19

Nutrition and Overweight

Co-Lead Agencies: Food and Drug Administration
National Institutes of Health

Contents

Goal

Promote health and reduce chronic disease associated with diet and weight.

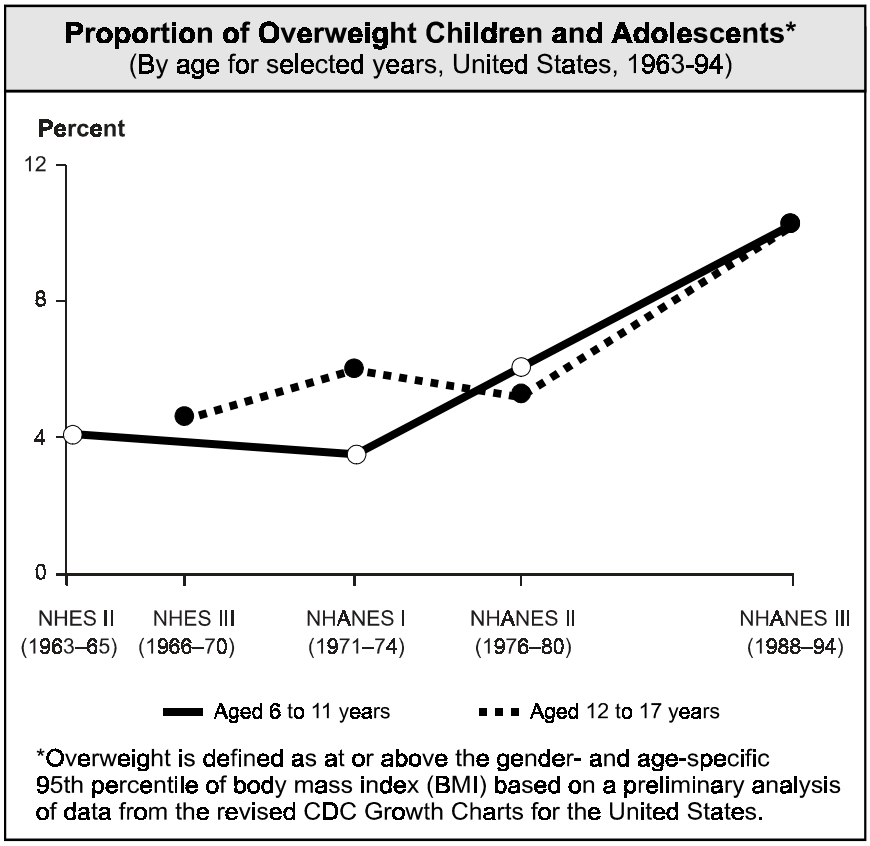
Overview

Issues and Trends

Nutrition is essential for growth and development, health, and well-being. Behaviors to promote health should start early in life with breastfeeding[1] and continue through life with the development of healthful eating habits. Nutritional, or dietary, factors contribute substantially to the burden of preventable illnesses and premature deaths in the United States.[2] Indeed, dietary factors are associated with 4 of the 10 leading causes of death: coronary heart disease (CHD), some types of cancer, stroke, and type 2 diabetes.[3] These health conditions are estimated to cost society over $200 billion each year in medical expenses and lost productivity.[4] Dietary factors also are associated with osteoporosis, which affects more than 25 million persons in the United States and is the major underlying cause of bone fractures in postmenopausal women and elderly persons.[5]

Many dietary components are involved in the relationship between nutrition and health. A primary concern is consuming too much saturated fat and too few vegetables, fruits, and grain products that are high in vitamins and minerals, carbohydrates (starch and dietary fiber), and other substances that are important to good health. The 2000 *Dietary Guidelines for Americans* recommend that, to stay healthy, persons aged 2 years and older should follow these ABCs for good health: **A**im for fitness, **B**uild a healthy base, and **C**hoose sensibly. To aim for fitness, aim for a healthy weight and be physically active each day. To build a healthy base, let the Pyramid guide food choices; choose a variety of grains daily, especially whole grains; choose a variety of fruits and vegetables daily; and keep food safe to eat. To choose sensibly, choose a diet that is low in saturated fat and cholesterol and moderate in total fat; choose beverages and foods to moderate intake of sugars; choose and prepare foods with less salt; and if consuming alcoholic beverages, do so in moderation.[6] The Food Guide Pyramid, introduced in 1992, is an educational tool that conveys recommendations about the number of servings from different food groups each day and other principles of the *Dietary Guidelines for Americans*.[7] [Note: In text that follows in this chapter, *Dietary Guidelines for Americans* will refer to the 2000 *Dietary Guidelines for Americans* unless otherwise noted.]

The *Dietary Guidelines for Americans* also emphasize the need for adequate consumption of iron-rich and calcium-rich foods.[6] Although some progress has been made since the 1970s in reducing the prevalence of iron deficiency among low-



Source: Adapted from Troiano, R.P., and Flegal, K.M. Data as reported in: Overweight children and adolescents: Description, epidemiology, and demographics. *Pediatrics* 101:497-504, 1998.

income children,[8] much more is needed to improve the health of children of all ages and of women who are pregnant or are of childbearing age. Since the start of this decade, consumption of calcium-rich foods, such as milk products, has generally decreased and is especially low among teenaged girls and young women.[9] Because important sources of calcium also can include other foods with calcium—occurring naturally or through fortification—as well as dietary supplements, the current emphasis is on tracking total calcium intake from all sources, as demonstrated by an objective in this focus area. In addition, in recent years there has been a concerted effort to increase the folic acid intake of females of childbearing age through fortification and other means to reduce the risk of neural tube defects.[10, 11] (See Focus Area 16. Maternal, Infant, and Child Health.)

In general, however, excesses and imbalances of some food components in the diet have replaced once commonplace nutrient deficiencies. Unfortunately, there has been an alarming increase in the number of overweight and obese persons.[12, 13] Overweight results when a person eats more calories from food (energy) than he or she expends, for example, through physical activity. This balance between energy intake and output is influenced by metabolic and genetic factors as well as behaviors affecting dietary intake and physical activity; environmental, cultural, and socioeconomic components also play a role.

When a body mass index (BMI) cut-point of 25 is used, nearly 55 percent of the U.S. adult population was defined as overweight or obese in 1988–94, compared to 46 percent in 1976–80.[12, 14, 15] In particular, the proportion of adults defined as obese by a BMI of 30 or greater has increased from 14.5 percent to 22.5 percent.[12] A similar increase in overweight and obesity also has been observed in children above age 6 years in both genders and in all population groups.[16]

Many diseases are associated with overweight and obesity. Persons who are overweight or obese are at increased risk for high blood pressure, type 2 diabetes, coronary heart disease, stroke, gallbladder disease, osteoarthritis, sleep apnea, respiratory problems, and some types of cancer. The health outcomes related to these diseases, however, often can be improved through weight loss or, at a minimum, no further weight gain. Total costs (medical costs and lost productivity) attributable to obesity alone amounted to an estimated $99 billion in 1995.[17]

Disparities

Disparities in health status indicators and risk factors for diet-related disease are evident in many segments of the population based on gender, age, race and ethnicity, and income. For example, overweight and obesity are observed in all population groups, but obesity is particularly common among Hispanic, African American, Native American, and Pacific Islander women. Furthermore, despite concerns about the increase in overweight and certain excesses in U.S. diets, segments of the population also suffer from undernutrition, including persons who are socially isolated and poor. Over the years, the recognition of the consequences of food insecurity (limited access to safe, nutritious food) has led to the development of national measures and surveys to evaluate food insecurity and hunger and to the ability to assess disparities among different population groups. With food security and other measures of undernutrition, such as growth retardation and iron deficiency, disparities are evident based not only on income but also on race and ethnicity.

In addition, there are concerns about the nutritional status of persons in hospitals, nursing homes, convalescent centers, and institutions; persons with disabilities, including physically, mentally, and developmentally disabled persons in community settings; children in child care facilities; persons living on reservations; persons in correctional facilities; and persons who are homeless. National data about these population groups are currently unavailable or limited. Data also are insufficient to target the fastest growing segment of the population, old and very old persons who live independently.

Opportunities

Establishing healthful dietary and physical activity behaviors needs to begin in childhood. Educating school-aged children about nutrition is important to help establish healthful eating habits early in life.[18, 19] Research suggests that parents who understand proper nutrition can help children in preschool choose healthful

foods, but they have less influence on the choices of school-aged children.[20] Thus, the impact of nutrition education on health may be more effective if targeted directly at school-aged children. Unfortunately, a survey done in 1994 showed that only 69 percent of States and 80 percent of school districts required nutrition education for students in at least some grades from kindergarten through 12th grade.[21]

A well-designed curriculum that effectively addresses essential nutrition education topics can increase students' knowledge about nutrition, help shape appropriate attitudes, and help develop the behavioral skills students need to plan, prepare, and select healthful meals and snacks.[18, 22, 23] Curricula that encourage specific, healthful eating behaviors and provide students with the skills needed to adopt and maintain those behaviors have led to favorable changes in student dietary behaviors and cardiovascular disease risk factors.[18, 22, 23] In order to enhance the effectiveness of these lessons, however, nutrition course work should be part of the core curriculum for the professional preparation of teachers of all grades and should be emphasized in continuing education activities for teachers.

Topics considered to be essential at the elementary, middle, junior high, and senior high school levels include using the Food Guide Pyramid; learning the benefits of healthful eating; making healthful food choices for meals and snacks; preparing healthy meals and snacks; using food labels; eating a variety of foods; eating more fruits, vegetables, and grains; eating foods low in saturated fat and total fat more often; eating more calcium-rich foods; balancing food intake and physical activity; accepting body size differences; and following food safety practices.[18, 24] In addition, the following topics are considered to be essential at the middle, junior high, and senior high school levels: the *Dietary Guidelines for Americans;* eating disorders; healthy weight maintenance; influences on food choices such as families, culture, and media; and goals for dietary improvement.[18]

Nutrition education should be taught as part of a comprehensive school health education program, and essential nutrition education topics should be integrated into science and other curricula to reinforce principles and messages learned in the health units. Nutrition education is addressed within a school health education objective. (See Focus Area 7. Educational and Community-Based Programs.) In addition, students must have access to healthful food choices to enhance further the likelihood of adopting healthful dietary practices. For these reasons, monitoring students' eating practices at school is important.

Although health promotion efforts should begin in childhood, they need to continue throughout adulthood. In particular, public education about the long-term health consequences and risks associated with overweight and how to achieve and maintain a healthy weight is necessary. While many persons attempt to lose weight, studies show that within 5 years a majority regain the weight.[25] To maintain weight loss, healthful dietary habits must be coupled with decreased sedentary behavior and increased physical activity and become permanent lifestyle changes. (See Focus Area 22. Physical Activity and Fitness.) Additionally, changes in the

physical and social environment may help persons maintain the necessary long-term lifestyle changes for both diet and physical activity.

Policymakers and program planners at the national, State, and community levels can and should provide important leadership in fostering healthful diets and physical activity patterns among people in the United States. The family and others, such as health care practitioners, schools, worksites, institutional food services, and the media, can play a key role in this process. For example, registered dietitians and other qualified health care practitioners can improve health outcomes through efforts focused on nutrition screening, assessment, and primary and secondary prevention.

Food-related businesses also can help consumers achieve healthful diets by providing nutrition information for foods purchased in supermarkets, fast-food outlets, restaurants, and carryout operations. For example, the introduction of a new food label in 1993 has resulted in nutrition information on most processed packaged foods, along with credible health and nutrient content claims and standardized serving sizes.[26] While efforts were made in the 1990s to increase the availability of nutrition information, reduced-fat foods, and other healthful food choices in supermarkets, significant challenges remain on these fronts for away-from-home foods purchased at food service outlets. The importance of addressing these challenges is suggested by recent data indicating that nearly 40 percent of a family's food budget is spent on away-from-home food, including food from restaurants and fast-food outlets.[27] One analysis found that away-from-home foods are generally higher in saturated fat, total fat, cholesterol, and sodium and lower in dietary fiber, iron, and calcium than at-home foods.[27] Away-from-home sites include restaurants, fast-food outlets, school cafeterias, vending machines, and other food service outlets. This study also suggested that persons either eat larger amounts when they eat out, eat higher calorie foods, or both.

Many of the Healthy People 2010 objectives that address nutrition and overweight in the United States measure in some way the Nation's progress toward implementing the recommendations of the *Dietary Guidelines for Americans.* The recommendations for food and nutrient intake are not intended to be met every day but rather on average over a span of time. Although the Healthy People 2010 dietary intake objectives address the proportion of the population that consumes a specified level of certain foods or nutrients, it is also important to track and report the average amount eaten by different population groups to help interpret progress on these objectives. Other objectives target aspects of undernutrition, including iron deficiency, growth retardation, and food security.

In summary, several actions are recognized as fundamental in achieving this focus area's objectives:

- Improving accessibility of nutrition information, nutrition education, nutrition counseling and related services, and healthful foods in a variety of settings and for all population groups.

- Focusing on preventing chronic disease associated with diet and weight, beginning in youth.
- Strengthening the link between nutrition and physical activity in health promotion.
- Maintaining a strong national program for basic and applied nutrition research to provide a sound science base for dietary recommendations and effective interventions.
- Maintaining a strong national nutrition monitoring program to provide accurate, reliable, timely, and comparable data to assess status and progress and to be responsive to unmet data needs and emerging issues.
- Strengthening State and community data systems to be responsive to the data users at these levels.
- Building and sustaining broad-based initiatives and commitment to these objectives by public and private sector partners at the national, State, and local levels.

Interim Progress Toward Year 2000 Objectives

Of the 27 nutrition objectives, targets for 5 have been met, including 2 related to the availability of reduced-fat foods and prevalence of growth retardation.[28] The majority of the objectives have shown some progress, including those related to total fruit, vegetable, and grain product intake and total fat and saturated fat intake; availability of nutrition labeling on foods; breastfeeding; nutrition education in schools; and availability of worksite nutrition and weight management programs. For certain other objectives, such as consumer actions to reduce salt intake and home-delivered meals to elderly persons, there has been little or no progress. And for others, such as intake of calcium-rich food and overweight and obesity, movement has been away from the targets. In particular, the proportion of adults and children who are overweight or obese has increased substantially, and this represents one of the biggest challenges for Healthy People 2010.

Note: Unless otherwise noted, data are from the Centers for Disease Control and Prevention, National Center for Health Statistics, *Healthy People 2000 Review, 1998–99*.

Nutrition and Overweight

Goal: Promote health and reduce chronic disease associated with diet and weight.

Number	Objective Short Title
Weight Status and Growth	
19-1	Healthy weight in adults
19-2	Obesity in adults
19-3	Overweight or obesity in children and adolescents
19-4	Growth retardation in children
Food and Nutrient Consumption	
19-5	Fruit intake
19-6	Vegetable intake
19-7	Grain product intake
19-8	Saturated fat intake
19-9	Total fat intake
19-10	Sodium intake
19-11	Calcium intake
Iron Deficiency and Anemia	
19-12	Iron deficiency in young children and in females of childbearing age
19-13	Anemia in low-income pregnant females
19-14	Iron deficiency in pregnant females
Schools, Worksites, and Nutrition Counseling	
19-15	Meals and snacks at school
19-16	Worksite promotion of nutrition education and weight management
19-17	Nutrition counseling for medical conditions
Food Security	
19-18	Food security

Weight Status and Growth

19-1. Increase the proportion of adults who are at a healthy weight.

Target: 60 percent.

Baseline: 42 percent of adults aged 20 years and older were at a healthy weight (defined as a body mass index [BMI] equal to or greater than 18.5 and less than 25) in 1988–94 (age adjusted to the year 2000 standard population).

Target setting method: Better than the best.

Data source: National Health and Nutrition Examination Survey (NHANES), CDC, NCHS.

NOTE: THE TABLE BELOW MAY CONTINUE TO THE FOLLOWING PAGE.

Adults Aged 20 Years and Older, 1988–94 (unless noted)	Healthy Weight		
	19-1. Both Genders	Females*	Males*
	Percent		
TOTAL	42	45	38
Race and ethnicity			
American Indian or Alaska Native	DSU	DSU	DSU
Asian or Pacific Islander	DSU	DSU	DSU
Asian	DNC	DNC	DNC
Native Hawaiian and other Pacific Islander	DNC	DNC	DNC
Black or African American	34	29	40
White	42	47	37
Hispanic or Latino	DSU	DSU	DSU
Mexican American	30	31	30
Not Hispanic or Latino	43	47	39
Black or African American	34	29	40
White	43	49	38

Adults Aged 20 Years and Older, 1988–94 (unless noted)	Healthy Weight		
	19-1. Both Genders	Females*	Males*
	Percent		
Age			
20 to 39 years	51	55	48
40 to 59 years	36	40	31
60 years and older	36	37	33
Family income level†			
Lower income (≤130 percent of poverty threshold)	38	33	44
Higher income (>130 percent of poverty threshold)	43	48	37
Disability status			
Persons with disabilities	32 (1991–94)	35 (1991–94)	30 (1991–94)
Persons without disabilities	41 (1991–94)	45 (1991–94)	36 (1991–94)
Select populations			
Persons with arthritis	36 (1991–94)	37 (1991–94)	34 (1991–94)
Persons without arthritis	43 (1991–94)	47 (1991–94)	40 (1991–94)
Persons with diabetes	26	DNA	DNA
Persons without diabetes	43	DNA	DNA
Persons with high blood pressure	27	29	26
Persons without high blood pressure	46	50	42

DNA = Data have not been analyzed. DNC = Data are not collected. DSU = Data are statistically unreliable.

Note: Age adjusted to the year 2000 standard population.

*Data for females and males are displayed to further characterize the issue.

†A household income below 130 percent of poverty threshold is used by the Food Stamp Program.

NOTE: THE TABLE ABOVE MAY HAVE CONTINUED FROM THE PREVIOUS PAGE.

19-2. Reduce the proportion of adults who are obese.

Target: 15 percent.

Baseline: 23 percent of adults aged 20 years and older were identified as obese (defined as a BMI of 30 or more) in 1988–94 (age adjusted to the year 2000 standard population).

Target setting method: Better than the best.

Data source: National Health and Nutrition Examination Survey (NHANES), CDC, NCHS.

NOTE: THE TABLE BELOW MAY CONTINUE TO THE FOLLOWING PAGE.

Adults Aged 20 Years and Older, 1988–94 (unless noted)	Obesity		
	19-2. Both Genders	Females*	Males*
	Percent		
TOTAL	23	25	20
Race and ethnicity			
American Indian or Alaska Native	DSU	DSU	DSU
Asian or Pacific Islander	DSU	DSU	DSU
Asian	DNC	DNC	DNC
Native Hawaiian and other Pacific Islander	DNC	DNC	DNC
Black or African American	30	38	21
White	22	24	21
Hispanic or Latino	DSU	DSU	DSU
Mexican American	29	35	24
Not Hispanic or Latino	22	25	20
Black or African American	30	38	21
White	22	23	20
Age (not age adjusted)			
20 to 39 years	18	21	15
40 to 59 years	28	30	25
60 years and older	24	26	21
Family income level†			
Lower income (≤130 percent of poverty threshold)	29	35	21
Higher income (>130 percent of poverty threshold)	22	23	20
Disability status			
Persons with disabilities	30 (1991–94)	38 (1991–94)	21 (1991–94)
Persons without disabilities	23 (1991–94)	25 (1991–94)	22 (1991–94)

Adults Aged 20 Years and Older, 1988–94 (unless noted)	Obesity		
	19-2. Both Genders	Females*	Males*
	Percent		
Select populations			
Persons with arthritis	30	33	27
Persons without arthritis	21	23	19
Persons with diabetes	41	DNA	DNA
Persons without diabetes	22	DNA	DNA
Persons with high blood pressure	38	47	33
Persons without high blood pressure	18	20	16

DNA = Data have not been analyzed. DNC = Data are not collected. DSU = Data are statistically unreliable.

Note: Age adjusted to the year 2000 standard population.

*Data for females and males are displayed to further characterize the issue.

†A household income below 130 percent of poverty threshold is used by the Food Stamp Program.

NOTE: THE TABLE ABOVE MAY HAVE CONTINUED FROM THE PREVIOUS PAGE.

19-3. Reduce the proportion of children and adolescents who are overweight or obese.

Target and baseline:

Objective	Reduction in Overweight or Obese Children and Adolescents*	1988–94 Baseline	2010 Target
		Percent	
19-3a.	Children aged 6 to 11 years	11	5
19-3b.	Adolescents aged 12 to 19 years	11	5
19-3c.	Children and adolescents aged 6 to 19 years	11	5

*Defined as at or above the gender- and age-specific 95th percentile of BMI based on the revised CDC Growth Charts for the United States.

Target setting method: Better than the best.

Data source: National Health and Nutrition Examination Survey (NHANES), CDC, NCHS.

Children and Adolescents Aged 6 to 19 Years, 1988–94 (unless noted)	Overweight or Obese		
	19-3a. Children Aged 6 to 11 Years	19-3b. Adolescents Aged 12 to 19 Years	19-3c. Children and Adolescents Aged 6 to 19 Years
	Percent		
TOTAL	11	11	11
Race and ethnicity			
American Indian or Alaska Native	DSU	DSU	DNA
Asian or Pacific Islander	DSU	DSU	DNA
Asian	DNC	DNC	DNC
Native Hawaiian and other Pacific Islander	DNC	DNC	DNC
Black or African American	15	13	14
White	11	11	11
Hispanic or Latino	DSU	DSU	DSU
Mexican American	17	14	15
Not Hispanic or Latino	11	10	11
Black or African American	15	13	14
White	10	10	10
Gender			
Female	11	10	10
Male	12	11	12
Family income level*			
Lower income (≤130 percent of poverty threshold)	11	16	13
Higher income (>130 percent of poverty threshold)	11	8	10
Disability status			
Persons with disabilities	DSU (1991–94)	DSU (1991–94)	DSU (1991–94)
Persons without disabilities	13 (1991–94)	11 (1991–94)	12 (1991–94)

DNA = Data have not been analyzed. DNC = Data are not collected. DSU = Data are statistically unreliable.
*A household income below 130 percent of poverty threshold is used by the Food Stamp Program.

Maintenance of a healthy weight is a major goal in the effort to reduce the burden of illness and its consequent reduction in quality of life and life expectancy. The selection of a BMI cut-point to establish the upper limit of the healthy weight range is based on the relationship of overweight or obesity to risk factors for

chronic disease or premature death. A BMI of less than 25 has been accepted by numerous groups as the upper limit of the healthy weight range, since chronic disease risk increases in most populations at or above this cut-point.[14, 15, 29] The lower cut-point for the healthy weight range (BMI of 18.5) was selected to be consistent with national and international recommendations.[14, 15] Problems associated with excessive thinness (BMI less than 18.5) include menstrual irregularity, infertility, and osteoporosis. There is some concern that the increased focus on overweight may result in more eating disorders, such as bulimia and anorexia nervosa. (See Focus Area 18. Mental Health and Mental Disorders.) However, no evidence currently exists that suggests the increased focus on overweight has resulted in additional cases of eating disorders.

Overweight and obesity are caused by many factors. These factors reflect the contributions of inherited, metabolic, behavioral, environmental, cultural, and socioeconomic components. As weight increases, so does the prevalence of health risks. Simple, health-oriented definitions of overweight and obesity should be based on the amount of excess body fat at which health risks to individuals begin to increase. No such definitions currently exist. Most current clinical studies assessing the health effects of overweight rely on a measurement of body weight adjusted for height. BMI is the choice for many researchers and health professionals. While the relation of BMI to body fat differs by age and gender, it provides valid comparisons across racial and ethnic groups.[30] However, BMI does not provide information concerning body fat distribution, which has been identified as an independent predictor of health risk.[15, 29] Thus, until a better surrogate for body fat is developed, BMI often will be used to screen for overweight and obese individuals. Health risks also increase as waist measurement increases, and thus waist measurement also can be a useful indicator.[6]

Interpretations of data about overweight and obesity have differed because criteria for these terms have varied over time, from study to study, and from one part of the world to another. National and international organizations now support the use of a BMI of 30 or greater to identify obesity.[14, 15] These BMI cut-points are only a guide to the identification and treatment of overweight and obese individuals and allow for the comparison across populations and over time. However, the health risks associated with overweight and obesity are part of a continuum and do not conform to rigid cut-points.

Overweight and obesity affect a large proportion of the U.S. population—55 percent of adults. Between 1976 and 1994, the number of cases of obesity alone increased more than 50 percent—from 14.5 percent of the adult population to 22.5 percent. Approximately 25 percent of U.S. adult females and 20 percent of U.S. adult males are obese.[12] Because weight management is difficult for most persons, the Healthy People 2010 target of no more than 15 percent of adults aged 20 years and older having a BMI of 30 or more is ambitious. Nonetheless, the potential benefits from reduction in overweight and obesity are of considerable public health importance and deserve particular emphasis and attention. A concerted public effort will be needed to prevent further increases of overweight and obe-

sity. Health care providers, health plans, and managed care organizations need to be alert to the development of overweight and obesity in their clients and should provide information concerning the associated risks. These groups need to provide guidance to help consumers address this health problem. To lose weight and keep it off, overweight persons will need long-term lifestyle changes in dietary and physical activity patterns that they can easily incorporate into their lives.

Patterns of healthful eating behavior need to begin in childhood and be maintained throughout adulthood. These patterns can be encouraged through nutrition education at schools and worksites that takes into account cultural and other factors influencing diet. Persons should be aware of the impact that away-from-home eating can have on weight management. In order to address physical activity needs, changes in the physical environment—such as access to walkways and bicycle paths—and the social environment—through social support and safe communities—will be needed to achieve long-term success.

There is much concern about the increasing prevalence of obesity in children and adolescents. Overweight and obesity acquired during childhood or adolescence may persist into adulthood and increase the risk for some chronic diseases later in life. Teenaged boys lose some fat accumulated before puberty during adolescence, but fat deposition continues in girls. Thus, without measures of sexual maturity, measures of body fat and body weight are difficult to interpret in children and adolescents. Therefore, the objective to reduce the prevalence of overweight and obesity among children and adolescents has a target set at no more than 5 percent and uses the gender- and age-specific 95th percentile of BMI from the revised Centers for Disease Control and Prevention (CDC) Growth Charts for the United States. Interventions need to recognize that obese children also may experience psychological stress. The reduction of BMI in children and adolescents should be achieved by emphasizing physical activity and a properly balanced diet so that healthy growth is maintained. Additional research is needed to better define the prevalence and health consequences of overweight and obesity in children and adolescents and the implications of such findings for these persons as they become the next generation of adults.

19-4. Reduce growth retardation among low-income children under age 5 years.

Target: 5 percent.

Baseline: 8 percent of low-income children under age 5 years were growth retarded in 1997 (defined as height for age below the fifth percentile in the age-gender appropriate population using the 1977 NCHS/CDC growth charts;[31] preliminary data; not age adjusted).

Target setting method: Better than the best.

Data source: Pediatric Nutrition Surveillance System, CDC, NCCDPHP.

Low-Income Children Under Age 5 Years, 1997	Growth Retardation			
	19-4. Under Age 5 Years	Under Age 1 Year*	Aged 1 Year*	Aged 2 to 4 Years*
	Percent			
TOTAL	8	10	9	6
Race and ethnicity				
American Indian or Alaska Native	8	9	7	9
Asian or Pacific Islander	9	9	11	8
Asian	DNC	DNC	DNC	DNC
Native Hawaiian and other Pacific Islander	DNC	DNC	DNC	DNC
Black or African American	DNC	DNC	DNC	DNC
White	DNC	DNC	DNC	DNC
Hispanic or Latino	7	7	8	5
Not Hispanic or Latino	DNC	DNC	DNC	DNC
Black or African American	9	15	10	5
White	8	10	9	6
Gender				
Female	8	10	8	6
Male	8	10	10	6
Disability status				
Children with disabilities	DNC	DNC	DNC	DNC
Children without disabilities	DNC	DNC	DNC	DNC

DNA = Data have not been analyzed. DNC = Data are not collected. DSU = Data are statistically unreliable.
Note: Preliminary data; not age adjusted.
*Data for specific age groups under 5 years are displayed to further characterize the issue.

Retardation in linear growth in preschool children serves as an indicator of overall health and development and also may reflect the adequacy of a child's diet. Full growth potential may not be reached because of less than optimal nutrition, infectious diseases, chronic diseases, or poor health care. Inadequate maternal weight gain during pregnancy and other prenatal factors that influence birth weight also affect the prevalence of growth retardation among infants and young children.

Growth retardation is not a problem for the majority of young children in the United States. By definition, approximately 5 percent of healthy children are expected to be below the fifth percentile of height for age due to normal biologic variation. If more than 5 percent of a population group is below the fifth percen-

tile, this suggests that full growth potential is not being reached by some children in that group. Among some age and ethnic groups of low-income children under age 5 years in the United States, up to 15 percent are below the fifth percentile. While progress has been made in reducing the prevalence of growth retardation among low-income Hispanic and Asian or Pacific Islander children, it remains especially high for African American children in the first year of life.

Interventions to improve children's linear growth potential include better nutrition; improvements in the prevention, diagnosis, and treatment of infectious and chronic diseases; and provision and use of adequate health services. Although the response of a population to interventions for growth retardation may not be as rapid as for iron deficiency or underweight, achievement of the objective by the year 2010 in all racial and ethnic, socioeconomic, and age groups should be possible. Special attention should be given to homeless children and those with special health care needs.

Food and Nutrient Consumption

19-5. Increase the proportion of persons aged 2 years and older who consume at least two daily servings of fruit.

Target: 75 percent.

Baseline: 28 percent of persons aged 2 years and older consumed at least two daily servings of fruit in 1994–96 (age adjusted to the year 2000 standard population).

Target setting method: Better than the best.

Data source: Continuing Survey of Food Intakes by Individuals (CSFII) (2-day average), USDA.

NOTE: THE TABLE BELOW MAY CONTINUE TO THE FOLLOWING PAGE.

Persons Aged 2 Years and Older, 1994–96	Two or More Daily Servings of Fruit
	Percent
TOTAL	28
Race and ethnicity	
American Indian or Alaska Native	DSU
Asian or Pacific Islander	DSU
Asian	DNC
Native Hawaiian and other Pacific Islander	DNC
Black or African American	DNA
White	DNA

Persons Aged 2 Years and Older, 1994–96	Two or More Daily Servings of Fruit
	Percent
Hispanic or Latino	32
Mexican American	29
Other Hispanic	30
Not Hispanic or Latino	
Black or African American	24
White	27
Gender and age	
Female	
2 years and older	26
2 to 5 years (not age adjusted)	43
6 to 11 years (not age adjusted)	26
12 to 19 years (not age adjusted)	23
20 to 39 years (not age adjusted)	20
40 to 59 years (not age adjusted)	26
60 years and older (not age adjusted)	35
Male	
2 years and older	29
2 to 5 years (not age adjusted)	46
6 to 11 years (not age adjusted)	27
12 to 19 years (not age adjusted)	22
20 to 39 years (not age adjusted)	23
40 to 59 years (not age adjusted)	28
60 years and older (not age adjusted)	39
Household income level*	
Lower income (≤130 percent of poverty threshold)	23
Higher income (>130 percent of poverty threshold)	29
Disability status	
Persons with disabilities	DNC
Persons without disabilities	DNC

DNA = Data have not been analyzed. DNC = Data are not collected. DSU = Data are statistically unreliable.

Note: Age adjusted to the year 2000 standard population.

*A household income below 130 percent of poverty threshold is used by the Food Stamp Program.

NOTE: THE TABLE ABOVE MAY HAVE CONTINUED FROM THE PREVIOUS PAGE.

19-6. Increase the proportion of persons aged 2 years and older who consume at least three daily servings of vegetables, with at least one-third being dark green or orange vegetables.

Target: 50 percent.

Baseline: 3 percent of persons aged 2 years and older consumed at least three daily servings of vegetables, with at least one-third of these servings being dark green or orange vegetables in 1994–96 (age adjusted to the year 2000 standard population).

Target setting method: Better than the best.

Data source: Continuing Survey of Food Intakes by Individuals (CSFII) (2-day average), USDA.

NOTE: THE TABLE BELOW MAY CONTINUE TO THE FOLLOWING PAGE.

Persons Aged 2 Years and Older, 1994–96	Servings of Vegetables		
	19-6. Meet Both Recommen-dations	3 or More Daily Servings*	One-Third or More Servings From Dark Green or Orange Vegetables*
	Percent		
TOTAL	3	49	8
Race and ethnicity			
American Indian or Alaska Native	DSU	DSU	DSU
Asian or Pacific Islander	DSU	DSU	DSU
Asian	DNC	DNC	DNC
Native Hawaiian and other Pacific Islander	DNC	DNC	DNC
Black or African American	DNA	DNA	DNA
White	DNA	DNA	DNA
Hispanic or Latino	2	47	6
Mexican American	2	50	5
Other Hispanic	DSU	44	6
Not Hispanic or Latino	DNA	DNA	DNA
Black or African American	DNA	43	14
White	DNA	50	8

Persons Aged 2 Years and Older, 1994–96	Servings of Vegetables		
	19-6. Meet Both Recommen-dations	3 or More Daily Servings*	One-Third or More Servings From Dark Green or Orange Vegetables*
	Percent		
Gender and age			
Female			
2 years and older	4	41	10
2 to 5 years (not age adjusted)	DSU	23	9
6 to 11 years (not age adjusted)	DSU	24	7
12 to 19 years (not age adjusted)	2	38	7
20 to 39 years (not age adjusted)	4	43	10
40 to 59 years (not age adjusted)	4	49	11
60 years and older (not age adjusted)	6	43	13
Male			
2 years and older	3	57	7
2 to 5 years (not age adjusted)	DSU	23	8
6 to 11 years (not age adjusted)	DSU	27	6
12 to 19 years (not age adjusted)	DSU	55	4
20 to 39 years (not age adjusted)	3	68	4
40 to 59 years (not age adjusted)	4	64	9
60 years and older (not age adjusted)	6	57	11
Household income level†			
Lower income (≤130 percent of poverty threshold)	3	42	8
Higher income (>130 percent of poverty threshold)	4	50	8

Persons Aged 2 Years and Older, 1994–96	Servings of Vegetables		
	19-6. Meet Both Recommen-dations	3 or More Daily Servings*	One-Third or More Servings From Dark Green or Orange Vegetables*
	Percent		
Disability status			
Persons with disabilities	DNC	DNC	DNC
Persons without disabilities	DNC	DNC	DNC

DNA = Data have not been analyzed. DNC = Data are not collected. DSU = Data are statistically unreliable.

Note: Aged adjusted to the year 2000 standard population.

*Data for number and type of daily servings are displayed to further characterize the issue.

†A household income below 130 percent of poverty threshold is used by the Food Stamp Program.

NOTE: THE TABLE ABOVE MAY HAVE CONTINUED FROM THE PREVIOUS PAGE.

19-7. Increase the proportion of persons aged 2 years and older who consume at least six daily servings of grain products, with at least three being whole grains.

Target: 50 percent.

Baseline: 7 percent of persons aged 2 years and older consumed at least six daily servings of grain products, with at least three being whole grains in 1994–96 (age adjusted to the year 2000 standard population).

Target setting method: Better than the best.

Data source: Continuing Survey of Food Intakes by Individuals (CSFII) (2-day average), USDA.

NOTE: THE TABLE BELOW MAY CONTINUE TO THE FOLLOWING PAGE.

Persons Aged 2 Years and Older, 1994–96	Servings of Grains		
	19-7. Meet Both Recommen-dations	6 or More Daily Servings*	3 or More Servings From Whole Grain*
	Percent		
TOTAL	7	51	7
Race and ethnicity			
American Indian or Alaska Native	DSU	DSU	DSU
Asian or Pacific Islander	DSU	DSU	DSU
Asian	DNC	DNC	DNC
Native Hawaiian and other Pacific Islander	DNC	DNC	DNC
Black or African American	DNA	DNA	DNA
White	DNA	DNA	DNA
Hispanic or Latino	4	46	4
Mexican American	3	46	4
Other Hispanic	4	46	4
Not Hispanic or Latino	DNA	DNA	DNA
Black or African American	3	40	4
White	7	54	8
Gender and age			
Female			
2 years and older	4	39	5
2 to 5 years (not age adjusted)	4	40	5
6 to 11 years (not age adjusted)	2	46	2
12 to 19 years (not age adjusted)	6	49	6
20 to 39 years (not age adjusted)	4	40	5
40 to 59 years (not age adjusted)	4	38	5
60 years and older (not age adjusted)	4	28	6

Persons Aged 2 Years and Older, 1994–96	Servings of Grains		
	19-7. Meet Both Recommen-dations	6 or More Daily Servings*	3 or More Servings From Whole Grain*
	Percent		
Male			
2 years and older	9	64	10
2 to 5 years (not age adjusted)	5	50	6
6 to 11 years (not age adjusted)	5	60	5
12 to 19 years (not age adjusted)	9	77	9
20 to 39 years (not age adjusted)	10	70	11
40 to 59 years (not age adjusted)	10	64	11
60 years and older (not age adjusted)	11	54	12
Household income level†			
Lower income (≤130 percent of poverty threshold)	4	44	5
Higher income (>130 percent of poverty threshold)	7	53	8
Disability status			
Persons with disabilities	DNC	DNC	DNC
Persons without disabilities	DNC	DNC	DNC

DNA = Data have not been analyzed. DNC = Data are not collected. DSU = Data are statistically unreliable.

Note: Age adjusted to the year 2000 standard population.

*Data for number and type of daily servings are displayed to further characterize the issue.

†A household income below 130 percent of poverty threshold is used by the Food Stamp Program.

NOTE: THE TABLE ABOVE MAY HAVE CONTINUED FROM THE PREVIOUS PAGE.

The *Dietary Guidelines for Americans* recommend that Americans choose a variety of grains daily, especially whole grains, and a variety of fruits and vegetables daily.[6] In the United States, persons of all ages eat fewer than the recommended number of servings of grain products, vegetables, and fruits.[28] Vegetables (including legumes, such as beans and peas), fruits, and grains are good sources of vitamins and minerals, carbohydrates (starch and dietary fiber), and other substances that are important for good health. Some evidence from clinical studies suggests that water-soluble fibers from foods such as oat bran, beans, and certain fruits are associated with lower blood glucose and blood lipid levels.[32] Dietary patterns with higher intakes of vegetables (including legumes), fruits, and grains are associated

with a variety of health benefits, including a decreased risk for some types of cancer.[32, 33, 34, 35, 36, 37]

The *Dietary Guidelines for Americans* recommend three to five servings from various vegetables and vegetable juices and two to four servings from various fruits and fruit juices, depending on calorie needs. Consumers can select from a plentiful supply of fresh, frozen, dried, and canned products throughout the year to obtain five or more servings of fruits and vegetables daily. The *Dietary Guidelines for Americans* recommend that persons choose dark green leafy vegetables, orange vegetables and fruits, and dry beans and peas often. In 1994–96, the average daily intake of fruits and vegetables was five servings, but only about 7 to 10 percent of vegetable servings were dark green or deep yellow (orange), and only about 5 to 6 percent were legumes.[38] In contrast, fried potatoes accounted for about one-third (32 percent) of vegetable servings consumed by youth aged 2 to 19 years. Consumption of fruits and vegetables also is tracked at the State level and is discussed in *Tracking Healthy People 2010.*

The *Dietary Guidelines for Americans* recommend 6 to 11 daily servings of grain products, depending on calorie needs, with several of these from whole-grain foods. Although grain product consumption increased during the 1990s, consumption of whole-grain products remains very low. In 1994–96, for the population aged 2 years and older, the average daily intake of grain products was nearly seven servings, but only about 14 to 15 percent of grain servings were whole grain.[38] The guidelines also recommend that grain products be prepared with little added saturated fat and moderate or low amounts of added sugars; however, considerable amounts of fats and sugars are contributed to U.S. diets by baked products such as cookies, cakes, and doughnuts.[39, 40] No State-level data on grain intakes are available for adults, adolescents, and children.

19-8. Increase the proportion of persons aged 2 years and older who consume less than 10 percent of calories from saturated fat.

Target: 75 percent.

Baseline: 36 percent of persons aged 2 years and older consumed less than 10 percent of daily calories from saturated fat in 1994–96 (age adjusted to the year 2000 standard population).

Target setting method: Better than the best.

Data source: Continuing Survey of Food Intakes by Individuals (CSFII) (2-day average), USDA.

NOTE: THE TABLE BELOW MAY CONTINUE TO THE FOLLOWING PAGE.

Persons Aged 2 Years and Older, 1994–96	Less than 10 Percent of Calories From Saturated Fat
	Percent
TOTAL	36
Race and ethnicity	
American Indian or Alaska Native	DSU
Asian or Pacific Islander	DSU
Asian	DNC
Native Hawaiian and other Pacific Islander	DNC
Black or African American	DNA
White	DNA
Hispanic or Latino	39
Mexican American	37
Other Hispanic	40
Not Hispanic or Latino	DNA
Black or African American	31
White	35
Gender and age	
Female	
2 years and older	39
2 to 5 years (not age adjusted)	23
6 to 11 years (not age adjusted)	23
12 to 19 years (not age adjusted)	34
20 to 39 years (not age adjusted)	41
40 to 59 years (not age adjusted)	42
60 years and older (not age adjusted)	47
Male	
2 years and older	32
2 to 5 years (not age adjusted)	23
6 to 11 years (not age adjusted)	25
12 to 19 years (not age adjusted)	27
20 to 39 years (not age adjusted)	32
40 to 59 years (not age adjusted)	33
60 years and older (not age adjusted)	42

Persons Aged 2 Years and Older, 1994–96	Less than 10 Percent of Calories From Saturated Fat
	Percent
Household income level*	
Lower income (≤130 percent of poverty threshold)	33
Higher income (>130 percent of poverty threshold)	36
Disability status	
Persons with disabilities	DNC
Persons without disabilities	DNC

DNA = Data have not been analyzed. DNC = Data are not collected. DSU = Data are statistically unreliable.
Note: Age adjusted to the year 2000 standard population.
*A household income below 130 percent of poverty threshold is used by the Food Stamp Program.

NOTE: THE TABLE ABOVE MAY HAVE CONTINUED FROM THE PREVIOUS PAGE.

19-9. Increase the proportion of persons aged 2 years and older who consume no more than 30 percent of calories from total fat.

Target: 75 percent.

Baseline: 33 percent of persons aged 2 years and older consumed no more than 30 percent of daily calories from total fat in 1994–96 (age adjusted to the year 2000 standard population).

Target setting method: Better than the best.

Data source: Continuing Survey of Food Intakes by Individuals (CSFII) (2-day average), USDA.

NOTE: THE TABLE BELOW MAY CONTINUE TO THE FOLLOWING PAGE.

Persons Aged 2 Years and Older, 1994–96	No More Than 30 Percent of Calories From Total Fat
	Percent
TOTAL	33
Race and ethnicity	
American Indian or Alaska Native	DSU
Asian or Pacific Islander	DSU
Asian	DNC
Native Hawaiian and other Pacific Islander	DNC

Persons Aged 2 Years and Older, 1994–96	No More Than 30 Percent of Calories From Total Fat
	Percent
Black or African American	DNA
White	DNA
Hispanic or Latino	36
Mexican American	33
Other Hispanic	38
Not Hispanic or Latino	DNA
Black or African American	26
White	33
Gender and age	
Female	
2 years and older	36
2 to 5 years (not age adjusted)	35
6 to 11 years (not age adjusted)	34
12 to 19 years (not age adjusted)	36
20 to 39 years (not age adjusted)	38
40 to 59 years (not age adjusted)	33
60 years and older (not age adjusted)	40
Male	
2 years and older	30
2 to 5 years (not age adjusted)	33
6 to 11 years (not age adjusted)	30
12 to 19 years (not age adjusted)	30
20 to 39 years (not age adjusted)	29
40 to 59 years (not age adjusted)	28
60 years and older (not age adjusted)	34
Household income level*	
Lower income (≤130 percent of poverty threshold)	30
Higher income (>130 percent of poverty threshold)	34

Persons Aged 2 Years and Older, 1994–96	No More Than 30 Percent of Calories From Total Fat
	Percent
Disability status	
Persons with disabilities	DNC
Persons without disabilities	DNC

DNA = Data have not been analyzed. DNC = Data are not collected. DSU = Data are statistically unreliable.
Note: Age adjusted to the year 2000 standard population.
*A household income below 130 percent of poverty threshold is used by the Food Stamp Program.

NOTE: THE TABLE ABOVE MAY HAVE CONTINUED FROM THE PREVIOUS PAGE.

Both the *Dietary Guidelines for Americans* and the National Cholesterol Education and Prevention Program recommend a diet that contains less than 10 percent of calories from saturated fat and no more than 30 percent of calories from total fat.[6, 33, 41] This can be achieved by obtaining most calories from plant foods (grains, fruits, vegetables) that have little added fat. Such a healthful diet also can include low-fat and lean foods from the milk group and the meat group. The increase of overweight and obesity in the United States indicates that more attention needs to be paid to serving size and total calorie content because a low-fat content does not, automatically, signify a lower calorie content.

The role of fat in the diet is complicated because different types of fatty acids have different effects on health. Evidence to date is complicated, but certain messages appear clear: persons in the United States consume too much dietary fat in general, and too much of the fat consumed is from saturated fatty acids—the type associated with an increased risk for heart disease. (See Focus Area 12. Heart Disease and Stroke.)

Strong evidence from human and animal studies shows that diets low in saturated fatty acids and cholesterol are associated with low risks and rates of coronary heart disease. Saturated fatty acids are the major dietary factors that raise blood low-density lipoprotein (LDL) cholesterol levels, increasing the risk for heart disease. Increasing evidence suggests that *trans*-fatty acids also can increase LDL-cholesterol levels.[42] Monounsaturated and polyunsaturated fatty acids do not raise blood cholesterol. Omega-3 polyunsaturated fatty acids, which are found in some fish such as salmon, tuna, and mackerel, are being studied to determine whether they offer protection against heart disease.[6]

A 1989 National Research Council report[33] indicated that diets high in total fat were associated with a higher risk of several cancers, especially cancer of the colon, prostate, and breast, but noted that findings were inconsistent. (See Focus Area 3. Cancer.) A 1996 review of the evidence showed that the relationship between the amount and type of fat and the risk of cancer continues to be uncertain.[43] To help clarify the relationship between total dietary fat and the risk of

cancer, a randomized clinical trial called the Women's Health Initiative has been started. Set to conclude in 2003, it is a multicenter trial designed to test several risk factors for chronic disease in U.S. females.[44] A major emphasis is to reduce fat to 25 percent of dietary calories to determine whether a low-fat diet has any effect on breast cancer risk.

The proportion of calories in the U.S. diet provided by total fat is about 33 percent, saturated fat is about 11 percent, and *trans*-fat is about 2.6 percent.[45] The primary sources of saturated fat are meats and dairy products that contain fat. Thus, nonfat and low-fat dairy products and lean meats are choices that can help reduce saturated fat intake. *Trans*-fatty acids are formed when vegetable oil is hydrogenated to solidify the oils and increase the shelf life and flavor stability of the fats and the foods that contain them. Margarines that have been formulated to contain no *trans*-fats are available in most U.S. grocery stores. Other dietary sources of *trans*-fat are restaurant and fast-food fats (including frying fats), baked products, and some snack foods, such as chips.

The major vegetable sources of monounsaturated fatty acids include nuts, avocados, olive oil, canola oil, and high-oleic forms of safflower and sunflower seed oil. The major sources of polyunsaturated fatty acids are vegetable oils, including soybean oil, corn oil, and high-linoleic forms of safflower and sunflower seed oil and a few nuts, such as walnuts. Substituting monounsaturated and polyunsaturated fatty acids for saturated fatty acids can help lower health risks.

The proportion of all meals and snacks from away-from-home sources increased by more than two-thirds between 1977–78 and 1995, from 16 percent of all meals and snacks in 1977–78 to 27 percent of all meals and snacks in 1995.[27] Away-from-home food tends to have a higher saturated fat content, and persons tend to consume more calories when eating away from home than at home.[27] In 1995, the average total fat and saturated fat content of away-from-home foods, expressed as a percentage of calories, was 38 percent and 13 percent, respectively, compared with 32 percent and 11 percent for at-home foods.[27] Meals and snacks eaten by children at school had the highest saturated fat density of all food outlets. Thus, to help assess fat and saturated fat intake, as well as develop strategies to help children reduce the amount of fat they consume, additional tracking of saturated fat and total fat intake from foods eaten away from home as well as at home is important.

19-10. Increase the proportion of persons aged 2 years and older who consume 2,400 mg or less of sodium daily.

Target: 65 percent.

Baseline: 21 percent of persons aged 2 years and older consumed 2,400 mg or less of sodium daily (from foods, dietary supplements, tap water, and salt use at the table) in 1988–94 (age adjusted to the year 2000 standard population).

Target setting method: Better than the best.

Data source: National Health and Nutrition Examination Survey (NHANES), CDC, NCHS.

NOTE: THE TABLE BELOW MAY CONTINUE TO THE FOLLOWING PAGE.

Persons Aged 2 Years and Older, 1988–94 (unless noted)	Consume 2,400 mg of Sodium or Less
	Percent
TOTAL	21
Race and ethnicity	
American Indian or Alaska Native	DSU
Asian or Pacific Islander	DSU
Asian	DNC
Native Hawaiian and other Pacific Islander	DNC
Black or African American	25
White	20
Hispanic or Latino	DSU
Mexican American	25
Not Hispanic or Latino	21
Black or African American	25
White	20
Gender and age	
Female	
2 years and older	32
2 to 5 years (not age adjusted)	64
6 to 11 years (not age adjusted)	26
12 to 19 years (not age adjusted)	29
20 years and older	30
Male	
2 years and older	9
2 to 5 years (not age adjusted)	50
6 to 11 years (not age adjusted)	16
12 to 19 years (not age adjusted)	4
20 years and older	6
Family income level*	
Lower income (≤130 percent of poverty threshold)	25
Higher income (>130 percent of poverty threshold)	20

Persons Aged 2 Years and Older, 1988–94 (unless noted)	Consume 2,400 mg of Sodium or Less
	Percent
Disability status (aged 20 years and older)	
Persons with disabilities	18 (1991–94)
Persons without disabilities	16 (1991–94)
Select populations	
Females with high blood pressure	32
Females without high blood pressure	29
Males with high blood pressure	7
Males without high blood pressure	5

DNA = Data have not been analyzed. DNC = Data are not collected. DSU = Data are statistically unreliable.

Note: Age adjusted to the year 2000 standard population.

*A household income below 130 percent of poverty threshold is used by the Food Stamp Program.

NOTE: THE TABLE ABOVE MAY HAVE CONTINUED FROM THE PREVIOUS PAGE.

The *Dietary Guidelines for Americans* recommend choosing and preparing foods with less salt (salt consists of both sodium and chloride). Most studies in diverse populations have shown that salt intake is linked to increasing levels of blood pressure.[6, 46, 47, 48] (See Focus Area 12. Heart Disease and Stroke.) Persons who consume less salt or sodium have a lower risk of developing high blood pressure.[6] Data also show that high sodium intake may increase the amount of calcium excreted in the urine and therefore increase the body's need for calcium.[49] Eating less salt may decrease the loss of calcium from bone.[6]

Most persons in the United States consume more sodium than is needed, and reduction of sodium or salt or both to no more than 2,400 mg sodium or 6 g salt per day is recommended by some authorities.[33, 46] Data from the Continuing Survey of Food Intakes by Individuals show that, even without including salt added at the table, both home foods and away-from-home foods provide excessive amounts of sodium.[27] Higher sodium intakes also tend to be associated with higher calorie intakes; for example, males, who consume more calories than females, also consume more sodium.[27]

Sodium occurs naturally in foods. However, most dietary salt or sodium is added to foods during processing or preparation, with smaller amounts added at the discretion of the consumer in the form of table salt or use of condiments such as soy sauce.[50, 51] Thus, both the sodium content of foods and estimates of the amount of salt added have been used to assess dietary sodium consumption. Other contributing sources of sodium are water, dietary supplements, and medications such as antacids.

19-11. Increase the proportion of persons aged 2 years and older who meet dietary recommendations for calcium.

Target: 75 percent.

Baseline: 46 percent of persons aged 2 years and older were at or above approximated mean calcium requirements (based on consideration of calcium from foods, dietary supplements, and antacids) in 1988–94 (age adjusted to the year 2000 standard population).

Target setting method: Better than the best.

Data source: National Health and Nutrition Examination Survey (NHANES), CDC, NCHS.

NOTE: THE TABLE BELOW MAY CONTINUE TO THE FOLLOWING PAGE.

Persons Aged 2 Years and Older, 1988–94 (unless noted)	Met Calcium Recommendations
	Percent
TOTAL	46
Race and ethnicity	
American Indian or Alaska Native	DSU
Asian or Pacific Islander	DSU
Asian	DNC
Native Hawaiian and other Pacific Islander	DNC
Black or African American	30
White	49
Hispanic or Latino	DSU
Mexican American	44
Not Hispanic or Latino	46
Black or African American	30
White	50
Gender and age	
Female	
2 years and older	36
2 to 8 years (not age adjusted)	79
9 to 19 years (not age adjusted)	19
20 to 49 years (not age adjusted)	40
50 years and older (not age adjusted)	27
Male	
2 years and older	56
2 to 8 years (not age adjusted)	89

Persons Aged 2 Years and Older, 1988–94 (unless noted)	Met Calcium Recommendations
	Percent
9 to 19 years (not age adjusted)	52
20 to 49 years (not age adjusted)	64
50 years and older (not age adjusted)	35
Family income level*	
Lower income (≤130 percent of poverty threshold)	39
Higher income (>130 percent of poverty threshold)	48
Disability status (aged 20 years and older)	
Persons with disabilities	44 (1991–94)
Persons without disabilities	44 (1991–94)

DNA = Data have not been analyzed. DNC = Data are not collected. DSU = Data are statistically unreliable.
Note: Age adjusted to the year 2000 standard population.
*A household income below 130 percent of poverty threshold is used by the Food Stamp Program.

NOTE: THE TABLE ABOVE MAY HAVE CONTINUED FROM THE PREVIOUS PAGE.

Calcium is essential for the formation and maintenance of bones and teeth.[32] The recommendations for adequate daily intakes of calcium are 500 mg for children aged 1 to 3 years, 800 mg for children aged 4 to 8 years, 1,300 mg for adolescents aged 9 to 18 years, 1,000 mg for adults aged 19 to 50 years, and 1,200 mg for adults aged 51 years and older.[52] Approximated mean calcium requirements are defined as 77 percent of the recommendations by the Institute of Medicine for adequate intakes of calcium.[52, 53] The bone mass achieved at full growth (peak bone mass) appears to be related to intake of calcium during childhood and adolescence.[33] Opinion is divided as to the age at which peak bone mass is achieved, although most of the accumulation of bone mineral occurs in humans by about age 20 years. After persons reach their adult height, a period of consolidation of bone density continues until approximately age 30 to 35 years. A high peak bone mass is thought to be protective against fractures in later life.

Osteoporosis is a complex disorder caused by many contributing factors. (See Focus Area 2. Arthritis, Osteoporosis, and Chronic Back Conditions.) Regular exercise and a diet with enough calcium help maintain good bone health and reduce the risk of osteoporosis later in life. However, the ideal level of calcium intake for development of peak bone mass is unknown. For the most part, young children appear to meet the approximate calcium requirements. In contrast, the majority of adolescent and adult females do not meet the average requirements. This is in part because of their lower food consumption, as well as the lower consumption of milk products relative to soft drinks in U.S. diets.[54] For example, in the period 1994–96, the amount of soft drinks consumed was about twice that consumed in the late 1970s and surpassed consumption of fluid milk. Thus, an

increase in consumption of various sources of calcium is recommended for nearly all groups and especially for teenaged girls and women. In postmenopausal females—the group at highest risk for osteoporosis—estrogen replacement therapy under medical supervision is the most effective means to reduce the rate of bone loss and risk of fractures.[32]

The relationship between dietary calcium and blood pressure is uncertain. Results from studies that have used calcium supplements show a small reduction in systolic blood pressure in hypertensive individuals, with no significant reduction in diastolic blood pressure.[55] Among persons with normal blood pressure, there is no significant difference in blood pressure with calcium supplements.[56]

Dietary sources of calcium include milk and milk products such as cheese and yogurt, canned fish with soft bones such as sardines, dark green leafy vegetables such as kale and mustard or turnip greens, tofu made with calcium, tortillas made from lime-processed corn, calcium-enriched grain products, and other calcium-fortified foods and beverages.[6] In some locations, water is a source of calcium, but in amounts that cannot readily be determined. With current food selection practices, use of dairy products may constitute the difference between getting enough calcium in one's diet or not. Nonfat and low-fat dairy products are choices that help reduce the intake of saturated fat while still providing calcium, vitamin D, and other nutrients important for bone health. For those who have lactose intolerance, a range of lactose-reduced dairy products can provide calcium. Persons who do not (or cannot) consume and absorb adequate levels of calcium from dairy food sources may consider use of calcium-fortified foods, while persons with clinical evidence of inadequate intake should receive professional advice on the proper type and dosage of calcium supplements. Calcium supplements come in different forms, including calcium-containing antacids.

Fluid milk (but not yogurt or cheese) is an excellent source of vitamin D, which is essential for calcium utilization. Vitamin D also is synthesized in the skin upon exposure to sunlight.

19-12. Reduce iron deficiency among young children and females of childbearing age.

Target and Baseline:

Objective	Reduction in Iron Deficiency*	1988–94 Baseline	2010 Target
		Percent	
19-12a.	Children aged 1 to 2 years	9	5
19-12b.	Children aged 3 to 4 years	4	1
19-12c.	Nonpregnant females aged 12 to 49 years	11	7

*Iron deficiency is defined as having abnormal results for two or more of the following tests: serum ferritin concentration, erythrocyte protoporphyrin, or transferrin saturation. Refer to *Tracking Healthy People 2010* for threshold values.

Target setting method: Better than the best.

Data source: National Health and Nutrition Examination Survey (NHANES), CDC, NCHS.

NOTE: THE TABLE BELOW MAY CONTINUE TO THE FOLLOWING PAGE.

Select Populations, 1988–94 (unless noted)	Iron Deficiency		
	19-12a. Aged 1 to 2 Years	19-12b. Aged 3 to 4 Years	19-12c. Females of Childbearing Age
	Percent		
TOTAL	9	4	11
Race and ethnicity			
American Indian or Alaska Native	DSU	DSU	DSU
Asian or Pacific Islander	DSU	DSU	DSU
Asian	DNC	DNC	DNC
Native Hawaiian and other Pacific Islander	DNC	DNC	DNC
Black or African American	10	2	15
White	8	3	10
Hispanic or Latino	DSU	DSU	DSU
Mexican American	17	6	19

Select Populations, 1988–94 (unless noted)	Iron Deficiency		
	19-12a. Aged 1 to 2 Years	19-12b. Aged 3 to 4 Years	19-12c. Females of Childbearing Age
	Percent		
Not Hispanic or Latino	DNA	DNA	DNA
Black or African American	10	2	15
White	6	1	8
Family income level*			
Lower income (≤130 percent of poverty threshold)	12	5	16
Higher income (>130 percent of poverty threshold)	7	3	9
Disability status (aged 20 to 49 years)			
Persons with disabilities	DNC	DNC	4 (1991–94)
Persons without disabilities	DNC	DNC	12 (1991–94)

DNA = Data have not been analyzed. DNC = Data are not collected. DSU = Data are statistically unreliable.
*A household income below 130 percent of poverty threshold is used by the Food Stamp Program.

NOTE: THE TABLE ABOVE MAY HAVE CONTINUED FROM THE PREVIOUS PAGE.

19-13. Reduce anemia among low-income pregnant females in their third trimester.

Target: 20 percent.

Baseline: 29 percent of low-income pregnant females in their third trimester were anemic (defined as hemoglobin <11.0 g/dL) in 1996.

Target setting method: Better than the best.

Data source: Pregnancy Nutrition Surveillance System, CDC, NCCDPHP.

NOTE: THE TABLE BELOW MAY CONTINUE TO THE FOLLOWING PAGE.

Low-Income Pregnant Females, Third Trimester, 1996	Anemia
	Percent
TOTAL	29
Race and ethnicity	
American Indian or Alaska Native	31
Asian or Pacific Islander	26
Asian	DNC
Native Hawaiian and other Pacific Islander	DNC
Black or African American	DNC
White	DNC

Low-Income Pregnant Females, Third Trimester, 1996	Anemia
	Percent
Hispanic or Latino	25
Not Hispanic or Latino	DNA
Black or African American	44
White	24
Disability status	
Females with disabilities	DNC
Females without disabilities	DNC

DNA = Data have not been analyzed. DNC = Data are not collected. DSU = Data are statistically unreliable.

NOTE: THE TABLE ABOVE MAY HAVE CONTINUED FROM THE PREVIOUS PAGE.

19-14. (Developmental) Reduce iron deficiency among pregnant females.

Potential data source: National Health and Nutrition Examination Survey (NHANES), CDC, NCHS.

The terms anemia, iron deficiency, and iron deficiency anemia often are used interchangeably but are not equivalent. Iron deficiency ranges from depleted iron stores without functional or health impairment to iron deficiency with anemia, which affects the functioning of several organ systems. Iron deficiency anemia is more likely than iron deficiency without anemia to cause preterm births, low birth weight, and delays in infant and child development.[57, 58, 59] Iron deficiency (with and without anemia) in adolescent females has been associated with decreased verbal learning and memory.[60] The prevalence of iron deficiency anemia among children aged 1 to 2 years and 3 to 4 years and females aged 12 to 49 years in 1988 to 1994 was 3 percent, less than 1 percent, and 4 percent, respectively.

Anemia can be caused by many factors other than iron deficiency, including other nutrient deficiencies, infection, inflammation, and hereditary anemias. Anemia is used for monitoring risk of iron deficiency at the State and local levels because of the low cost and feasibility of measuring hemoglobin or hematocrit in the clinic setting.[61] Anemia is a good predictor of iron deficiency when the prevalence of iron deficiency is high, such as during the third trimester of pregnancy. It is not a good predictor of iron deficiency when the prevalence of iron deficiency is expected to be low, such as among white, non-Hispanic children aged 3 to 4 years in the United States. In that case, the majority of anemia is due to other causes.[8] However, changes in the prevalence of anemia over time at State and local levels can be used to evaluate the effectiveness of programs to decrease the prevalence of iron deficiency.

Iron deficiency and anemia among young children declined during the 1970s in association with increased iron intake.[8] Although the prevalence of iron deficiency

among low-income children continued to decline from 1976–80 to 1988–94, the prevalence of iron deficiency among all young children remained the same, and the prevalence of iron deficiency among females of childbearing age actually increased.[9] From 1979 to 1996, the prevalence of third trimester anemia among low-income pregnant females did not change.[62, 63]

Iron deficiency is highest among toddlers and among certain racial, ethnic, and low-income children.[64] Iron deficiency can be prevented among young children by teaching families about child nutrition, including promoting breastfeeding of infants, with exclusive breastfeeding for 4 to 6 months; the use of iron-fortified formulas when formulas are used; delayed introduction of cow's milk until age 12 months; and age-appropriate introduction of iron-rich solid foods, such as iron-fortified infant cereals and pureed meats, and foods that enhance iron absorption such as vitamin C-rich fruits, vegetables, or juices.[61]

Nonpregnant females of childbearing age are at increased risk for iron deficiency because of iron loss during menstruation coupled with inadequate intake of iron.[61] Pregnant females are also at increased risk because of the increased iron requirements of pregnancy.[61, 63] Consequently, a Healthy People 2010 objective has been established to reduce the prevalence of anemia among low-income pregnant females in their third trimester. Although groups other than low-income females are considered at risk for iron deficiency during pregnancy, no nationally representative data exist on the prevalence of iron deficiency or iron deficiency anemia among pregnant females.

National data indicate that only one-fourth of all females of childbearing age (12 to 49 years) meet the U.S. recommended dietary allowance for iron (15 mg) through their diets.[65] Iron deficiency among females of childbearing age may be prevented by periodic anemia screening and appropriate treatment and by counseling them about better eating practices, such as selecting iron-rich foods, taking iron supplements during pregnancy, increasing consumption of foods that enhance iron absorption (for example, orange juice and other citrus products), and discouraging consumption of iron inhibitors (for example, coffee and tea) with iron-rich foods.[61] Some good sources of iron include ready-to-eat cereals with added iron; enriched and whole grain breads; lean meats; turkey dark meat; shellfish; spinach; and cooked dry beans, peas, and lentils.

19-15. (Developmental) Increase the proportion of children and adolescents aged 6 to 19 years whose intake of meals and snacks at school contributes to good overall dietary quality.

Potential data sources: Continuing Survey of Food Intakes by Individuals (CSFII), USDA; National Food and Nutrition Survey, USDA and CDC; National Health and Nutrition Examination Survey (NHANES), CDC, NCHS.

Students today have increased food options at school. Although students may understand that good nutrition and good health are connected, that understanding may not be reflected in their food choices and meal patterns. The U.S. Department of Agriculture (USDA) has established standards requiring schools to plan menus that meet the 1995 *Dietary Guidelines for Americans*, but these standards do not apply to à la carte foods; to foods sold in snack bars, school stores, and vending machines; or to foods students bring from home. Students' food choices are influenced by the total eating environment created by schools. This includes the types of foods available throughout the school, point-of-choice nutrition information in the cafeteria and around the school, nutrition education provided in the classroom, and nutrition promotions that reach families and affect the choices of foods brought to school.

Improving the quality of students' dietary intake in the school setting is important because, for many children, meals and snacks consumed at school make a major contribution to their total daily consumption of food and nutrients. National food consumption data collected in 1994 and 1995 show that school foods had the highest saturated fat density of all food outlets.[27] School foods also had higher than recommended levels of sodium—as did other away-from-home foods and at-home foods. Nonetheless, these analyses also showed positive aspects of foods obtained from school. School foods had the highest calcium density of all sources and the highest dietary fiber density of all away-from-home sources. The establishment of an environment that supports a good overall diet would enable school nutrition and food services, in conjunction with students, their families, and other school employees, to make an important contribution to short- and long-term disease prevention and health promotion. In addition, such an environment would foster learning readiness (for example, by encouraging students to consume substantial breakfasts).[66, 67, 68]

19-16. Increase the proportion of worksites that offer nutrition or weight management classes or counseling.

Target: 85 percent.

Baseline: 55 percent of worksites with 50 or more employees offered nutrition or weight management classes or counseling at the worksite or through their health plans in 1998–99.

Target setting method: 55 percent improvement.

Data source: National Worksite Health Promotion Survey, Association for Worksite Health Promotion (AWHP).

Worksites, 1998–99	Offer Nutrition or Weight Management Classes or Counseling		
Worksite Size	Worksite or Health Plan	Worksite	Health Plan
		Percent	
Total (50 or more employees)	55	28	39
50 to 99 employees	48	21	39
100 to 249 employees	51	29	37
250 to 749 employees	59	44	42
750 or more employees	83	70	50

Worksite programs can reach large numbers of employees with information, activities, and services that encourage the adoption of healthy dietary and physical activity behaviors.[69] (See Focus Area 7. Educational and Community-Based Programs and Focus Area 22. Physical Activity and Fitness.) Employer-sponsored programs can be offered onsite or in partnership with community organizations. Examples of such programs include weight management classes, physical activity programs, lunchtime seminars, self-help programs, cooking demonstrations and classes, healthy food service and vending machine selections, point-of-purchase nutrition information, and flexible health benefits that include nutrition-related services.

A recent study of worksite health promotion programs found that specific interventions at the worksite resulted in employees choosing to reduce the amount of fat calories they consumed and eating more fruits, vegetables, and dietary fiber.[70] Worksite health promotion programs may reduce health care costs, including employer costs for insurance programs, disability benefits, and medical expenses.[71, 72]

If possible, nutrition education and weight management programs at the worksite should be part of a comprehensive health promotion program. In addition, employers could reimburse health promotion activities and provide company time for employees to participate in the programs.[73]

Worksite programs should be made available to the family members of employees and company retirees as well as current employees. Also, these programs should be offered in a culturally and linguistically competent manner and any educational materials provided should be culturally and linguistically appropriate.

19-17. Increase the proportion of physician office visits made by patients with a diagnosis of cardiovascular disease, diabetes, or hyperlipidemia that include counseling or education related to diet and nutrition.

Target: 75 percent.

Baseline: 42 percent of physician office visits made by patients with a diagnosis of cardiovascular disease, diabetes, or hyperlipidemia included ordering or providing counseling or education on diet and nutrition in 1997 (age adjusted to the year 2000 standard population).

Target setting method: Better than the best.

Data source: National Ambulatory Medical Care Survey (NAMCS), CDC, NCHS.

NOTE: THE TABLE BELOW MAY CONTINUE TO THE FOLLOWING PAGE.

Persons With Specific Conditions, 1997	Physician Office Visits That Include Ordering or Providing Diet and Nutrition Counseling or Education			
	19-17. Any of the Three Conditions	Hyperlipidemia*	Cardiovascular Disease*	Diabetes*
	Percent			
TOTAL	42	65	36	48
Race and ethnicity				
American Indian or Alaska Native	DSU	DSU	DSU	DSU
Asian or Pacific Islander	DSU	DSU	DSU	DSU
Asian	DNC	DNC	DNC	DNC
Native Hawaiian and other Pacific Islander	DNC	DNC	DNC	DNC
Black or African American	46	DSU	40	54
White	41	64	35	47
Hispanic or Latino	DSU	DSU	DSU	DSU
Not Hispanic or Latino	DSU	DSU	DSU	DSU
Black or African American	DSU	DSU	DSU	DSU
White	DSU	DSU	DSU	DSU

Persons With Specific Conditions, 1997	Physician Office Visits That Include Ordering or Providing Diet and Nutrition Counseling or Education			
	19-17. Any of the Three Condi-tions	Hyper-lipide-mia*	Cardio-vascular Dis-ease*	Diabe-tes*
	Percent			
Gender				
Female	39	55	34	46
Male	44	73	38	49
Age				
20 to 44 years	45	75	37	49
45 to 64 years	41	62	36	47
65 years and older	33	44	32	45
Family income level†				
Lower income (≤130 percent of poverty threshold)	DNC	DNC	DNC	DNC
Higher income (>130 percent of poverty threshold)	DNC	DNC	DNC	DNC
Disability status				
Persons with disabilities	DNC	DNC	DNC	DNC
Persons without disabilities	DNC	DNC	DNC	DNC

DNA = Data have not been analyzed. DNC = Data are not collected. DSU = Data are statistically unreliable.

Note: Age adjusted to the year 2000 standard population.

*Data for separate conditions are displayed to further characterize the issue.

†A household income below 130 percent of poverty threshold is used by the Food Stamp Program.

NOTE: THE TABLE ABOVE MAY HAVE CONTINUED FROM THE PREVIOUS PAGE.

Primary care providers are well positioned in the health care system to provide preventive services, including nutrition screening and assessment, referral, and counseling. For example, they can screen for age-specific and diagnosis-related nutrition risk factors as a part of routine patient contact. The public views physicians—and registered dietitians in particular—as credible sources of nutrition information.[74] Dietary assessment, counseling, and followup by physicians and qualified nutrition professionals are effective in reducing patient dietary fat intake and serum cholesterol.[75, 76, 77, 78] For many physicians, referring patients to qualified nutrition professionals for nutrition assessment, education, counseling on behavioral change, diet modification, and specialized nutrition therapies represents appropriate clinical practice.

Nutrition counseling by registered dietitians and other qualified nutrition professionals has been found to be cost effective for patients with hyperlipidemia[79, 80] and type 2 diabetes mellitus.[81] Nutrition services also are a critical component of improved health outcomes for many other diseases and conditions, including obesity, gastrointestinal and hepatic disease, renal disease, cancer, HIV/AIDS, pressure ulcers, burns and trauma, eating disorders, and prenatal care. A 1997 study that evaluated the cost of covering medical nutrition therapy under Medicare part B projected savings to the program of $11 million in 2001 and $65 million in 2004.[82, 83] (See Focus Area 3. Cancer, Focus Area 4. Chronic Kidney Disease, Focus Area 13. HIV, and Focus Area 16. Maternal, Infant, and Child Health.)

Food Security

19-18. Increase food security among U.S. households and in so doing reduce hunger.

Target: 94 percent.

Baseline: 88 percent of all U.S. households were food secure in 1995.

Target setting method: 6 percentage point improvement (50 percent decrease in food insecurity; consistent with the U.S. pledge to the 1996 World Food Summit).

Data sources: Food Security Supplement to the Current Population Survey, U.S. Department of Commerce, Bureau of the Census; National Food and Nutrition Survey (beginning in 2001), HHS and USDA.

NOTE: THE TABLE BELOW MAY CONTINUE TO THE FOLLOWING PAGE.

U.S. Households, 1995	Food Secure
	Percent
TOTAL	88
Race and ethnicity	
American Indian or Alaska Native	78
Asian or Pacific Islander	91
Asian	DSU
Native Hawaiian and other Pacific Islander	DSU
Black or African American	76
White	90
Hispanic or Latino	75
Mexican American	73

U.S. Households, 1995	Food Secure
	Percent
Not Hispanic or Latino	89
Black or African American	76
White	91
Lower income level (≤130 percent of poverty threshold)*	
All	69
With children (under age 18 years)	59
With elderly persons (aged 65 years and over)	85
Higher income level (>130 percent of poverty threshold)*	
All	94
With children (under age 18 years)	91
With elderly persons (aged 65 years and over)	98
Disability status	
Persons with disabilities	DNC
Persons without disabilities	DNC
Select populations	
Household characteristics	
With children	83
With elderly persons	94

DNA = Data have not been analyzed. DNC = Data are not collected. DSU = Data are statistically unreliable.
*A household income below 130 percent poverty threshold is used by the Food Stamp Program.

NOTE: THE TABLE ABOVE MAY HAVE CONTINUED FROM THE PREVIOUS PAGE.

Food security means that people have access at all times to enough food for an active, healthy life. It implies that people have nutritionally adequate and safe foods and sufficient household resources to ensure their ability to acquire adequate, acceptable foods in socially acceptable ways—that is, through regular marketplace sources and not through severe coping strategies like emergency food sources, scavenging, and stealing. Hunger in this context refers to the uneasy or painful sensation caused by a lack of food.

While the vast majority of persons in the United States are food secure and have not experienced resource-constrained hunger, both food insecurity and hunger have remained a painful fact of life for too many people.[84, 85] The specific concern is with food insecurity and hunger resulting from inadequate household resources. Other sources of food insecurity (such as illness, child abuse and neglect, or loss of function or mobility) are not included in this definition. Food insecurity and hunger may coexist with malnutrition, but they are not the same thing or even necessarily closely associated. Food insecurity and hunger, however, are believed to have harmful health and behavioral impacts in their own right.[86] These are of

particular concern for pregnant women, children, elderly persons, and other nutritionally vulnerable groups.[87]

The United States is committed to increasing food security by working with local leaders as outlined in the U.S. Action Plan on Food Security, through USDA's Community Food Security Initiative, and the Maternal and Child Health Bureau's Healthy Start.[88, 89]

Related Objectives From Other Focus Areas

1. **Access to Quality Health Services**
   - 1-3. Counseling about health behaviors
2. **Arthritis, Osteoporosis, and Chronic Back Conditions**
   - 2-9. Cases of osteoporosis
3. **Cancer**
   - 3-1. Overall cancer deaths
   - 3-3. Breast cancer deaths
   - 3-5. Colorectal cancer deaths
   - 3-10. Provider counseling about cancer prevention
4. **Chronic Kidney Disease**
   - 4-3. Counseling for chronic kidney failure care
5. **Diabetes**
   - 5-1. Diabetes education
   - 5-2. New cases of diabetes
   - 5-6. Diabetes-related deaths
7. **Educational and Community-Based Programs**
   - 7-2. School health education
   - 7-5. Worksite health promotion programs
   - 7-6. Participation in employer-sponsored health promotion activities
   - 7-10. Community health promotion programs
   - 7-11. Culturally appropriate and linguistically competent community health promotion programs
10. **Food Safety**
    - 10-4. Food allergy deaths
    - 10-5. Consumer food safety practices
11. **Health Communication**
    - 11-4. Quality of Internet health information sources
12. **Heart Disease and Stroke**
    - 12-1. Coronary heart disease (CHD) deaths
    - 12-7. Stroke deaths
    - 12-9. High blood pressure
    - 12-11. Action to help control blood pressure
    - 12-13. Mean total blood cholesterol levels
    - 12-14. High blood cholesterol levels
16. **Maternal, Infant, and Child Health**
    - 16-10. Low birth weight and very low birth weight
    - 16-12. Weight gain during pregnancy

16-15. Spina bifida and other neural tube defects
16-16. Optimum folic acid levels
16-17. Prenatal substance exposure
16-18. Fetal alcohol syndrome
16-19. Breastfeeding

18. Mental Health and Mental Disorders

18-5. Eating disorder relapses

22. Physical Activity and Fitness

22-1. No leisure-time physical activity
22-2. Moderate physical activity
22-3. Vigorous physical activity
22-6. Moderate physical activity in adolescents
22-7. Vigorous physical activity in adolescents
22-9. Daily physical education in schools
22-13. Worksite physical activity and fitness

26. Substance Abuse

26-12. Average annual alcohol consumption

Terminology

(A listing of abbreviations and acronyms used in this publication appears in Appendix H.)

Anemia: A condition in which the hemoglobin in red blood cells falls below normal. Anemia most often results from iron deficiency but also may result from deficiencies of folic acid, vitamin B12, or copper, or from chronic disease, certain conditions, or chronic blood loss.

Body mass index (BMI): Weight (in kilograms) divided by the square of height (in meters), or weight (in pounds) divided by the square of height (in inches) times 704.5. Because it is readily calculated, BMI is the measurement of choice as an indicator of healthy weight, overweight, and obesity.

Calorie: Unit used for measuring the energy produced by food when metabolized in the body.

Cholesterol: A waxy substance that circulates in the bloodstream. When the level of cholesterol in the blood is too high, some of the cholesterol is deposited in the walls of the blood vessels. Over time, these deposits can build up until they narrow the blood vessels, causing atherosclerosis, which reduces the blood flow. The higher the blood cholesterol level, the greater is the risk of getting heart disease. Blood cholesterol levels of less than 200 mg/dL are considered desirable. Levels of 240 mg/dL or above are considered high and require further testing and possible intervention. Levels of 200-239 mg/dL are considered borderline. Lowering blood cholesterol reduces the risk of heart disease.

HDL (high-density lipoprotein) cholesterol: The so-called good cholesterol. Cholesterol travels in the blood combined with protein in packages called lipoproteins. HDL is thought to carry cholesterol away from other parts of the body back to the liver for removal from the body. A low level of HDL increases the risk for CHD, whereas a high HDL level is protective.

LDL (low-density lipoprotein) cholesterol: The so-called bad cholesterol. LDL contains most of the cholesterol in the blood and carries it to the tissues and organs of the body, including the arteries. Cholesterol from LDL is the main source of damaging buildup and blockage in the arteries. The higher the level of LDL in the blood, the greater is the risk for CHD.

Complex carbohydrate: Starch and dietary fiber.

Coronary heart disease (CHD): The type of heart disease due to narrowing of the coronary arteries.

Dietary fiber: Plant food components, including plant cell walls, pectins, gums, and brans that cannot be digested.

***Dietary Guidelines for Americans*:** A report published by the U.S. Department of Agriculture and U.S. Department of Health and Human Services that explains how to eat to maintain health. The guidelines form the basis of national nutrition policy and are revised every 5 years. This chapter refers mostly to the 2000 guidelines.

Fats/fatty acids: Fats and fatty acids are hydrocarbon chains ending in a carboxyl group at one end that bond to glycerol to form fat. Fatty acids are characterized as saturated, monounsaturated, or polyunsaturated depending on how many double bonds are between the carbon atoms. Fatty acids supply energy and promote absorption of fat-soluble vitamins. Some fatty acids are "essential," because they cannot be made by the body.

> **Saturated fatty acids:** Fatty acids with no double bonds between carbon atoms. Levels of saturated fatty acids are especially high in meat and dairy products that contain fat. Saturated fatty acids are linked to increased blood cholesterol levels and a greater risk for heart disease.
>
> ***Trans*-fatty acids:** Alternate forms of naturally occurring unsaturated fatty acids produced in fats as a result of hydrogenation, such as when vegetable oil becomes margarine or shortening. *Trans*-fatty acids also occur in milk fat, beef fat, and lamb fat. These fatty acids have been associated with increased blood cholesterol levels.
>
> **Unsaturated fatty acids:** Fatty acids with one or more double bonds between carbon atoms. These fatty acids do not raise blood cholesterol levels.
>
> **Polyunsaturated:** Fatty acids with more than one double bond between carbon atoms.
>
> **Monounsaturated:** Fatty acids with one double bond between carbon atoms.

Food Guide Pyramid: A graphic depiction of U.S. Department of Agriculture's current food guide that includes five major food groups in its "base" (grains, vegetables, fruits, milk products, and meats, and meat substitutes) and a "tip" depicting the relatively small contribution that discretionary fat and added sugars should make in U.S. diets. The Food Guide Pyramid provides information on the choices within each group and the recommended number of servings.

Food security: Access by all people at all times to enough food for an active, healthy life. It includes at a minimum (1) the ready availability of nutritionally adequate and safe foods, and (2) an assured ability to acquire acceptable foods in socially acceptable ways.

Food insecurity: Limited or uncertain availability of nutritionally adequate and safe foods or limited and uncertain ability to acquire acceptable foods in socially acceptable ways.

HDL-cholesterol: See cholesterol.

Hunger: The uneasy or painful sensation caused by a lack of food.

Hypertension: High blood pressure.

Hypertriglyceridemia: Elevated levels of triglycerides in the blood.

Iron deficiency: Lack of adequate iron in the body to support and maintain functioning. It can lead to iron deficiency anemia, a reduction in the concentration of hemoglobin in the red blood cells due to a lack of iron supply to the bone marrow.

LDL-cholesterol: See cholesterol.

Linear growth: Increase in length or height.

Medical nutrition therapy: Use of specific nutrition counseling and interventions, based on an assessment of nutritional status, to manage a condition or treat an illness or injury.

Metabolism: The sum total of all the chemical reactions that go on in living cells.

Nutrition: The set of processes by which nutrients and other food components are taken in by the body and used.

Obesity: A condition characterized by excessive body fat.

Osteoporosis: A bone disease characterized by a reduction in bone mass and a deterioration of the bone structure leading to bone fragility.

Overweight: Excess body weight.

Physical activity: Bodily movement that substantially increases energy expenditure.

Registered dietitian: A food and nutrition expert who has met the minimum academic and professional requirements to receive the credential "RD." Many States and Commonwealths also have licensing laws for dietitians and nutrition practitioners.

Sedentary behavior: A pattern of behavior that is relatively inactive, such as a lifestyle characterized by a lot of sitting.

Type 2 diabetes: The most common form of diabetes, which results from insulin resistance and abnormal insulin action. Type 2 diabetes was previously referred to as noninsulin-dependent diabetes mellitus (NIDDM) and adult-onset diabetes.

References

[1] American Academy of Pediatrics, Work Group on Breastfeeding. Breastfeeding and the use of human milk. *Pediatrics* 100(6):1035-1039, 1997.

[2] Frazao, E. The high costs of poor eating patterns in the United States. In: Frazao, E., ed. *America's Eating Habits: Changes and Consequences.* Washington, DC: U.S. Department of Agriculture (USDA), Economic Research Service (ERS), AIB-750, 1999.

[3] National Center for Health Statistics (NCHS). Report of final mortality statistics, 1995. *Monthly Vital Statistics Report* 45(11):Suppl. 2, June 12, 1997.

[4] Frazao, E. The American diet: A costly problem. *Food Review* 19:2-6, 1996.

[5] National Institutes of Health (NIH). *NIH Consensus Statement: Optimal Calcium Intake*. 12(4), 1994.

[6] USDA and U.S. Department of Health and Human Services (HHS). *Dietary Guidelines for Americans*. 5th ed. USDA Home and Garden Bulletin No. 232. Washington, DC: USDA, 2000.

[7] USDA. *The Food Guide Pyramid*. USDA Home and Garden Bulletin No. 252. Washington, DC: USDA, 1992.

[8] Yip, R. The changing characteristics of childhood iron nutritional status in the United States. In: Filer, Jr., L.J., ed. *Dietary Iron: Birth to Two Years*. New York, NY: Raven Press, Ltd., 1989, 37-61.

[9] NCHS. *Healthy People 2000 Review, 1998–99*. DHHS Pub. No. (PHS) 99-1256. Hyattsville, MD: Public Health Service (PHS), 1997.

[10] HHS. Recommendations for the use of folic acid to reduce the number of cases of spina bifida and other neural tube defects. *Morbidity and Mortality Weekly Report* 41:1-7, 1992.

[11] Lewis, C.J.; Crane, N.T.; Wilson, D.B.; et al. Estimated folate intakes: Data updated to reflect food fortification, increased bioavailability, and dietary supplement use. *American Journal of Clinical Nutrition* 70:198-207, 1999.

[12] Flegal, K.M.; Carroll, M.D.; Kuczmarski, R.J.; et al. Overweight and obesity in the United States: Prevalence and trends, 1960–1994. *International Journal of Obesity* 22(1):39-47, 1998.

[13] Kuczmarski, R.J.; Carroll, M.D.; Flegal, K.M.; et al. Varying body mass index cutoff points to describe overweight prevalence among U.S. adults: NHANES III (1988–1994). *Obesity Research* 5(6):542-548, 1997.

[14] World Health Organization (WHO). *Obesity: Preventing and Managing the Global Epidemic. Report of a WHO Consultation on Obesity, Geneva, 3-5 June 1997*. Geneva, Switzerland: WHO, 1998.

[15] NIH. Clinical guideline on the identification, evaluation and treatment of overweight and obesity in adults—The evidence report. *Obesity Research* 6(Suppl. 2):51S-209S, 1998.

[16] Troiano, R.P., and Flegal, K.M. Overweight children and adolescents: Description, epidemiology, and demographics. *Pediatrics* 101:497-504, 1998.

[17] Wolf, A.M., and Colditz, G.A. Current estimates of the economic cost of obesity in the United States. *Obesity Research* 6(2):97-106, 1998.

[18] Centers for Disease Control and Prevention (CDC). Guidelines for school health programs to promote lifelong healthy eating. *Morbidity and Mortality Weekly Report* 45(RR-9):1-33, 1996.

[19] Kelder, S.H.; Perry, C.L.; Klepp, K.I.; et al. Longitudinal tracking of adolescent smoking, physical activity, and food choice behaviors. *American Journal of Public Health* 84(7):1121-1126, 1994.

[20] Variyam, J.N.; Blaylock, J.; Lin, B.H.; et al. Mother's nutrition knowledge and children's dietary intakes. *American Journal of Agricultural Economics* 81(2), May 1999.

[21] Collins, J.L.; Small, M.L.; Kann, L.; et al. School health education. *Journal of School Health* 65(8):302-311, 1995.

[22] Contento, I.; Balch, G.I.; Bronner, Y.L.; et al. Nutrition education for school-aged children. *Journal of Nutrition Education* 27(6):298-311, 1995.

[23] Lytle, L., and Achterberg, C. Changing the diet of America's children: What works and why? *Journal of Nutrition Education* 27(5):250-260, 1995.

[24] USDA, Food and Nutrition Service (FNS). *Team Nutrition Strategic Plan*. Washington, DC: FNS, 1998.

[25] NIH Technology Assessment Conference Panel. Methods for voluntary weight loss and control. Consensus development conference, March 30 to April 1, 1992. *Annals of Internal Medicine* 119(7.2):764-770, 1993.

[26] Wilkening, V.L. FDA's regulations to implement the NLEA. *Nutrition Today* 13-20, 1993.

[27] Lin, B.H.; Guthrie, J.; and Frazao, E. Nutrient contribution of food away from home. In: Frazao, E., ed. *America's Eating Habits: Changes and Consequences*. Washington, DC: USDA, ERS, AIB-750, 1999.

[28] Crane, N.T.; Hubbard, V.S.; and Lewis, C.J. National nutrition objectives and the Dietary Guidelines for Americans. *Nutrition Today* 33:49-58, 1998.

[29] WHO Expert Committee. *Physical Status: The Use and Interpretation of Anthropometry*. *Report of a WHO Expert Committee*. WHO Technical Report Series: 854. Geneva, Switzerland: WHO, 1995.

[30] Gallagher, D.; Visser, M.; Sepulveda, D.; et al. How useful is body mass index for comparison of body fatness across age, sex, and ethnic groups. *American Journal of Epidemiology* 143(3):228-239, 1996.

[31] CDC. *Pediatric Nutrition Surveillance, 1997.* Full report. Atlanta, GA: HHS, CDC, 1998.

[32] PHS. *The Surgeon General's Report on Nutrition and Health*. DHHS Pub. No. (PHS) 88050210. Washington, DC: HHS, 1988.

[33] National Research Council. *Diet and Health: Implications for Reducing Chronic Disease Risk.* Washington, DC: National Academy Press, 1989.

[34] HHS, Food and Drug Administration (FDA). Notice of final rule: Food labeling; health claims and label statements; dietary fiber and cardiovascular disease. *Federal Register* 2552-2605, January 5, 1993.

[35] HHS, FDA. Notice of final rule: Food labeling; health claims and label statements; dietary fiber and cancer. *Federal Register* 2537-2552, January 5, 1993.

[36] Chief Medical Officer's Committee on Medical Aspects of Food. *Nutritional Aspects of the Development of Cancer*. London, England: Stationery Office, 1998.

[37] World Cancer Research Fund, in association with American Institute for Cancer Research. *Food, Nutrition and the Prevention of Cancer: A Global Perspective*. Washington, DC: the Fund, 1997.

[38] USDA, Agricultural Research Service (ARS). Unpublished data from the 1994–96 Continuing Survey of Food Intakes by Individuals, February 1998.

[39] Morton, J.F., and Guthrie, J.F. Changes in children's total fat intakes and their food sources of fat, 1989–91 versus 1994–95: Implications for diet quality. *Family Economics and Nutrition Review* 11(3):44-57, 1998.

[40] Guthrie, J.F., and Morton, J.F. Food sources of added sweeteners in the diets of Americans. *Journal of the American Dietetic Association* 100(1):43-48, 51, 2000.

[41] National Heart, Lung, and Blood Institute (NHLBI). *The Report of the Expert Panel on Population Strategies for Blood Cholesterol Reduction. National Cholesterol Education Program of the National Heart, Lung, and Blood Institute.* Washington, DC: HHS, 1990.

[42] Lichtenstein, A.H.; Ausman, L.M.; Jalbert, S.M.; et al. Effects of different forms of dietary hydrogenated fats on serum lipoprotein cholesterol levels. *New England Journal of Medicine* 340(25):1933-1940, 1999.

[43] Ip, C., and Carroll, K., eds. Proceedings of the workshop on individual fatty acids and cancer. Washington, DC, June 4-5, 1996. *American Journal of Clinical Nutrition* 66(Suppl. 6):1505S-1586S, 1997.

[44] Freedman, L.S.; Prentice, R.L.; Clifford, C.; et al. Dietary fat and breast cancer: Where are we? *Journal of the National Cancer Institute* 85(10):764-765, 1993.

[45] Allison, D.B.; Egan, S.K.; Barraj, L.M.; et al. Estimated intakes of *trans* fatty and other fatty acids in the U.S. population. *Journal of the American Dietetic Association* 99(2):166-174, 1999.

[46] NHLBI. *Sixth Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure*. DHHS Pub. No. 98-4080. Washington, DC: HHS, 1997.

[47] Elliott, P.; Stamler, J.; Nichols, R.; et al., for the Intersalt Cooperative Research Group. Intersalt revisited: Further analyses of 24 hour sodium excretion and blood pressure within and across populations. *British Medical Journal* 312:1249-1253, 1966.

[48] Stamler, J.; Stamler, R.; and Neaton, J.D. Blood pressure, systolic and diastolic, and cardiovascular risks: U.S. population data. *Archives of Internal Medicine* 153(5):598-615, 1993.

[49] Kurtz, T.W.; Al-Bander, H.A.; and Morris, R.C. "Salt sensitive" essential hypertension in men: Is the sodium ion alone important? *New England Journal of Medicine* 317(17):1043-1048, 1987.

[50] Mattes, R., and Donnelly, D. Relative contributions of dietary sodium sources. *Journal of the American College of Nutrition* 10(4):383-393, 1991.

[51] James, W.P.T.; Ralph, A.; and Sanchez-Castillo, C.P. The dominance of salt in manufactured food in the sodium intake of affluent societies. *Lancet* 1(8530):426-429, 1987.

[52] Institute of Medicine. *Dietary Reference Intakes for Calcium, Phosphorus, Magnesium, Vitamin D, and Fluoride.* Washington, DC: National Academy Press, 1997.

[53] Life Sciences Research Office, Federation of American Societies for Experimental Biology. Prepared for the Interagency Board for Nutrition Monitoring and Related Research. *Third Report on Nutrition Monitoring in the United States.* Vol. I. Washington, DC: U.S. Government Printing Office, 1995, 104-105.

[54] Tippett, K., and Cleveland, L. How current diets stack up: Comparison with the dietary guidelines. In: Frazao, E., ed. *America's Eating Patterns: Changes and Consequences*. Washington, DC: USDA, ERS, AIB-750, 1999.

[55] Bucher, H.C.; Cook, R.J.; Guyatt, G.; et al. Effects of dietary calcium supplementation on blood pressure. A meta-analysis of randomized controlled trials. *Journal of the American Medical Association* 275:1016-1022, 1996.

[56] Allender, P.S.; Cutler, J.A.; Follman, D.; et al. Dietary calcium and blood pressure: A meta-analysis of randomized clinical trials. *Annals of Internal Medicine* 124(9):825-829, 1996.

[57] Idjradinata, P., and Pollitt, E. Reversal of developmental delays in iron-deficient anaemic infants treated with iron. *Lancet* 341(8836):1-4, 1993.

[58] Lozoff, B.; Jimenez, E.; and Wolf, A.W. Long-term developmental outcome of infants with iron deficiency. *New England Journal of Medicine* 325(10):687-694, 1991.

[59] Scholl, T.O.; Hediger, M.L.; Fischer, R.L.; et al. Anemia vs iron deficiency: Increased risk of preterm delivery in a prospective study. *American Journal of Clinical Nutrition* 55(5):985-998, 1992.

[60] Bruner, A.B.; Joffe, A.; Duggan, A.K.; et al. Randomized study of cognitive effects of iron supplementation in non-anaemic iron-deficient adolescent girls. *Lancet* 348(9033):992-996, 1996.

[61] CDC. Recommendations to prevent and control iron deficiency in the United States. *Morbidity and Mortality Weekly Report* 47(RR-3):1-29, 1998.

[62] Perry, G.S.; Yip, R.; and Zyrkowski, C. Nutritional risk factors among low-income pregnant U.S. women: The Centers for Disease Control and Prevention (CDC) Pregnancy Nutrition Surveillance System, 1979 through 1993. *Seminars in Perinatology* 19(3):211-221, 1995.

[63] CDC. *Pregnancy Nutrition Surveillance, 1996.* Full report. Atlanta, GA: HHS, CDC, 1998.

[64] Looker, A.C.; Dallman, P.R.; Carroll, M.D.; et al. Prevalence of iron deficiency in the United States. *Journal of the American Medical Association* 277:973-976, 1997.

[65] USDA, ARS. Data tables: Results from USDA's 1994–96 Continuing Survey of Food Intakes by Individuals and 1994–96 Diet and Health Knowledge Survey. Riverdale, MD: USDA, ARS, Beltsville Human Nutrition Research Center, December 1997. <http://www.barc.usda.gov/bhnrc/foodsurvey/home.htm>January 14, 1998.

[66] Devaney, B., and Stewart, E. *Eating Breakfast: Effects of the School Breakfast Program.* Washington, DC: USDA, FNS, 1998.

[67] Murphy, J.M.; Pagano, M.E.; Nachmani, J.; et al. The relationship of school breakfast to psychosocial and academic functioning: Cross-sectional and longitudinal observations in an inner-city school sample. *Archives of Pediatric and Adolescent Medicine* 152(9):899-907, 1998.

[68] Pollitt, E. Does breakfast make a difference at school? *Journal of the American Dietetic Association* 95(10):1134-1139, 1995.

[69] PHS. *Worksite Nutrition: A Guide to Planning, Implementation, and Evaluation.* 2nd ed. Washington, DC: American Dietetic Association (ADA) and Office of Disease Prevention and Health Promotion, PHS, HHS, 1993.

[70] Sorensen, G.; Stoddard, A.; Hunt, M.K.; et al. The effects of a health promotion-health protection intervention on behavior change: The WellWorks Study. *American Journal of Public Health* 88(11):1685-1690, 1998.

[71] Goetzel, R.Z.; Jacobson, B.H.; Aldana, S.G.; et al. Health care costs of worksite health promotion participants and non-participants. *Journal of Occupational and Environmental Medicine* 40(4):341-346, 1998.

[72] Shephard, R.J. Employee health and fitness—State of the art. *Preventive Medicine* 12(5):644-653, 1983.

[73] Felix, M.R.; Stunkard, A.J.; Cohen, R.Y.; et al. Health promotion at the worksite. I. A process for establishing programs. *Preventive Medicine* 14(1):99-108, 1985.

[74] ADA. *The American Dietetic Association 1997 Nutrition Trends Survey*. Chicago, IL: ADA, 1997.

[75] Caggiula, A.W.; Christakis, G.; Farrand, M.; et al. The Multiple Risk Factor Intervention Trial (MRFIT). IV. Intervention on blood lipids. *Preventive Medicine* 10(4):443-475, 1987.

[76] Geil, P.B.; Anderson, J.W.; and Gustafson, N.J. Women and men with hypercholesterolemia respond similarly to an American Heart Association step 1 diet. *Journal of the American Dietetic Association* 95(4):436-441, 1995.

[77] Gambera, P.J.; Schneeman, B.O.; and Davis, P.A. Use of the Food Guide Pyramid and U.S. Dietary Guidelines to improve dietary intake and reduce cardiovascular risk in active-duty Air Force members. *Journal of the American Dietetic Association* 95(11):1268-1273, 1995.

[78] Hebert, J.R.; Ebbeling, C.B.; Ockene, I.S.; et al. A dietitian-delivered group nutrition program leads to reductions in dietary fat, serum cholesterol, and body weight: The Worcester Area Trial for Counseling in Hyperlipidemia (WATCH). *Journal of the American Dietetic Association* 99(5):544-552, 1999.

[79] McGehee, M.M.; Johnson, E.Q.; Rasmussen, H.M.; et al. Benefits and costs of medical nutrition therapy by registered dietitians for patients with hypercholesterolemia. *Journal of the American Dietetic Association* 95:1041-1043, 1995.

[80] Sikand, G. Medical nutrition therapy lowers serum cholesterol and saves medication costs in men with hypercholesterolemia. *Journal of the American Dietetic Association* 98:889-894, 1998.

[81] Franz, M.J.; Splett, P.L.; Monk, A.; et al. Cost-effectiveness of medical nutrition therapy provided by dietitians for persons with non-insulin dependent diabetes mellitus. *Journal of the American Dietetic Association* 95(9):1018-1024, 1995.

[82] Sheils, J.F.; Rubin, R.; and Stapleton, D.C. The estimated costs and savings of medical nutrition therapy: The Medicare population. *Journal of the American Dietetic Association* 99(4):428-435, 1999.

[83] Johnson, R.K. The Lewin Group Study—What does it tell us and why does it matter? *Journal of the American Dietetic Association* 99(4):426-427, 1999.

[84] Bickel, G.; Andrews, M.; and Carlson, S. The magnitude of hunger: In a new national measure of food security. *Topics in Clinical Nutrition* 13(4):15-30, 1998.

[85] Food Research and Action Center. *Community Childhood Hunger Identification Project: A Survey of Childhood Hunger in the United States*. Vol. 1. Washington, DC: the Center, 1995.

[86] Kendall, A.; Olson, C.M.; and Frongillo, Jr., E.A. Validation of the Radimer/Cornell measures of hunger and food insecurity. *Journal of Nutrition* 125(11):2793-2801, 1995.

[87] Foreign Agricultural Service (FAS), USDA. *U.S. Action Plan on Food Security: Solutions to Hunger*. Washington, DC: USDA, FAS, 1999.

[88] USDA. *USDA's Community Food Security Initiative Action Plan*. USDA Community Food Security Initiative, August 1999.

[89] Health Resources and Services Administration (HRSA), Maternal and Child Health Bureau. *Community Outreach, The Healthy Start Initiative: A Community-Driven Approach to Infant Mortality Reduction.* Vol. IV. Washington, DC: HRSA, 1996.