SECTION 1

Introduction

CHAPTER 1

Nutritional Assessment

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CHAPTER OUTLINE

- Introduction
- Nutrition and Health
- Nutritional Screening and Nutritional Assessment Tools
- Standard Methods of Evaluating Nutritional Status
- The Nutrition Care Process
- Emerging Opportunities for Nutritional Assessment and Evaluation
- Chapter Summary

LEARNING OBJECTIVES

After completing this chapter, the reader should be able to:
1. Describe the historic evolution of nutrient deficiency diseases, the role of nutrition with chronic disease, and the screening and diagnosis of malnutrition in the clinical setting.
2. Differentiate between screening and assessment for nutritional risk.
3. Understand the different methods of collecting nutrition assessment data.
4. Recognize the different components of the nutrition care process.
5. Examine the role of nutrition assessment in the prevention and treatment of chronic disease.

▶ Introduction

Nutritional imbalances are a severe public-health problem that has been associated with a significant increase in the risk of mortality and morbidity. An individual's nutritional status is influenced by factors such as consuming food in sufficient amounts, selecting the right foods to promote adequate nutrient intake, and the individual's eating pattern. A sedentary lifestyle and a poor-quality eating pattern have been identified as risk factors for the development of chronic diseases such as hypertension,

cardiovascular disease, diabetes mellitus (DM), stroke, and cancer. Adverse outcomes such as disability, poor quality of life, and high rates of low-birthweight babies occur as a result of poor eating patterns and malnutrition in both developed and underdeveloped countries. Identifying the impact of poor eating patterns on chronic diseases and assessing the nutritional status of individuals, families, and communities are important tasks in promoting population health.[1,2]

In the United States, approximately 50% of the adult population suffers from one or more avoidable

Refers to the measurement of the human individual. An early tool of physical anthropology, it has been used for identification, for the purposes of understanding human physical variation, in paleoanthropology, and in various attempts to correlate physical with racial and psychological traits.	Refers to the use of laboratory or biochemical data acquired through blood and urine samples (amongst others) to evaluate an individual's nutritional status.	A physical examination, medical examination, or clinical examination is the process by which a medical professional investigates the body of a patient for signs of disease. Visible aspects of general body composition include an evaluation of general muscle, fat mass, and evaluation of fluid status.
Anthropometry	**Biochemical**	**Clinical Examination**

A dietary assessment is a comprehensive evaluation of a person's food intake. Nutrition assessment methods include 24-hour recall, food frequency questionnaire, dietary history, food diary techniques, and observed food consumption.

Dietary Assessment

FIGURE 1.1 ABCDs of nutritional assessment

chronic disease. More than two-thirds of adults and approximately one-thirds of children and youth are overweight or obese. These extreme rates of overweight, obesity, and chronic disease have been a public-health concern for more than two decades and contribute not only to increased health risks but also to associated high medical costs.[3] In 2008, the medical costs connected with obesity were assessed at $147 billion. In 2012, the total estimated cost of diagnosed diabetes was $245 billion, including $176 billion in direct medical costs and $69 billion in decreased productivity.[4]

The evaluation of the nutrition status of different segments of the population helps in measuring the prevalence of nutritional disorders, and also to plan counteractive strategies (see **FIGURE 1.1**).
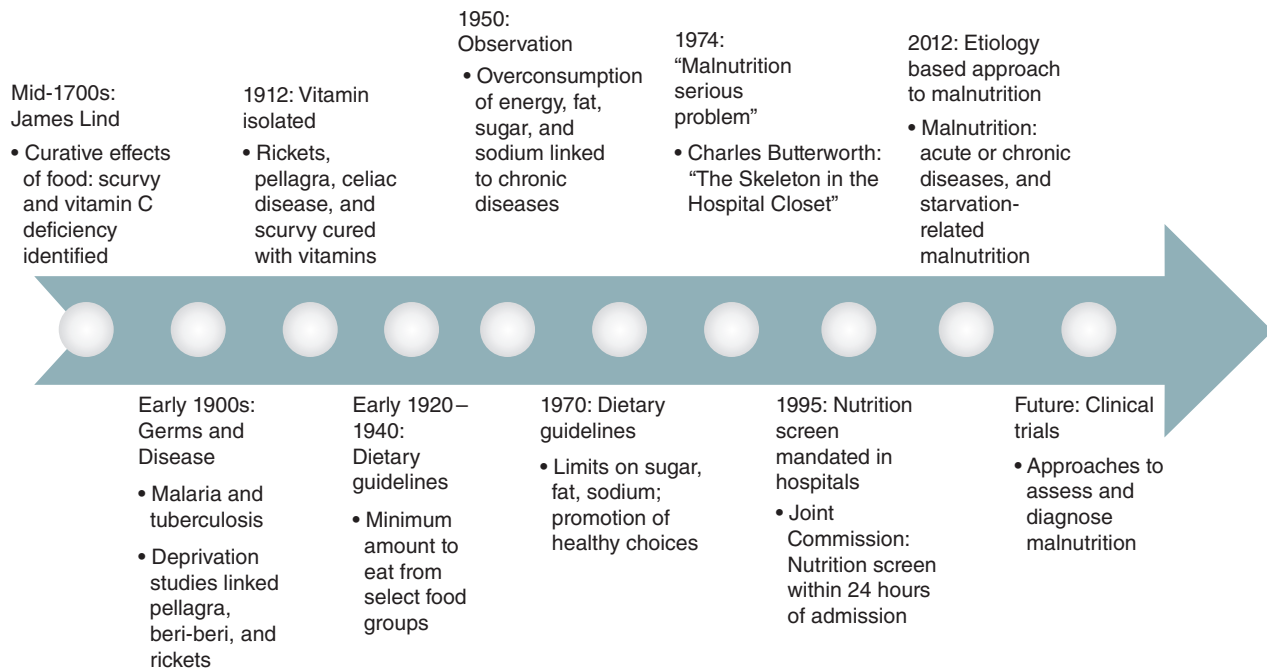
▶ Nutrition and Health

Preview   Nutritional assessment is the first step to identify nutrition-related problems that arise from nutrient deficiency and lead to chronic disease or result in malnutrition.

Nutrient Deficiency Diseases: A Historical Perspective

Good health and quality of life are desired by all individuals living in a society. Access to safe drinking water, nutritious food, and quality medical care are essential to the well-being of any person. Undernutrition and hunger are prevalent in underdeveloped as well as developed countries. An estimated 870 million adults and children worldwide have inadequate food intakes.[5] Chronic undernutrition leads to the onset of deficiency diseases, and physical signs of such diseases emerge when the intake of essential nutrients is inadequate and prolonged.

Keen observations by physicians in the early 1700s identified that in some instances the cause of human illness was related to the absence of certain foods; they proposed that those foods contained specific compounds whose absence led to the signs and symptoms of disease. One of the earliest known discoveries of the curative effects of foods with deficiency diseases was by Scottish physician James Lind in the mid-1700s. British sailors taking long voyages were developing **scurvy** and becoming severely ill or dying on the voyage. Observational research has progressed over time to the current

FIGURE 1.2 Nutrition and health: A historical perspective

Mid-1700s: James Lind
- Curative effects of food: scurvy and vitamin C deficiency identified

1912: Vitamin isolated
- Rickets, pellagra, celiac disease, and scurvy cured with vitamins

1950: Observation
- Overconsumption of energy, fat, sugar, and sodium linked to chronic diseases

1974: "Malnutrition serious problem"
- Charles Butterworth: "The Skeleton in the Hospital Closet"

2012: Etiology based approach to malnutrition
- Malnutrition: acute or chronic diseases, and starvation-related malnutrition

Early 1900s: Germs and Disease
- Malaria and tuberculosis
- Deprivation studies linked pellagra, beri-beri, and rickets

Early 1920–1940: Dietary guidelines
- Minimum amount to eat from select food groups

1970: Dietary guidelines
- Limits on sugar, fat, sodium; promotion of healthy choices

1995: Nutrition screen mandated in hospitals
- Joint Commission: Nutrition screen within 24 hours of admission

Future: Clinical trials
- Approaches to assess and diagnose malnutrition

dietary guidelines. **FIGURE 1.2** shows a short historic timeline of nutrition and health.[6,7]

Leading Causes of Death and Chronic Diseases

The interest in modifying diet to prevent chronic disease in Americans began when deficiency diseases and infectious diseases were eradicated. In addition, the implementation of government-mandated enrichment and fortification of food staples and the use of vaccinations to reduce deaths from infectious diseases also contributed to increased awareness of the American diet.[8]

TABLE 1.1 ranks the 10 leading causes of death in the United States today. Four of the ten—heart disease, cancer, stroke, and diabetes mellitus[9]—are linked to diet and either can be prevented or have their onsets delayed by implementing healthy eating practices and making positive lifestyle choices.

Nutritionists today are challenged to find the optimal food pattern and nutrient profile that will optimize the quality of life and prevent chronic disease for their clients. Conducting nutritional assessment in the community setting is important when identifying early risks for chronic disease. Novel approaches such as evaluating the genetic profile of individuals to identify genetic determinates that lead to chronic disease

are being researched as a potential added "tool" that registered dietitian nutritionists (RDNs) can use along with traditional assessment measures. Understanding genomics in relationship to nutritional management of complex diseases is in its infancy, so routine genetic testing to provide dietary advice is not ready for practical application. The prospect for using nutritional genomics in the future, however, is exciting. It has the potential to offer RDNs and healthcare professionals the tools to create "genetically" personalized diet plans that are specific to any individual's genetic makeup.

History of Diagnosing Malnutrition in the Clinical Setting

Identifying malnutrition and offering nutrition support to malnourished patients is relatively new in the clinical setting. In 1974, Dr. Charles Butterworth wrote a landmark paper, "The Skeleton in the Hospital Closet," in which he exposed malnutrition in the hospital as a serious problem.[10] In 1995, the Joint Commission (a US nonprofit healthcare accrediting organization), working with input from the American Society of Clinical Nutrition and the American Dietetic Association (now the Academy of Nutrition and Dietetics), created the standard requirement that hospitals provide a nutrition screening of each patient within 24 hours of admission.[11] Although this requirement offered a

TABLE 1.1 Leading causes of death in the United States

Rank	Disease	Contributing Risk Factors	Number of Deaths Annually
1	Heart disease	Increasing age, family history, smoking, poor-quality diet, obesity, hypertension, increased cholesterol, stress, physical inactivity	614,348
2	Cancer	Increased age, smoking, excessive consumption of alcohol, excessive exposure to sun, obesity, family history, presence of some chronic conditions such as ulcerative colitis	591,699
3	Chronic lower-respiratory diseases	Exposure to tobacco smoke, chemicals, dust and burning fuel; advanced age and genetics	147,101
4	Accidents (unintentional injuries)	Motor-vehicle accidents most common; contributing factors include inexperience, teenage drivers, distractions	136,053
5	Stroke (cerebrovascular diseases)	Hypertension, tobacco use, diabetes, increased cholesterol, obesity, inactivity, coronary disease, excessive alcohol intake	133,103
6	Alzheimer's disease	Conditions that damage the heart and blood vessels such as diabetes, high cholesterol, and hypertension	93,541
7	Diabetes	Family history, dietary factors such as low vitamin D consumption, increased weight, obesity, inactivity, race, hypertension, increased cholesterol, polycystic ovarian syndrome, gestational diabetes, increased age	76,488
8	Influenza and pneumonia	Chronic disease, smoking, being immunocompromised	55,227
9	Nephritis, nephrotic syndrome, and nephrosis	Medical conditions that cause kidney injury such as diabetes, side effects of certain medications such as nonsteroidal anti-inflammatory drugs, infections such as HIV and malaria	48,146
10	Intentional self-harm (suicide)	Depression, previous self-harm	42,773

Modified from Health United States. Table 19 (data are for 2014). 2015. www.cdc.gov. Accessed January 24, 2017.

framework for early identification of malnutrition, there has been considerable variance in the nutrition screening tools used and the procedures needed to follow and implement the rest of the nutrition care plan.[12] Many screening tools have used albumin as the primary indicator to identify malnutrition in patients. It is well documented, however, that albumin is a poor diagnostic indicator for malnutrition given the fact that it fluctuates in the presence of inflammation that could be induced by external factors such as trauma, surgery, or inflammatory diseases. The American Society for Parenteral and Enteral Nutrition (ASPEN) and the European Society for Clinical Nutrition and Metabolism has created an etiology-based approach to diagnose adult malnutrition in the clinical setting. This approach identifies malnutrition in the context of acute illness, chronic diseases, and starvation-related malnutrition.[13] This approach has been widely adopted by clinical dietitians across the United States. Clinical trials are currently underway to validate this approach to assessing and diagnosing malnutrition in the hospital setting.

Recap   Nutrition has played an integral role in maintaining optimal health and quality of life for individuals in the United States and elsewhere in the world. A paradox exists in the United States where healthcare professionals need to have the knowledge and skills to address the health-related problems associated with over nutrition (obesity and chronic diseases) and undernutrition (frailty and wasting diseases). Nutritional assessment is the first step to implementing a nutrition care plan that assists individuals in successfully implementing dietary and lifestyle changes to improve their quality of life, lower their risks for disease, and help prevent or overcome malnutrition.

▶ Nutritional Screening and Nutritional Assessment Tools

Preview   Nutritional screening tools are designed to quickly evaluate nutritional risk in individuals. Nutritional assessment tools identify malnutrition in individuals.

Nutritional Screening Tools

The Academy of Nutrition and Dietetics (the Academy) recommends the use of nutrition screening to identify individuals who are at nutritional risk. This ensures that those patients who are at risk, are given high priority for a thorough nutritional evaluation by an RDN. **Nutrition screening** is defined as "the process of identifying patients, clients, or groups who may have a nutrition diagnosis and benefit from nutritional assessment and intervention by a registered dietitian."[14] Nutritional screening tools should be quick, easy-to-use tools that can be completed by any member of a healthcare team with minimal nutrition expertise (e.g., diet technicians, nurses, and physician assistants). Furthermore, screening tools should be validated to ensure that they accurately identify nutritional risks for the population and setting for which they are intended. Screening forms have use in both community and clinical settings. In community settings, for example, forms can be used to identify risk for chronic diseases such as diabetes, heart disease, and high blood pressure in adults. These are typically used at community events such as health fairs and workplace wellness fairs. When the results identify individuals at risk for a chronic disease, they are often referred to their primary care physicians for extensive evaluation to determine

TABLE 1.2 Nutrition screening key criteria
Height and weight
History of weight gain or loss (intentional or unintentional)
Changes in appetite
Lifestyle habits (tobacco use, physical activity, alcohol consumption)
Digestive disorders (constipation, diarrhea, nausea, vomiting)
Laboratory measures (blood, urine, or both)
Family history, previous medical history, or both

Modified from Field LB, Hand RK. Differentiating malnutrition screening and assessment: a nutrition care process perspective. *J Acad Nutr Diet.* 2015;15:824-828.

whether a chronic disease is present. They may also be referred to an RDN who will offer recommendations for making dietary and lifestyle changes to the individual that, depending on the diagnosis, will either ward off the onset of the disease or will help the individual manage the newly diagnosed disease. Screening forms are also offered to the elderly living in the community setting or assisted living to identify risks for malnutrition, osteoporosis, and other chronic diseases. The criteria on the screening form varies by facility; key criteria that are commonly included are shown in **TABLE 1.2**.

In the clinical and long-term care setting, screening forms are designed to identify risks of malnutrition (undernutrition), determine the need for more-in-depth nutritional assessment, and ultimately offer an early detection of malnutrition so that nutrition support is provided in a timely manner. In the United States, an estimated 30% to 50% of adult hospital patients are malnourished. Few patients, however receive the formal diagnosis of malnutrition at discharge, and only an estimated 3.2% of discharged patients are diagnosed with malnutrition.[15] It has been well documented that patients who enter the hospital malnourished and are not given nutrition support have increased morbidity and mortality, decreased function and quality of life, and increased length of hospital stays.[16,17] This leads to increased healthcare costs expenses that can cost hospitals millions of dollars.[18]

It is critical for clinical, long-term care, and community facilities to use validated screening tools to identify patients for malnutrition risk or use

validated screening tools to diagnose patients with malnutrition—and sometimes both. Using a validated screening tool ensures that (1) the individual who is identified at risk for malnutrition is indeed malnourished (high sensitivity), and (2) the individual who is not identified at risk for malnutrition is likely to be well nourished (high specificity).[14]

The Academy has identified several validated nutritional screening tools that have been researched for their ability to help identify malnutrition risk in individuals in community and clinical settings.[19] These tools largely use the same screening parameters to determine scores and risk levels. Commonly used risk-assessment parameters include recent weight loss, recent poor intake or appetite, and body mass index (BMI).[20] **TABLE 1.3** summarizes the most commonly used validated screening tools available and a description of their target populations when screening for malnutrition risk.

Nutrition Assessment Tools

Nutritional assessment is defined by the Academy as "identifying and evaluating data needed to make decisions about a nutrition-related problem/diagnosis."[21] In essence, the difference between nutritional screening and nutritional assessment is that a screen identifies the "risk" for a nutrition problem or malnutrition, while the assessment "identifies the presence of or diagnosis" of a nutrition problem or malnutrition. Once identified, the practitioner creates an intervention to resolve the nutrition problem.[14] Validated nutritional assessment tools have been designed to allow RDNs and other healthcare professionals who are trained to use the tool to quickly and cost-effectively diagnose malnutrition in the acute care setting. The **subjective global assessment (SGA)** form initially started as a screening tool that has evolved as a validated diagnostic tool for malnutrition. When administrated

TABLE 1.3 Commonly used nutrition screening tools			
Nutrition Screening Tool	**Patient Population**	**Risk-Screening Parameters**	**Measures for Malnutrition Risk**
Malnutrition screening tool	Acute-care hospitalized adults, oncology patients	■ Recent weight loss ■ Recent poor intake	■ Score 0–1 for recent intake ■ Score 0–4 for recent weight loss ■ Total score: ≥2 = at risk for malnutrition
Mini Nutritional Assessment (MNA): Short Form	Subacute and ambulatory elderly patients	■ Recent intake ■ Recent weight loss ■ Mobility ■ Recent acute disease or psychological stress ■ Neuropsychological problems ■ BMI	■ Score 0–3 for each parameter ■ Total score: <11 = at risk for malnutrition
Malnutrition Universal Screening Tool (MUST)	Acute-care medical adults, medical surgical hospitalized adult patients	■ BMI ■ Weight loss (%) ■ Acute disease	■ Score 0–3 for each parameter ■ Total score: >2 = high risk 1 = medium risk
Nutrition Risk Screening (NRS 2002)	Medical-surgical hospitalized, acute-care hospitalized patients	■ Recent weight loss (%) ■ BMI ■ Severity of disease ■ Elderly (>70 years of age) ■ Food intake or eating problems, skipping meals	■ Score 0–3 for each parameter ■ Total score: >3 = start nutrition support

Data from The Academy of Nutrition and Dietetics. *The Nutrition Care Manual*. https://www.nutritioncaremanual.org/. Accessed January 15, 2017.

by a trained professional, it is recognized as a validated method to diagnose malnutrition and predict postoperative complications, longer length of stay in postoperative patients and patients in the intensive care unit, readmission to the intensive care unit, and mortality.[22,23]

> **Recap**   Nutritional screening tools are designed to quickly evaluate nutritional risk in individuals. Nutritional assessment tools are used to identify the presence of malnutrition in individuals. It is important that the RDN use validated screening and assessment tools to ensure that the results are correct for the population being evaluated.

▶ Standard Methods of Evaluating Nutritional Status

> **Preview**   The use of nutrition assessment methods such as anthropometry, biochemical, and clinical dietary methods are essential tools to determine the health of individuals and groups.

Although the type of data collected to conduct nutritional assessments varies by clinical setting, the process and goal are the same. The evaluation of an individual or population nutritional status involves the interpretation of anthropometric, biochemical, clinical, and dietary data to define whether an individual or a group of individuals are well nourished or suffer from malnutrition. Malnutrition includes both overnutrition and undernutrition.

Anthropometric Measures Method

Anthropometry is defined as the study of the measurement of the human body. It includes dimensions of bone, muscle, and adipose tissue. The area of anthropometry is a noninvasive process for determining body fat mass that incorporates several human body dimensions. Weight, standing height, horizontal length, skinfold thicknesses, limb lengths, wrist breadths, and head, chest, and waist circumferences are just a few examples of the different human body measurements that fall under anthropometric measures.[24]

Many indexes and ratios can be calculated from anthropometric measurements. One common indicator calculated from anthropometric measurements

TABLE 1.4 Calculating body mass index

BMI Formula	Weight (kilograms) ÷ height (meters²)
Interpretation	BMI values <18.5 = Underweight BMI values 18.5–24.9 = Normal or desirable BMI values 25.0–29.9 = Overweight BMI values 30.0–34.9 = Obese (class I) BMI values 35.0–39 = Obese (class II) BMI values > 40.0 = Extreme obesity

Data from National Institutes of Health. Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity adults. 1988. Report no. 98-4083. https://www.ncbi.nlm.nih.gov/books/NBK2003/. Accessed December 3, 2016.

is the **body mass index (BMI)**. BMI is a measure of body fat utilizing height and weight for adult men and women. The National Academies of Science Engineering and Medicine (NASEM)—Health and Medicine Division, the Centers for Disease Control and Prevention (CDC), and many other organizations that conduct research on the health risks associated with excess weight and obesity use BMI as a measure.[25] **TABLE 1.4** shows the formula used to calculate BMI as well as the parameters used to interpret measures.

Anthropometry is a significant element in the nutrition assessment of individual children and adults, as well as segments of the population. Through the use of the National Health and Nutrition Examination Survey (NHANES), data collected through anthropometric measurements have been used to monitor growth and weight trends in the American population for more than 50 years.[26]

The anthropometric data for infants and children reveal general health status and dietary adequacy and are used to track trends in growth and development over time. The data collected have been used to produce national reference standards or growth charts.[27] Researchers from different health disciplines, for example, cardiovascular health, gerontology, nutrition, and occupational health, use anthropometric data to examine health status and healthcare utilization trends in U.S. adults.[24]

Biochemical Measures Method

Variations in the quantity and composition of a person's diet are reflected in the concentration of chemical substances in tissue and body fluids and the appearance of different metabolites. The nutrition gamut ranges from an extreme of malnutrition because of deficiency, to optimal nutrition, to malnutrition

because of overnutrition at the other end. Biochemical measures serve to identify nutritional status at any stage along the nutrition spectrum.

Although used commonly for identifying malnutrition, current literature is inconsistent for showing the validity of biochemical markers as determinants of individuals' nutritional status. The main consensus in the literature is that laboratory markers are not reliable as a stand-alone assessment.[28] The analysis of laboratory data can be difficult, and results are not always connected to clinical or nutrition findings. Biochemical results can be influenced by non-nutritional factors such as medications, hydration status, disease state, and stress.[28]

Not all content of body nutrients can be assessed by biochemical methods. Common deficiencies identified via biochemical or laboratory methods include[9]:

- Blood-forming nutrients such as iron, folacin, and vitamins B_6 and B_{12}
- Water-soluble vitamins such as thiamine, riboflavin, niacin, and vitamin C
- All of the fat-soluble vitamins (A, D, E, and K)
- Minerals such as iron, iodine, and trace elements; and
- Levels of blood lipids, including cholesterol, triglycerides, glucose, and enzymes linked to heart disease

The results of anthropometric, clinical, and dietary assessment methods can guide decisions concerning the need for biochemical or laboratory data.

Clinical Method: History and Physical

A comprehensive look at an individual's or a group's nutrition assessment takes into account their history. A clinical history coupled with a physical examination is essential to identify signs and symptoms of malnutrition. A clinical history usually includes information such as medical diagnosis, recent hospital admissions, medications, changes in intake of food and fluids, food supply and preparation ability, and weight changes.

Once a history is obtained, a **nutrition-focused physical exam (NFPE)** should be conducted. An NFPE is a systematic way of evaluating an individual from head to toe, paying attention to his or her physical appearance and function to discover signs and symptoms related to malnutrition, nutrient deficiency, and toxicity.[29]

The presence of weight loss is an indicator of an individual's nutritional status.[30] In 2012, the Academy and the American Society for Parenteral and Enteral Nutrition put out a consensus statement defining malnutrition as the presence of two of the following symptoms: inadequate energy intake, weight loss, loss of muscle mass, loss of subcutaneous fat, localized or generalized accumulation of fluid, or decreased functional status as measured by handgrip strength.[12] Many of these characteristics are easily evaluated via an NFPE. See **TABLE 1.5** to review some of the signs and symptoms that can be identified as a result of conducting a systems-focused assessment.

Dietary Methods

Dietary assessment methods are used to collect an individual's and group information on food supply and nutrients consumed. For groups of individuals (population groups), statistical databases such as the **Food and Agriculture Organization of the United Nations (FAO)** and the **Bureau of Labor Statistics Consumer expenditure survey data** provide information on food supply and purchasing habits. Actual food-intake data are obtained through the use of dietary surveys, food diaries, 24-hour recall, food-frequency questionnaires, food-habit questionnaires, or a combination of any of these methods. The NHANES is an example of a national survey program in the United States that has been designed to assess the health and nutritional status of adults and children.[26] This survey is unique in combining interviews and physical examinations.

A food diary requires that a participant report all food and fluids consumed for a specified period of time. A 24-hour recall involves listing all food and fluids consumed in the previous 24 hours. Foods and quantity consumed are recalled from memory with the assistance of a trained interviewer to facilitate the process. A food-frequency questionnaire is a structured listing of individual foods or groups of foods. For each food item or group, the participant must define the frequency in which the food is consumed in a specified time frame. This can be the number of times the food or group is consumed in a day, a week, or even a month. Diet histories are used to determine the usual intake of a specific individual. Food-habit questionnaires are used to collect either general information or specific details such as food perceptions and beliefs. Food likes and dislikes, food-preparation methods, and social surroundings related to meals are collected using this method. Combined dietary assessment methods can be pooled to improve accuracy and enable interpretation of the dietary data.[31]

Like all self-reported data, the complete accuracy of information obtained from dietary assessment methods such as surveys can be questioned. A study designed to evaluate the validity of the data reported by NHANES on caloric intake reported that in the 39 years of the history of the survey, data reported by the majority of participants were not physiologically reasonable.[32] These findings suggest that the ability to estimate population trends in caloric intake

TABLE 1.5   Signs and symptoms of nutritional deficiency

Body System	Sign or Symptom	Nutrient Deficiency
General appearance	Wasting	Energy
Skin	Rash Rash in sun-exposed area Easy bruising	Many vitamins, zinc, essential fatty acids Niacin (pellagra) Vitamin C or K
Hair and nails	Thinning or loss of hair Premature whitening of hair Spooning (upcurling) of nails	Protein Selenium Iron
Eyes	Impaired night vision Corneal keratomalacia (corneal drying and clouding)	Vitamin A Vitamin A
Mouth	Cheilosis and glossitis Bleeding gums	Riboflavin, niacin, pyridoxine, iron Vitamin C, riboflavin
Extremities	Edema	Protein
Neurologic	Paresthesias or numbness in a stocking-glove distribution Tetany Cognitive and sensory deficits	Thiamin (beri beri) Ca, Mg Thiamin, niacin, pyridoxine, vitamin B_{12}
Musculoskeletal	Wasting of muscle Bone deformities (e.g., bowlegs, knocked knees, curved spine) Bone tenderness Joint pain or swelling	Protein Vitamin D, calcium Vitamin D Vitamin C
Gastrointestinal	Diarrhea Diarrhea and dysgeusia Dysphagia or odynophagia (because of Plummer–Vinson syndrome)	Protein, niacin, folate, vitamin B_{12} Zinc Iron
Endocrine	Thyromegaly	Iodine

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to support the development of public policy relevant to diet and health relationships from the American nutrition surveillance system can be limited.[32]

Recap   The use of the different nutrition assessment methods are valuable, simple, and practical tools used to describe nutrition problems in individuals as well as groups within the community.

▶ The Nutrition Care Process

Preview   The Nutrition Care Process is a tool used by nutrition and dietetics professionals to improve the consistency and quality of individualized care for patients, clients, or groups.
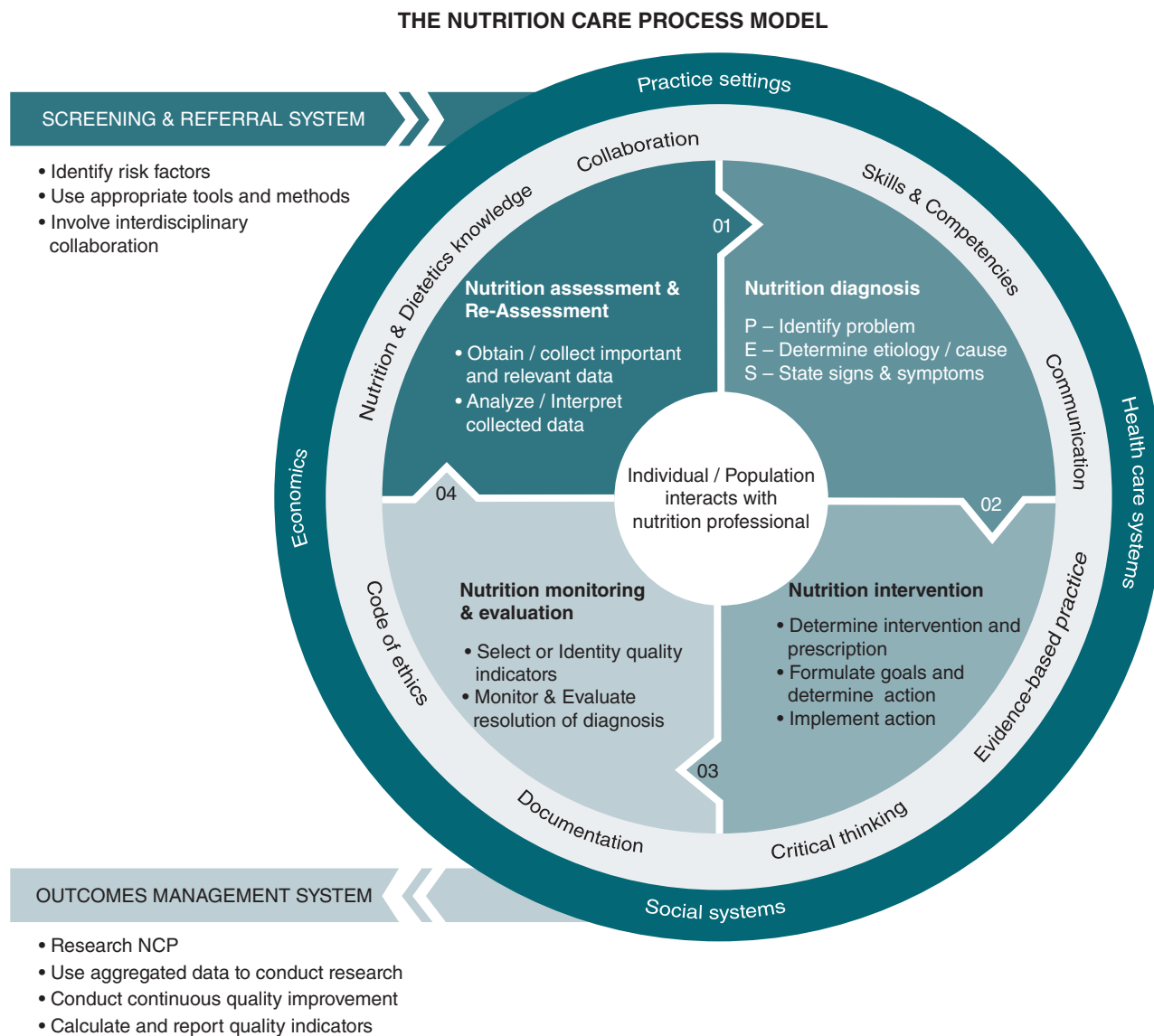
The Nutrition Care Process

The **Nutrition Care Process (NCP)** is a standardized model developed to assist the RDNs and dietetic technicians, registered (NDTR), in delivering high-quality nutrition care.[33] This process provides the framework for the RDN and NDTR to customize care, taking into account the individual's needs and values, while using the best scientific evidence at the time care decisions must be made. In 2003, the Academy endorsed the use of the NCP to afford nutrition specialists a strategy for critical thinking and decision making.

The NCP involves the use of unique yet interdependent—that is, distinct but interrelated—steps. This includes the completion of a nutrition assessment. Part of completing a nutrition assessment involves four steps. The first step is collecting and documenting information such as nutrition-related history, anthropometric measurements, laboratory data, clinical history, and NFPE findings. The second step is defining a nutrition diagnosis. This requires the RDN to evaluate the collected assessment information and name a specific problem that can be resolved through nutritional interventions. The third step requires the RDN to select nutrition interventions that will address the root of the nutrition diagnosis to resolve or control signs and symptoms. The last step of the NCP is monitoring and evaluation to determine whether the individual has achieved or is making progress toward the predetermined goal.[33]

Nutrition Care Process and Model

The **Nutrition Care Process and Model (NCPM)** is a pictorial conception that shows the steps of the Nutrition Care Process as well as internal and external factors that influence application of the NCP (**FIGURE 1.3**).

THE NUTRITION CARE PROCESS MODEL

FIGURE 1.3 The nutrition care process and model for nutrition and dietetics professionals

The relationship between the RDN and the individual or groups of individuals is at the center of the model, which defines the four steps of the NCP—nutrition assessment, diagnosis, intervention, and monitoring and evaluation. The NCP helps to identify external factors such as skill and ability of the RDN, application of evidence-based practice, application of the code of ethics, and knowledge of the RDN as some of the external factors influencing the process. This set of factors defines how individuals and groups of individuals receive nutrition information.

Other factors that impact the ability of individuals and groups to take advantage of the RDN services includes the healthcare system, socio-economics, and the practice setting. The practice setting reveals rules and regulations that guide a practice and include the age and conditions qualifying for services and how the nutrition and dietetics professional apportions his or her time. The healthcare system defines the amount of time available for the nutrition and dietetics professional–patient interaction, the kind of services offered, and who provides the services. Social components reflect the health-related knowledge, values, and the time devoted to improving nutritional health of both individuals and groups. The economic aspect integrates resources assigned to nutrition care, including the value of a food and the nutrition professional's time expressed in the form of salary and reimbursement.[34]

The screening and referral process as well as outcomes management complete the components of the NCP. The NCPM offers a consistent structure and framework for nutrition and food professionals to use when providing nutrition care. The model is intended for use with individuals and groups of individuals of all ages with any healthcare condition and in all care settings.[13]

Nutrition Care Process: Standardized Language

RDNs utilize **Nutrition Care Process Terminology (NCPT)** to describe all activities performed in the four steps of the NCP.[21] The NCPT is a controlled vocabulary used to depict the distinctive activities of nutrition and dietetics in completing the nutrition assessment, nutrition diagnosis, nutrition intervention, and nutrition monitoring and evaluation. It is intended to enable clear and reliable narratives of the services provided by RDNs.[35] Aside from facilitating communication, the NCPT enables researchers to define the types of nutrition problems observed in patient populations (nutrition diagnoses), the interventions to put in place, and the outcomes obtained.

The NCPT contains more than 1,000 terms and was developed with contributions from practitioners and researchers. Many of the terms have been matched for incorporation into the Systematized Nomenclature of Medicine—Clinical Terms and Logical Observation Identifiers Names and Codes. These are clinical terms in use worldwide for electronic health records. The NCPT's specific vocabulary allows for data gathering for nutrition research and documentation of quality measures.

The NCPT includes specific language for nutrition diagnosis. These statements help describe nutrition problems that the RDN can treat. The unique language developed to identify nutrition interventions helps outline actions intended to change a nutrition-related behavior, environmental condition, or aspect of health status for an individual or a group.[35] The NCPT also includes nomenclature to identify nutrition monitoring and evaluation parameters that can be used to determine changes in outcomes as they relate to nutrition diagnosis and intervention.

Nutrition Care Process: Assessment

Nutrition assessment is a systematic method for obtaining, verifying, and interpreting data needed to identify nutrition-related problems, their causes, and their significances.[36] It is a continuous, nonlinear, and dynamic procedure that includes initial data gathering as well as recurrent reassessment and analysis of the individual's status compared to identified standards. Through the evaluation of the data collected for the nutrition assessment, the RDNs is able to determine whether a nutritionally diagnosable problem exists.[36]

The nutrition assessment terms are identified and grouped into five domains: food/nutrition-related history, anthropometric measurements, biochemical data, medical tests, and procedures.

A nutrition assessment commences after an individual is referred, as a consequence of an at-risk nutrition screen, or when an individual can benefit from nutrition care. Nutrition assessment allows the nutrition practitioner to determine if a nutrition diagnosis or problem exists. When that is the case, the RDN properly diagnoses the problem and generates a *problem, etiology, signs* or *symptoms* (PES) statement. This is step two of the NCP. In addition, RDNs create a plan to put in place interventions to resolve the nutrition diagnoses. In some instances, a plan of care identifies the need for further information or testing. If the initial completed assessment or reassessment shows that a nutrition problem is not present or that current problems cannot be improved by supplementary nutrition care, discharge from nutrition care services is appropriate.[21]

Data to complete a nutrition assessment of individuals is obtained from the person through interviews, observation, measurements, medical records, and information provided by the referring healthcare provider. For population groups, data from surveys, administrative data sets, and epidemiological or research studies are used to collect assessment information. The use of standardized language enables effective comparison of nutrition-assessment findings. When conducting the assessment, the RDN must determine which are the most appropriate data to collect, assess the need for additional data, select assessment tools and procedures that match the situation, and apply assessment tools in a reliable manner. The assessor must determine which data are relevant, important, and valid for inclusion in the nutrition assessment.[21]

NCP: Nutrition Diagnosis

Defining a nutrition diagnosis is an important step between nutrition assessment and defining nutrition interventions. The purpose of a standardized nutrition diagnosis language is to designate nutrition problems reliably so that they are clear for all professionals. A **nutrition diagnosis** is used to identify and define a particular nutrition problem that can be solved or whose symptoms can be managed through nutrition interventions by a nutrition and food professional. A nutrition diagnosis (such as inadequate sodium intake) is different from a medical diagnosis (such as congestive heart failure). Unlike a nutrition diagnosis, a medical diagnosis defines a disease process or pathology such as congestive heart failure. It is not within the scope of nutrition and dietetics professionals to determine or assign medical diagnoses. The standardized language improves communication and documentation of nutrition care, and it offers a minimum data set and consistent data foundations for future research. The nutrition diagnosis falls into three domains: intake, clinical, and behavioral or environment. **TABLE 1.6** shows examples of nutrition diagnostic terminology that fall under each domain. A designation of "no nutrition diagnoses" can be used for individuals whose documented nutrition assessment indicate no nutritional problem requiring nutrition intervention and treatment.[21]

The outcome of the nutrition-diagnosis step of the NCP is the creation of a diagnosis statement, or **PES statement**, which has three elements: the problem (P), its etiology (E), and its signs and symptoms (S). The elements of the PES statement are joined by the phrases "related to" and "as evidenced by." The data collected and analyzed during the nutrition assessment

TABLE 1.6 Nutrition diagnostic terminology

Domain	Problem
Intake	Inadequate energy intake Malnutrition
Clinical	Impaired nutrient utilization Unintended weight loss
Behavioral/ Environmental	Not ready for diet or lifestyle change Limited access to food or water

Data from Academy of Nutrition and Dietetics. *Nutrition Terminology Reference Manual (eNCPT): Dietetics Language for Nutrition Care*. 2016. http://ncpt.webauthor.com/. Accessed December 8, 2016.

are used to generate the PES statement.[21] **FIGURE 1.4** shows how the standardized language is used to create a nutrition diagnosis and PES statement.

NCP: Intervention

The third step of the NCP is determining the most appropriate intervention to resolve the nutrition problem. A **nutrition intervention** is the action taken by the nutrition and dietetics professional to correct or manage a nutrition problem. Its purpose is to target and resolve the diagnosis by eliminating signs and symptoms related to nutrition-related behaviors, environmental conditions, or conditions that affect nutrition and health. Nutrition interventions need to be individualized to meet the specific needs of each person.[21,36]

The NCP nutrition intervention has two distinct steps: planning and implementation. Planning involves selecting and prioritizing the nutrition diagnosis, collaborating with other caregivers, involving the patient and his or her representative, and reviewing evidence-based practice guidelines. With the patient at the center of the care, the FDN should work toward the expected outcome for the nutrition diagnosis, outline nutrition interventions, identify the frequency of the treatment, and identify the resources needed. The implementation step involves communicating and carrying out the care plan developed for the individual. Plan implementation involves monitoring the plan for acceptance (by the individual) and effectiveness. If the expected outcome for the individual is not being obtained, the interventions must be changed.[21,36]

Most often the nutrition intervention is designed to correct the etiology component of the PES statement.

Patient Information

Mrs. Smith is a 66-year-old female who was referred to your office by her primary care provider. The reason for the referral is outlined weight loss in the past 3 months.

Mrs. Smith's diagnosis includes diabetes, hypertension, and arthritis. Her height is 5'4". Her weight in the past three months: month 1 = 135 lbs, month 2= 127 lbs, month 3 = 122 lbs. Her usual body weight fluctuates between 137 and 134 lbs. Her current BMI = 20.9. This value is within the range for normal BMI.

Mrs. Smith's medical history is significant for diabetes and arthritis. During your interaction with the Mrs. Smith, you determine that overall her blood sugars are well controlled. She understands her medication regime and the importance of following her medication schedule. She reports that she has been "a bit out of sorts" since her husband died four months ago. Mr. Smith had been a world-renowned chef who had retired and turned his energy to shopping for and preparing every meal at home. Since his death, Mrs. Smith has not had the desire to shop for food or cook meals. This just does not seem important to her.

As the nutrition assessment is completed, you conclude that Mrs. Smith has poor intakes of calories and protein. Her intake is related to changes in her living situation following the death of her husband, who had supported her by preparing all meals. The poor intake has resulted in a 13-lb weight loss in three months.

Focusing on the poor intake as the key problem, the PES statement can be written as:

Inadequate protein-energy intake (NI-5.3) related to poor meal intake and loss of support for preparing meals as evidenced by a 13-lb weight loss in three months.

To address the weight loss, the PES statement can be written as:

Unintended weight loss (NC-3.2) related to poor meal intake and loss of support for preparing meals as evidenced by a 13-lb weight loss in 3 months.

FIGURE 1.4 Using standardized language to create a PES statement

Data from Academy of Nutrition and Dietetics. *Nutrition Terminology Reference Manual (eNCPT): Dietetics Language for Nutrition Care.* 2016.http://ncpt.webauthor.com/. Accessed December 8, 2016.

Four domains are used when creating nutrition interventions: (1) food or nutrient delivery, (2) nutrition education, (3) nutrition counseling, and (4) coordination of care. The food or nutrient delivery domain encompasses provision of meals, snacks, and enteral and parenteral nutrition. Education and counseling tactics can help operationalize food and nutrient delivery efforts and guide individuals to make food choices that promote healthy eating patterns and optimize health. Nutrition education varies by care setting, desired outcome, and whether the person has a chronic or acute disease process. For instance, for home-dwelling individuals, food safety might be the focus of their nutrition education; therefore, counseling goes beyond understanding healthy eating patterns. It requires influencing and coaching individuals to foster lifestyle changes. Coordination of care is an **interprofessional** collaboration to identify the individual's needs and identify resources.[21,36]

NCP: Monitoring and Evaluation

Nutrition monitoring and evacuation is the fourth step of the NCP. The purpose of this step is to measure the progress made by the individual in achieving the predetermined outcome. The individual's outcomes that are relevant to the nutrition diagnosis and interventions are monitored and measured. Data sources to aid in this step include self-monitoring information and material collected through records such as forms, spreadsheets, and computer programs. Information from anthropometric measurements, biochemical data, tests, and procedures also help to evaluate progress from current status to desired state. Data from pretests, questionnaires, surveys, and mail or telephone follow-up can also be used to measure the level of success of the plan of care.[21,36]

Outcomes associated with food and nutrient intake, nutrition-related physical signs and symptoms, and nutrition-related patient- and individual-centered outcomes are usually monitored by the nutrition and dietetics professional.[21,36]

The NCP's nutrition monitoring and evaluation step incorporates three unique and interconnected processes: monitoring process, measuring outcomes, and evaluating outcomes. Monitoring process involves ensuring that the client, patient, or individual understands and complies with the plan. This includes determining if the interventions were implemented as prescribed, providing evidence of how the plan is helping the patient to meet (or not meet) their goals, detecting other positive or negative outcomes, collecting information, identifying causes for absence of progress, and aggregating data that support the lack of progress as well as support conclusions with evidence. Measuring outcomes involves identifying markers that are relevant to the nutrition diagnosis or signs and symptoms, nutrition goals, medical diagnosis and outcomes, and quality-management goals. Evaluating outcomes requires that the nutrition care provider

evaluate the change between the outcomes obtained to the individual's status at the beginning of the care process.[21,36]

> **Recap**   The use of standardized indicators and criteria helps nutrition and dietetics professionals communicate using a common language understood inside and outside the profession. Data collected are used to promote continued development of the outcome data's validity and reliability.

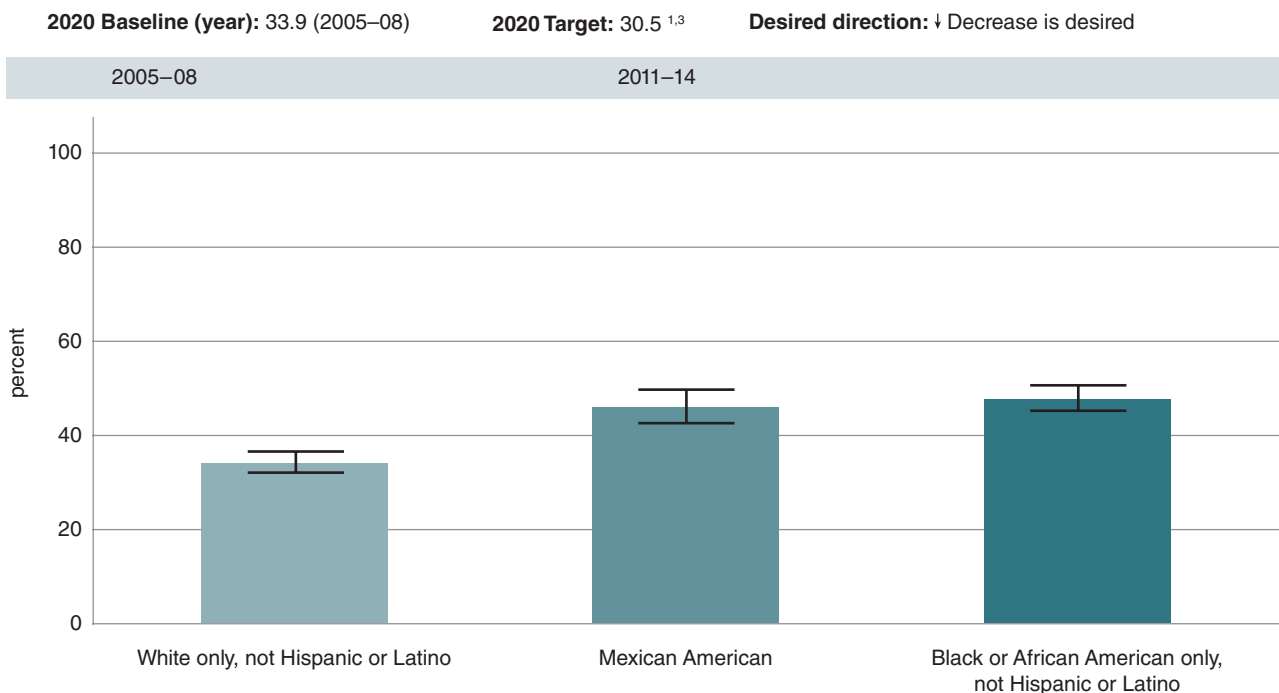## ▶ Emerging Opportunities for Nutritional Assessment and Evaluation

> **Preview**   Micronutrient deficiencies are no longer the leading public-health priority in the United States. It is important to monitor individual and groups of individuals' diet and body weight as part of health-promotion and disease-prevention programs.

For more than a century, the role of nutrition in promoting health and preventing disease was over-shadowed by great achievements in medicine. In the same time frame, science and research increased our knowledge and understanding of micronutrient requirements and their role in supporting health. Changes in the food industry supporting the enrichment and fortification of food products have contributed to eradicating micronutrient deficiencies in some segments of the population. As a result, micronutrient deficiencies are no longer the highest public-health priority. Currently, a better understanding of the complex relationship between nutrition and health has placed the conduct of nutrition assessments as a key indicator in the surveillance of population health. Conducting population nutrition assessments provides data that help to continue advance healthcare practices.

Healthy People 2020 Nutrition Objectives

One of the goals of the Healthy People 2020 initiative is to reduce the proportion of adults who are obese. The goal is to decrease this rate from a 2020 baseline of 33.9% to 30.5% by 2020. The 2011–2014 data reflecting rate of obesity per race are shown in Figure 1.4. These data show that the obesity rate for the white non-Hispanic or Latino rate is 34.4%. The obesity rate for African Americans is 47.9%. There is a 13.5 percentage-point difference between the groups with the best and worst obesity rates. This type of information is important for healthcare providers regardless of the practice setting. For the researcher interested in public health, this type of information is essential to demonstrate the need for additional research involving this segment of the population. **FIGURE 1.5** shows obesity disparities by race and ethnicity.

2020 Baseline (year): 33.9 (2005–08)   **2020 Target:** 30.5 [1,3]   **Desired direction:** ↓ Decrease is desired

FIGURE 1.5   Disparities details by race and ethnicity for 2011–2014: Obesity among adults (age adjusted, percent, 20+ years)
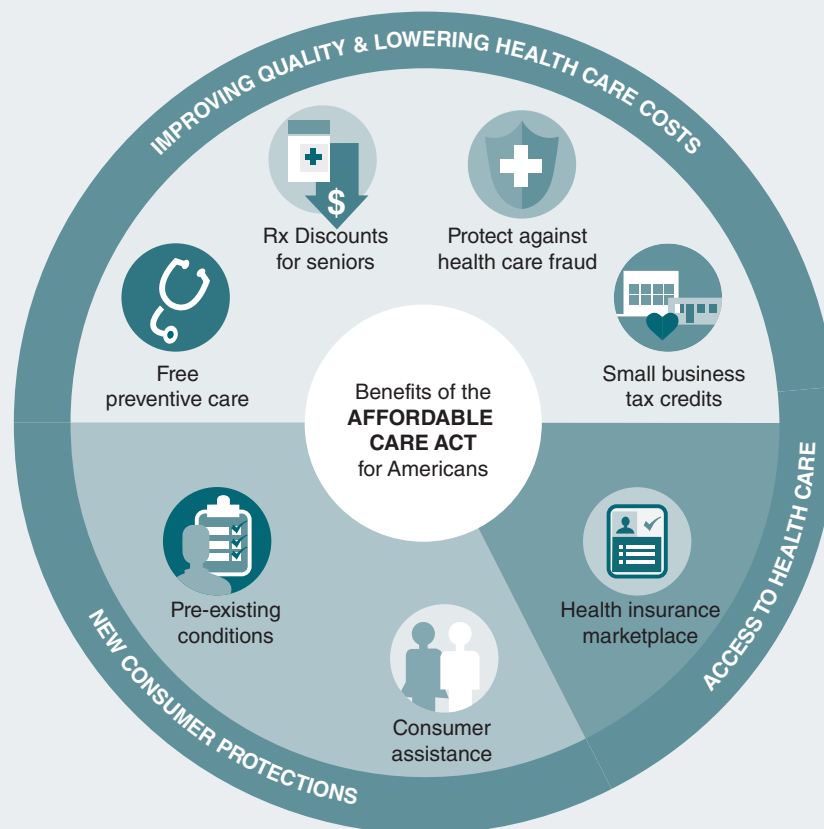
VIEWPOINT

Health Initiatives

Robin S. Rood, MA, MEd, RD, LD

A health initiative is a strategy, action plan, or approach offered by an agency of the federal government, private business, or nonprofit organization to inform and direct people toward better health. In March 2010, the Affordable Care Act (ACA) was enacted into law, expanding access to health care to millions of people who had previously been unable to get health care because of preexisting conditions or simply because they could not afford it (**FIGURE A**).[1] One of the ACA's most popular features is that it allows children to remain on their parents' insurance until age 26 years.[2] In addition, preventive care services such as free flu shots, birth control, and annual physicals are more easily accessed.

In September 2010, First Lady Michelle Obama and National Football League (NFL) Commissioner Roger Goodell launched the "Let's Move" Campaign. Although the website is still available for public viewing, it is no longer being updated.[3] The "Play 60" campaign is now called the "Fuel Up to Play 60" and is an in-school nutrition and physical-activity program sponsored by the National Dairy Council, the NFL, and partners with the U.S. Department of Agriculture.[4] These programs encourage children, teens, and adults to engage in physical activity every day. The goal is to create a public and private partnership to combat childhood obesity.

The Presidential Active Lifestyle Award (PALA+) was created by the National Foundation on Fitness, Sports, and Nutrition to promote physical activity and good nutrition, and encourage Americans to meet the Physical Activity Guidelines and Dietary Guidelines for Americans. To win this award you can register at www.supertracker.usda.gov/PALAplus.aspx and log in to track foods and exercise for five weeks to earn a PALA+, or sign up at the

IMPROVING QUALITY & LOWERING HEALTH CARE COSTS

Rx Discounts for seniors

Protect against health care fraud

Free preventive care

Small business tax credits

Benefits of the **AFFORDABLE CARE ACT** for Americans

Pre-existing conditions

Health insurance marketplace

Consumer assistance

NEW CONSUMER PROTECTIONS

ACCESS TO HEALTH CARE

Benefits for women

Providing insurance options, covering preventing service, and lowering costs.

Your adult coverage

Coverage available to children up to age 26 years.

Strengthening Medicare

Yearly wellness visit and many free preventing services for some seniors with Medicare.

Holding insurance companies accountable

Insures must justify any premium increase of 10% or more before the rate takes effect.

FIGURE A Benefits of the Affordable Care Act

Reproduced from Issues: Affordable Care Act. United States Congressman Gene Green. https://green.house.gov/issues/affordable-care-act.
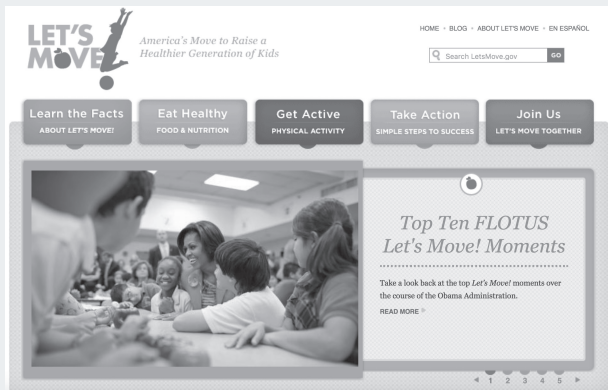
Reproduced from Let's Move! https://letsmove.obamawhitehouse.archives.gov.

National Fitness Foundation (www.fitness.foundation/pala), the only nonprofit officially chartered by Congress. Anyone who extends the challenge to weeks 6–8 will achieve a Presidential Active Lifestyle Premium Award.[5,6]

In December 2010, a health initiative called Healthy People 2020 was launched to assess the current health of Americans and offer health education programs targeted to their needs so that every population can live healthy lives.[7]

Now in its third decade, Healthy People 2020 is a science-based set of national objectives aimed at improving the health of all Americans. Healthy People 2020 reflects the need to address current issues in health care, including:

- Adolescent health
- Blood disorders and blood safety
- Dementias, including Alzheimer's disease
- Early and middle childhood
- Genomics
- Global health
- Health-related quality of life and well-being
- Healthcare-associated infections
- Lesbian, gay, bisexual, and transgender health
- Older adults
- Preparedness
- Sleep health
- Social determinants of health

The results of this ongoing collection of information can be found at www.healthypeople.gov. At this time, Healthy People 2030 is in development to project what areas of health are of concern to future generations.

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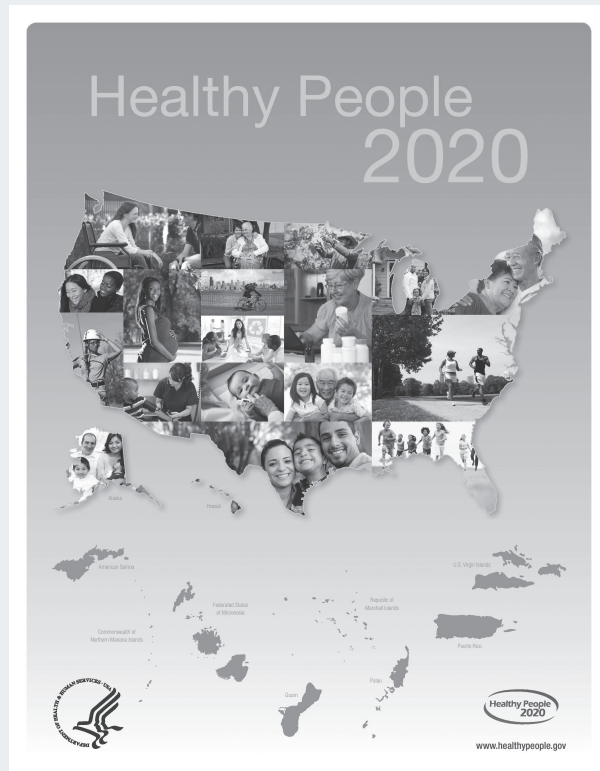
Reproduced from Healthy People 2020. U.S. Department of Health and Human Services. https://www.healthypeople.gov/.

A nation with a healthy population means a stronger and more productive society. Healthy minds and bodies also benefit economically from diet and physical exercise. Because health care costs have continued to increase, initiatives such as Healthy People 2020 and Healthy People 2030 will help keep costs down, create a healthier workforce, and stimulate the economy.

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Healthy People 2020 (HP 2020) is a set of goals and objectives with 10-year targets that are designed to guide national health-promotion and disease-prevention efforts to improve the health of all people in the United States. Released by the U.S. Department of Health and Human Services each decade, the Healthy People initiatives reflect the idea that setting objectives and providing science-based benchmarks to track and monitor progress can motivate and focus action. HP 2020 represents the fourth generation of this initiative, building on three decades of previous work.[38]

HP 2020 is a tool used for strategic management by the federal government, states, communities, and many other public- and private-sector partners. Its comprehensive set of objectives and targets is used to measure progress for health issues in specific populations as well as serve as a foundation for prevention and wellness activities across various sectors and within the federal government. It also serves as a model for measurement at the state and local levels. HP 2020 is committed to the vision of "a society in which all people live long, healthy lives." The initiative has four predominant goals:[38]

1. Help Americans have higher-quality and longer lives that are free of preventable diseases, disabilities, injuries, and premature death.
2. Help Americans achieve health equity, eliminate disparities, and improve the health of all groups.
3. Create social and physical environments that promote good health for all.
4. Promote quality of life, healthy development, and healthy behaviors across all life stages.

HP 2020 monitors approximately 1,200 objectives organized into 42 topic areas, each of which represents an important public-health area.[38] See **TABLE 1.7**.

The goal of the nutrition and health-status objective is to promote health and reduce chronic-disease risk through the consumption of healthful diets and achievement and maintenance of healthy body weights.[39]

The nutrition and weight status objectives for HP 2020 reflect strong science supporting the health benefits of eating a healthful diet and maintaining a healthy body weight. The objectives also emphasize that efforts to change diet and weight should address individual behaviors as well as the policies and environments that support these behaviors in settings such as schools, work sites, healthcare organizations, and communities.[39]

The goal of promoting healthy diets and healthy weight includes increasing household food security and eliminating hunger. A healthy diet includes a variety of nutrient-dense foods within and across the food groups, especially whole grains, fruits, vegetables, low-fat or fat-free milk or milk products, and lean meats and other protein sources. Individuals are also encouraged to limit the intake of saturated and *trans* fats, cholesterol, added sugars, sodium, and alcohol, as well as limit overall intake to meet caloric needs.[40]

Monitoring population diet and body weight is an important part of any health-promotion and disease-prevention program. Good nutrition is especially important to the growth and development of children. A healthy diet also helps Americans reduce their risks for many health conditions, including overweight and obesity, malnutrition, iron-deficiency anemia, heart disease, hypertension, dyslipidemia, type 2 diabetes, osteoporosis, oral disease, constipation, diverticular disease, and some forms of cancer.[22,39]

Diet reflects the variety of foods and beverages consumed over time in the home and in settings such as work sites, schools, and restaurants. Interventions that support the consumption of a healthier diet help ensure that individuals will have the knowledge and skills to make healthier choices.

Because weight is influenced by the balance between number of calories consumed versus calories expended, interventions put in place to improve weight should support changes in diet as well as physical activity. As new and innovative policies and environmental interventions to support diet and physical activity are implemented, it will be important to identify which are most effective. A better understanding of how to prevent unhealthy weight gain is also needed.[39] HP 2020 includes 22 objectives[21] as shown in **TABLE 1.8**.

Diabetes Mellitus

Diabetes mellitus is perhaps one of the oldest disorders known to medicine. Clinical descriptions describing what we now call DM were portrayed 3,000 years ago by the ancient Egyptians.[41] See **FIGURE 1.6** for a quick history of DM.
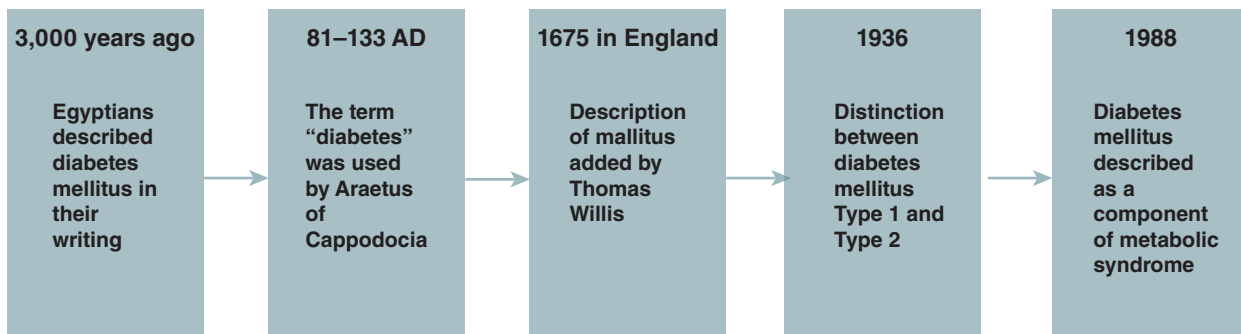
Because DM is so widespread, it is now considered a 21st-century global emergency. An estimated 415 million adults worldwide live with DM. In addition, 318 million adults suffer from impaired glucose tolerance, thus increasing their risk for developing DM.[24] In the United States, 29.1 million people—9.3% of the American population—have diabetes, out of which only 21 million individuals have been diagnosed. During 2008–2009, an estimated 18,436 people younger than 20 years in the United States were newly diagnosed with type 1 diabetes annually, and 5,089

TABLE 1.7 Healthy People 2020 topic areas

Public-Health Area		
Access to Health Services	**Genomics***	**Nutrition and Weight Status**
Adolescent health*	Global health*	Occupational safety and health
Arthritis, osteoporosis, and chronic back conditions Blood disorders and blood safety*	Healthcare-associated infections* Health communication and health information technology	Older adults* Oral health
Cancer	Health-related quality of life and well-being*	Physical activity
Chronic kidney disease	Hearing and other sensory or communication disorders	Preparedness*
Dementias, including Alzheimer's disease*	Heart disease and stroke	Public-health infrastructure
Diabetes	HIV	Respiratory diseases
Disability and health	Immunization and infectious diseases	Sexually transmitted diseases
Early and middle childhood*	Injury and violence prevention	Sleep health*
Educational and community-based programs	Lesbian, gay, bisexual, and transgender health*	Social determinants of health*
Environmental health	Maternal, infant, and child health	Substance abuse
Family planning	Medical product safety	Tobacco use
Food safety	Mental health and mental disorders	Vision

(Leftmost column spanning label: **Topic Areas**)

*These topics were not included in HP2010 and are new to HP2020.

Data from Centers for Disease Control and Prevention. *HP 2020*. https://www.cdc.gov/nchs/healthy_people/hp2020.htm. 2015. Accessed December 17, 2016.

3,000 years ago	81–133 AD	1675 in England	1936	1988
Egyptians described diabetes mellitus in their writing	The term "diabetes" was used by Araetus of Cappodocia	Description of mallitus added by Thomas Willis	Distinction between diabetes mellitus Type 1 and Type 2	Diabetes mellitus described as a component of metabolic syndrome

FIGURE 1.6 History of diabetes mellitus

Data from Ahmed AM. History of diabetes mellitus. *Saudi Med J*. 2002. Apr;23(4):373-378.

TABLE 1.8	HP 2020 nutrition and weight status objectives
Area	**Objectives**
Healthier Food Access	Increase the number of states with nutrition standards for foods and beverages provided to preschool-aged children in childcare
	Increase the proportion of schools that offer nutritious foods and beverages outside of school meals ■ Increase the proportion of schools that do not sell or offer calorically sweetened beverages to students ■ Increase the proportion of school districts that require schools to make fruits or vegetables available whenever other food is offered or sold
	Increase the number of states that have state-level policies that incentivize food retail outlets to provide foods that are encouraged by the *Dietary Guidelines for Americans*
	Increase the proportion of Americans who have access to a food retail outlet that sells a variety of foods that are encouraged by the *Dietary Guidelines for Americans*
Health Care and Work-Site Settings	Increase the proportion of primary care physicians who regularly measure their patients' body mass index (BMI) ■ Increase the proportion of primary care physicians who regularly assess BMI in their adult patients ■ Increase the proportion of primary care physicians who regularly assess BMI for age and gender in their child or adolescent patients
	Increase the proportion of physician office visits that include counseling or education related to nutrition or weight ■ 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 or nutrition ■ Increase the proportion of physician office visits made by adult patients who are obese that include counseling or education related to weight reduction, nutrition, or physical activity ■ Increase the proportion of physician visits made by all child or adult patients that include counseling about nutrition or diet
	Increase the proportion of work sites that offer nutrition or weight-management classes or counseling
Weight Status	Increase the proportion of adults who are at a healthy weight
	Reduce the proportion of adults who are obese
	Reduce the proportion of children and adolescents who are considered obese ■ Reduce the proportion of children ages 2 to 5 years who are considered obese ■ Reduce the proportion of children ages 6 to 11 years who are considered obese ■ Reduce the proportion of adolescents ages 12 to 19 years who are considered obese ■ Reduce the proportion of children and adolescents ages 2 to 19 years who are considered obese
	Prevent inappropriate weight gain in youth and adults ■ Prevent inappropriate weight gain in children ages 2 to 5 years ■ Prevent inappropriate weight gain in children ages 6 to 11 years ■ Prevent inappropriate weight gain in adolescents ages 12 to 19 years ■ Prevent inappropriate weight gain in children and adolescents ages 2 to 19 years ■ Prevent inappropriate weight gain in adults ages 20 years and older
Food Insecurity	Eliminate the worst food insecurity among children
	Reduce household food insecurity and thus reduce hunger

| TABLE 1.8 *(continued)*	
Area	**Objectives**
Food and Nutrient Consumption	Increase the contribution of fruits to the diets of the population age 2 years and older ▪ Increase the variety and contribution of vegetables to the diets of the population age 2 years and older ▪ Increase the contribution of total vegetables to the diets of the population age 2 years and older
	Increase the contribution of dark green vegetables, red and orange vegetables, and beans and peas to the diets of the population age 2 years and older
	Increase the contribution of whole grains to the diets of the population age 2 years and older
	Reduce consumption of calories from solid fats and added sugars in the population age 2 years and older ▪ Reduce consumption of calories from solid fats ▪ Reduce consumption of calories from added sugars ▪ Reduce consumption of calories from solid fats and added sugars
	Reduce consumption of saturated fat in the population age 2 years and older
	Reduce consumption of sodium in the population age 2 years and older
	Increase consumption of calcium in the population age 2 years and older
Iron Deficiency	Reduce iron deficiency among young children and females of childbearing age ▪ Reduce iron deficiency among children ages 1 to 2 years ▪ Reduce iron deficiency among children ages 3 to 4 years ▪ Reduce iron deficiency among females ages 12 to 49 years
	Reduce iron deficiency among pregnant females

Data from US Department of Health and Human Services. (2015), *Heathy People 2020*. https://www.healthypeople.gov/. Accessed December 17, 2016.

people younger than 20 years were newly diagnosed with type 2 diabetes annually (see **FIGURE 1.7**).[42]

Diabetes was the seventh-leading cause of death in the United States in 2010 based on the 69,071 death certificates that listed diabetes as the underlying cause of death. Studies have found that only 35% to 40% of deceased people with diabetes had death certificates that listed diabetes; 10% to 15% had diabetes listed as the underlying cause of death. From 2003–2006, after adjusting for population age differences, death rates from all causes were 1.5 times higher among adults 18 years of age and older with diagnosed diabetes than among adults without diagnosed diabetes.[42]

Managing DM

Diabetes can be treated and managed when someone adopts a healthy eating pattern, engages in regular physical activity, and takes prescribed medications to lower blood glucose levels. Another critical part of diabetes management is reducing cardiovascular disease risk factors such as high blood pressure, high lipid levels, and the use of tobacco. Patient education and self-care practices also are important aspects of
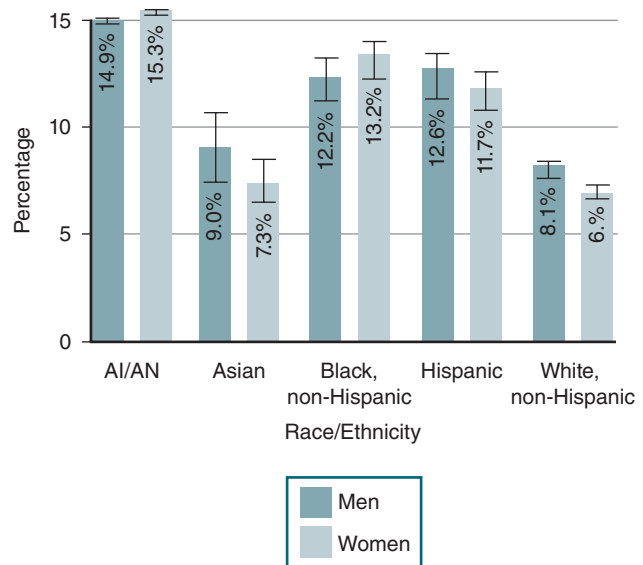
AI/AN = American Indian/Alaska Native.

Note: Error bars represent upper and lower bounds of the 95% confidence interval.

FIGURE 1.7 New cases of DM in individuals younger than 20 years of age-2013–2015

Reproduced from Center for Disease Control and Prevention, *National Diabetes Statistics Report, 2014*. http://www.thefdha.org/pdf/diabetes.pdf.

disease management that help people with diabetes stay healthy. Nutritional assessment has been vital in identifying risks and diagnosing symptoms and comorbidities associated with DM.[42] Medical nutrition therapy is key to preventing DM, managing individuals who have been diagnosed with DM, and preventing—or at least reducing—the development of DM comorbidities.[43]

Weight Management

From 2011–2014, 36.5% of adult Americans were considered obese. Overall, the prevalence of obesity among middle-aged adults ages 40 to 59 years (40.2%) and older adults ages 60 years and older (37.0%) was higher than among younger adults ages 20 to 39 years (32.3%). The prevalence of obesity among women (38.3%) was higher than among men (34.3%).[44] In 2015, the rate of obesity by state was higher in states such as Texas, Oklahoma, Missouri, and South Carolina. Obesity increases the risk for morbidity because of higher risks for; or the presence of hypertension, dyslipidemia, diabetes, coronary heart disease, stroke, gallbladder disease, osteoarthritis, sleep apnea and respiratory problems, and some cancers. Obesity is also related to increased risks of mortality. The biomedical, psychosocial, and economic effects of obesity have significant repercussions for the health and well-being of the US population.[45] **FIGURE 1.8** shows the rate of obesity and the rate of coronary heart disease by state for 2015.

The worldwide rate of obesity has more than doubled since 1980. In 2014, more than 1.9 billion adults ages 18 and older (39% of the world's population) were classified as overweight. Of these, more 600 million (13%) were deemed obese. Sadly, most of the world's population lives in countries where being overweight or obese kills more people than being underweight. In 2014, 41 million children over the age of five years fell into the category of overweight or obese. The silver lining in this epidemic is that obesity is preventable.[46]

The World Health Organization (WHO) defines overweight and obesity as "abnormal or excessive fat accumulation that presents a risk to health."[47] Different measuring indexes are used to capture weight measurements, depending on the age group. For children up to 5 years of age, the WHO's child growth standards introduced in April 2006 are recommended. For individuals 5 to 19 years of age, the WHO has developed growth reference data. The data are a reconstruction of the 1977 National Center for Health Statistics (NCHS) and WHO reference and uses the original NCHS data set supplemented with data from the WHO child growth standards sample for young children up to age 5 years. Body mass index is the most frequently used measure of overweight and obesity in adults. BMI is calculated by dividing an individual's weight in kilograms by the square of his or her height in meters $(kg \div m^2)$.[47] See **TABLE 1.9** for a list of BMI ranges and corresponding weight classifications.

The BMI provides the most useful population-level measure of overweight and obesity, as it is the same for both genders and for all ages of adults. It is important to note that one of the limitations of BMI measurement is that it may not correspond to the same body-fat percentage in different individuals.[47]

Globally, increased BMI is a risk factor for noncommunicable diseases such as cardiovascular disease, DM, musculoskeletal disorders (such as osteoarthritis), and cancer (particularly endometrial, breast, ovarian, prostate, liver, kidney, and colon). The risk for these noncommunicable illnesses rises for individuals with higher BMIs. Childhood obesity is linked with a higher chance of adult obesity, premature death, and adult disability. Aside from health risks in their future, obese children suffer from breathing problems and have higher risks for fractures, hypertension, cardiovascular disease, insulin resistance, and attendant psychological consequences.[46]
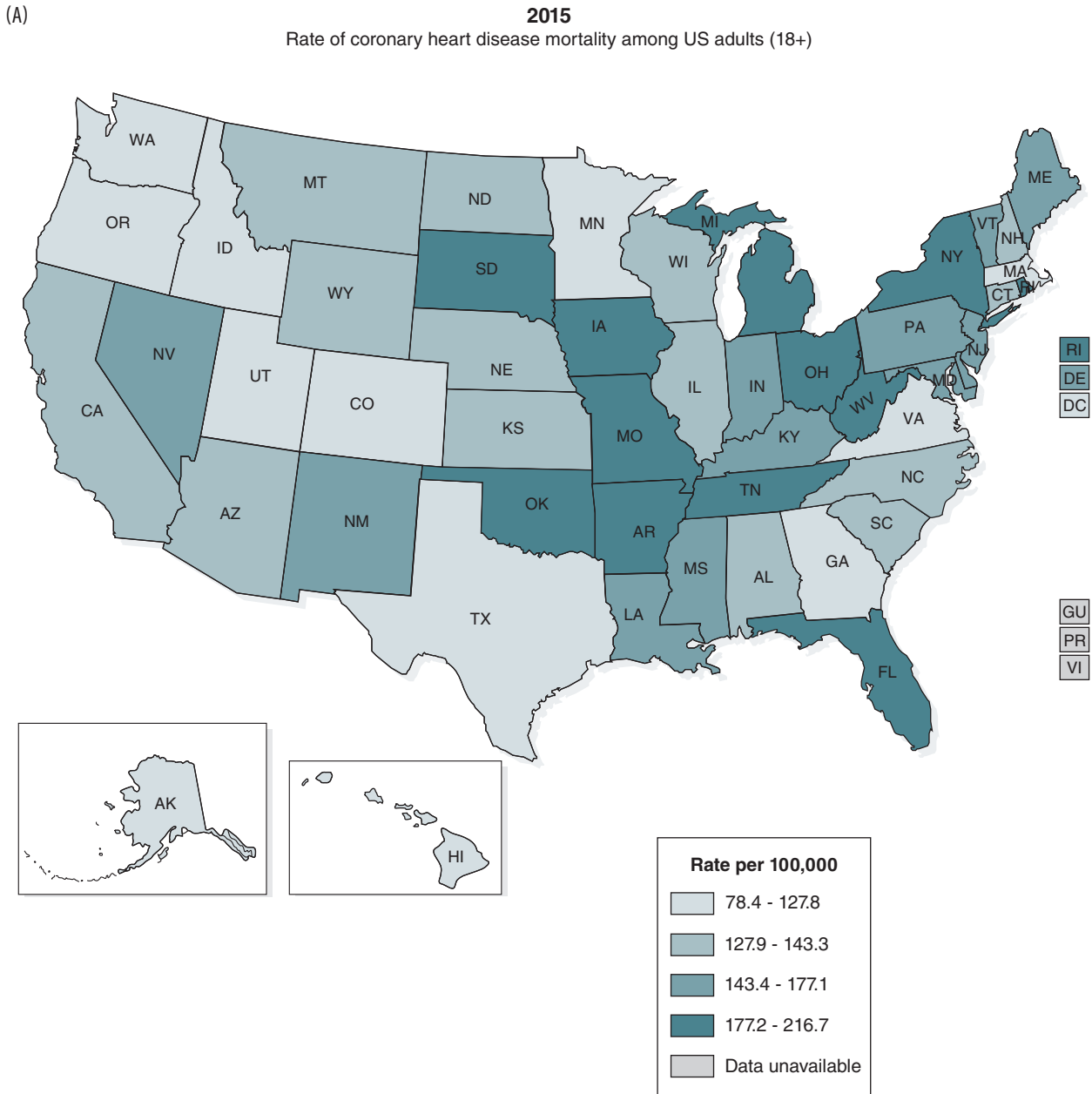
What Is Being Done About the Obesity Epidemic?

In 2004, the World Health Organization implemented the "WHO Global Strategy on Diet, Physical Activity and Health" program, which outlines the steps needed to promote healthy diets and active lifestyles. This initiative challenges all stakeholders to get involved at global, regional, national, and local levels to improve diet and physical-activity patterns for all members of the population. The WHO has also put in place its "Global Action Plan for the Prevention and Control of Non-Communicable Diseases 2013–2020." Endorsed by heads of state and government in September 2011, this program seeks a 25% reduction in premature mortality from noncommunicable diseases by 2025. In 2016, the World Health Assembly requested a plan from the director general of the WHO's Commission on Ending Childhood Obesity to address the obesogenic environment and critical periods in the life course to tackle childhood obesity.[46] In the United States, HP 2020 addresses nutrition and weight status as one of its topic areas.

Heart Disease

Every 42 seconds, someone somewhere in the United States has a heart attack. Every minute, an American

(A)   **2015**
Rate of coronary heart disease mortality among US adults (18+)

Rate per 100,000

- 78.4 - 127.8
- 127.9 - 143.3
- 143.4 - 177.1
- 177.2 - 216.7
- Data unavailable

FIGURE 1.8 Coronary heart disease and obesity rate, 2015 (a) Rate of coronary heart disease (b) Prevalence of obesity

Data from CDC Data Trend Interactive Maps. https://www.cdc.gov/dhdsp/maps/dtm/index.html Accessed July 3, 2017. Map developed by Nancy Munoz using CDC interactive data tools

dies from a condition related to heart disease.[48] In fact, heart disease is the leading cause of death for both men and women. More than half of those who died from heart disease in 2009 were men. In the United States, one out of every four deaths results from heart disease, and approximately 610,000 Americans die from heart disease every year.[49] Heart disease includes several types of heart conditions such as coronary artery disease, heart attacks, and related conditions such as angina. The most common type of heart disease in the United States is coronary artery

disease, which affects the blood flow to the heart. In 2014, approximately 356,000 people died from coronary artery disease.[49]

Heart disease is the leading cause of death for people of most racial and ethnic groups in the United States, including African Americans, Hispanics, and whites. For Asian Americans or Pacific Islanders and American Indians or Alaska Natives, heart disease is second only to cancer.[50] The United States spends some $207 billion per year in caring for individuals with heart disease when healthcare services,

(B)

2015
Prevalence of obesity among US adults (20+)

Percent (%)
- 20.6 - 26.6
- 26.7 - 30.4
- 30.5 - 32.2
- 32.3 - 36.8
- Data unavailable
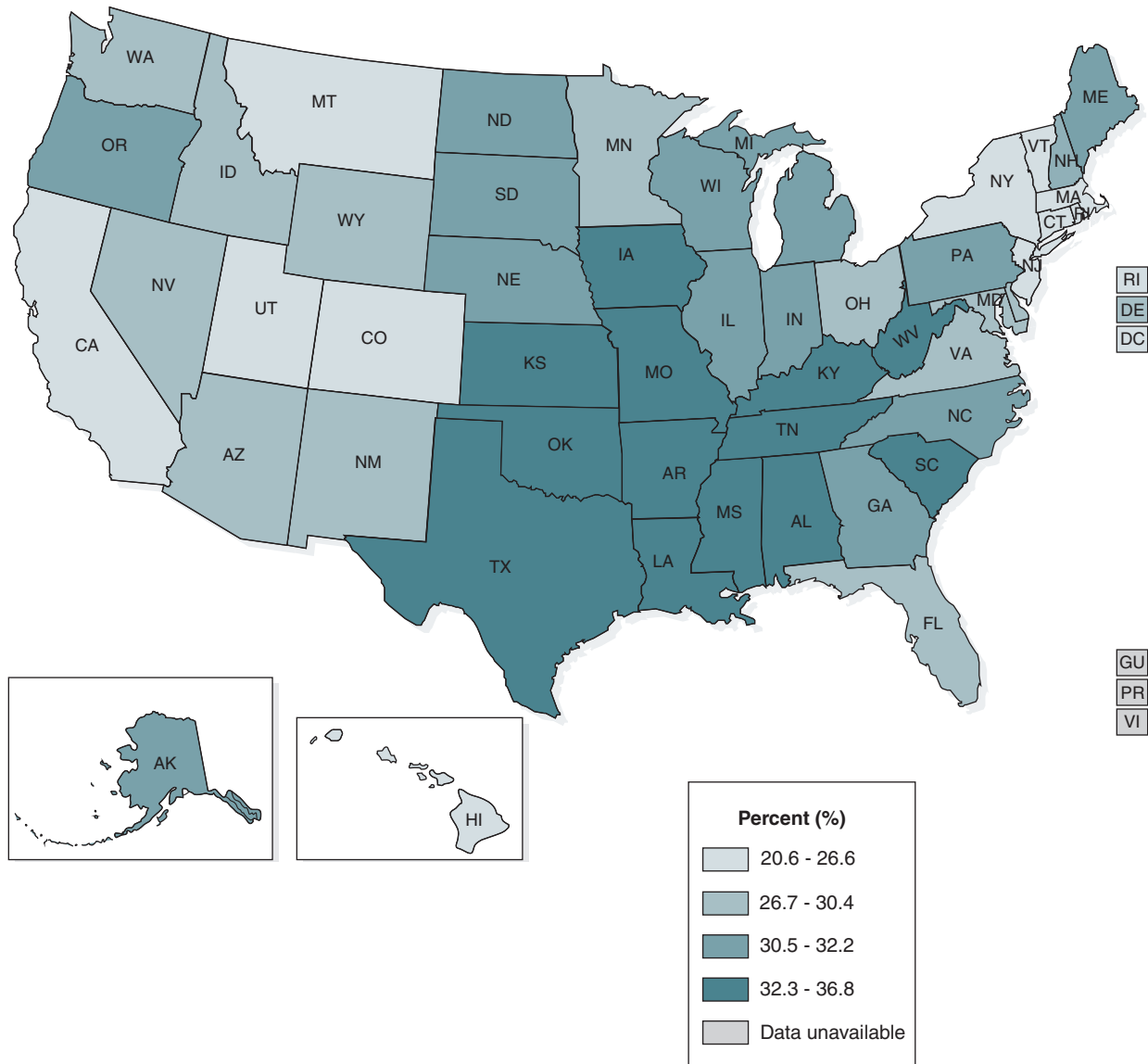
FIGURE 1.8   (*continued*)

Data from CDC Data Trend Interactive Maps. https://www.cdc.gov/dhdsp/maps/dtm/index.html Accessed July 3, 2017. Map developed by Nancy Munoz using CDC interactive data tools.

medications, and loss of productive time are included in this amount.[49]

Additionally, heart disease is also the leading cause of death around the world. In 2012, 15.5 million people reportedly died from heart disease, accounting for 31% of all worldwide deaths. Of these deaths, 7.4 million died from coronary heart disease and 6.7 million died from strokes. More than three-quarters of the deaths related to heart disease occur in countries with low to middle incomes.[49]

Most cardiovascular diseases can be prevented when an individual focuses on behavioral factors such as the use of tobacco, being obese and overweight, engaging in unhealthy eating patterns, having a physically inactive lifestyle, and consuming alcohol in higher-than-recommended amounts. Individuals with heart disease or who have a high risk for developing heart disease (by having one or more risk factors such as hypertension, diabetes, hyperlipidemia, or a preexisting diagnosis of the disease) need early detection and intervention as appropriate.[51] The WHO has identified both population-wide and individual low-resource interventions that, when used jointly, can help decrease the burden associated with

TABLE 1.9 BMI classification

Classification	BMI Range
Underweight	< 18.5
Normal	18.5–24.9
Overweight	> 25.0
Pre-obese	25–29.9
Obese	> 30.0
Obese I	30–34.9
Obese II	35–39.0
Obese III	> 40

Data from World Health Organization. (2016). *Global Strategy on Diet, Physical Activity, and Health*. http://www.who.int/dietphysicalactivity/childhood_what/en/. Accessed August 18, 2017.

heart disease. Population-wide strategies that can be implemented to decrease heart disease include the implementation of comprehensive tobacco policies and the use of taxation to decrease the intake of foods that are considered high in sodium, fat, and sugar. Adjusting the environment by constructing walking and bicycling paths, helping people limit their consumption of alcohol, and providing heathy school meals to children are also examples of population strategies.[51]

At the individual level, systems must be in place to identify individuals with overall high total risk factors or single risk factors such as hypertension and hypercholesterolemia. Secondary prevention of heart disease in individuals with a diagnosis of the disease includes the use of medications such as aspirin, beta blockers, angiotensin-converting-enzyme inhibitors, and statins.[51]

Health benefits achieved by implementing these interventions are mostly independent. When smoking cessation is added to these strategies, 75% of recurrent vascular events are preventable.[51]

In 2013, WHO members agreed on global strategies to decrease the avoidable noncommunicable-disease burden. This includes reducing the global prevalence of hypertension by 25% and ensuring that at least 50% of eligible individuals would receive drug therapy and counseling to prevent heart attacks and strokes.[51]

In the United States, one HP 2020 goal is focused on improving the cardiovascular health of all Americans by 20% and reducing deaths from cardiovascular diseases and stroke by 20% by the year 2020.[52]

Cancer

Cancer is the name given to a collection of related diseases. Some types of cancer can start in any of the trillion cells in the human body. Normally, these cells grow and divide to form new cells as the body needs them. Old or damaged cells die, and new cells take their place. When cancer develops, however, this orderly process breaks down. As abnormal cells survive when they should die, new cells form when they are not needed. These extra cells can divide without stopping and may form growths called **tumors**. Many cancers form solid tumors, which are masses of tissue.[53]

Cancerous tumors are malignant, which means they can spread into or invade nearby tissues. In addition, as these tumors grow, some of their cells can break off and travel to distant places in the body through the blood or lymph systems and form new tumors far from the original tumor.[53]

Cancer cells differ from normal cells in many ways that allow them to grow out of control and become invasive. One important difference is that cancer cells are less specialized than normal cells—that is, where normal cells mature into highly distinct cell types with specific functions, cancer cells do not. This is one reason why cancer cells continue to divide without stopping, unlike normal cells. Cancer cells are able to ignore signals that tell normal cells to stop dividing or that begin apoptosis (cell death), which the body uses to rid itself of unneeded cells.[36]

Each year in the United States, more than 1.5 million people are diagnosed with cancer—and more than 500,000 Americans die of cancer. By 2020, the number of new cancer cases is expected to increase to nearly 2 million a year.[54]

More than half of all cancer deaths could be prevented by healthy choices, screening, and vaccinations. Not smoking, drinking alcohol in moderation or not at all, getting enough sleep, eating a diet rich in fruits and vegetables and low in red meat, and getting enough physical activity have been shown to improve overall health and lower the risk of developing some cancers.[54]

Smoking causes approximately 90% of lung cancer deaths in men and almost 80% in women. Smoking also causes cancers of the larynx, mouth, throat, esophagus, bladder, kidney, pancreas, cervix, colon, and stomach, as well as a type of blood cancer called acute myeloid leukemia.[54]

The CDC supports comprehensive efforts at local, state, and national levels to prevent and control cancer for all Americans. To optimize public-health efficiency and effectiveness, the CDC recommends

coordinating chronic-disease prevention efforts in four key domains:[54]

1. Epidemiology and surveillance to monitor trends and track progress
2. Environmental approaches to promote health and support healthy behaviors
3. Healthcare system interventions to improve the effective delivery and use of clinical and other high-value preventive services
4. Community programs linked to clinical services to improve and sustain the management of chronic conditions

These four domains help organize and focus the effective work done by the public-health community for many years. At the same time, they help concentrate efforts to strengthen programs and build expertise to address gaps in services. Finally, they help government agencies, state and local grantees, and diverse public and private partners find new ways to work together and support each other's efforts.[54]

Worldwide, cancer is among the leading cause of morbidity and mortality. In 2012, 14 million new cases and 8.2 million cancer-related deaths were reported. New cases of cancer are expected to grow by 70% over the next 20 years. The most-common cancer sites in men were lung, prostate, colon and rectum, stomach, and liver. In women, cancer is most commonly diagnosed in the breast, colon and rectum, lungs, cervix, and stomach. Approximately one-third of cancer-related deaths are associated with lifestyle behaviors such as increased BMI, minimal intake of fruit and vegetables, sedentary lifestyles, and habitual use of tobacco and alcohol.[55]

In excess of 60% of all new annual cases of cancer arise in Africa, Asia, and Central and South America. These regions account for 70% of the world's cancer deaths.[56]

In 2013, the WHO rolled out its Global Action Plan for the Prevention and Control of Non-Communicable Diseases 2013–2020. One aim of the plan includes reducing premature mortality from cancer by 25%.[55]

Nutritional Epidemiology

Epidemiology concerns itself with the causes of diseases in populations and how diseases they develop and spread. The patient is the community, and individuals are viewed collectively. By definition, epidemiology is the scientific, systematic, and data-driven study of the distribution (frequency, pattern) and determinants (causes, risk factors) of health-related states and events (not just diseases) in specified populations (neighborhood, school, city, state, country, global). It is also the application of such study to controlling health problems.[57] Epidemiology is an essential element of public health, offering the basis for guiding practical and appropriate public-health interventions grounded in this science and in causal reasoning.[58]

Results obtained from epidemiologic studies are used to assess a community's health, make individual decisions, complete a clinical picture, and look for causes.[57] Public-health officials accountable for policy development, implementation, and evaluation use epidemiologic data as a factual framework for decision making. Many individuals may not recognize that they use epidemiologic evidence to make daily decisions affecting their health. When someone decides to quit smoking for example, or climbs the stairs rather than wait for an elevator, or eats a salad rather than a cheeseburger with fries for lunch, he or she may be influenced, consciously or unconsciously, by epidemiologists' assessment of risk.[57]

As epidemiologists research illness occurrence, they depend on healthcare providers to determine the correct diagnosis of each individual. On the other hand, epidemiologists offer providers an increased understanding of the clinical presentation and history of the condition being evaluated. A considerable number of epidemiologic studies are focused on finding causal elements that affect any individual's possibility of developing disease.[57]

Nutritional epidemiology is a moderately new field of medical research that looks at the association between nutrition and health. Diet and physical activity are difficult to measure accurately, which may partly explain why nutrition has received less attention than other risk factors for disease in epidemiology.[42]

The rigor of the research associated with nutritional epidemiology varies. Meta-analyses with questionable design and execution have helped to disperse contradictory messages about nutrition and health. One example of this is Flegal et al.,[59] who concluded that being overweight lessens the risk of all-cause mortality. Similarly, a contradicting meta-analysis reported that substituting saturated fat with polyunsaturated fats has no significant effect on cardiovascular risk.[59] These types of conclusion can be dangerous. Misleading or contradicting messages can prevent the public from adopting healthy lifestyles.[60]

Nutritional epidemiology requires design and analysis strategies that are unique to the field of food and nutrition. Appreciating the particulars of nutritional epidemiologic research demands a thorough understanding of nutritional science and its methodological background.[60]
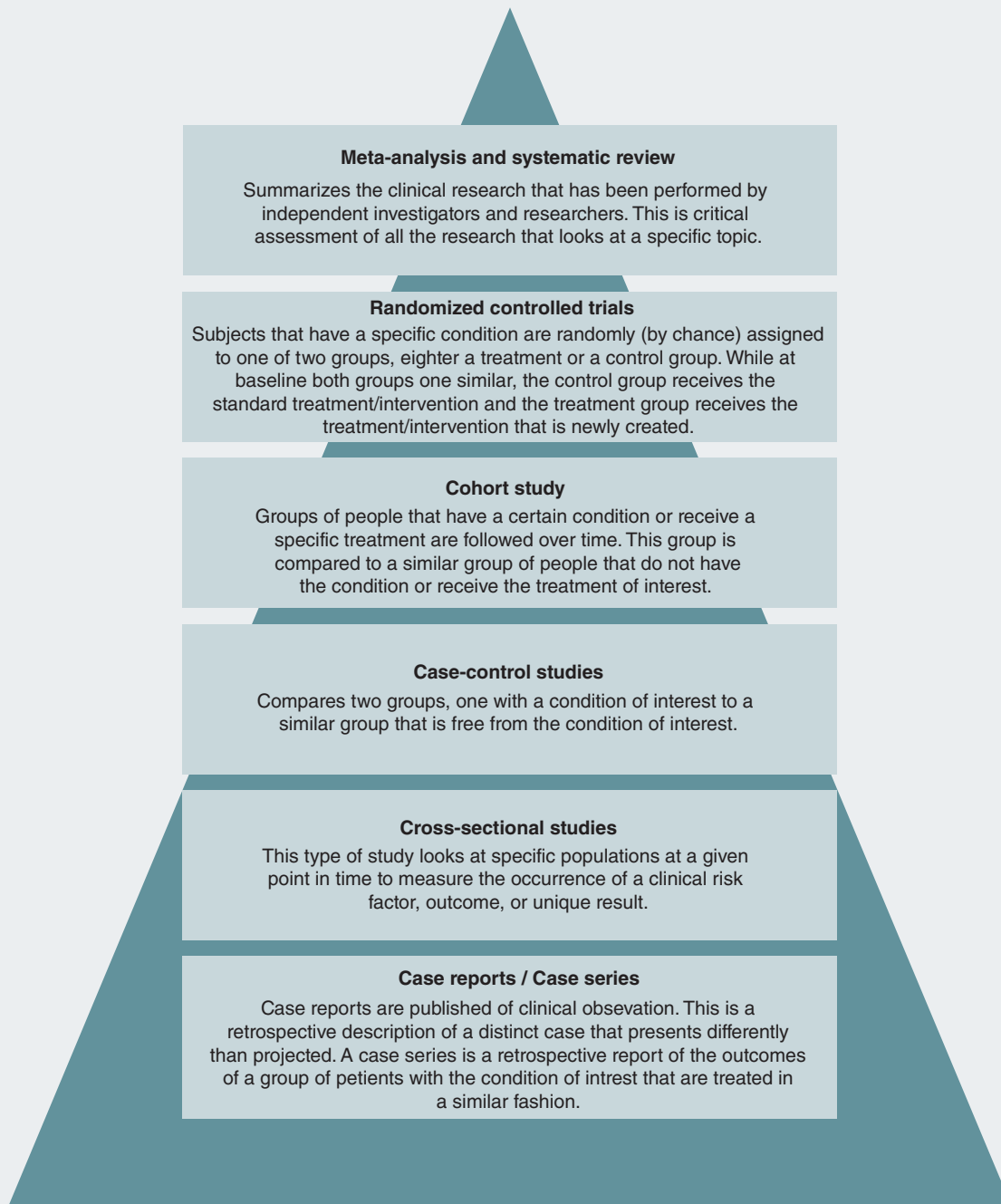
Measuring Nutrition Intake

Although the methods to collect information on nutrient intake have many limitations, numerous procedures have been created to determine nutrient intake from individuals and populations at large. Tools such as food-composition tables, food-frequency questionnaires, and

HIGHLIGHT

Understanding Types of Research

Meta-analysis and systematic review

Summarizes the clinical research that has been performed by independent investigators and researchers. This is critical assessment of all the research that looks at a specific topic.

Randomized controlled trials

Subjects that have a specific condition are randomly (by chance) assigned to one of two groups, eighter a treatment or a control group. While at baseline both groups one similar, the control group receives the standard treatment/intervention and the treatment group receives the treatment/intervention that is newly created.

Cohort study

Groups of people that have a certain condition or receive a specific treatment are followed over time. This group is compared to a similar group of people that do not have the condition or receive the treatment of interest.

Case-control studies

Compares two groups, one with a condition of interest to a similar group that is free from the condition of interest.

Cross-sectional studies

This type of study looks at specific populations at a given point in time to measure the occurrence of a clinical risk factor, outcome, or unique result.

Case reports / Case series

Case reports are published of clinical obsevation. This is a retrospective description of a distinct case that presents differently than projected. A case series is a retrospective report of the outcomes of a group of petients with the condition of intrest that are treated in a similar fashion.

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biomarkers have shown good validity with the use of several criteria. The strengths unique to each method make it appropriate for use in particular applications.

The gold standard for determining nutrient information is the multiple-week diet record. With this tool, individuals document all items they consume over a period of several weeks. The method is different from other data-collection processes because an individual does not have to depend on his or her memory. The high contributor burden as well as the cost of maintaining diet records has reduced their use in large-scale epidemiologic studies. The capacity of these records to convey thorough diet data makes them valuable in validation studies for other dietary assessment techniques. Another drawback of diet records is that the procedure of logging data can alter an individual's diet, thus rendering the data nonrepresentative of actual and usual intake. On the other hand, projected intakes from diet records have shown high correlation with results from multiple 24-hour recalls.[61] In recurrent 24-hour recalls, a participant details all foods eaten in the preceding 24 hours or calendar day to a skilled interviewer in person or over the phone. This technique has been commonly used in dietary-intervention trials. It is also used in national surveys to discover trends in nutritional intake.[60]

Nutritional Epidemiology in Illness Cause and Effect

One of the main reproaches stacked against nutritional epidemiology is that it depends heavily on observational data. This research method is believed to be secondary to experimental data in defining causation. When evidence from randomized controlled trials is not available, nutritional epidemiologists characteristically rely on prospective cohort studies, the strongest observational study design in terms of diminishing bias and deducing causality.[60]

Recap   The incidence of obesity is associated with increased risks for morbidity associated with the presence of hypertension, dyslipidemia, diabetes, coronary heart disease, stroke, gallbladder disease, osteoarthritis, sleep apnea, respiratory problems, and some cancers. Obesity has also been linked to increased risk of mortality. Nutritional epidemiology is a moderately new field of medical research that looks at the association between nutrition and health.

▶ Chapter Summary

Consuming healthy foods and living an active lifestyle are basic ways to promote health and well-being. Getting adequate nutrition is particularly important during periods of rapid growth and development. Following an unhealthy eating pattern during pregnancy, infancy, childhood, and adolescence can contribute to underdeveloped physical and mental abilities that have lifelong consequences. Prolonged nutrition deficiency, whether from excessive or inadequate intake, will promote or exacerbate a range of ailments and affect an individual's quality and length of life.

The use of nutrition screening allows for the identification of individuals who are at nutritional risk so that a full nutrition assessment can be completed. The Academy defines a nutrition assessment as "identifying and evaluating data needed to make decisions about a nutrition-related problem/diagnosis."[21] Nutrition-assessment techniques can be classified as one of four types: anthropometric, biochemical, clinical, or dietary.

The increased understanding of the role of nutrition in promoting health and well-being has made the evaluation of individuals, families, and communities key to monitoring public health.
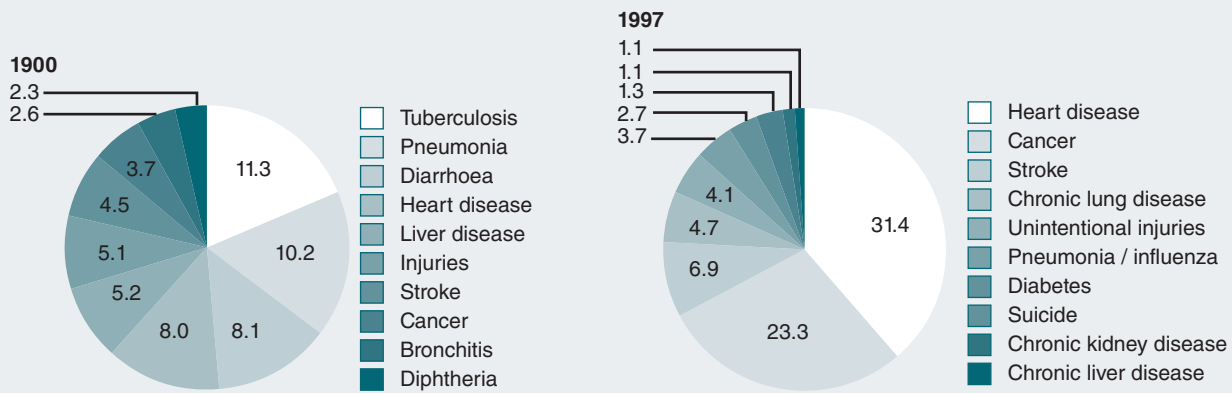
◆ CASE STUDY

In the 21st century, the incidence of chronic disease has displaced the previous prevalence of nutrient deficiency as the primary area of public-health concern as population conditions. Leading causes of death have shifted from infectious diseases to chronic conditions. Approximately one-half of all American adults—117 million individuals—have one or more preventable chronic diseases, many of which are related to poor-quality eating patterns and physical inactivity.

Dr. Jones is a researcher who was just awarded a grant by the National Institute of Health (NIH) to measure the prevalence of diabetes in a selected sector of Camden, New Jersey.

Questions:

1. As you go through the information in this chapter, determine which nutrition assessment methods you would incorporate in your procedure.
2. What drives your assessment-method selection?

The ten leading causes of death in the United States in 1900 and 1997

1900

Tuberculosis 11.3
Pneumonia 10.2
Diarrhoea 8.1
Heart disease 8.0
Liver disease 5.2
Injuries 5.1
Stroke 4.5
Cancer 3.7
Bronchitis 2.6
Diphtheria 2.3

1997

Heart disease 31.4
Cancer 23.3
Stroke 6.9
Chronic lung disease 4.7
Unintentional injuries 4.1
Pneumonia / influenza 3.7
Diabetes 2.7
Suicide 1.3
Chronic kidney disease 1.1
Chronic liver disease 1.1

Data from Centers for Disease Control and Prevention. Leading Causes of Death, 1900–1998. Date unknown. https://www.cdc.gov/nchs/data/dvs/lead1900_98.pdf.

Learning Portfolio

Key Terms

Anthropometry
Body mass index (BMI)
Bureau of Labor Statistics Consumer expenditure survey data
Epidemiology
Food and Agriculture Organization of the United Nations (FAO)
Healthy People 2020 (HP 2020)
Interprofessional
Nutrition assessment
Nutrition Care Process (NCP)

Nutrition Care Process Terminology (NCPT)
Nutrition Care Process and Model (NCPM)
Nutrition diagnosis
Nutrition-focused physical exam (NFPE)
Nutrition intervention
Nutrition screening
PES statement
Scurvy
Subjective global assessment (SGA)
Tumors

Study Questions

1. The key difference between a nutrition-screening form and a nutrition-assessment form is:
   a. Screening forms provide a diagnosis for malnutrition
   b. Screening forms determine risk for malnutrition
   c. Screening forms diagnose chronic disease
   d. Screening forms determine risk for weight gain

2. The Academy of Nutrition and Dietetics recommends using the _____ screening form to assess risk for malnutrition in the adults in the clinical setting.
   a. MUST
   b. SNAQ
   c. Mini SNAQ
   d. Mini MUST

3. When writing PES statements, the section that includes the cause of the nutrition problem is the _____.
   a. Problem
   b. Etiology
   c. Signs and symptoms
   d. Intervention

4. Which of the following is *not* one of the four steps of the Nutrition Care Process?
   a. Screening and referral
   b. Nutrition assessment
   c. Nutrition intervention
   d. Nutrition diagnosis

5. The part of the Nutrition Care Process that involves data collection, reviewing the data for key factors, and comparing that data against nutrition care criteria is:
   a. Nutrition diagnosis
   b. Nutritional assessment
   c. Nutrition intervention
   d. Nutrition monitoring and evaluation

6. The HP 2020 Nutrition objectives:
   a. Are released by the Food and Drug Administration
   b. Are objectives to measure progress for health concerns in specific populations
   c. Has 10 prominent goals
   d. Provides strategic management for use only at the national level

7. Which of the following is *not* one of the four prominent nutrition goals for HP 2020?
   a. Eliminate all tobacco use by adults, teenagers, and children
   b. Attain high-quality longer lives free of preventable disease, disability, injury, and premature death
   c. Create social and physical environments that promote good health for all
   d. Achieve health equity, eliminate disparities, and improve the health of all groups

8. Which of the following is an objective that falls in the "weight status" category of the HP 2020 objectives?
   a. Reduce the proportion of adults who are at a healthy weight
   b. Reduce the number of women who are morbidly obese
   c. Increase the proportion of adults who are at a healthy weight
   d. Reduce the proportion of men who are underweight

9. Which of the following is *not* one of the objectives for the area of food and nutrient consumption for individuals age 2 years and older?
   a. Increase the consumption of fruits
   b. Increase the consumption of dairy
   c. Reduce the consumption of calories from solid fats
   d. Reduce the consumption of sodium

10. Diabetes is the _____ leading cause of death in the United States.
    a. First
    b. Second
    c. Seventh
    d. 10th

11. The most useful population-level measure of overweight and obesity in adults is:
    a. Ideal body weight
    b. Body mass index
    c. Body fat and lean mass percentages
    d. Growth charts

12. Which of the following is the leading cause of death for Americans?
    a. Diabetes mellitus
    b. Heart disease
    c. Stroke
    d. Osteoporosis

13. Half of all cancer deaths could be prevented by:
    a. Frequent primary care provider visits
    b. Sedentary lifestyle
    c. Polypharmacy
    d. Healthy eating practices and lifestyle choices

14. The strongest observational study design used in nutritional epidemiology is the:
    a. Meta-analysis
    b. Randomized placebo-controlled trial
    c. Prospective cohort
    d. Case control

15. Information included in the clinical history includes all of the following *except*:
    a. Medication
    b. Changes in food intake
    c. Medical diagnosis
    d. Laboratory tests

16. When should the nutrition-focused physical exam be conducted?
    a. After the lab values are in the medical record
    b. At the time of admission
    c. After the history is obtained
    d. Before any procedure is performed

17. According to the consensus statement by the Academy of Nutrition and Dietetics and ASPEN, malnutrition is diagnosed when the following two symptoms are present:
    a. Loss of muscle mass and loss of fluid
    b. Excessive energy intake and excessive subcutaneous fat
    c. Inadequate energy intake and weight loss
    d. Improved handgrip strength and fluid loss

18. Which of the following are two distinct steps in the intervention part of the Nutrition Care Process?
    a. Planning and implementation
    b. Communication and nutrient delivery
    c. Coordinating care and education
    d. Collecting and assessing data

19. Which of the following is a reason why micronutrient deficiency is not as prevalent in the United States today?
    a. Food staples were required by law to be enriched or fortified with important nutrients
    b. More people have access to antibiotics
    c. It is a farm-to-table philosophy
    d. Megadoses of nutrients are frequently used

20. The phrase "inadequate intake" is found in the _____ part of the nutrition diagnostic statement:
    a. Problem
    b. Signs and symptoms
    c. Etiology
    d. Assessment

21. Measuring weight, height, and body composition are examples of the data collection for the _____ method.
    a. Biochemical
    b. Anthropometric
    c. Clinical
    d. Dietary

22. Measuring blood nutrient concentrations, urinary metabolites, and blood lipid concentrations are examples of data collected in the _____ assessment method.
    a. Clinical
    b. Anthropometric
    c. Biochemical
    d. Dietary

23. The dietary data-collection method that uses a structured listing of individual foods or groups of foods that an individual consumes over a period of time is called a _____.
    a. 24-hour recall
    b. Food-frequency questionnaire
    c. Diet history
    d. Three-day food record

24. In the early 1700s, Dr. James Lind discovered an association between the consumption of citrus fruits and the prevention of which deficiency disease?
    a. Osteoporosis
    b. Rickets
    c. Pellegra
    d. Scurvy

25. During the so-called germ theory era, physicians believed that the cause of frequent illnesses in the general population were from _____.
    a. Infectious organisms
    b. Nutrient deficiencies
    c. Nutrient toxicity
    d. Nutrient excesses

26. _____ is the method used to find the causes of health outcomes and diseases in populations.
    a. Assessment
    b. Nutrition-focused physical exam
    c. Epidemiology
    d. Nutrition care process

27. Once micronutrient deficiency diseases were eradicated in the United States, health officials focused their attention on the dietary practices associated with chronic disease. These dietary practices include all of the following *except*:
    a. Excessive sugar intake
    b. Excessive fruit and vegetable intake
    c. Excessive saturated fat intake
    d. Excessive sodium intake

28. The part of the Nutrition Care Process that determines the extent to which intervention goals are met is:
    a. Assessment
    b. Intervention
    c. Diagnosis
    d. Monitoring and evaluation

29. The assessment tool that has been validated to accurately predict poor outcomes and longer length of hospital stay after surgery is the:
    a. Mininutritional assessment form
    b. Mini SNAQ
    c. Malnutrition Universal Screening Tool (MUST)
    d. Subjective global assessment

30. The most reliable indicator of poor nutritional status is:
     a. Weight loss
     b. Low albumin concentrations
     c. Low dietary intake of nutrients
     d. Poor handgrip strength

Discussion Questions

1. How does the obesity rate affect the incidence of chronic disease in the United States?
2. Describe the shift from infectious disease to chronic disease that affects public health.
3. Nutrition screens allow individuals who are at risk of suboptimal nutritional status to be identified. List and describe the most commonly used screening tools. What are the benefits and drawbacks of each screening tool?

Activities

1. Develop a marketing campaign targeting a specific segment of the community you live or study in that introduces population-based intervention strategies to reduce obesity and impact overall health.
2. Type 2 diabetes is widespread in all obese groups and now even in preteen children. Develop an education tool to teach young children the health risks associated with diabetes.
3. Select a chronic condition that is prevalent in the American population. Work with three to four classmates to develop "the top 10 must know topics" by the average person in efforts to prevent or manage the disease. Develop a wiki page to communicate the information. Use videos and graphics on the page to deliver the message.

Online Resources

Food and Agriculture Organization (FAO) of the United Nations

The FAO develops methods and standards for food and agriculture statistics, provides technical assistance services, and disseminates data for global monitoring. It is the world's largest database of food and agriculture statistics:
http://www.fao.org/statistics/en/.

Bureau of Labor Statistics Consumer Expenditure Survey Data

This database provides information on the buying habits of American consumers, including data on their expenditures, income, and consumer unit (families and single consumers) characteristics:
http://www.bls.gov/cex/.

Anthropometric Measurement Videos

This website provides technical videos on how to conduct anthropometric measures:
https://wwwn.cdc.gov/nchs/nhanes/nhanes3/anthropometricvideos.aspx.

The State of Obesity: Adults in the United States

This website provides interactive maps on adult obesity in the United States:
http://stateofobesity.org/adult-obesity/.

Malnutrition Universal Screening Tool (MUST)

This website provides the background for the MUST tool, online calculator, and videos.
http://www.bapen.org.uk/screening-and-must/must.

Mini Nutritional Assessment Tool (MNA)

This website provides an overview of the MNA tool and videos and provides access to the required forms:
http://www.mna-elderly.com/.

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