that they want to avoid (e.g., sodium or cholesterol) than about constituents of which they might consume too little (e.g., vitamins and minerals).

Heimbach and Stokes (1982) also surveyed members of the AIN, the food industry, and a consumer panel concerning nutrient labeling. Questionnaires were sent to all AIN members, "interested consumers" representing food and health professions, teachers and consumer advocates, and members of a number of food industry groups. Responses were obtained from 531 AIN members, 177 members of the food industry, and 107 interested consumers derived from a list maintained by the FDA Office of Consumer Affairs. The response rate was highest from the AIN members (30%) and lowest from the consumers (12%). Generally, obesity and heart disease were identified as the major diet-related health problems with information concerning calories, sodium, fat, protein, iron, calcium, and carbohydrates considered to be most useful. However, these generalizations mask some real differences between AIN members and the consumers. Consumers were much more concerned about sugar, salt, and food additives than AIN members. Conversely, AIN members were much more concerned about vitamins and minerals in general, and iron and calcium specifically, than members of the consumer group.

The progress on implementation of labeling continues to be controversial (Schucker, 1985). Some organizations oppose expansion of labeling beyond voluntary labeling of retail purchased packaged foods; others have concluded that mandatory labeling of all purchased or obtained foods is necessary as public policy. For example, the Nutritional Information Labeling Act of 1985 was introduced in the U.S. Senate (S. 1699). The Act would require the following information on food labels: total calories per serving; total calories by type of fat such as saturated, polyunsaturated, monounsaturated; total number of grams of fat contained in one serving, including type of fat (saturated, polyunsaturated, monounsaturated); the specific common name of the fat or oil used in the product; the total number of milligrams of cholesterol contained in a serving; and the total number of milligrams of sodium or potassium per serving. The bill would require such labeling on all packaged foods. The FDA reportedly opposes the bill because it claims that complexity of the legislation proposed would serve to confuse consumers (Anonymous, 1985b). No action on the bill has occurred.
Scientific opinion on such legislation is variable. Some organizations hold that legislation on labeling of sodium, cholesterol, polyunsaturated fat, and saturated fat content of foods is needed. Others hold that it would be useful but should be voluntary. Presumably, data on opinions of the general public are available from the FLAPS. Whether this analysis of data has been conducted by FDA is not known by the Panel.

The Panel concludes that since 1980 some progress has been made in the areas covered by Objectives #9 and #11. In particular, public awareness of food composition has increased as a result of nutrient labeling. The trend for wider adoption of voluntary nutrient labeling has slowed. Whether this progress toward the two National Nutrition Objectives is adequate is a public policy matter, not an issue of scientific evaluation.

D. SUGGESTED PROGRAMS AND STRATEGIES

The most useful federal government implementation programs in place appear to be the publication and dissemination of Dietary Guidelines for Americans and the voluntary nutrition labeling programs of the FDA. Greater emphasis on developing programs and strategies is needed to help consumers use food labels to understand better the role of food composition in promoting health.

In the broader perspective, the Panel suggests that Objectives #9 and #11 are components of a goal associated with nutrition education of the general public. In this context, greater effort should be directed toward helping the public gain a better understanding of food composition, including the use of nutrient labels. The public needs to be made aware of how food preparation practices can influence the nutrient and caloric content of foods as consumed. Educational efforts need greater focus; for example, programs need to help the public distinguish between dietary cholesterol and serum cholesterol, with the latter, not the former, being one of the three major risk factors for heart disease (cigarette smoking, hypertension, and serum cholesterol).

The Panel recognizes that Objective #11 goes well beyond current regulations and proposed legislation. Further, the Objective cannot be achieved by voluntary efforts alone. The Panel appreciates the wide disparity of opinion on the voluntary nature and extent of nutrient labeling of all foods. This lack of consensus among concerned parties is a major impediment to modification of regulations and passage of new legislation. Continued discussion of the issues by all parties offers the possibility of resolving certain aspects impeding wider adoption of voluntary efforts.
The Panel concludes that:

1) The FDA and USDA should be encouraged to continue their efforts to find a consensus on labeling that would satisfy the needs of the public and that would have a minimum burden and cost to both the consumer and the food industry.

2) The food industry should be encouraged to increase voluntary compliance with the current nutrient labeling regulations and to extend nutrient labeling to additional foods.

3) The USDA should be encouraged to act on its previously announced nutrient labeling provisions for meat and poultry products.

4) More effort needs to be undertaken by government agencies at all levels, the private sector, and professional organizations to help consumers understand nutrient labeling, and how to use it in enhancing their knowledge of food composition.

5) Because of variability in the composition of fresh foods and the influence of preparation practices, information related to nonpackaged foods at locations where foods are obtained or purchased (similar to that on nutrition labels of processed foods) while desirable, would be difficult to develop and regulate.

E. PANEL RECOMMENDATIONS ON THE OBJECTIVE

The Panel members agree that public awareness of nutrient content of foods has increased since 1980, and could be greater by 1990. Some members of the Panel suggest that a strong case can be made for adding calcium to the list of nutrients noted in Objective #9 and to programs associated with implementation of this Objective.

Because all essential nutrients are important to good health, a majority of the Panel members suggest that mention of specific nutrients should be deleted. They recommend that Objective #9 be restated in more general terms of nutrient content of food and opportunities for food choices. They suggest that Objective #9 be modified to read:

• By 1990, at least 75% of the adult population will be knowledgeable about the food choices recommended in Dietary Guidelines for Americans and will be able to identify the major nutrients provided by those food choices.
A minority of the Panel members suggest that Objective #9 stand as originally written and that greater emphasis be placed on education and information dissemination in the next several years. A majority of the Panel members suggest that Objective #11 be modified to reflect the reported trends in acceptance of regulations concerning voluntary nutrient labeling of packaged foods and the practicality of labeling all non-packaged foods by 1990. They suggest that Objective #11 be modified to read:

- By 1990, 90% of packaged foods should have labels that provide information on caloric content and nutrient composition in a form that enables consumers to select diets that promote and protect health as suggested in Dietary Guidelines for Americans. In addition, by 1990, voluntary nutrition labeling of fresh meats, poultry, and produce at point of retail purchase should encompass 25% of sales of these foods.

A minority of the Panel members concur with the goal of labeling 90% of packaged foods but consider it premature to establish an objective for fresh meats, poultry, and produce at point of retail purchase.
OBJECTIVE #12: "By 1985, the proportion of employee and school cafeteria managers who are aware of and actively promoting, USDA/DHHS dietary guidelines should be greater than 50 percent."

A. ANALYSIS OF OBJECTIVE AS STATED

While agreeing in principle with the accelerated time frame, the Panel is unable to determine why this Objective specifies 1985 rather than 1990. The Panel is concerned that implementation plans omit provision for measuring or assessing progress on the Objective. Indeed, the implementation steps appear more appropriate to Objectives #11 and #13.

The intent of Objective #12 may have been to include emphasis on improving the nutritional quality of meals served outside the home; that is, school and workplace cafeterias. Over the past decade, food consumption patterns indicate increasing frequency of meal and food consumption from restaurants, fast food establishments, and vending machines. Institutional and military service cafeterias and dining facilities are major sources of meals for their clientele. These considerations suggest that Objective #12, as originally written, is too limited in scope. The intent appears to have been greater awareness and application of Dietary Guidelines for Americans in locations where meals or food are served outside the home on a regular basis.

B. PERTINENT SOURCES OF DATA

The Panel is not aware of the data upon which this Objective was based. The Panel has been unable to identify documentation that might measure progress on achievement of this Objective.

The Journal of the American Dietetic Association (JADA) and the Journal of Nutrition Education (JNE) are widely read by school food service personnel. Journal issues from 1980 to 1985 were examined to determine the number of published articles and abstracts which described food service operations which had utilized the Dietary Guidelines for Americans. JADA had eight such abstracts, published mainly in journals such as School Food Service Research Review and Food Management. Examination of issues of School Food Service Research Review (SFSRR) revealed only a limited number of articles which cited or referenced the Dietary Guidelines for Americans. JNE had three articles devoted to this topic.
C. PROGRESS ON IMPLEMENTATION AND ADDITIONAL DATA NEEDED

The program which has the most potential for influencing school food service managers to integrate information from the Dietary Guidelines for Americans into preparation of school meals is the Nutrition Education and Training Program (NET). This program was created by P.L. 95-165 in 1977 (the National School Lunch Act and Child Nutrition Amendments). Originally, this law provided entitlement funding of $0.50 per child enrolled in a school or institution through 1979. While all states were to receive at least $75,000, some states received more because of the number of school-age children in their populations. The key components of the program were:

- nutrition education and training for school nutrition educators and food service personnel;
- food service management training for school food service personnel;
- nutrition education resources and activities for children in schools and child care institutions.

The funding for the NET program has been threatened every year since 1981. Current estimates are that the program will be restricted to $5 million for FY 1986, and future federal funding is uncertain. Each state is to receive a minimum of $50,000 with the remainder allocated through a formula based on the number of children enrolled in public schools. The Food and Nutrition Service (FNS), USDA, is the funding agency. Calls to FNS staff indicated that data on the number of schools throughout the United States that are participating in NET programs are unavailable. No data are collected at the federal level which would indicate how states are using NET program money as program operations are determined solely at the state level. Data from review and evaluation by the several states may be available, but the Panel has had little success in obtaining such information.

In Pennsylvania, 25 NET grants of at least $2500 were awarded to local school systems in 1984, and 24 in 1985. This accounted for $110,000 out of a $200,000 budget. Approximately 700 schools were directly or indirectly reached by the NET program grants (Sims, 1985).

In Florida, Preschool Nutrition Education and Training Programs (PNETP) were implemented in 1981 cooperatively by the Department of Education, Cooperative State Extension Service, and local school systems (Wagner, 1983, 1984). Local programs are operational in 53 of 67 Florida counties and reach a potential audience of about 3000 licensed day care centers serving 35% of all children under age 5 years statewide.
The PNENTP includes training by Cooperative Extension agents, curriculum materials, and continued contact by information sheets. Efforts to assess the influence of PNENTP participation are underway.

Several evaluations were conducted to determine the effectiveness of NET Programs soon after they were implemented. Evaluations by St. Pierre and others (St. Pierre, 1981; St. Pierre and Rezmovic, 1982; St. Pierre et al., 1981) report that typical school food service directors implemented close to 60% of the scheduled school-level activities suggested by the nutrition education curriculum.

St. Pierre (1981) did note three areas where, in 1979 (i.e., 2 years after the program was funded), "NET activities did not appear to be as fully implemented or as successful as desirable." One of these three areas was the "training of school food service personnel."

Gillespie (1984) monitored the NET program in three public elementary schools in upstate New York and determined program effectiveness. Improvements were noted in children's nutrition knowledge, attitudes toward consuming certain foods, and snacking practices. She noted that food service personnel who expressed an interest in nutrition education felt they had too many other responsibilities and did not have time to get involved. Also, many lacked training in nutrition and felt they had little to offer in educating children about proper nutrition. This study also noted the difficulties involved in bringing the school lunchroom and classroom together to improve nutrition education. Three barriers were identified: teachers' and staff's perception of the food service program, isolation of the food service from other school activities, and the food service program's time and budget constraints.

Nutrition services offered at the worksite locations are becoming increasingly popular. Glanz and Seewald-Klein (1986) point out that "cafeteria interventions and point of choice nutrition information are the most common types of environmental or structural interventions in worksite nutrition programs." However, these authors give no indication of the proportion of worksite cafeterias currently offering such services. In a survey of 64 industries in the Northeast offering health promotion and fitness programs, 48 offered special food items or nutrition information in employee cafeterias and vending machines (Murray et al., 1986). Hospital cafeterias are another worksite location where health promotion practices and nutrition education programs might be evaluated. The Panel has no data on such studies or activities.
D. SUGGESTED PROGRAMS AND STRATEGIES

In considering the intent of Objective #12, the Panel noted that food service operations include a broad scope of activities. These include school, public, worksite, governmental, military service, institutional, and hospital cafeterias; vending machines; fast-food establishments; restaurants; airline food services; and other sources of meal delivery outside the home. In this context, Objective #12, if focused on awareness and promotion of the Dietary Guidelines for Americans, becomes a component of Objectives #9, #11, and #13.

Comments on Objective #12 were received from five organizations who recognized the general educational goal of Objective #12. One suggestion was made that this Objective should focus on having school and other cafeteria menus reflect the Dietary Guidelines for Americans. USDA has indicated that food service personnel are a primary target group in the Department's programs to promote the Dietary Guidelines for Americans.

E. PANEL RECOMMENDATIONS ON THE OBJECTIVE

Based on the foregoing, a majority of the Panel members suggested that Objective #12 be subsumed in a revised Objective focused on nutrition education. Specifically,

- By 1990, food service operations should provide food choices that make it possible for persons to follow the Dietary Guidelines for Americans.

The Panel is aware that assessment of progress toward such a revised Objective will be difficult to measure within the next 5 years. The Panel recommends that DHHS and USDA work closely with those professional and food industry organizations which represent the broad spectrum of food service operations to promote availability of food choices which allow individuals to select foods that meet their dietary needs as suggested by the Dietary Guidelines for Americans.

The NET programs which are already in place in the several states may be a logical place to evaluate progress toward the Objective in 1990. For example, Jensen et al. (1985) have developed an educational kit for promotion of nutrition information. The materials provide information and techniques for the school food service personnel to integrate lunchroom activities with classroom education as well as with home and community awareness. They reported that evaluation of outcomes from use of the educational kit in 14 elementary schools indicated success in changing student food habits and attitudes as well as utilizing food service personnel in nutrition education.
Consideration should be given to evaluation of food choices offered by public business eating establishments, restaurants, airline food services, fast-food establishments, and vending machines with respect to the recommendations contained in Dietary Guidelines for Americans. Cooperation of these components of the private sector should be encouraged.

The minority of the Panel concluded that Objective #12 as stated in 1983 should be retained as written, but changing 1985 to 1990 and 50% to 75%.
OBJECTIVE #13: "By 1990, all States should include nutrition education as a part of required comprehensive school health education at the elementary and secondary levels."

A. ANALYSIS OF OBJECTIVE AS STATED

The Panel observed that the Objective could be interpreted to mean that nutrition should be a part of an integrated elementary and secondary health education program or could be a separate identified curriculum component. The majority of implementation plans focus on the former, that is, integration of nutrition into health education. Certain Technical Assistance/Cooperative Measures and Research and Surveillance Measures of the implementation plans (U.S. Department of Health and Human Services, 1983) do indicate identification and evaluation of nutrition education activities separately from the health education programs.

B. PERTINENT SOURCES OF DATA

The need for nutrition education of children, adolescents, and adults is well documented (Mellinger, 1985). Since 1977, numerous federal government reports have uniformly indicated support for nutrition education.

Information received by the Panel from scientific societies and other organizations supports the concept of nutrition education of children in school and in the home.

The implementation plans refer to a CDC "School Health in America Survey." Efforts of the Panel to identify the current status of this survey have not been successful. A recent review of federal activities in school health education (Gilbert et al., 1985), which identifies ongoing programs and strategies of many federal agencies including CDC, makes no mention of such a survey.

The CDC Center for Health Promotion and Education has prepared, among other activities, a comprehensive compendium of curricula for school health programs (Centers for Disease Control, 1984). The Panel has no knowledge of the dissemination or use of this document at the community and local school level.

While not directed at nutrition education per se, the Food and Nutrition Service, USDA, began an evaluation of the National School Lunch, School Breakfast, and Special Milk Programs in 1979. Results of this study were published in 1983 (Wellisch et al., 1983). The study focused on participation in, and effects of, subsidized food and feeding programs in the U.S.
School System. In 1980, about 90% of all elementary and secondary schools participated in at least one of the three programs. Welleisch et al. (1983) indicate 94,000 schools participated in the School Lunch Program, 33,000 in the Breakfast Program, and 84,000 in the Milk Program. The three programs served daily 26.6 million meals, 3.8 million meals, and 9.8 million half pints of milk, respectively. In FY 1981, about 4.2 billion lunches were provided to school children. While these data provide little insight into formal classroom education on health and/or nutrition, they do indicate that there is widespread exposure to nutritionally adequate meals in public and private school breakfast and lunch programs.

The NET program was established in 1977. The NET programs include a series of grants to state educational agencies to provide for training of food service personnel in nutrition and food service as well as conducting nutrition education activities in schools and child care facilities (Maretzki, 1979). By 1981, most states had implemented NET programs and established units within state agencies whose mandate included nutrition education activities. Evaluations of various state programs after 2 to 4 years (Maretzki, 1979; St. Pierre and Rezmovic, 1982; St. Pierre et al., 1981) all indicated a favorable and/or positive impact of NET programs on student knowledge of nutrition. St. Pierre and Rezmovic (1982) also reported both centralized and decentralized state nutrition education programs operated effectively.

Jensen et al. (1985) reported recently that because of reduced federal financial support after FY 1981, participation in the School Lunch Program decreased and the cost per meal increased. To offset reduced participation, several states have utilized NET program resources to integrate school lunchroom programs with classroom nutrition education. For example, Jensen et al. (1985) developed and evaluated a 4-week educational module promoting school lunch participation by reinforced classroom education in several Connecticut elementary schools. Based on data from 1743 students in grades one through three in schools using the kit, school lunch participation and food consumption increased significantly. Parents reported that children chose more nutritious foods for meals and snacks at home and chose school lunches more often. Jensen et al. (1985) concluded that this program demonstrated that by influencing student food choices and increasing participation in the school lunch program, the school food service manager can be an effective member of the nutrition education team.

Analogous and related programs have been initiated in other states such as Florida (e.g., Wagner, 1983, 1984) and Pennsylvania (Sims, 1985); however, the Panel is not aware of efforts to assess similar activities on a national level. Such data would be valuable in assessing progress on Objectives #12 and #13.
The studies evaluating school food service programs as well as those assessing the NET programs have been funded primarily by the several states and the FNS, USDA. The Panel is not aware of the status of ongoing evaluation studies of the USDA, but recommends that the DHHS Task Force seek further data and information from the Food and Nutrition Service, USDA, and from education and health agencies of the states.

C. PROGRESS ON IMPLEMENTATION AND ADDITIONAL DATA NEEDED

Gilbert et al. (1985) have reviewed current federal activities in school health education. The Panel notes that many federal activities cited by Gilbert et al. (1985) refer to programs, activities, and strategies related to nutrition and health promotion initiated in 1982-1985; thus, evaluation of progress on implementation is premature. The Panel recommends that DHHS establish procedures to evaluate these activities in the near future, in order that evaluation studies can be conducted in 1988-1990. Cooperation with USDA in evaluation of NET programs is also recommended. In addition, the Panel calls attention to the fact that all states have at least $50,000 for FY 1986 to implement the NET programs. However, no mechanism exists to monitor or document how such money is used to include nutrition as part of the school health education programs.

Private sector efforts in school nutrition education include those of the NDC, AHA, and others. For example, the NDC (Alcantara, 1985) distributed over 6500 educational materials to schools in 1981-1982. These efforts reached 2 million elementary and secondary school children. The NDC (Alcantara, 1985) also reported that the 33 affiliated Dairy Council units work with school health education teachers at the local and state level to include nutrition education in elementary and secondary school curricula. Several units of the NDC learning materials integrate components of Dietary Guidelines for Americans. The AHA School-site Program focusing on choosing healthy lifestyles includes emphasis on nutrition (American Heart Association, 1985). The Panel is not aware of the extent to which such private sector efforts collectively reach elementary and secondary school students.

While the Panel obtained data on the number of public health nutritionists working in state, county, and local health agencies, analogous figures for NET program funded positions in state education agencies were not available. Such data would be useful in assessing the use of NET program funds in achieving Objective #13.
D. SUGGESTED PROGRAMS AND STRATEGIES

As indicated in above, the Panel has identified a number of nutrition education activities occurring at the local school and community level. A majority of these efforts involve state and local education agencies, school food service personnel, and numerous programs funded by several USDA agencies and Department of Education initiatives. As suggested in previous paragraphs and in discussion of Objective #12, the Panel concludes that evaluation of progress will require a concerted cooperative effort to gather data from a number of different state and federal agencies and departments. The Panel recognizes that there is no assurance that such data would provide a basis for evaluation.

The Panel suggests that efforts to attain Objective #13 should be primarily state initiatives but be supported by DHHS, USDA, Department of Education, and the private sector including the AHA, AHEA, NDC, and SNE.

E. PANEL RECOMMENDATIONS ON THE OBJECTIVE

The Panel suggests that Objective #13 should be broader than originally stated and could be achieved in 1990 if stated as:

- By 1990, all states should document the inclusion of a nutrition education component in their K to 12 curriculum.

The Panel considers sound nutrition education of teachers and food service personnel a prerequisite to nutrition education in the classroom. The Panel recommends that as curricular offerings are coordinated with or related to school food service delivery, by 1990, states include nutrition coursework in certification guidelines. For example, the Panel suggests the following be considered:

- By 1990, all states will include in certification requirements for elementary and selected secondary school teachers, the completion of at least a 1 semester college-level course in nutrition beyond 1 year of biological sciences. For secondary school teachers of health, physical education, and athletics, training in the basic biological sciences should be required for certification.
As noted previously, the NET programs of the several states include nutrition education components. Methods by which nutrition education of school food service workers and teachers could be expanded within the NET programs by state and local efforts should be explored.

In addition to recommending that nutrition education be identified as a component of K through 12 curricula in the states, the Panel recognizes the importance of providing nutrition education to children at an early age. Therefore, the Panel suggests that states give consideration to including nutrition education as an integral component of the program provided in licensed day care centers and nursery school programs. The Panel notes that nutrition has been an integral part of the Head Start program since its inception.
OBJECTIVE #14: "By 1990, virtually all routine health contacts with health professionals should include some element of nutrition education and nutrition counseling."

A. ANALYSIS OF OBJECTIVE AS STATED

Objective #14 conceptualizes a desirable goal, but Objective #14 as stated is unmeasurable in terms of progress or attainment. The Panel considers the term "virtually all" too all inclusive as nutrition education and counseling may be inappropriate in certain routine health contacts. The term "health professionals" is too broad, permitting wide interpretation. The term, "some element" is not defined. The Objective as stated has no provision for quality control of information transmitted.

B. PERTINENT DATA

No baseline data were available in 1979. To the Panel's knowledge, efforts to collect such data on a representative nationwide sample of health professionals such as primary care providers, physicians, or health clinic personnel are nonexistent. Without such baseline data, it is not possible to assess progress on Objective #14. However, some data are available from which inferences may be projected.

The National Health Interview Survey (U.S. Department of Health and Human Services, 1984a) provides data on numbers of physician and dental visits per person per year for a representative sample of the civilian noninstitutionalized U.S. population. Recent data from this survey indicate the following:

<table>
<thead>
<tr>
<th></th>
<th>1964</th>
<th>1976</th>
<th>1981</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physician visits, all sources or places</td>
<td>4.6</td>
<td>4.9</td>
<td>4.6</td>
</tr>
<tr>
<td>Dental visits</td>
<td>1.6</td>
<td>1.6</td>
<td>1.7</td>
</tr>
</tbody>
</table>

These observations suggest that the typical citizen sought medical attention from a professional health care provider between four and five times per year and obtained dental care about 1.6 times per year during the period 1964-1981. Data from this NCHS survey also indicate differences in number of visits that are related to age, sex, race, and family income.

Data from the National Ambulatory Medical Care Survey show that the percentage of the population with one or more visits to physicians per year increased from 67.7% in 1963-1964 to 75.7% in 1975. These figures have stabilized since 1975 in terms of the percent of whites and minorities visiting physicians (National Center for Health Statistics, 1985b). If consultations with physicians and dentists are indicative of routine contacts
with health professionals, then data suggest that about three-fourths of all citizens have one or more contacts per year and that the total number of contacts per person per year is about six.

Consumer surveys suggest health professionals are not the only primary source of health-related information. For example, The Hearst Corporation (1985) survey of 998 adult women found the women surveyed obtained health-related information from the following sources either frequently or sometimes:

<table>
<thead>
<tr>
<th>Source</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magazines</td>
<td>78%</td>
</tr>
<tr>
<td>Television</td>
<td>76%</td>
</tr>
<tr>
<td>Personal physician</td>
<td>74%</td>
</tr>
<tr>
<td>Newspapers</td>
<td>70%</td>
</tr>
<tr>
<td>Friend or family member</td>
<td>66%</td>
</tr>
<tr>
<td>Radio</td>
<td>47%</td>
</tr>
<tr>
<td>Books</td>
<td>37%</td>
</tr>
<tr>
<td>Other health professionals</td>
<td>37%</td>
</tr>
<tr>
<td>Public health agencies</td>
<td>22%</td>
</tr>
<tr>
<td>FDA and DHHS</td>
<td>20%</td>
</tr>
<tr>
<td>Women's Health Centers</td>
<td>14%</td>
</tr>
</tbody>
</table>

The Panel suggests that these data, while on a small sample, indicate that magazines, television, and newspapers are as important or perhaps more important sources of health-related information than individual contacts with health professionals. The Panel does have concerns in regard to the reliability and scientific accuracy of nutrition information disseminated via these sources.

C. PROGRESS ON IMPLEMENTATION AND DATA GAPS

The programs and strategies identified in the PHS implementation plans are directed primarily toward physicians and not to the broad array of health professionals who may provide nutrition education or diet counseling. The Panel has few data on progress in these programs. In addition, many citizens received significant health-related information from other sources. The relative increase in, and acceptance of, nutrient labeling in the past several years (see Objective #11) is in itself an indication of a greater degree of consumer education in regard to nutrition.

The ADA indicated that Objective #14 will be achieved in publicly funded pediatric (EPSDT) and prenatal (Medi-Cal) programs in California (Owen and Haynes, 1985); however, no data were provided in support of this conclusion. The ADA statement also indicated that widespread access to effective nutritional services to treat major chronic diseases is not likely unless substantial change occurs in referral patterns by physicians and in reimbursement practices to registered dietitians by third-party payors. In addition, ADA noted that it was unlikely that
a significant percentage of physicians will incorporate nutrition into their practices unless new methods are developed and promoted through vigorous continuing medical education (CME) efforts.

A recent National Academy of Sciences (NAS) publication addressed issues associated with education of physicians (National Research Council, 1985). Among other conclusions, the NAS Panel recommended that medical students be given a course or its equivalent in the fundamentals of nutrition along with the other basic sciences. The report and its recommendation have not been universally accepted (Cooper, 1985). Even if an increase in nutrition education as part of medical curricula were accomplished, the effect on health contacts would not be evident until well after 1990. Efforts to encourage similar formal coursework for dental students are underway.

A second relevant issue is education of health professionals in regard to acquiring the knowledge base to recognize who needs nutrition education and/or counseling. There is a continuing need for data on the quantity and quality of nutrition course content in required curricula for health professionals who provide primary and secondary health care (e.g., physicians assistants, nurses, nurse practitioners, nurse midwives, therapists, and others). The issue of nutrition education of health professionals was mentioned by many of the scientific organizations providing information and comments to the Panel, including the ADA, AHA, AHEA, AIN, AMA, Public Health Foundation (PHF), and SNE. The qualifications of educators who teach nutrition to these various types of health professionals continues to be a topic of discussion.

Registered dietitians and public health nutritionists are the health professionals educated and trained to provide diet counseling and nutrition education. They represent a resource for training and education of not only individuals or groups, but also other health professionals. The Report of the 1984 Study Commission on Dietetics (American Dietetic Association, 1985) suggests that in 1981 there were 30,645 full-time equivalent dietitians employed in all settings with 47% employed in hospitals. An increasing number of dietitians are employed in private practice or in community agencies where they could provide counseling and education to patients and clients referred by other health professionals.

The WIC Program, funded by the USDA, provides nutrition counseling, education, and food supplements to low-income pregnant women, infants, and children as an adjunct to their health care (Association of State and Territorial Health Officials Foundation, 1985). According to data collected from 47 state health agencies, 44 provided nutrition screening services to 7.5 million people in 1983. Of those receiving nutrition counseling, 93% did so under WIC programs. These data suggest that nutrition
implementation programs identified in 1983 within DHHS are funded at considerably lower levels than those of USDA in terms of delivery of nutrition education and nutrition counseling. This observation is in part corroborated in a first quarter 1985 survey of Kaufman (1985). They found that within 54 states and territories reporting, 2930 public health nutritionist positions were budgeted in state and local health agencies. Of these, 62% were funded by WIC and 11% by the MCH Block Grant. When all funding sources for state and local health agencies are taken together, about 25% of positions for public health nutritionists are funded by state and local revenues and 73% are funded federally to serve women of childbearing age, infants, and children. As pointed out by Kaufman (1985), these data indicate that the majority of time and effort of public health nutritionists at the state and local level is supported for activities associated with four of the National Nutrition Objectives which focus on women, infants, and children, even though 11 of the Nutrition Objectives related to health promotion and disease prevention for adults.

A number of nutrition educational activities occur outside contacts with primary health care providers. For example, the Cooperative State Extension Service of the USDA and Land Grant Colleges have a broad and far-reaching educational program in human nutrition throughout the 50 states. Results of a recent study showed that clients of the Extension Service often asked about the relationship of diet to health, interactions of foods with drugs, and information on therapeutic diets (Sims et al., 1985). While not funded to conduct education, the USDA Agricultural Research Service has established five major Nutrition Research Centers. In addition, the USDA Food and Consumer Services agency oversees a significant number of programs involving family nutrition services, food distribution, special food supplement distribution, data collection, and monitoring of food consumption and dietary composition of the U.S. population. In the overall perspective, these programs provide nutrition information to consumers but these are not strictly contacts with health professionals.

The Panel concludes that the number of health professionals with training in nutrition is limited. Dietitians, nutritionists, and a few clinical nutritionists (primarily M.D.s) represent the primary resource and most medical practitioners, the other. Available data on the former suggest the number of qualified persons is small in terms of individual contact with citizens (Association of State and Territorial Health Foundation, 1985).

One possible indication of progress is the establishment of Clinical Nutrition Research Units (CNRU) funded by DHHS during the past 6 years. Results of their research programs have been reported (Combs et al., 1986). While it is generally acknowledged that the research activities of CNRU do contribute to nutrition education, the extent of these contributions have
not been evaluated. The number of CNRU has not expanded and they are funded to conduct research only, even though the CNRU setting provides ample opportunity for graduate and professional training and service. DHHS support for nutrition curriculum development grants in applied nutrition for health professional schools was eliminated in 1981.

Many voluntary and professional public health organizations make a wide range of nutrition-oriented information and materials available to the public directly or through health professionals. For example, the AHA has a series of pamphlets on hypertension, heart disease, salt and sodium, weight reduction, etc., which are utilized widely by health professionals in nutrition education and counseling. Similarly, the ADA, NDC, and other organizations (e.g., grocery chains such as the Giant Food, Inc.) provide public information and educational materials that relate nutrition and health.

D. SUGGESTED PROGRAMS AND STRATEGIES

The Panel concludes that there is a complex set of issues which relate to education of health professionals and qualifications of health professionals who are providing nutrition education and counseling. The Panel does not believe these issues can be resolved by 1990. Pertinent questions include:

- Should formal nutrition coursework be mandated in core curricula of medical, dental, nursing, allied health, and public health students?

- If nutrition education should be an identifiable formal segment of education and training of all health professionals, what topics should be included and what credentials should be required of the faculty?

- Should certification of designated health professionals include tests of their nutrition knowledge?

- What system of certification, registration, or licensure of nutrition professionals should be espoused and promulgated?

- Should national scientific and medical organizations provide appropriate guides or publications on evaluation of credentials or validity of certification, registration, and/or licensure of health professionals who provide nutrition counseling?

The Panel suggests that for the period 1985 to 1990, efforts of the public and private sectors emphasize the concepts of nutrition identified in Dietary Guidelines for Americans. In counseling individuals with particular nutrition problems, such
as anorexia nervosa or morbid obesity, referral to a qualified physician or medical clinic should be standard practice. The Panel is of the opinion that almost all major encounters with physicians and dentists provide an opportunity to consider the nutritional aspects of the disorder or disease being prevented or treated. When nutritional assessment and evaluation are needed, referral to a qualified health professional, such as a registered dietitian, should be accepted practice.

The Panel recommends that emphasis be placed on the following programs and strategies from 1986 to 1990:

1) **Education and training of health professional practitioners**

- Medical, public health, nursing, pharmacy, occupational therapy, physical therapy, and dental schools should have an independent "core" course in nutrition to assure that students can recognize nutrition problems and can refer patients to appropriate resources.

- The training of generalist primary care practitioners (e.g., physicians, nurses, etc.) should include programs that encourage joint training on a clinical level in aspects of nutrition dealing with health promotion and disease prevention, treatment of nutrition-related diseases and disorders, and nutritional support.

- All national or state boards for registration, certification, or licensure in the fields noted above should include both basic and applied nutrition items on their qualifying examination.

2) **Coordination of service delivery**

- Every health professional school should identify a faculty member as the nutrition coordinator. This person would be involved in planning programs for students and serve as a contact person for an education and training network in nutrition.

- The federal government should consider providing funding and assistance for development of regional networks of teaching hospitals and health professional schools as well as institutions involved in health promotion and disease prevention, modeled on regional networks now existing in New York/New Jersey and the Southeast.

3) **Reimbursement for services**

- Federal training support and teaching hospital reimbursement for both physician specialists and clinical nutrition specialists in allied health
should be available at all hospitals accredited by the Joint Commission on Accreditation of Hospitals (JCAH).

- Prospective payment systems for health care delivery should include documentation of nutrition education and nutrition counseling.

- Federal training support and teaching-related reimbursements in teaching hospitals should be based on calculations which include not only numbers of physicians and allied health professionals, but also other baccalaureate and masters degree level specialists such as clinical nutritionists and registered dietitians.

E. RECOMMENDATION OF PANEL ON OBJECTIVE

The Panel concludes that Objective #14 as written is desirable, but unmeasurable. Rather, the Panel urges strongly that professional education in nutrition be strengthened and that nutrition counseling be emphasized. Programs and strategies should address those issues identified on p.107. If accomplished by 1990, all encounters with primary health care professionals could include the availability of nutritional care or referral to nutrition education or counseling qualified nutrition professionals as appropriate. The Panel recognizes that this suggestion is also desirable, but unmeasurable.

The Panel recommends that Objective #14 be reconsidered as a goal, and might be altered to read:

- By 1990, 95% of all encounters with primary health care professionals by individuals who are at risk because of age, physiological, or disease-related factors will include (or will make referrals to) nutrition education or nutrition counseling, as appropriate.
OBJECTIVE #15: "Before 1990, a comprehensive National nutrition status monitoring system should have the capability for detecting nutritional problems in special population groups, as well as for obtaining baseline data for decisions on National nutrition policies."

A. ANALYSIS OF OBJECTIVE AS STATED

The Panel suggests that the objective or implementation plans need better definition. Specifically, the extent to which special population groups are identified needs further clarification. For example, data are incomplete on nutritional status of major subgroups such as Blacks, Mexican Americans, Asian Americans, Puerto Rican Americans, children under age 5 years, pregnant adolescents, the frail elderly, and elderly over 85 years of age. In addition, provisions should be made for larger sample sizes of such minorities in order that multiple subgroups (e.g., low-income, white, elderly) can be assessed. Secondly, the Panel concludes that the implementation plans for 1990 should include a major focus on timely dissemination of data and appropriate interpretation to the states. The state health agencies have a continuing requirement for baseline data to make nutrition policy decisions as well as for program planning and evaluation.

B. PERTINENT SOURCES OF DATA

The nutrition monitoring activities of DHHS agencies have been reviewed by Brandt and McGinnis (1984), and those of USDA by Harris (1985). A number of national and regional surveys provide data on nutritional status. These include:

- The National Health and Nutrition Examination Survey (NHANES);
- The Nationwide Food Consumption Survey (NFCS);
- The National Health Information Survey (NHIS);
- The CDC Pediatric and Pregnancy Nutrition Surveillance Systems;
- The CDC Behavioral Risk Factor Survey;
- The several surveys by NIH Institutes, e.g., NHLBI, NCI on blood lipid levels and cancer.

These efforts, and related activities, are sources of data; however, the slow pace and discontinuities in collection, analysis, publication, and dissemination of data are continuing impediments to their use. For example, much of the data from
NHANES II, conducted in 1976-1980, has become available only recently because of limited resources for data analyses and dissemination.

C. PROGRESS ON IMPLEMENTATION AND ADDITIONAL DATA NEEDED

Among the implementation steps identified in 1979, several have been completed or are ongoing. These include:

- Planning for conduct of NHANES III in 1988;
- Monitoring of blood lipid levels in the U.S. population;
- Conduct of the Hispanic HANES (1982-1984);
- Studies and surveys of the nutritional content of foods and changes in patterns of dietary consumption of foods;
- Initiation of the Continuing Survey of Food Intakes by Individuals (CSFII);
- Expansion of the computerized National Nutrient Data Bank;

Since development of the Joint Implementation Plan, several task forces and interagency committees have extended and refined the scope and content of the 1981 Comprehensive National Nutrition Monitoring Plan. The majority of these groups has recommended monitoring food components that have public health significance such as food energy, total fat, and various essential nutrients. Several systems have been developed for prioritizing the food components to be monitored. Implementation of the National Nutrition Monitoring System will improve information exchange between data generators and users, will increase the types and quantity of nutrition data available to all users, and will provide a uniform framework for collecting, analyzing, and evaluating data on the nutritional status of the U.S. population. Publication of the final report of the Joint USDA/DHHS Nutrition Monitoring Evaluation Committee (JNMEC) is pending (Woteki, 1985).

Legislation has been introduced into the 99th Congress to provide for enactment of National Nutrition Monitoring programs. These include:


As of February 19, 1986, the House Science and Technology Committee voted to report H.R. 2436 to the full House; no action has been reported on S. 1569.

Within the several states, nutrition surveillance programs are utilized to monitor quality of service delivery, identify possible problems in reaching target populations, and provide objective data on programs for planning purposes (Scheer and Sims, 1983). Because such local monitoring systems serve the needs of city, county, and state health agencies not only for monitoring the nutritional status of the population but also for other public health purposes, these requirements should receive serious consideration in pending federal efforts.

D. SUGGESTED PROGRAMS AND STRATEGIES

It is evident from information received from scientific organizations that there is widespread, strong support in the scientific community for Objective #15. For example, the SNE (Maretzki, 1985) stated:

... the 1984 President's Task Force on Food Assistance identified the need to improve Federal efforts in nutrition monitoring. A bill has been introduced in the 99th Congress (H.R. 2436) which is widely supported by over 70 scientific, professional, public health and government organizations and consumer, antihunger, senior, religious and community groups. SNE supports H.R. 2436 because it will put into place a coordinated system for obtaining data on the nutritional status of the U.S. population and thereby make more effective use of Federal expenditures for nutrition monitoring activities. The legislation would also help to solve many of the problems with current monitoring activities which are uncoordinated, untimely, give inadequate attention to assessing high-risk groups and geographic areas, and lack sufficient resources for the continuous collection, processing and analysis of dietary, nutritional and related health status information. For example, the hope for integration between the National Health and Nutrition Examination Survey (NHANES)
and the Nationwide Food Consumption Survey (NFCS) in 1987 was delayed because DHHS did not budget for the survey in its FY 85 budget proposal.

The ADA (Owen and Haynes, 1985) noted:

Due to funding restrictions, virtually all elements of this system are behind schedule, outdated and/or not readily available. In addition, the major surveys are conducted and reported too infrequently to be useful in detecting new nutrition problems or monitoring trends. There seems to be little development of cheaper and quicker methods, and technical assistance to help other levels of government do this is very limited.

In Maryland, the Governor's Task Force on Food and Nutrition issued an Interim Report (November 1984) that identified the need for a monitoring system to provide a continuing source of data on nutritional needs of specific population subgroups. The data are essential to measure current status and to demonstrate progress in meeting the Objectives.

Some of these problems are addressed by mechanisms found in current legislation, H.R. 2436 (National Nutrition Monitoring and Related Research Act of 1985) and S.R. 1569 (Improved Public Health Through Nutrition Monitoring Act of 1985), which are widely supported by the nutrition community.

Results of the AIN Survey (Allison, 1985) and comments received from the AMA (White and Lubin, 1985) support the establishment of a National Nutrition Monitoring System. Individual views expressed in the AIN survey note inadequacy of current funding, the need for coordination of efforts, and the possible need to lengthen the time frame for implementation. The AMA indicated that Objective #15 will be accomplished only when DHHS and USDA agree to cooperate on the overall goal.

E. PANEL RECOMMENDATIONS ON THE OBJECTIVE

Information and views received from the scientific community indicate that there is unanimous support for Objective #15. The Panel agrees that Objective #15 is both desirable and needed. The components of the National Nutrition Monitoring System that are already in place (e.g., NCHS, CDC, FDA, NHLBI, and USDA data collection and analysis programs) are a major
source of data used by the Panel and the DHHS Task Force in evaluating progress from 1980 to 1985 on Objectives for Improved Nutrition. If the comprehensive National Nutrition Monitoring System were operational in 1990, evaluation of progress on the Objectives for the Nation would be facilitated.

The Panel observes that fiscal support for programs related to assessment of nutritional status has been insufficient to provide for timely data analysis, publication, and dissemination. While there is widespread scientific support within DHHS and USDA for a coordinated National Nutritional Monitoring System, there is no agreement at the public policy level on the content and scope of the system. The Panel suggests that agreement on scientific aspects of a coordinated National Nutritional Monitoring System should be reached prior to the legislative mandate for such a system. The Panel also suggests that Objective #15 is sufficiently important to promotion of health and prevention of disease that, if necessary, additional resources, manpower, and time should be committed to its attainment by 1990. The current impasse should be resolved in 1986 by focused efforts of the secretaries of the two departments.

Because of the widespread support for the concept of a National Nutrition Monitoring System, the Panel suggests that Objective #15 is attainable by 1990 through increased support for expansion and integration of components now in existence. Restating Objective #15 more positively:

- By 1990, a comprehensive National Nutrition Monitoring System should be in place and operational. The system should be capable of detecting nutritional problems in special population groups and of providing data to federal, state, and local agencies for decisions on nutrition policies as well as program planning, implementation, and evaluation.
IV. CONCLUDING REMARKS

A. GENERAL CONCLUSIONS

The DHHS is to be commended for its continuing efforts to develop specific objectives for improving nutrition of the U.S. population and to evaluate progress in achieving these objectives. As developed in 1979, the Objectives for Improved Nutrition for 1990 served to focus the attention of local, state, and federal agencies, interested industries, academia, professional and voluntary organizations, and the general public on disease prevention and health promotion. The Objectives designated potential benefits from improved nutrition in promoting health and preventing disease. They focused on reduction of dietary and related risk factors for major diseases, increased public awareness and knowledge about nutrition as well as professional efforts to provide such knowledge, and development of a nationwide system to monitor nutritional status of the population.

While not stated specifically in the report of the 1979 Conference (U.S. Department of Health, Education, and Welfare, 1979) or implementation plans (U.S. Department of Health and Human Services, 1983), awareness of the interrelationships of nutrition and health by individuals was a fundamental goal in the Objectives for Improved Nutrition. The Panel anticipates that with concerted emphasis on the 15 Objectives, by 1990 a majority of school-age children and adults in the U.S. population could know their height, weight, blood pressure, and serum cholesterol and the implications of these for their own health. Similarly, by 1990, a majority of all school-age children and adults in the U.S. population could be able to list the seven basic nutrition concepts in Dietary Guidelines for Americans (U.S. Department of Agriculture/U.S. Department of Health and Human Services, 1985).

Therefore the Panel concludes:

- Selection of Objectives for Improved Nutrition as one of the 15 topics in Objectives for the Nation in 1990 is laudable. Nutrition scientists and practitioners have for many years worked to gain public attention concerning the important role that quality of diet plays in health promotion and disease prevention. The Objectives have served to identify key areas related to nutrition and diet.
• Information available to the Panel including that provided by scientific societies and other organizations is consistent with the hypothesis that acceptance and implementation of the Objectives for Improved Nutrition have had a beneficial effect on nutritional awareness and the overall health of the U.S. population. However, the available data are not sufficient to permit the conclusion that documented health improvements can be attributed directly to the 15 Objectives for Improved Nutrition.

B. QUESTIONS ADDRESSED

The Panel has discussed the seven questions posed by FDA in the workscope in the course of its deliberations. Four of the questions (#1, #2, #6, and #7) (see Chapter I, p.4) are specific to each Objective and this Panel's responses are presented within the several sections of Chapter III.

1) Deletion of Objectives. The Panel concludes that none of the Objectives for Improved Nutrition as stated in 1980 should be deleted. The Panel has recommended certain changes in the focus of some objectives; however, for continuity over the 10-year period, all should be retained.

2) Modification of Objectives. As evidenced by the Panel's conclusions presented in Chapter III, the midcourse review has provided an opportunity to modify and reorient the scope or focus of several Objectives for Improved Nutrition.

The Panel, and several scientific organizations that provided information and comments, noted repeatedly that to be useful in practice, objectives require endpoints that are measurable. That is, progress in reaching each objective must be quantifiable. From the Panel's perspective, either the 1980 statements of some of the objectives did not clearly delineate measurable endpoints, or the implementation plans did not provide for programs or resources necessary to measure progress.

The Panel recognizes that all modifications of the Objectives for Improved Nutrition suggested in Chapter III may not be possible. In Chapter V, the Panel suggests a process by which these modifications could be considered in the future.

3) Additional Objectives for Improved Nutrition in 1990. Knowledge of the role of nutrients in specific metabolic processes, in health promotion, and disease prevention has expanded rapidly in recent decades. Information and views
received from the scientific community led the Panel to suggest serious consideration be given to the addition of two important public health issues that include Objectives for Improved Nutrition. These are identified in the following paragraphs.

a) **Nutrition and Cancer.** The role of diet, dietary factors, and nutrition in the etiology and prevention of various types of cancers is a topic of continuing scientific research and debate. In a review of causes of cancers, Doll and Peto (1981) stated that if suitable modifications of national dietary practices were adopted, there is strong but indirect evidence that the death rates from the most common types of cancers could be reduced. However, they indicated that neither laboratory studies nor epidemiological observations may be able to provide evidence for causal or protective relationships in human populations because of the difficulty in control of confounding factors. Nevertheless, Doll and Peto (1981) estimated that a 35% reduction of the U.S. death rate from the major types of cancer might be possible by dietary modifications.

A committee of the NRC has published a comprehensive review entitled, "Diet, Nutrition, and Cancer" (National Research Council, 1982). This report reviewed the then current state of knowledge on associations between dietary factors and occurrence of various types of human cancer. The report draws on experimental animal studies, epidemiological investigations, and other sources of data and information. While cautioning "... it is not yet possible to make firm scientific pronouncements about the association between diet and cancer", the NRC committee noted a positive association between cancer occurrence and high dietary intakes of fat and protein, as well as an inverse relationship between cancer and dietary intakes of vitamin A and its carotenoid precursors, vitamin C and selenium.

The NRC Committee concluded that scientific evidence suggests most common types of cancer are influenced by dietary patterns, but precise estimates of the contribution of diet and its components as well as the percent reduction of risk for certain cancers that might be afforded by dietary modifications were not possible (National Research Council, 1982).

The Panel concludes that in view of the evolving information on associations among dietary factors, nutritional status, and development or prevention of cancer, focus should be given to diet, nutrition, and cancer by identification of an Objective for Improved Nutrition in the National Objectives for 1990.
• By 1990, public and private sector support for biomedical research on interrelationships of dietary factors, dietary patterns, specific nutrients, and related nutritional factors with cancer should be increased over that designated in 1985.

• By 1990, educational and informational programs on the influence of diet and nutrition on cancer should have reached 95% of all adults in the United States. Programs in the public and private sectors should be coordinated to provide information that is scientifically sound, definitive, and consistent with research findings.

b) Nutrition and Skeletal Integrity. Osteoporosis is generally regarded as a significant health problem in the older population of the United States, particularly in postmenopausal white women. In 1984, osteoporosis was considered a public health problem sufficiently serious to warrant a National Institutes of Health Consensus Development Conference to address issues pertinent to the etiology, progression, and treatment of the disease (Consensus Development Panel, 1984).

Peak adult bone mass accrued early in adulthood may be an important determinant of bone mass remaining later in life. Cortical bone and trabecular bone lost at varying rates over the remainder of the lifespan, with an average annual loss rate of about 1% (Parfitt, 1984a,b). Along with decreases in bone mass after the third to fourth decade, hormonal production patterns change, particularly in postmenopausal women. These changes contribute to the occurrence of osteoporosis and increased incidence of fractures with age.

A number of risk factors have been implicated in bone mineral loss. These include sedentary lifestyle, lighter body weight, smoking, alcohol abuse, and certain diseases or drug treatments (Johnston, 1984; Melton and Riggs, 1983). Nutritional factors also play a role in the development of osteoporosis, although direct relationships between dietary intakes of certain nutrients with development of osteoporosis have not been established. Among nutrients receiving greatest attention in this respect are calcium (Matkovic et al., 1979), phosphorus (Anderson et al., 1977), vitamin D (Anderson, 1982), and protein (Allen et al., 1979).
While there are multiple factors involved in the development of osteoporosis, a majority of the Panel members concludes that the role of diet in development of osteoporosis should be identified as an Objective for Improved Nutrition in 1990.

- By 1990, public and private sector support for biomedical research on the inter-relationships of dietary factors and specific nutrients with osteoporosis should be increased over that designated in 1985.

- By 1990, scientific knowledge on the role of nutritional factors in the etiology and prevention of osteoporosis should be sufficient to support coordinated public and private sector educational and information programs to increase public awareness of the nutritional risk factors associated with development of the disorder.

The Panel recommends that the DHHS Task Force initiate efforts to develop these two additional Objectives for 1990 more fully.
V. RECOMMENDATIONS FOR FUTURE CONSIDERATION

In its evaluation of the Objectives for Improved Nutrition (Chapter III), the Panel noted a number of inter-relationships among the objectives, including commonality of implementation programs or several approaches to prevention of one disease. Similarly, the Panel observes that nutrition intervention, education, awareness, and activities are frequently identified in other Objectives for the Nation in 1990. For example, the Objectives for the Nation on High Blood Pressure Control (#1), Improved Nutrition (#13), Physical Fitness and Exercise (#14), as well as Control of Stress and Violent Behavior (#15) all include aspects of lifestyle, diet, and awareness of factors that impact on development of cardiovascular disease. Similarly, nutrition intervention is included in Pregnancy and Infant Health (#13) and infant nutrition is associated with Objective #7 in Improved Nutrition. In addition, avoidance of cariogenic foods is noted in Fluoridation and Dental Health (#9), while nutrition education per se is Objective #13 in Improved Nutrition.

Rather than recommending restructuring of the Nutrition Objectives or overall Public Health Objectives for 1990 at this time, the Panel recommends strongly that efforts be initiated in 1986 to develop Objectives for the Nation, including Objectives for Improved Nutrition for the decade 1990-2000. The Objectives for Improved Nutrition should be based on current and evolving knowledge of nutrition and nutritional impact on health promotion and disease prevention. They should be developed carefully and critically as quantifiable objectives. They must be established with sufficient resources to facilitate their implementation and assessment, but with sufficient flexibility to allow midcourse correction in 1995.

An early step in the planning for Objectives for the Nation for 2000 would be reexamination of the scope and inter-relationships of the 15 topical areas identified as Objectives for the Nation in 1990. Subsequently, the planning process should include identification and delineation of quantifiable Objectives for Improved Nutrition. The Panel's comments on systems development and analysis in Chapter II-D (see p.11), while addressing this midcourse evaluation of progress, are equally applicable to the establishment of objectives in all topical areas for the next decade.

Information and views received from the scientific community identified a number of public health concerns related to nutrition that are not stated as Objectives for Improved Nutrition in 1990. The Panel has reviewed these suggestions and recommends that the following topics be given consideration in the development of Objectives for Improved Nutrition in 2000.
A. NUTRITION AND DENTAL HEALTH

In the 1980 report on promoting health and preventing disease (U.S. Department of Health and Human Services, 1980), the role of nutrition in promoting dental health and preventing several dental diseases was discussed extensively. The 1983 implementation plans (U.S. Department of Health and Human Services, 1983) focused on fluoridation and dental health. In view of the recent advances in understanding of the role of nutrition in dental diseases and the pathological processes of dental diseases, consideration should be given to reexamining the possible need for an Objective for Improved Nutrition in 2000 that focuses on nutrition and dental health.

B. DIETARY CLAIMS/HEALTH FRAUD

Belief in mystical powers of foods has been a tenet of most civilizations since antiquity. Real or imagined concerns with the quality and safety of food lead persons to seek alternatives to what is considered accepted dietary practices. Often based in ignorance or fear, interest in alternative dietary practice can grow to zealousy and cultism. As noted by White and Mondeika (1980), man's belief in the magical, protective, or curative properties of foods, while constantly changing, continually leads to an uncertain blend of religion and pseudoscience.

Each generation has its compendium of health problems, diseases, and disorders for which solutions are sought. These continuing searches for eternal health, eternal youth, and magical cures provide ample opportunity for what Herbert (1980) has termed the "health hustlers". Sometimes misguided, but most frequently with malice of forethought, health hustlers peddle foods with "special properties", preparations that allegedly cure health-related disorders, and diets or supplements that claim to obviate the need for accepted dietary practice or medical treatment.

Health fraud in nutrition has many forms. It includes food fads, dietary claims, fad diets, recommendations on special nutrient needs, and disease prevention and therapy by dietary manipulation. Health fraud permeates contemporary society and preys on the ignorant, ill-informed, and unsuspecting citizen. Magazines, newspapers, radio, and television are major sources of nutrition information. The Panel has concerns in regard to the reliability and scientific validity of much of this information.

There are a number of current public health issues where nutrition health fraud is practiced. These include cancer control by dietary manipulation, alleviation of arthritis and other conditions by consumption of special food supplements, weight control regimens, and other approaches that range from innocuous to medically dangerous. The Panel is concerned that
nutrition health fraud continues to grow, despite efforts of the government and responsible segments of the health food industry to control misguided and fraudulent practices. The FDA, Federal Trade Commission, U.S. Postal Service, and Pharmaceuticals Advertising Council have recently expanded their joint efforts to address health fraud (U.S. Department of Health and Human Services, 1985a,b). The Council for Responsible Nutrition (1985) has developed a code of ethics for its members that deals with fair business practices, responsible advertising, and product safety.

Because health fraud in nutrition continues to grow, the Panel recommends that DHHS consider establishing an Objective for Improved Nutrition in 2000 that addresses health fraud and dietary claims. The current efforts of both the public and private sectors to control this major issue provide a basis for identifying baseline data, expanding programs to educate consumers, and developing regulatory and/or legislative approaches.

C. HYPERVITAMINOSIS

McDonald (1986) has indicated that approximately 35-40% of the U.S. population use vitamin/mineral supplements and that within certain population subgroups, use is substantially higher. Stewart et al. (1985) have reported analogous data from a survey of persons in the Western U.S. where supplement use is above average. One aspect of dietary claims is the touting of the need for, or value of, excess quantities of vitamins and minerals. Excessive consumption of fat-soluble vitamins that are stored efficiently in the body may lead to toxicity. For example, toxicity can result from chronic ingestion of vitamin D dosages that exceed the Recommended Dietary Allowances by several-fold (e.g., doses of 2000 IU). Doses in excess of 1000 IU/day should be prescribed by a physician (DeLuca, 1980). Signs and symptoms of vitamin D toxicity include: hypercalcemia, hypercalciuria, anorexia, nausea, vomiting, polyuria, an alternation of diarrhea and constipation, nephrocalcinosis, renal failure, kidney stones, and metastatic calcification of the kidneys, bronchi, arteries, and periarticular tissues. Cessation of megadose supplementation does not immediately reverse the toxicity because liver stores of the vitamin remain high and these continue to be liberated into the circulation.

Vitamin A and its provitamin, β-carotene, can also give rise to hypervitaminosis as well as undesirable effects. Hypervitaminosis A has been reported after doses of 1 million IU or more of preformed vitamin A and in less well-documented reports of toxicity in individuals consuming lesser doses for many years (McLaren, 1984). Signs and symptoms of the toxicity include headache secondary to transient hydrocephalus, lethargy, listlessness, abdominal distress, constipation, nausea, vomiting, malaise and fatigue, alopecia, brittle nails, exostosis, rough
skin, papilledema, and exophthalmia. Excessive ingestion of the carotenoids either as supplements or massive doses of carotenoid-rich foods such as carrots gives rise to yellowing of the skin.

Toxicities of the water-soluble vitamins have also been reported (Jaffe et al., 1975). The signs and symptoms of vitamin C toxicity include increased urinary oxalate excretion (which may increase risks of nephrolithiases), increased hemolysis among patients with glucose 6-phosphate dehydrogenase deficiency, accelerated metabolism and excretion of the vitamins, altered urine tests for blood and glucose, and altered stool occult blood tests.

The growing public interest in using dietary vitamin/mineral supplements to prevent disease is an emerging public health issue (McDonald, 1986). The Panel suggests that efforts be initiated to collect additional baseline data now so that consideration can be given to establishing an Objective for Improved Nutrition in 2000 that focuses on education concerning the hazards of hypervitaminosis.

D. ANOREXIA NERVOSA AND BULIMIA

These two disorders are frequently seen in young women and include perception of body weight as excessive, regardless of whether body mass index is within or below the normal range. While successful treatment requires medical intervention and frequently mental health counseling, education and recognition of warning signs are useful approaches to prevention. There are few data on the extent of the problem or the number of individuals being treated. If such data were collected in 1986-1990, and the disorders were considered a major public health issue, an Objective for Improved Nutrition in 2000 could be established.

E. NUTRITION IN PREGNANCY

One set of Objectives for the Nation in 1990 addressed problems and issues associated with pregnancy and infant health. While health of the pregnant woman and early growth and development of the newborn were stressed, major emphases were on education, prenatal care, supplementation of diet, and delivery of such services to target populations. Implementation plans and strategies included nutrition, but not as a single major focus.

The Panel is aware that several programs of DHHS and USDA are directed to pregnant women including adolescents, single persons, and socioeconomically disadvantaged individuals. Similarly, professional organizations, such as the American Academy of Pediatrics, have identified certain target populations where medical and public health intervention can be useful. One such group in these targeted populations is low-birth-weight infants.
Infants weighing less than 2500 g at birth are termed low-birth-weight (LBW). These newborns have a higher death rate than infants of normal weight and mortality rates are higher as birth weight is lower. In addition, these infants have a higher incidence of congenital defects, neurological and cognitive problems, mental retardation, and susceptibility to infection and neonatal hypoglycemia (Beal, 1980). LBW infants are really two different types -- those born under 37-weeks gestation (referred to as "preterm" infants), and those which are full-term but are underweight for their gestational age [called "growth retarded" (Vermeersch, 1981a)].

Epidemiological investigations have explored the specific risk factors associated with the incidence of LBW infants among certain population groups. These studies have revealed the influences of maternal age (infant mortality is elevated in mothers below the age of 15 years and over the age of 35 years); parity (complications of pregnancy are more common in first pregnancies and the highest risk of LBW occurred in mothers with five pregnancies or more); past obstetrical performance (poor performance in one pregnancy increases the chance of problems in subsequent ones); race (the prevalence of LBW infants is higher among nonwhite groups); and, social class (lower education and social class of the parents are associated with a greater prevalence of low-birth-weight babies).

As noted in the causes of growth retardation among children (See Chapter III, p.27), the influences of family income, parental education, and occupational characteristics confound any interpretation made for the influence of "social class" on the prevalence of LBW infants. Investigations of the relationship between birth weights and the stage of gestation reveal that genetic potential may not be responsible for the higher incidence of LBW among certain ethnic groups. Instead, it is speculated that the variations observed may at least partly results from fetal growth retardation in the last trimester of pregnancy (Vermeersch, 1981a).

There are a number of nutritional correlates of birth weight. Two indicators of nutritional status that have shown consistent associations with birth weight are maternal body size (height and prepregnancy weight) and the amount of weight gained by the mother during pregnancy (Vermeersch, 1981b). Studies of perinatal mortality rates in comparison with prepregnancy weight status (e.g., Naeye, 1979) suggest that overweight mothers should gain 16 pounds, normal weight mothers 20 pounds, and underweight mothers 30 pounds or more (Worthington-Roberts, 1985a). In an earlier study, Naeye and co-workers (1973) found that even when factors such as race, marital status, and the interval since the last pregnancy were taken into account, successive pregnancies in the most poorly nourished mothers led to progressively more undernourished infants, whereas mothers in the highest nutritional category had successively larger offspring.
In addition to encouraging appropriate weight gain in pregnancy through adequate caloric intake, certain nutrients are also important to emphasize during pregnancy. These are folic acid, pyridoxine (vitamin B-6), iron, calcium, zinc, vitamin B-12, and protein.

Recently, health researchers have become aware of the adverse effect of excessive consumption of alcohol on fetal development. Jones and associates (1973) described the "Fetal Alcohol Syndrome" (FAS), a series of effects seen in children of women who chronically drink alcohol to excess during pregnancy. There is a high rate of perinatal mortality among infants with FAS. Physical as well as mental development is impaired. FAS infants exhibit poor rates of weight gain and failure to thrive despite concerted efforts at nutritional rehabilitation (Vermeersch, 1981b). Unlike genetic disorders, FAS is a totally preventable cause of growth abnormalities, congenital malformations, and mental retardation (Worthington-Roberts, 1985b). Thus, intensive prevention strategies should be undertaken as there is no known way to reverse or reduce the effects of alcohol on the fetus once they have occurred (Ouellette, 1984).

Based on these considerations, the Panel recommends that evaluation of progress toward achieving the Objectives for the Nation in 1990 which deal with pregnancy and infant health could provide baseline data on the extent of LBW infants as a national public health problem. The CDC National Pregnancy Surveillance System and National Health Interview Survey should yield additional data. If LBW infants are determined to be a continuing national public health issue in 1986-1990, the Panel recommends that an Objective for the Nation in 2000 be established in 1990. The Objective should focus on strategies to address awareness and education associated with the need for adequate nutritional intake in pregnancy and reasons for avoidance of alcohol ingestion.

F. NUTRITION IN THE ELDERLY

In the past several years the elderly have emerged as a highly visible segment of the U.S. population (Morrison, 1984). The number of persons over 65 years of age continues to increase and by 2000 will comprise about 13% of the U.S. population (U.S. Department of Health and Human Services, 1984a).

A number of factors impact on nutrition in the elderly. These include: physiological changes in various organ systems, including achlorhydria and changes in the absorption of nutrients, as well as altered mastication from loss of teeth or ill-fitting dentures (Morrison, 1984). Loss of gustatory and olfactory sensation may also alter both appetite for food and thus consumption of nutrients (Cohen and Getman, 1959; Newman et al., 1960). Vision and hearing loss, social isolation, and difficulties in mobility also contribute to nutrition-related difficulties. Physical infirmities or fears for physical
safety may make it more difficult to shop for food. Apathy and depression owing to social isolation or grief and mourning may also militate against a healthy appetite. The use of prescription drugs which alter appetite also contributes to inadequate intakes. The incidence of chronic degenerative diseases rises with age; dietary factors may be relevant in their cause as well as in their treatment (McEvoy et al., 1983).

Taken together, there are many causes of inadequate nutrition in the elderly that appear to be preventable (Morrison, 1984; Wilson, 1981). Efforts are already underway in the public and private sectors to address some of these issues. For example, "Healthy Older People" is a cooperative effort of federal, state, and local governments, professional organizations, voluntary groups, industry, and media. Sponsored by DHHS, the program includes consumer education, professional education, and technical assistance.

Because the population of elderly is growing and because strategies and programs already in place are collecting data, the Panel recommends that the Objectives for the Nation in 2000 include a focus on the elderly, and within the Objectives for Improved Nutrition in 2000, one or more objectives, as appropriate, address aspects of nutrition of the elderly. Some members of the Panel conclude that there is ample rationale and basis to develop an objective on nutritional needs of the elderly at this time.
VI. LITERATURE CITED


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VII. STUDY PARTICIPANTS

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* Objective #7 only.
VIII. INDIVIDUALS AND ORGANIZATIONS PROVIDING MATERIALS

A. OPEN MEETING PARTICIPANTS*

The Open Meeting of the ad hoc Review Panel on National Nutrition Objectives was held October 31, 1985. Requests were received from seven individuals and organizations for opportunity to make oral presentations. The following individuals participated in the presentations:

E. Alcantara, Ph.D.
National Dairy Council
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Richard G. Allison, Ph.D.
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* Copies of the Open Meeting transcript are available from:

Ace Federal Reporters
444 North Capitol Street
Washington, D.C. 20001
B. ORGANIZATIONS SUBMITTING STATEMENTS

The following organizations and individuals submitted written materials for consideration by the ad hoc Review Panel:

American Academy of Pediatrics
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American Dental Hygienists' Association
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Department of Health Services - California
Sacramento, California

Grocery Manufactures of America, Inc.
Washington, D.C.

Institute of Food Technologist
Chicago, Illinois

International Life Sciences Institute
Washington, D.C.

The National Association of State
Departments of Agriculture
Washington, D.C.

National Cattlemen's Association
Washington, D.C.

National Food Processors Association
Washington, D.C.

National Live Stock and Meat Board
Washington, D.C.

National Research Council/Food and
Nutrition Board
Washington, D.C.

National Restaurant Association
Washington, D.C.

National Task Force for the Preparation
and Practice of Health Educators, Inc.
New York, New York

Produce Marketing Association, Inc.
Newark, Delaware

The Public Health Foundation
(formerly Association of State
and Territorial Health Officials)
Kensington, Maryland

Society for Nutrition Education
Oakland, California

Task Force on Blacks and Minority Health
Bethesda, Maryland

The Sugar Association, Inc.
Washington, D.C.
APPENDIX A

LIST OF SCIENTIFIC SOCIETIES AND ORGANIZATIONS CONTACTED

American Academy of Pediatrics
American Association of Cereal Chemists
American Association of Colleges of Nursing
American Association of Medical Colleges
American Association of Occupational Health Nurses, Inc.
American Association of Retired Persons
American Cancer Society
American College Health Association
American College of Nurse Midwives
American College of Nutrition
American College of Obstetricians and Gynecologists
American Dental Association
American Dental Hygienists' Association
American Diabetes Association
American Dietetic Association
American Heart Association
American Holistic Nurses Association
American Home Economics Association
American Institute of Nutrition/American Society for Clinical Nutrition
American Meat Institute
American Medical Association
American Nurses' Association, Inc.
American Public Health Association
American School Food Service Association
American Society of Allied Health Professions
American Society of Bariatric Physicians
Association for Fitness in Business
Association of Food and Drug Officials of the U.S.
Association of Schools of Public Health
Association of State and Territorial Directors of Nursing
Association of State and Territorial Public Health Nutrition Directors
Association for the Care of Children's Health
Bread for the World
Center of Budget and Policy Priorities
Center for Science in the Public Interest
Community Nutrition Institute
Council for Responsible Nutrition
Food and Nutrition Board/National Academy of Sciences
Food Marketing Institute
Food Research and Action Center
Grocery Manufacturers Association
Institute of Food Technologists
International Life Sciences Institute
March of Dimes Birth Defects Foundation
National Association of Pediatric Nurse Associates Practitioners
National Association of School Nurses, Inc.
National Association of State Departments of Agriculture
National Cattlemen's Association
National Dairy Council
National Education Association
National Food Processors Association
National Food Service Association
National Frozen Food Association
National Pork Producers Council
National Restaurant Association
National Task Force for the Preparation and Practice of Health Educators, Inc.
Produce Marketing Association
Public Citizen Health Research Group
The Public Health Foundation (formerly Association of State and Territorial Health Officials)
Public Voice for Food and Health Policy
Society for Nutrition Education
The Sugar Association
Task Force on Black and Minority Health
United Egg Producers
United Fresh Fruit and Vegetable Association
Wheat Industry Council
APPENDIX B

LIST OF ACRONYMS

ADA American Dietetic Association
AHA American Heart Association
AHEA American Home Economics Association
AIN American Institute of Nutrition
AMA American Medical Association
ANA American Nursing Association
ASTHO Association of State and Territorial Health Officials
BMI Body mass index
CDC Centers for Disease Control
CFSAN Center for Food Safety and Applied Nutrition
CHD Coronary heart disease
CME Continuing Medical Education
CNI Community Nutrition Institute
CNRU Clinical Nutrition Research Units
CSFII Continuing Survey of Food Intakes by Individuals
DHHS U.S. Department of Health and Human Services
EPSDT Early and Periodic Screening, Diagnosis, and Treatment Program
FAS Fetal alcohol syndrome
FASEB Federation of American Societies for Experimental Biology
FDA Food and Drug Administration
FLAPS Food Label and Package Survey
FMI Food Marketing Institute
FNS Food and Nutrition Services, USDA
FRAC  Food Research and Action Center
GAO   General Accounting Office
HANES Health and Nutrition Examination Survey
IHS   Indian Health Survey
ILSI  International Life Sciences Institute
JADA  Journal of the American Dietetic Association
JCAH  Joint Commission on Accreditation of Hospitals
JNE   Journal of Nutrition Education
JNMEC Joint (USDA/DHHS) Nutrition Monitoring Evaluation Committee
LBW   Low-birth-weight
LRC   Lipid Research Clinics
LRC-CPPT Lipid Research Clinics Coronary Primary Prevention Trial
LSRO  Life Sciences Research Office
MCH   Maternal and Child Health
MCV   Mean Corpuscular Volume
MRFIT Multiple Risk Factor Intervention Trial
NAS   National Academy of Sciences
NCHS  National Center for Health Statistics
NCI   National Cancer Institute
NCPP  National Collaborative Perinatal Program
NDC   National Dairy Council
NET   Nutrition Education and Training Program
NFCS  Nationwide Food Consumption Survey
NFPA  National Food Processors Association
NHANES National Health and Nutrition Examination Survey
NHIS  National Health Information Survey
NHLBI  National Heart, Lung, and Blood Institute
NIH   National Institutes of Health
NINCDS National Institute of Neurological and Communicative Disorders and Stroke
NNS   National Natality Surveys
NRA.   National Restaurant Association
NRC   National Research Council
OASH  Office of the Assistant Secretary for Health
OSTP  Office of Science and Technology Policy
OTA   Office of Technology Assessment
PHF   Public Health Foundation (formerly ASTHO)
PHS   Public Health Service
PNETP Preschool Nutrition Education and Training Program
PTV   Public Television
RBC   Red blood cell
RDA   Recommended Dietary Allowance
SFSRR School Food Service Research Review
SNE   Society for Nutrition Education
USDA  United States Department of Agriculture
USRDA United States Recommended Dietary Allowance
WIC   Special Supplemental Food Program for Women, Infants and Children