Eleventh Edition

Personal Nutrition

Marie A. Boyle
Saint Elizabeth University

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***Personal Nutrition,* Eleventh Edition**
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In memory of Jesse, Dylan, and Rex—my twinkling stars in the night sky. And to all those who lost loved ones to the COVID-19 pandemic—may the memories you hold dear be a blessing, and may there be time enough for healing.

—Marie A. Boyle

About the Author

Marie A. Boyle, PhD, RD, received her BA in psychology from the University of Southern Maine and her MS and PhD in nutrition from Florida State University in Tallahassee, Florida. She is author of the community nutrition textbook *Community Nutrition in Action*. She is a professor in the Foods and Nutrition Department at Saint Elizabeth University in Morristown, New Jersey. She also teaches online graduate courses in applied nutrition at the University of New England. She serves as editor-in-chief of the *Journal of Hunger and Environmental Nutrition* from Taylor & Francis Publishers. Her other professional activities include membership in the American Public Health Association, the Academy of Nutrition and Dietetics, and the Society for Nutrition Education and Behavior.

Contents in Brief

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Preface

This 11th edition of *Personal Nutrition* reflects the same vision we had in writing the first edition of this book more than 30 years ago—that is, to apply basic nutrition concepts to personal, everyday life. The text is designed to support the many one- to four-credit introductory nutrition courses available to students today from a variety of majors and offers all readers the opportunity to develop practical skills in making decisions regarding their personal nutrition and health. Our challenge has been to teach facts about nutrition, to nurture critical thinking skills, and to motivate readers to apply what they learn in daily life.

Chapter Content

Chapter 1 introduces the basic nutrients the body needs and provides a personal invitation to eat well for optimum health. It assists readers in becoming sophisticated consumers of new information about nutrition, and explores the factors that affect food choices, including the media, advertising, and cultural factors. Chapter 2 describes in detail the MyPlate food guide and related nutrition tools, the *2020–2025 Dietary Guidelines for Americans* for creating healthy dietary patterns, and information on various international and ethnic cuisines that highlights the multicultural heritage of our country. It provides the newly revised food label for understanding the nutrition information, terminology, and health claims found on labels. Chapter 2 also includes a new section on Food Choices and the Environment that gives an overview of how food choices affect the environment and describes actions you can take to protect the environment. Chapter 3 provides a colorfully illustrated introduction to the workings of the human body, with an emphasis on the body's digestion and absorption of nutrients from foods. It also introduces you to the human microbiome. Chapters 4 through 8 present the nutrients and show how they all work together to nourish the body. Chapters 7 and 8 take a functional approach in presenting the roles of vitamins and minerals and spotlights the importance of the antioxidant nutrients and phytochemicals; both chapters include colorful new food photos depicting excellent food sources for individual vitamins and minerals. Chapter 9 discusses the impact of the beverages we drink on our nutritional health. In-depth coverage of alcohol in Chapter 9 provides students with important information on alcohol's relationship to nutrition and health, helping them make informed and responsible decisions. Chapter 10 discusses weight management issues and compares major weight-loss programs. Chapter 11 addresses the relationships between nutrition and personal fitness. Chapter 12 describes the special nutrition needs and concerns that arise during the various stages of the life cycle from conception through the older adult years. Chapter 13 addresses consumer concerns about the safety of our food supply, provides a glimpse at some of the problems and advantages of current food technologies, illustrates the global benefits derived when consumers choose locally grown, seasonal foods as much as possible, and presents a brief overview of hunger and food insecurity—both at home and abroad.

Features

The *Savvy Diner* features throughout the text motivate readers to make good health a priority and provide suggestions for making the best food and lifestyle choices for healthy living and disease prevention. This feature includes practical tips for today's students that offer health benefits for a lifetime. Topics include "Whole Grains for Health," "Nourish the Heart," "An Eating Pattern for Longevity," and "Color Your Plate for Health." The *Savvy Diner* features provide practical suggestions for healthy eating and reinforce the recommendations made in the *Dietary Guidelines for Americans.* These features include tips for consuming heart-healthy diets, eating more beans, preserving vitamins in foods, seasoning foods without excess sodium, dining out defensively, sports nutrition basics for athletes, and practicing home food safety.

The *Nutrition Action* features are magazine-style essays that keep you abreast of current topics important to nutrition-conscious consumers. The *Nutrition Action* features address topics such as fast food, smart snacking, food allergies, dietary supplements and medicinal herbs, diet and blood pressure, and aging well with physical activity. The *Nutrition Action* sections reflect the latest issues in the field. For example, "Carbohydrates—Friend or Foe?" helps consumers choose healthful carbohydrates while making sense of the carbohydrate debate; "Diet Confusion: Weighing the Evidence" helps readers make sense of the current weight-loss scene; and "Considering Organic Foods" includes the Earth-friendly benefits of eating fresh and locally grown organic foods.

The new *Make Every Bite Count* feature helps learners recognize healthy foods that can boost their intakes of essential nutrients. The brief feature serves as a healthy nudge to add certain nutrient-dense foods/food groups (e.g., berries; leafy greens; yogurt; ancient grains; nuts and seeds; soy foods; avocados) to the diet and explains why this step is beneficial, based on research. The goal is that by the end of the semester, readers will be motivated to try more nutrient-dense foods and gain health benefits from doing so. We emphasize that while single foods have some excellent benefits, overall dietary patterns are most important. For example, "Eating a wide variety of colorful fruits and vegetables helps you reap many health benefits! Leafy greens can play a part in this!"

The *Ask Yourself* sections at the beginning of each chapter contain a set of true or false questions designed to provide readers with a preview of the chapter's contents. Answers to the questions are also provided.

The *Try This* feature gives readers a chance to practice what they have learned. For example, Chapter 1 shows the steps for determining the number of calories consumed from the grams of carbohydrate, fat, and protein in a food.

Scorecards are hands-on features that allow readers to evaluate their own nutrition behaviors and knowledge in many areas. Some of the *Scorecards* assist readers in assessing their longevity, overall diet, sugar and fiber intake, fruit and vegetable consumption, weight status, physical activity habits, and food safety know-how.

The final special feature of each chapter is the *Spotlight*. Each addresses a common concern people have about nutrition. *Spotlight* topics include nutrition and the media, food choices and the environment, understanding diabetes, diet and heart disease, the benefits derived from plant-based diets, nutrition and cancer prevention, osteoporosis, fetal alcohol spectrum disorders, eating disorders, athletes and nutritional supplements, and promoting healthy weight in children and adolescents. The Chapter 13 *Spotlight* covers the many factors that influence nutrition and food insecurity among the people of the world and underscores that the practical suggestions offered throughout this book for attaining the ideals of personal nutrition are the

very suggestions that best support the health of the whole Earth as well. The *Spotlights* continue in their question-and-answer format to encourage readers to ask further questions about nutrition issues. We encourage you to ask us questions, too, in care of the publisher.

The appendixes have also been updated. Appendix A presents aids to calculations, including how to calculate the percentage of calories from fat in one's diet. Appendix A also includes a current listing of Daily Values (DV) used on food labels and sample USDA Healthy Eating Patterns at various calorie levels that complement the *Dietary Guidelines for Americans*. Appendix B includes the *Body Mass Index chart; Key Physical Activity Guidelines for Adults; and the full set of Dietary Reference Intakes (DRI).*

The glossary of terms that follows the appendixes provides a quick reference to the nutrition terminology defined in the margins and miniglossaries of the text and can be used as a review tool.

Notable Changes in the 11th Edition

Nutrition is a subject that is forever changing. This edition incorporates the many recent changes that have taken place in the field of nutrition. Since the last edition was published, we have more robust research findings examining healthy dietary patterns and the prevention of chronic diseases such as heart disease, diabetes, and certain types of cancer, as well as increasing consumer interest in environmentally friendly food choices and healthy lifestyle choices for longevity. Additionally, we have been challenged by the global COVID-19 pandemic that underscored the longstanding social and economic inequalities in developed and developing countries alike. The pandemic revealed that undernourished people have weaker immune systems and may be at greater risk of severe illness, and that underlying conditions, including obesity, heart disease, and diabetes, are strongly linked to worse COVID-19 outcomes.* The *2020–2025 Dietary Guidelines for Americans* report describes healthy dietary patterns, while emphasizing that all segments of our society—from home to school to work to communities—have a role to play in supporting healthy choices for all. Nevertheless, nutrition claims bombard us frequently in advertising and articles about nutrition and fitness on television, radio, social media, and the Internet, and in newspapers and magazines. It is important that consumers have the knowledge to evaluate the nutrition issues and controversies. This 11th edition of *Personal Nutrition* provides a sieve through which to separate the valid nutrition information from the rest.

For all chapters and special chapter features:

- We have reviewed and updated content.
- Many new photos enhance student interest and reinforce the real-life applications of the material.
- The learning objectives have been refined to specify key student outcomes for each major section of each chapter.
- Links to credible sources of nutrition information on a variety of nutrition topics are included in the chapters.
- We have created many new figures and tables and updated others.

**2020 Global Nutrition Report: Action on equity to end malnutrition.* Bristol, UK: Development Initiatives Poverty Research Ltd., 2020.

- **Chapter 1**
  - Included the latest trend information on consumer sources of nutrition information.
  - Updated the discussion regarding healthy lifestyle choices and disease prevention.
  - Revised the Nutrition Action feature to reflect the *2020–2025 Dietary Guidelines for Americans* messages.
  - Enhanced the discussion regarding nutrition misinformation and credible nutrition resources.
- **Chapter 2**
  - Created a new photo-illustrated graphic depicting nutrient density and the small shifts in food choices that can yield healthy dietary patterns over time.
  - Introduced the new DRI value for Chronic Disease Risk Reduction (CDRR).
  - Reorganized information on MyPlate; included table to provide summary information of dietary intake goals, key nutrients, and strategies for choosing nutrient-dense items from each food group.
  - Added complete coverage of the *2020–2025 Dietary Guidelines for Americans*, with new tables, figures, photos, and discussion of healthy dietary patterns and other recommendations to improve the nutrition and health status of Americans of all ages; added new graphic demonstrating how the U.S. diet measures up to the recommended dietary guidelines.
  - Added new photo-illustrated graphic that serves as a visual reference to "right-size" food portions and avoid consuming extra calories.
  - Included discussion of approved food label changes and new illustration of front-of-package labeling.
  - Created a new section on Food Choices and the Environment that gives an overview of how food choices and food waste affect the environment and describes actions to take to protect the environment through food choices.
- **Chapter 3**
  - Created a new discussion—Feeding the Microbiome—covering prebiotics, probiotics, and intestinal microflora.
  - Added new illustrations and discussion of the accessory organs critical to digestion and the transport of newly digested nutrients to the liver.
- **Chapter 4**
  - Added a new figure that identifies common sources of added sugars and demonstrates how Americans exceed recommended limits for added sugars.
  - Enhanced the discussion of whole grains, ancient grains, and dietary fiber.
  - Created new Spotlight feature regarding diabetes prevention and management.
  - Reorganized material regarding sweeteners approved for consumer use.
- **Chapter 5**
  - Reorganized major "Fat in the Diet" section; added new figure that identifies sources of saturated fat in the diet and demonstrates how Americans exceed recommended limits for saturated fats.
  - Revised discussion of omega-3 fats in the diet; added new feature with tips for choosing healthy fats, including nuts and seeds.
  - Revised recommendations and discussion for saturated fat and cholesterol according to the *2020–2025 Dietary Guidelines for Americans* and the American Heart Association's *Guidelines on the Primary Prevention of Cardiovascular Disease.*

- Updated information regarding lipoproteins and heart disease risk and added discussion of recommended dietary patterns for reducing risk for heart disease, including the DASH diet, Mediterranean diet, and plant-based diets.

- **Chapter 6**
  - Updated food allergy feature and discussion of gluten intolerance and celiac disease.
  - Updated *Spotlight,* including new tips for creating healthy plant-based dietary patterns; added new feature with tips for including soy foods in the diet.
  - Included new USDA Healthy Eating Patterns for Vegetarians, located in Appendix A.
- **Chapter 7**
  - Created "Summary Guides" for each of the vitamins. This feature provides a snapshot of each vitamin's chief roles in the body, recommended intake, and deficiency and toxicity symptoms. Each vitamin's best food sources are showcased by new food photos and a listing of sample foods. Included information on the vitamins of public health concern from the *2020–2025 Dietary Guidelines for Americans*.
  - Added a new photo-illustrated section regarding phytochemicals and functional foods with tips for optimizing intakes in the daily diet; added new discussion of nutrients that play a role in supporting immunity.
  - Expanded *Nutrition Action* feature "Choosing a Vitamin-Mineral Supplement or Herbal Remedy."
  - Updated recommendations for reducing risk for hypertension and for cancer prevention from major professional organizations.
- **Chapter 8**
  - Created "Summary Guides" for each of the minerals. This feature provides a snapshot of each mineral's chief roles in the body, recommended intake, and deficiency and toxicity symptoms. Each mineral's best food sources are showcased by new food photography images and a listing of sample foods.
  - Included information on the minerals of public health concern from the *Dietary Guidelines for Americans*.
  - Added a new figure that identifies major sources of sodium in the diet and demonstrates how Americans exceed recommended limits for sodium.
  - Updated Nutrition Action feature "Diet and Blood Pressure—Beyond Just the Salt Shaker"; enhanced DASH eating plan guidance with a new chart.
  - Revised Spotlight feature "Osteoporosis"; updated recommendations for prevention and included tips for adding more calcium to the diet.
- **Chapter 9**
  - Enhanced discussion of fructose-versus glucose-based sports drinks and sports performance; added new feature regarding tea consumption.
  - Updated content regarding fetal alcohol spectrum disorder.
- **Chapter 10**
  - Added new figure and maps regarding current prevalence of obesity.
  - Included new terminology regarding intuitive eating, mindfulness, and intermittent fasting.
  - Included tables describing characteristics of successful dieters and the elements of behavior change.

- Included new pharmaceutical options for weight loss.
- Updated discussion and summary table comparing popular weight-loss diets.
- Revised discussion of eating disorders, including summary table comparing the incidence and characteristics of various eating disorders.

- **Chapter 11**
  - Updated feature discussing the nutritional needs of active individuals versus competitive athletes.
  - Enhanced discussion of anaerobic versus aerobic metabolism and expanded content regarding fuel use and duration/intensity of physical activity.
  - Updated recommendations regarding hydration and protein needs; updated table for carbohydrate recommendations for various levels of physical activity.
  - Added new recommendations from the 2nd edition of the *Physical Activity Guidelines for Americans.*
  - Revised Spotlight on supplements and updated the table of ergogenic aids.
- **Chapter 12**
  - Introduced *Blue Zones* of the world and impact on longevity.
  - Added new graphic describing food safety practices recommended during pregnancy and tips for avoiding lead poisoning.
  - Include new recommendations from the *2020–2025 Dietary Guidelines for Americans* specific for pregnant and lactating women and children up to age 2.
  - Added new American Academy of Pediatrics recommendations regarding infant feeding guidelines; included new recommendations for food allergy prevention.
  - Added new evidence suggesting that diet quality is better among older adults, with diet quality showing the most room for improvement in adolescence.
  - Revised *Spotlight* feature—"Promoting Healthy Weight in Children and Adolescents."
  - Updated discussion regarding the aging of the population.
  - Revised recommendations for reducing the risk of chronic diseases; added new graphics showing prevalence of chronic health conditions as well as functional limitations among older adults.
  - Introduced the components of the *MIND diet* (Mediterranean-DASH Intervention for Neurodegenerative Delay), which focuses on foods in each of the two diets that affect brain health.
- **Chapter 13**
  - Updated discussions of problem foods needing special handling for food safety with new photo-illustrated figures.
  - Updated the features on local foods and sustainable food system approaches; added tips for reducing one's ecological footprint.
  - Updated statistics, diagrams, and discussions in chapter *Spotlight* on global food insecurity issues.

We welcome you to the fascinating subject of nutrition. We hope that the book speaks to you personally and that you find it practical for your everyday use. We hope, too, that by reading it, you may enhance your own personal nutrition and health.

Student and Instructor Resources

In addition to the text, an array of teaching and learning resources are available for both instructors and students.

Instructor Resources Additional instructor resources for this product are available online. Instructor assets include an Instructor's Manual, Educator's Guide, PowerPoint® slides, and a test bank powered by Cognero®. Sign up or sign in at www.cengage.com to search for and access this product and its online resources.

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MindTap Nutrition MindTap for Boyle, *Personal Nutrition*, 11e, today's most innovative online learning platform, powers your students from memorization to mastery. MindTap gives you complete control of your course to provide engaging content, challenge every individual, and build student confidence.

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Diet & Wellness Plus *Diet & Wellness Plus* helps you understand how nutrition relates to your personal health goals. Track your diet and activity, generate reports, and analyze the nutritional value of the food you eat. *Diet & Wellness Plus* includes over 75,000 foods as well as custom food and recipe features.

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"Make Every Bite Count" features, and the new Chapter 2 Spotlight on "Food Choices and the Environment." We are grateful to Anne Buison Pellizzon, PhD, RDN for her updates to Chapter 10, and to Jennifer Doane, MS, RD, CSSD for her expertise and updates to Chapter 11. We appreciate the hard work and expertise of the team of authors who prepared ancillary material for this edition. Special thanks go to the editorial team and their staff: Courtney Heilman, Product Manager; Jennifer Alverson, Senior Content Manager; Lori Hazzard, MPS Limited; and Paula Dohnal, Senior Learning Designer. Their guidance ensured the highest quality of work throughout all facets of this production. Our thanks to the many sales representatives who will introduce this new book to its readers. Our appreciation goes to other members of the production team: Niranjankumar Sathyanarayanan of Integra Software Services for photo research and everyone at MPS Limited for their hard work and diligence in producing a text to be proud of. Last, but not least, we owe much to our colleagues who provided expert reviews of this text—not only for their ideas and suggestions, many of which made their way into the text, but also for their continued enthusiasm, support, and interest in *Personal Nutrition*. Thanks to all of you:

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—Marie Boyle
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Chapter

1

The Basics of Understanding Nutrition

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Ask Yourself . . .

Which of the following statements about nutrition are true, and which are false? For each false statement, what is true?

1. The way people choose to live and eat can affect their health and quality of life as they age.
2. Diet closely influences certain diseases more than others.
3. Most people obtain information about nutrition from health professionals.
4. The more current a dietary claim, the more you can trust its accuracy and reliability.

Answers found on page 4.

Learning Objectives

1.1 List the six classes of nutrients.
1.2 Identify lifestyle factors that impact risk for chronic disease.
1.3 List several national nutrition-related objectives aimed at improving the nation's health.
1.4 Describe lifestyle practices associated with longevity and health.
1.5 Identify different factors that influence personal food choices.
1.6 Identify tips for stocking a healthy home pantry.
1.7 List strategies for choosing healthy meals when dining away from home.
1.8 Distinguish between reliable science-based nutrition information and nutrition/health fraud.

Stroll down the aisle of any supermarket, and you'll see all manner of foods touted with such claims as "natural," "low-carb," "locally grown," and "gluten-free." Flip through the pages of just about any magazine and you're likely to find advice on how to lose weight. Walk into any gym, and you'll probably hear members discussing the merits of one performance-enhancing substance or another. All this points to the fact that nutrition has become part and parcel of the American lifestyle.

> Tell me what you eat,
> and I will tell you what you are.
>
> —Jean Anthelme Brillat-Savarin (1755–1826, French politician and gourmet; author of *Physiology of Taste*)

It wasn't always that way, however. The field of nutrition is a relative newcomer on the scientific block. Although Hippocrates recognized diet as a component of health back in 400 BCE, only in the past hundred years or so have researchers begun to understand that carbohydrates, fats, and proteins are needed for normal growth. The discovery of the first vitamin occurred in the early 1900s. It wasn't until 1928, when an organization called the American Institute of Nutrition was formed, that nutrition was officially recognized as a distinct field of study.[1]* It took several more decades before nutrition achieved its current status as one of the most talked-about scientific disciplines.

Today, we spend billions of dollars each year investigating the many aspects of **nutrition**, a science that encompasses the study not only of vitamins, minerals, and other nutrients, but also of such diverse subjects as the effects of alcohol, caffeine, and pesticides. In addition, nutrition scientists continually expand our understanding of the impact food has on our bodies by examining research in chemistry, physics, biology,

nutrition The study of foods, their nutrients and other chemical components, their actions and interactions in the body, and their influence on health and disease.

*Reference notes for each chapter are in MindTap and in the Instructor Companion Site.

kate_sept2004/Getty Images

The scientific discipline of nutrition investigates how the foods you eat and your lifestyle habits affect your health over a lifetime.

biochemistry, genetics, immunology, and other nutrition-related fields. A number of other disciplines also make valuable contributions to the study of nutrition. These related fields include psychology, anthropology, epidemiology, geography, agriculture, ethics, economics, sociology, and philosophy.

Science has shown us that, to some extent, we really are what we eat, and many consumers now seek to translate the steady stream of new findings about nutrition into a lifestyle of healthy eating. Reportedly, people of all ages make food-purchasing decisions based on claims regarding nutrition and health.[2] Each additional nugget of nutrition news that comes along raises new questions: Is the Mediterranean diet the best for me? Should I take vitamin supplements? Can plant-based diets include meat? Can a sports drink improve my performance? Do pesticides really pose a hazard?

Some manufacturers and media outlets feed the confusion by offering health-conscious consumers unreliable products and misleading dietary advice, often making unsubstantiated claims for a number of nutritional products, including supplements touted as fat melters, muscle builders, and energy boosters. Unfortunately, misinformation runs rampant in the marketplace. Americans spend billions of dollars annually on medical and nutritional **health fraud** and **quackery**.[3] Consider, for example, that college athletes alone may spend hundreds of dollars a month on nutritional supplements, even though most of the products pitched to serious exercisers are useless and, in some cases, potentially harmful. At the same time, the sale of weight-loss foods, products, and services—not all of them sound—has become a $72 billion industry.[4]

To be sure, the widespread interest in nutrition has generated some positive changes in the marketplace. Whereas the sale of fresh fruit, oatmeal, and veggie power bowls in fast-food chains was virtually unheard of a decade ago, those eateries couldn't survive in the current nutrition-conscious environment without offering such healthy fare. (See the Nutrition Action feature later in this chapter for tips on eating healthfully at fast-food outlets.) By the same token, food manufacturers and grocers have responded to consumer concerns about health, wellness, and sustainability by providing shoppers with an unprecedented number of organic and locally sourced products and precooked fresh, retail meals at the supermarket.[5]

With the amount of nutrition information and the number of food alternatives always on the rise, choosing a healthy diet can seem like a daunting task. Fortunately, a basic understanding of nutrition can go a long way in helping you protect your health—both now and in the future. This book lays the foundation you need to take nutrition science out of the laboratory and move it into your kitchen, both today and tomorrow. The first steps are understanding the nature of the nutrients themselves and exploring the current trends in the field of nutrition.

health fraud Conscious deceit practiced for profit, such as the promotion of a false or an unproven product or therapy.

quackery Health fraud; a quack is a person who practices health fraud (quack = to boast loudly).

Ask Yourself Answers: 1. True. **2.** True. **3.** False. Most Americans look first to television, magazines, and the internet for nutrition information. **4.** False. If a nutrition claim is too new, it may not have been adequately tested. Findings must be confirmed many times over by experiments and evaluated in light of other knowledge before they can be translated into recommendations for the public.

1.1 The Nutrients in Foods

Almost any food you eat is mostly water, and some foods are as high as 99 percent water. The bulk of the solid materials consists of carbohydrates, fats, and proteins. If you could remove these materials, you would be left with a tiny residue of minerals, vitamins, and other compounds. Water, carbohydrates, fats, proteins, vitamins, and some of the minerals found in foods represent the six classes of **nutrients** (see Table 1-1). The other compounds may include food additives, pigments, phytochemicals, and other substances.

A complete chemical analysis of your body would show that it is made of materials similar to those in most foods, in roughly the same proportions. For example, if you weigh 150 pounds (and if that is a healthy weight for you), your body contains about 90 pounds of water and about 30 pounds of fat. The other 30 pounds consist mostly of proteins, carbohydrates, and the major minerals of your bones—calcium and phosphorus. Vitamins, other minerals, and incidental extras constitute only a fraction of a pound.

Scientists use the term **essential nutrient** to describe the nutrients that the body must obtain from food. About 40 nutrients are known to be *essential*; that is, they are compounds that the body cannot make for itself but are indispensable to life processes. How can you be sure you're getting all of the nutrients you need? The rest of this chapter, along with the diet-planning tools presented in Chapter 2, will help you design a dietary pattern that supports good health.

Table 1-1 The Six Classes of Nutrients

- carbohydrates
- fats
- proteins
- vitamins
- minerals
- water

The energy-yielding nutrients:

- carbohydrates
- fats
- proteins

The Energy-Yielding Nutrients

Upon being broken down in the body, or digested, three of the nutrients—carbohydrates, proteins, and fats—yield the **energy** that the body uses to fuel its various activities. In contrast, vitamins, minerals, and water, once broken down in the body, do not yield energy but perform other tasks, such as maintenance and repair. Each gram of carbohydrate and protein consumed supplies your body with 4 calories, and each gram of fat provides 9 calories (see Figure 1-1). Only one other substance that people consume supplies calories, and that is alcohol, which provides 7 calories per gram. Alcohol is not considered a nutrient, however, because it does not help maintain or repair body tissues the way nutrients do.

The body uses energy from carbohydrates, fats, and proteins to do work or generate heat. This energy is measured in **calories**—familiar to almost everyone as markers of how "fattening" foods are. If your body doesn't use (release) the energy you obtained from a food soon after you've eaten it, it stores that energy, usually as body fat, for later use. If a person eats excess amounts of proteins, fats, or carbohydrates fairly regularly, the stored fat builds up over time and leads to obesity. Too much of any food, whether lean meat (a protein-rich food), potatoes (a carbohydrate-rich food), or bacon (a fatty food), can contribute excess calories that result in making someone overweight.

Vitamins, Minerals, and Water

Unlike carbohydrates, fats, and proteins, **vitamins** and **minerals** do not supply energy or calories. Instead, they regulate the release of energy and other aspects of **metabolism**. As Table 1-2 shows, there are 13 vitamins, each with its special roles to play. Vitamins are divided into two classes: water-soluble (the B vitamins and vitamin C) and fat-soluble (vitamins A, D, E, and K). This distinction has many implications for the kinds of foods that provide the different vitamins and how the body uses them, as you will see in Chapter 7.

nutrients Substances obtained from food and used in the body to promote growth, maintenance, and repair. The nutrients include carbohydrates, fats, proteins, vitamins, minerals, and water.

essential nutrient A nutrient that must be obtained from food because the body cannot make it for itself.

energy The capacity to do work, such as moving or heating something.

calorie The unit used to measure energy.

vitamins Organic, or carbon-containing, essential nutrients that are vital to life but needed only in relatively minute amounts (*vita* = life; *amine* = containing nitrogen).

minerals Inorganic compounds, some of which are essential nutrients.

metabolism Collective term for all of the chemical and physical reactions occurring in living cells, including the reactions by which the body obtains and uses energy from foods.

Figure 1-1

Caloric Values and Functions of Carbohydrates, Proteins, Fats, and Alcohol

Dietary Sources of Energy	Energy Value (calorie content)	Sample Function(s)
Carbohydrates  Maximilian Stock/StockFood/Agefotostock	4 calories per gram	• The primary function of carbohydrates is to provide the body with energy. • Glucose is the preferred source of energy for the brain and nervous system. *See Chapter 4.*
Proteins  iStockPhoto.com/a_namenko	4 calories per gram	• No new living tissue can be built without protein; protein is part of every cell in the body. • The proteins in our bodies function as enzymes, antibodies, hormones, transport vehicles, oxygen carriers, tendons and ligaments, scars, cores of bones and teeth, filaments of hair, fingernails, and more. *See Chapter 6.*
Fats (Lipids)  DEA/P. Martini/De Agostini/Getty Images	9 calories per gram	• Fat is the body's chief form of energy storage, and there is virtually no limit to the amount of fat we can store. • Fats in food provide satiety by slowing the emptying rate of the stomach. • Fats in foods carry fat-soluble vitamins (A, D, E, K) along with essential fatty acids. *See Chapter 5.*
Alcohol  Shaiith/Shutterstock.com	7 calories per gram	• Alcohol is a sedative. • The extent to which central nervous system function is impaired is directly related to the amount of alcohol in the blood. *See Chapter 9.*

The minerals also perform important functions. Some, such as calcium, make up the structure of bones and teeth. Others, including sodium, float about in the body's fluids, where they help regulate crucial bodily functions, such as heartbeat and muscle contractions.

Often neglected but equally vital, **water** is the medium in which nearly all the body's activities take place. Some 60 percent of your body's weight consists of water, which carries materials to and from cells and provides the warm, nutrient-rich bath

water Fluid that provides the medium for life processes.

Table 1-2 The Vitamins and Minerals

The Vitamins		The Minerals	
The Water-Soluble Vitamins	**The Fat-Soluble Vitamins**	**The Major Minerals**	**The Trace Minerals**
B vitamins	Vitamin A	Calcium	Chromium
Thiamin	Vitamin D	Potassium	Manganese
Riboflavin	Vitamin E	Chloride	Copper
Niacin	Vitamin K	Sodium	Molybdenum
Vitamin B_6		Magnesium	Fluoride
Folate		Sulfur	Selenium
Vitamin B_{12}		Phosphorus	Iodine
Biotin			Zinc
Pantothenic acid			Iron
Vitamin C			

in which cells thrive. Water also transports hormonal messages from place to place. When energy-yielding nutrients release energy, they break down into water and other simple compounds. Water is an essential nutrient and without water, you could live only a few days.

Each day your body loses water in the form of sweat and urine. Therefore, you must replace large amounts of it—on the order of 2 to 3 quarts a day. To be sure, you

Try This: Calculate the Calorie Value of Carbohydrates, Fats, and Proteins

Vankad/Shutterstock.com

James R. T. Bossert/Shutterstock.com

Remember that 1 gram is a very small amount. For instance, 1 teaspoon of sugar weighs roughly 4 grams.

If you know the number of grams of carbohydrates, fats, and proteins in a food, you can calculate the number of calories in it. Simply multiply the carbohydrate grams by 4, the fat grams by 9, and the protein grams by 4. Add the totals together to obtain the number of calories. For example, a deluxe fast-food hamburger contains about 45 grams of carbohydrate, 27 grams of protein, and 39 grams of fat:

45 grams of carbohydrate × 4 calories = 180 calories
39 grams of fat × 9 calories = 351 calories
27 grams of protein × 4 calories = 108 calories
Total: 639 calories

The percentage of your total energy intake from carbohydrates, fats, and proteins can then be determined by dividing the number of calories from each energy nutrient by the total calories and then multiplying your answer by 100 to get the percentage:

$$\text{Calories from carbohydrates} = \frac{45 \times 4 \text{ cal/g}}{639} = 0.281 \times 100 = 28\%$$

$$\text{Calories from fats} = \frac{39 \times 9 \text{ cal/g}}{639} = 0.548 \times 100 = 55\%$$

$$\text{Calories from proteins} = \frac{27 \times 4 \text{ cal/g}}{639} = 0.168 \times 100 = 17\%$$

See Appendix A for help with figuring percentages and other calculations.

don't need to *drink* that much water daily, because the foods and other beverages you consume do supply some of the water you need.

1.2 Nutrition and Health Promotion

In the past, scientists investigating the role that diet plays in health focused on the consequences of getting too little of one nutrient or another. Until the end of World War II, in fact, nutrition researchers concentrated on eliminating diseases caused by **undernutrition** or a deficiency of a particular vitamin or mineral.

These days, the focus is just the opposite. Deficiency diseases have been virtually eliminated in America because of our abundant food supply and the practice of fortifying food with essential nutrients (adding iodine to salt or certain B vitamins to grain products, for example). Nevertheless, diseases related to **malnutrition** in the form of **overnutrition**, from energy and nutrient excesses or imbalances, run rampant. Many of the major killers (see Figure 1-2), such as heart disease, some types of cancer, stroke, and diabetes, are influenced by a number of factors, including a person's genetic makeup, eating and physical activity habits, exposure to tobacco, and other lifestyle practices (see Figure 1-3). Four of the leading causes of death in the United States are related to dietary imbalance and excess—coronary heart disease, some types of cancer, stroke, and diabetes. Diet also contributes to the development of other conditions, such as hypertension, osteoporosis, obesity, dental caries, and diseases of the gastrointestinal tract.[6]

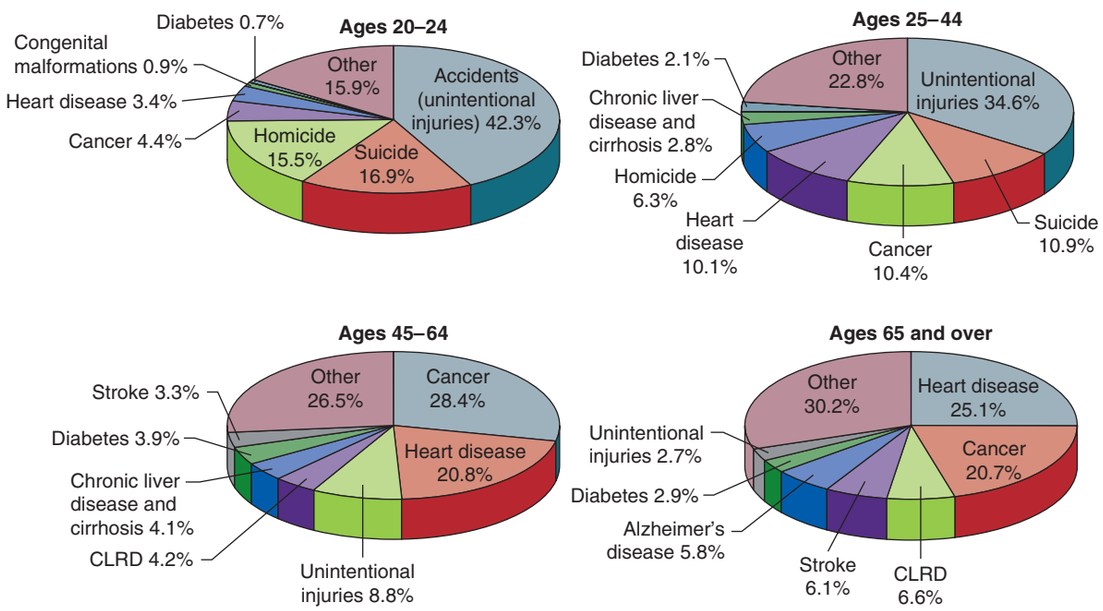
undernutrition Severe underconsumption of calories or nutrients, leading to disease or increased susceptibility to disease; a form of malnutrition.

malnutrition Any condition caused by an excess, deficiency, or imbalance of calories or nutrients.

overnutrition Calorie or nutrient overconsumption severe enough to cause disease or increased risk of disease; a form of malnutrition.

Figure 1-2

Percent Distribution of the Leading Causes of Death Among Adults by Age Group, United States



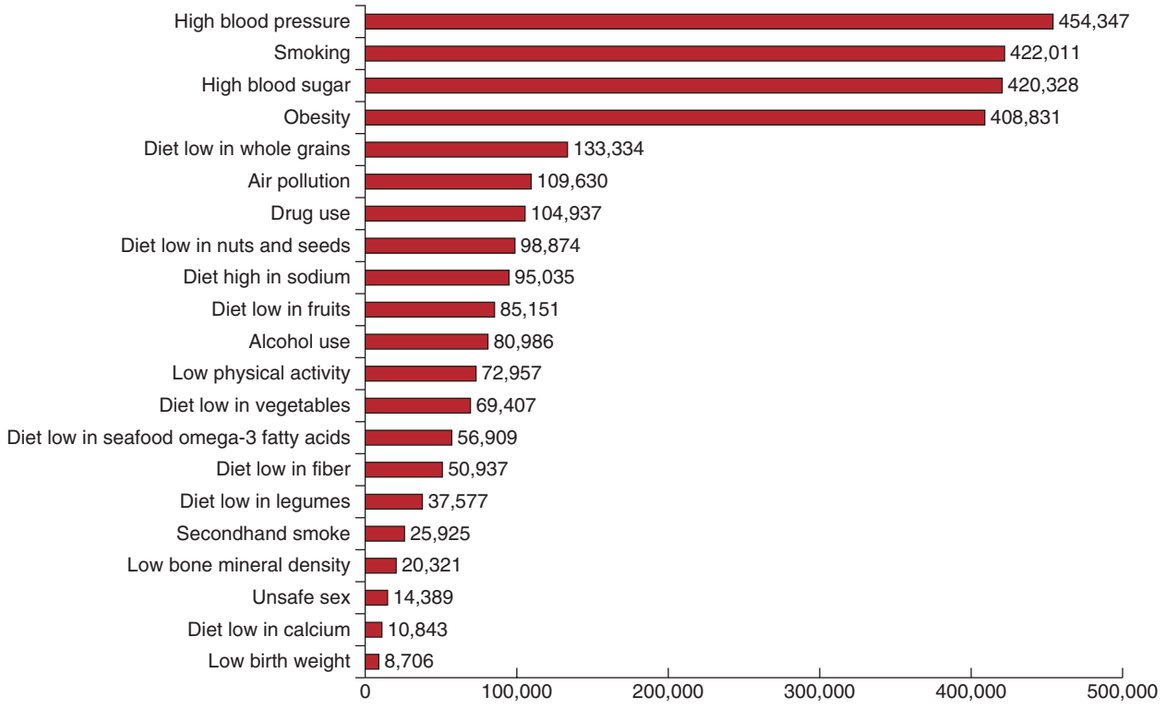
NOTES: CLRD is chronic lower respiratory diseases. Values show percentage of total deaths; totals may not add to 100 due to rounding. Note that when the 2020 mortality data is finalized, COVID-19 is expected to rank among the top three leading causes of death in the United States for the year 2020. For updates, go to www.cdc.gov/nchs/fastats/default.htm.

DATA SOURCE: National Vital Statistics System, National Center for Health Statistics, CDC, 2019.

Figure 1-3

Number of Deaths by Risk Factor

This figure shows the numbers of deaths attributed to several specific risk factors, including diet and lifestyle-related factors (blood pressure, physical activity, body mass index, blood sugar, and eating patterns); smoking; air pollution (both outdoor and indoor); and environmental factors including clean water and sanitation. The dominant risk factors are those related to eating patterns, smoking, and alcohol intake.



SOURCE: Institute for Health Metrics and Evaluation, *Global Burden of Disease*, 2019; H. Ritchie, Causes of Death, Published online at OurWorldInData.org.

Because obesity and a sedentary lifestyle are linked with chronic diseases, such as diabetes, heart disease, and certain cancers, it can be projected that increased rates of obesity will lead to increased deaths each year, not to mention hospitalizations, disabilities, time lost from jobs, and poor quality of life for many Americans.[7]

This is not to say that diet is the sole culprit causing these diseases. Figure 1-4 puts nutrition (a factor you can control) in perspective with respect to heredity (a factor you cannot control). It illustrates the point that some diseases are much more related to nutrition than others and that some are not responsive to nutrition at all. At one extreme are diseases that can be completely cured by supplying missing nutrients, and at the other extreme are certain genetic (inherited) diseases that are unaltered by nutrition. Most diseases fall in between, being influenced by inherited susceptibility but responsive to dietary manipulations that help counteract the disease process. Thus, diabetes may be managed by means of lifestyle habits, including diet and physical activity; cardiovascular disease may respond favorably to a heart-healthy dietary pattern, stress management, and a physically active lifestyle.

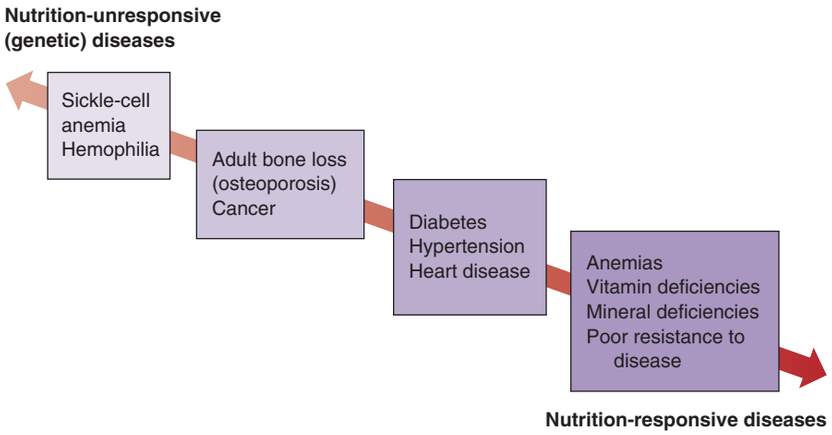
A number of environmental, behavioral, social, and genetic factors work together to determine a person's likelihood of suffering from a **degenerative disease**.

degenerative disease Chronic disease characterized by deterioration of body organs as a result of misuse and neglect. Poor eating habits, smoking, lack of exercise, and other lifestyle habits often contribute to degenerative diseases including heart disease, cancer, osteoporosis, and diabetes.

Figure 1-4

Nutrition and Disease

Not all diseases are equally influenced by diet. Some are purely hereditary, such as sickle-cell anemia. Some may be inherited (or the tendency to develop them may be inherited) but may be influenced by diet, such as some forms of diabetes. Some are purely dietary, such as the vitamin and mineral deficiency diseases. Good nutrition alone is certainly not enough to prevent many diseases, but it helps.



For example, diet notwithstanding, someone who smokes, doesn't exercise regularly, and has a parent who suffered a heart attack is more likely to end up with heart disease than a nonsmoker who works out regularly and does not have a close relative with heart disease. The way to alter disease risk is to concentrate on changing the daily habits that can be controlled, such as eating more fruits and vegetables. The results can be significant. Consider the simple tips for choosing a variety of colorful fruits in the Make Every Bite Count! feature that follows.

Make Every Bite **Count** Berries

Berries add a colorful and sweet touch to any meal and provide fiber, vitamin C, folate, potassium, beta-carotene, and antioxidants. Just one cup of strawberries supplies 100 percent of the vitamin C you need in a day![8] There are many varieties, including blackberries, blueberries, currants, huckleberries, kiwifruit, mulberries, raspberries, and strawberries.[9]

iStockPhoto.com/AK2

What does the research say?

Studies suggest that **antioxidant** nutrients in berries may promote heart health. A systematic review of 22 studies suggests that berries protect the function of blood vessels.[10] Eating a wide variety of colorful fruits and vegetables helps you reap many health benefits. Berries can play a part in this!

iStockPhoto.com/BillinoII

antioxidant nutrients Vitamins and minerals that protect other compounds from damaging reactions involving oxygen by themselves reacting with oxygen. The antioxidant nutrients are vitamin C, vitamin E, and beta-carotene. The mineral selenium also has a role in antioxidant reactions in the body.

Tasty Tips

- Add berries to overnight oats or a yogurt parfait.
- Use frozen berries in a smoothie.
- Make a trail mix with dried berries (or freeze-dried berries) and nuts for on-the-go snacking.
- Use berries as a pancake or bagel topping.
- Add berries to baked goods.
- Buy fresh berries when in season. Consider freezing some for later!

Researchers who monitored the habits and health of a group of some 7,000 Californians for nearly two decades were able to pinpoint seven common lifestyle elements associated with optimal quality of life and longevity: avoiding excess alcohol; not smoking; maintaining a healthy weight; exercising regularly; sleeping 7 to 8 hours a night; eating breakfast; and eating nutritious, regular meals. In fact, after 20 years, those who had adhered to these healthy habits were only half as likely to have died as those who had unhealthy habits. The group with healthy habits was also half as likely to have suffered the types of disabilities that interfere with day-to-day living. Granted, the researchers speculated that some of the habits—for example, sleeping 7 to 8 hours a night—are not necessarily as beneficial as, say, the habit of exercising regularly. Rather, regular eating and sleeping habits are most likely to be signs that people make the time and have enough control of their lives to take care of their health.[11]

Nutrition shares responsibility with other lifestyle factors for maintaining good health. By the time you are 65 years old, you will have eaten about 100,000 pounds of food. Each bite may or may not have brought with it the nutrients you needed. The impact of the food you have eaten, together with your lifestyle habits, accumulates over a lifetime, and people who have lived and eaten differently all their lives are in widely different states of health by the time they reach 65. Researchers repeatedly report that people who regularly consume a variety of plant foods, such as fruits, vegetables, legumes (beans peas, lentils), nuts, and whole grains, have reduced risks of heart disease, stroke, diabetes, certain cancers, and other chronic diseases.[12] The key to disease prevention and optimal health is not in eating or avoiding a certain food, but rather in creating a lifestyle that includes nutritious meals and enjoying regular physical activity.

A person who practices good health habits can expect to delay the onset of even minimal disability by several years, compared with a person who practices few or none of them (see Figure 1-5).[13] If you believe in accepting the things you cannot control and controlling the things you can, you are in luck. Your nutritional health can be controlled, and because nutrition is involved in at least half of the preceding lifestyle recommendations, it clearly plays a key role in maintaining good health. This chapter's Scorecard feature, "The Longevity Game," further demonstrates this point.

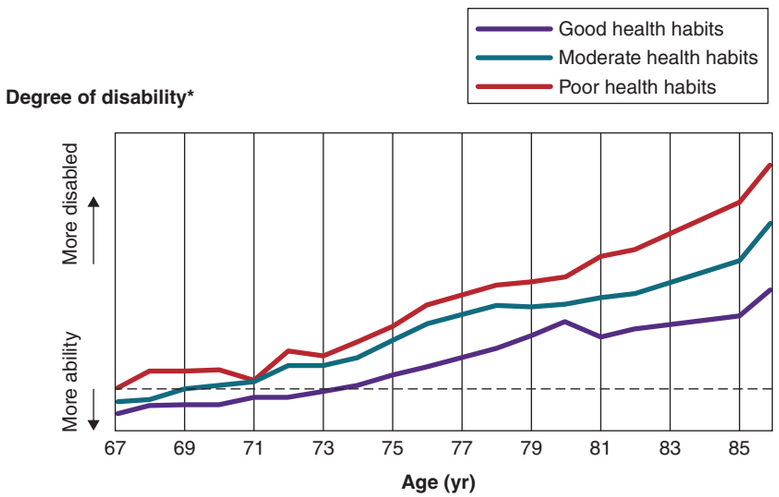


Figure 1-5

Healthy Aging

In a study of more than 1,700 people, those who smoked the least, maintained a healthy weight, and exercised regularly not only lived longer but also postponed disability. As shown here, people with the best health habits delayed the onset of even minimal disability to about age 73, compared with age 66 for those with the poorest health habits.

*The dashed line represents minimal disability, defined as having some difficulty performing the everyday tasks of daily living (such as bathing, dressing, eating, walking, toileting, and getting outside).

SOURCE: Based on Figure 2 from p. 4 of the following article: J. F. Fries (2012), The theory and practice of active aging. *Current Gerontology and Geriatrics Research* 3: 420637. doi:10.1155/2012/420637.

Table 1-3 Nine Voluntary Global Targets for Prevention and Control of Chronic Diseases to be Attained by 2025

Many governments worldwide have endorsed nine specific targets with the goal to reduce premature death from the four major chronic diseases (cardiovascular diseases, cancer, diabetes, and chronic respiratory diseases) by 25% by 2025. Guidance on achieving the targets is available in the *WHO Global Status Report on Noncommunicable Diseases*.

Target 1: A 25% relative reduction in the overall mortality from cardiovascular diseases, cancer, diabetes, or chronic respiratory diseases

Target 2: At least 10% relative reduction in the harmful use of alcohol

Target 3: A 10% relative reduction in prevalence of insufficient physical activity

Target 4: A 30% relative reduction in mean population intake of salt/sodium

Target 5: A 30% relative reduction in prevalence of current tobacco use

Target 6: A 25% relative reduction in the prevalence of high blood pressure

Target 7: Halt the rise in diabetes and obesity

Target 8: At least 50% of eligible people receive drug therapy and counseling to prevent heart attack and stroke

Target 9: An 80% availability of the affordable basic technologies and essential medicines, including generics, required to treat major chronic diseases in both public and private facilities

SOURCE: WHO, Global Status Report on Noncommunicable Diseases, 2014. See also: *Noncommunicable Diseases Progress Monitor 2020*, www.who.int/publications.

Recognizing the need for increased emphasis on preventive health measures, new efforts are underway to foster better collaboration between organizations involved in promoting the public's health.[14] Under the leadership of the World Health Organization (WHO), more than 190 countries have agreed on global mechanisms to reduce the avoidable chronic disease burden.[15] This plan aims to reduce the number of premature deaths from chronic diseases by 25 percent by 2025 through nine voluntary global targets (Table 1-3). The nine targets address factors such as tobacco and alcohol use, unhealthy diet, and physical inactivity that increase people's risk of developing chronic diseases.[16] The chapters that follow explain the link between diet and chronic diseases in more detail and offer advice on how to reduce one's risk for chronic disease.

1.3 A National Agenda for Improving Nutrition and Health

Some people do things that are not good for their health. They overeat, smoke, refuse to wear a helmet when riding a bicycle, never wear seat belts when driving, fail to take their blood pressure medication—the list is endless. These behaviors reflect personal choices, habits, and customs that are influenced and modified by social forces. We call these *lifestyle behaviors*, and they can be changed if the individual is so motivated. **Health promotion** focuses on changing human

health promotion Helping people achieve their maximum potential for good health.

behavior: getting people to eat healthy diets, be physically active, get regular rest, develop leisure-time hobbies for relaxation, strengthen social networks with family and friends, and achieve a balance among family, work, and play.[17]

The relative importance of certain dietary recommendations is underscored by their appearance in the US Department of Health and Human Services' official health promotion strategy for improving the nation's health, laid out in the year 2020. Called *Healthy People 2030*, the plan of action presents a national health promotion and disease prevention agenda for the next 10 years.[18] The report sets health objectives to achieve by the year 2030 with broad goals designed to help all Americans reach their full potential by attaining high-quality, longer lives free of preventable disease, by eliminating health disparities, by creating social, physical, and economic environments that promote good health and well-being for all, and by promoting healthy behaviors across the life span. Table 1-4 lists the nutrition-related objectives considered to be top health priorities for the present decade.

The goals of the *Healthy People 2030* nutrition topic area promote health and reduce chronic disease risk through the consumption of healthy diets and achievement and maintenance of healthy body weights. Several *Healthy People 2030* objectives focus on risk reduction and specify targets for the intake of nutrients such as sodium and calcium and of foods such as fruits, vegetables, and whole-grain products. Other risk-reduction objectives set targets to reduce the prevalence of obesity, to reduce consumption of calories from saturated fat and added sugars, to increase the proportion of schools that do not sell or offer calorically sweetened beverages to students, and to reduce the proportion of people who engage in no leisure-time physical activity. Each *Healthy People* objective has a target for specific improvements to be achieved by the year 2030.

How are Americans doing in terms of meeting the Healthy People objectives? Nearly half of all American adults—133 million people—suffer from one or more preventable diseases related to poor-quality **dietary patterns** and physical inactivity, and nearly 40 percent of adults and 20 percent of children and adolescents have obesity.[19]

United States Department of Health & Human Services.

The *Healthy People 2030* goals represent the nation's hope for the improved health of Americans. The goals emphasize promotion of health throughout the life cycle and highlight the importance of tailoring behavior change strategies to fit a particular age group.

dietary pattern The combination of foods and beverages that constitute an individual's complete dietary intake over time; may describe a usual way of eating or a combination of foods recommended for consumption.

Table 1-4 Selected Nutrition-Related Healthy People 2030 Objectives[a]

Nutrition and Healthy Eating

- Increase consumption of fruits by persons aged 2 years and over.[b]
- Increase consumption of total vegetables by persons aged 2 years and over.[b]
- Increase consumption of dark green vegetables, red and orange vegetables, and beans and peas by persons aged 2 years and over.[b]
- Increase consumption of whole grains by persons aged 2 years and over.[b]
- Reduce consumption of calories from added sugars by persons aged 2 years and over.
- Reduce consumption of saturated fat by persons aged 2 years and over.[c]
- Reduce the consumption of sodium by persons aged 2 years and over.[c]
- Increase the consumption of potassium by persons aged 2 years and over.
- Increase the consumption of vitamin D by persons aged 2 years and over.
- Increase the consumption of calcium by persons aged 2 years and over.[c]
- Reduce iron deficiency among females aged 12 to 49 years.
- Reduce household food insecurity and in so doing reduce hunger.

Safe Food Handling[d]

- Reduce infections caused by key pathogens transmitted commonly through food.
- Increase the proportion of consumers who practice four essential food safety behaviors when handling food: washing hands, avoiding cross-contamination, cooking foods to a safe temperature, and chilling foods promptly.
- Improve food safety practices associated with foodborne illness in foodservice and retail establishments.

Overweight and Obesity

- Reduce the proportion of adults with obesity.
- Increase the proportion of physician office visits made by adult patients with obesity that include counseling or education related to weight reduction, nutrition, or physical activity.

Physical Activity

- Increase the proportion of adults who meet current minimum guidelines for aerobic physical activity and muscle-strengthening activity.
- Reduce the proportion of adults who engage in no leisure-time physical activity.
- Increase the proportion of adults who walk or use a bicycle to get to and from places.

[a] The complete list of *Healthy People 2030* objectives and the targets for specific improvements to be achieved by the year 2030 may be viewed online at www.healthypeople.gov.
[b] See Table 2-3 and Figure 2-14 in Chapter 2 for specific recommendations.
[c] Recommendations: < 10 percent of calories from saturated fat; 2,300 mg or less of sodium and 1,300 mg of calcium for children (ages 9 to 18); 1,000 mg of calcium for adults (ages 19 to 50); and 1,200 mg of calcium for adults over 50.
[d] See Chapter 13 for more on the topic of food safety.

SOURCE: US Department of Health and Human Services, Office of Disease Prevention and Health Promotion, *Healthy People 2030* (Washington, DC: US Department of Health and Human Services, 2020).

On average, the US diet is low in vegetables, fruit, and whole grains, and is high in sodium, calories, unhealthy types of fat, and added sugars.[20] Only 24 percent of adults meet the current minimum guidelines for aerobic physical activity and muscle-strengthening activity (see Chapter 11).[21]

The *Healthy People 2030* objectives represent some of the priorities for maintaining good health. Much of the practical information presented later in this chapter and in those that follow is aimed at guiding you toward developing eating and lifestyle habits that will help you achieve these objectives.

The **Savvy** Diner

Eating Pattern for Longevity (Obj. 1.4)

Need proof that good dietary choices can have a profound effect on your health and longevity? Look no farther than the Okinawans! These people dwell on a group of islands—known collectively as Okinawa—that lie southwest of mainland Japan. Okinawans enjoy one of the longest life spans of anyone on Earth, and they do so while maintaining a very high quality of life. This fact has sparked much interest in the Okinawan culture and resulted in the 25-year Okinawa Centenarian Study that began in 1976 to investigate what makes these people so healthy.[22] Researchers studied more than 600 Okinawan centenarians and numerous others in their 70s, 80s, and 90s.

When the study began, researchers were surprised to find that many centenarians were still very active, devoid of health problems, and looked years younger than their chronological age. Upon further investigation, they also discovered that these people have low levels of cancer-causing free radicals, low cardiovascular risks, extremely healthy bone densities, and a lower prevalence of dementia than those of the same age in other countries. Indeed, Okinawan elders have among the lowest mortality rates in the world from many chronic diseases, including cancer, stroke, osteoporosis, and heart disease. Although there is no magic bullet that results in the Okinawans' longevity and health, Okinawan centenarians have a number of variables in common.[23]

1 Enough Is Enough.

Okinawan elders have an average body mass index (BMI) that ranges from 18 to 22. The Okinawans stay lean by eating a low-calorie diet and practicing calorie control in a cultural habit known as *hara hachi bu* (eating until they are only 80 percent full) and keeping physically active every day. In contrast, middle-aged Okinawans, who have a less traditional lifestyle, have an average BMI of 26, the highest in Japan and similar to that of Americans. As discussed in Chapter 10, a BMI of 25 or greater is considered overweight and places you at greater risk for chronic diseases, especially heart disease and stroke.

2 Moderation and a Healthy Lifestyle Are Key Cultural Values.

Okinawan elders never smoke. They consume a diet that is 80 percent plant-based and naturally high in unrefined whole grains, soy, vegetables, and fruits—all of which are rich in antioxidants, phytochemicals, and fiber. They consume higher intakes of good fats from fish, nuts, and vegetable oils, and they have rather low amounts of less-healthy fats in their diet. They keep active every day throughout their lives with a variety of activities, such as gardening, traditional dance, and martial arts. In fact, many of those studied still participated in competitive games and karate past the age of 100!

Karen Kasmauski/The Image Bank Unreleased/Getty Images

Mr. Fukashi Kanematsu, age 84, is an example of why the Okinawans are among the longest-lived people on Earth. He eats mostly fish and vegetables, doesn't drink or smoke, stays busy, and is physically active. Okinawan elders maintain optimistic attitudes and strong social bonds throughout their lives.

Even though these concepts may seem rather simple, the average American is not following suit. With high-stress, sedentary lifestyles, and diets high in saturated fat and low in protective nutrients such as antioxidants, it seems that the American way of life is the opposite of the Okinawan path. It might be hard to drastically change your entire lifestyle to follow that of the Okinawans; however, making some dietary changes would be a good place to start. Who knows–maybe you, too, can live to be a centenarian! Here is a general overview of the Okinawan elders' way of eating:

- They eat about 500 calories less per day than Americans.
- They eat plenty of whole grains, seven servings (3.5 cups) of vegetables, and about four servings (2 cups) of fruits a day.
- They eat seaweed, coldwater fish, and other seafood choices at least three times a week.
- They include soy foods in their daily diet, and consume poultry, eggs, pork, beef, and other meats in moderation.
- They drink plenty of water and tea, and drink alcohol in moderation.
- They consume very few sweets.

3 Psychological and Spiritual Health Matters.

Okinawans put family first. They keep socially engaged, maintaining strong bonds with friends and family. They have an easy-going approach to life. Centenarians score high on optimistic attitudes and adaptability. They possess a strong sense of purpose, which translates roughly to "that which makes one's life worth living."

Scorecard The Longevity Game (Obj. 1.4)

You cannot look into a crystal ball to find out how long you will live—but you can get a rough idea of the number of years you're likely to live based largely on your lifestyle today as well as certain givens, such as your family history. To do so, play the Longevity Game.

Start at the top line: age 78.8, the average life expectancy for adults in the United States today. For each of the 11 lifestyle areas, add or subtract years as instructed. If an area doesn't apply to you, go on to the next one. If you are not sure of the exact number to add or subtract, make a guess. Don't take the score too seriously, but do pay attention to those areas in which you lose years; they could point to habits you might want to change.

	START WITH	78.8
1.	Exercise	_____
2.	Relaxation	_____
3.	Driving	_____
4.	Blood pressure	_____
5.	65 and working	_____
6.	Family history	_____
7.	Smoking	_____
8.	Drinking	_____
9.	Gender	_____
10.	Weight	_____
11.	Age	_____
12.	Seat belts	_____
	YOUR FINAL SCORE:	_____

1. Exercise. If you work out on a daily basis, add 3 years. If you don't get much exercise at home, on the job, or at play, subtract 3 years.
2. Relaxation. If you have a laid-back approach to life (you roll with the punches), add 1 year. If you're aggressive, hard-driving, or anxious (suffer from sleepless nights, bite your nails, etc.), subtract 1 year. If you consider yourself unhappy, subtract another year.
3. Driving. Drivers involved in an accident or violation in the past 3 years should subtract 2 years. If you have been convicted of driving while intoxicated (DWI), subtract 5 years. If your record is free of accidents and violations over the last 2 years, add 1 year.
4. Blood pressure. Although high blood pressure is a major risk factor for common conditions (heart attacks and strokes), it can be lowered effectively through changes in lifestyle and/or medication. The problem is that rises in blood pressure cannot be felt, so many people don't know they have high blood pressure and therefore never receive treatment. If your blood pressure is checked regularly with a normal reading, add 3 years. If you have high blood pressure, subtract 3.
5. 65 and working. If you are at the traditional retirement age or older and still working, add 2 years.
6. Family history. If any grandparent has reached age 85, add 2 years; if all grandparents have reached age 80, add 4. If a parent or sibling suffered from or died of a stroke or heart attack before age 50, subtract 3.
7. Smoking. Cigarette smokers who finish more than two packs a day, subtract 8; one or two packs a day, subtract 6; one-half to one pack, subtract 3.
8. Drinking. If you drink three cocktails (or beers or glasses of wine) a day, subtract 1 year.
9. Gender. Women live longer than men. Females add 3 years; males subtract 3 years.
10. Weight. If you generally follow a healthy diet, you will probably remain healthy longer, entitling you to add 2 years.
11. Age. How long you have already lived can help predict how much longer you'll survive. If you're under 30, the jury is still out. But if your age is 30 to 39, add 2 years; 40 to 49, add 3 years; 50 to 69, add 4 years; 70 or over, add 5 years.
12. Seat belts. Do you always buckle up, even if it's a short trip? If you use a seat belt, add 1 year. If you don't, subtract 1 year.

SOURCE: Based on "The Longevity Game," by Northwestern Mutual Life Insurance Company.

1.5 Understanding Our Food Choices

The choices you make about what to eat can have a profound impact on your health, both now and in your later years. Healthy eaters resist disease and other stresses better than people with poor dietary habits and are more likely to enjoy an active, vigorous lifestyle for a greater number of years. Even so, the nutritional profile of various foods ranks as only one of many factors that influence your eating habits (see Table 1-5). Whether or not you realize it, each time you sit down to a meal, you bring to the table such factors as your own personal preferences, cultural traditions, and economic considerations. These influences exert as great an impact on your eating habits as do **hunger**—the physiological need for food—and **appetite**—the psychological desire for food, which may be

hunger The physiological need for food.

appetite The psychological desire to eat, which is often but not always accompanied by hunger.

stimulated in response to the sight, smell, or thought of food even when you're not hungry. The following sections examine some of the most influential factors in making food choices.

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Numerous factors influence your food choices. Examining your health beliefs, priorities, food preferences, and attitudes can help you understand why you select the foods you do.

Availability Our diets are limited by the types and amounts of food available through the food supply, which in turn are influenced by many forces. Because we have the geographic area, climate, soil conditions, labor, and capital necessary to maintain a large agricultural industry, Americans enjoy what is arguably the most abundant food supply in the world. In addition, unlike many other less wealthy countries, the United States has the resources needed to import and distribute a wide variety of foods from other countries—everything from kiwi from New Zealand to mangoes from the tropics.

History has shown, however, that when it comes to health, an abundant food supply can be a double-edged sword. Access to many types of foods allows people to choose high-calorie diets, which can contribute to obesity and increased risk for heart disease and other problems. That's one of the reasons why degenerative diseases are sometimes referred to as *diseases of affluence*.

Income, Food Prices, and Convenience As most college students know firsthand, the amount of money available to spend on food can mean the difference between ordering pizza every night and resigning yourself to a steady diet of peanut butter and jelly sandwiches. Extremely low incomes can make it difficult for people to buy enough food to meet their minimum nutritional needs, thereby putting them at risk of undernutrition.

Some experts argue that the association between energy-dense diets and low-energy costs (dollars per unit of energy) may be contributing to the higher obesity rates in socioeconomically disadvantaged groups.[24] That is, energy-dense diets provide low-income households with inexpensive food and beverage sources of concentrated energy, but offer little in the way of whole grains, fruits, and vegetables.[25]

Table 1-5 Many Factors Influence Personal Food Choices

- Hunger, appetite, and food habits
- Nutritional knowledge, health beliefs/concerns, and practices
- Availability, convenience, and economy
- Advertising and the media
- Early experiences, memories, social interactions, and cultural traditions
- Personal preference, taste, and psychological needs
- Values, such as political views, environmental concerns, and religious beliefs

Pete Beaumont

David Grossman/Alamy Stock Photo

Food swamps are areas or neighborhoods in which there are large numbers of unhealthy eating options, while food deserts are neighborhoods without easy access to fresh, affordable, and healthy foods.

Research shows that neighborhoods that are poor, rural, or predominantly minority do not always have ready access to supermarkets and more healthful foods.[26] These residents live in *food deserts*, defined as "urban neighborhoods or rural towns without ready access to fresh, healthy, and affordable food." Low-income census tracts qualify as food deserts if "at least 33 percent of the census tract's population live more than one mile from a supermarket or large grocery store or 10 miles in non-metropolitan tracts."[27] A review of neighborhood environments concluded that lower-income, ethnic/racial minority, and rural neighborhoods are most affected by poor access to supermarkets and healthful foods and greater availability of fast-food restaurants and energy-dense foods.[28] Neighborhoods with large numbers of unhealthy eating options are called *food swamps*, and recent data suggest that food swamps are more predictive of obesity rates than food deserts.[29]

A consumer's *perception* of the cost of various foods can also play a role in his or her choices. For example, two barriers that prevent people from adopting healthy eating habits are the beliefs that it would be too expensive and inconvenient. Table 1-6 lists the most frequently cited roadblocks to healthy eating.[30] In fact, 40 percent of consumers who answered one survey said that fruits, vegetables, seafood, and other elements of a nutrient-rich diet would strain their budgets. In reality, some research has shown that switching to a diet that is lower in saturated fat and added sugars can *reduce* food costs.[31] When measured on the basis of weight or average portion size, grains, vegetables, fruit, and dairy foods are less expensive than most protein foods and foods high in saturated fat, added sugars, and/or sodium. In other words, with healthy foods, you get fewer calories but more nutrients per dollar.[32] Just cutting back on the amount of meat and poultry—the source of much of the saturated fat in the American diet and the category in which many of our food dollars are spent—goes a long way in trimming food budgets. See the accompanying Box, "You *Can* Afford to Eat Nutritious Foods—Tips for Supermarketing," for more smart food shopping tips.

Research has found that not only is a diet of nutritious foods less costly, but it also promotes weight loss.[33] In one study, children with unhealthy weights and their parents were encouraged to consume more "nutrient-dense" foods like fruits and vegetables (high in nutrients and low in calories) and less "empty-calorie" foods (low in nutrients and high in calories). After one year, food costs decreased, and the children and parents had weights that were 5 to 8 percent lower than they were at the beginning of the study.[34]

Table 1-6 Perceived Barriers to Healthy Eating

- Healthy foods are not always available from fast-food and take-out restaurants.
- It costs more to eat healthy foods.
- I'm too busy to take the time to eat healthfully.
- I hear too much conflicting information about which foods are good for me and which foods are not.
- I don't want to give up the foods I like.
- Healthy foods don't taste as good.
- The people I usually eat with do not eat healthy foods.

Advertising and the Media

Television and radio commercials, as well as magazine and newspaper ads and the internet, play an extremely powerful role in influencing our food choices and our knowledge of nutrition. Additionally, in a consumer survey, some 78 percent of shoppers report interest in reading nutrition labels.[37] Given today's health-conscious environment, food manufacturers promote the nutritional merits of their products more than ever before.

Unfortunately, advertising is not always created with the consumers' best interests in mind. Much of the food advertising that we're exposed to, from the earliest ages, is aimed at selling products that aren't the optimal choices for regular inclusion in a healthy diet.[38] For example, the great majority of television commercials geared toward children and aired on Saturday mornings promote high-fat, sugary foods, such as candy and sugar-coated cereals.[39] In fact, the food industry spends more than $14 billion overall for food, beverage, and fast-food advertising. This amount dwarfs any amount spent by the government and nonprofit groups in campaigns to encourage people of all ages to increase their consumption of fruits and vegetables.[40] As a result, commercials promoting good nutrition are relatively few and far between.

Unfortunately, the reliability of the information delivered by the media varies considerably. The Spotlight at the end of this chapter will help you learn how to evaluate the nutrition information you receive via the media.

The **Savvy** Diner

You *Can* Afford to Eat Nutritious Foods—Tips for Supermarketing (Obj. 1.6)

Want to save money and consume a more nutritious diet? Nutritious eating starts with healthy food shopping. With preparation and some label-reading skills, you can leave the grocery store with a supply of healthy basics like these:[35]

- Fat-free or low-fat milk, yogurt, cheeses, and cottage cheese
- Light or reduced-fat margarines; canola or olive oil
- Eggs/egg substitutes
- Whole-grain breads, bagels, and English muffins
- Low-fat flour tortillas, soft corn tortillas
- Plain cereals (dry or cooked)
- Quinoa, whole-grain rice, and whole-grain or bean pasta
- Fresh, frozen, or canned fruits packed in water or juice
- Fresh, frozen, or canned vegetables
- Tofu, dried or canned beans, peas, and lentils
- Skinless, white-meat chicken or turkey; frozen veggie burgers
- Fish and shellfish (not battered and fried)
- Beef: round, sirloin, chuck, loin, and extra lean ground beef
- Pork: leg, shoulder, tenderloin
- Low-fat or nonfat salad dressings, salsa, herbs, and spices
- Nuts and seeds (unsalted, raw, or dry-roasted varieties)
- Whole-grain crackers, unsalted popcorn

The next time you shop for groceries, keep in mind these smart shopping tips:[36]

1. Buy local foods and fresh foods in season. Use the local newspaper to find the best seasonal buys and special sale items.
2. Shop from a list to help avoid buying unnecessary items. Keep a running list in your kitchen, and note items that you need to replace.
3. Read the ingredients list and Nutrition Facts label on packaged foods; compare amounts of saturated fat, sodium, calories, and nutrients in similar products. Ingredients are listed in order of quantity.
4. Use "sell by" and "best if used by" dates to ensure quality and freshness. Buy only the amount you or your family will eat before the food spoils.
5. Shop the perimeter of the grocery store to find many fresh whole foods: fresh produce; low-fat dairy products; lean meats, poultry, and fish; and whole-grain breads. Maneuver down the aisles only for specific items on your list, such as canned tomato products, spices, and canned or dry beans.

Social and Cultural Factors People's social and cultural groups have a significant impact on their food choices. **Social groups** such as families, friends, and coworkers tend to exert the most influence. The family plays one of the most powerful roles in determining our food choices. That makes sense, because the family is the first social group people encounter, as well as the one to which they typically belong for the longest period of time. The values, attitudes, and traditions of our family can have a lasting effect on our food choices. Think of the holiday food traditions in your own family. Treasured recipes or rituals surrounding holiday meals are often passed from one generation to the next.

Friends, coworkers, and members of other social networks also influence our food choices and eating behavior. For instance, many weight-loss programs feature group sessions made up of people with similar goals. Thus, they can support one another in their efforts to lose weight. Social pressure can also push us to eat meals we might not choose on our own. For example, if you are a guest in another country or in a friend's home, choosing not to partake of the food and drink that's offered might be considered rude. By the same token, it's natural to join your friends on a spontaneous trip for ice cream or pizza even when you're not hungry.

Kzenon/Shutterstock.com

The act of eating is complex. We derive many benefits—both physical and emotional—when we eat foods.

social group A group of people, such as a family, who depend on one another and share a set of norms, beliefs, values, and behaviors.

Culture also determines our food choices, to a large extent. Many of our eating habits arise from the traditions, belief systems, technologies, values, and norms of the culture in which we live. American eating habits have become as diverse as the various ethnic and cultural groups that make up America's people. Throughout American history, immigrant groups—from Poles to Jews to Italians to Irish to Germans to Hispanics to Greeks, to Somalis to Asians—have had and continue to have profound effects on the collective American palate. As food writer and critic John Mariani has pointed out:

> [T]he United States—a stewpot of cultures—has developed a gastronomy more varied . . . than that of any other country in the world. . . . In any major American city one will find restaurants representing a dozen national cuisines, including northern Italian trattorias, bourgeois French bistros, Portuguese seafood houses, Vietnamese and Thai eateries, Chinese dim sum parlors, Japanese sushi bars, and German rathskellers.[41]

One of the ways people of different cultures come together to share their respective heritages is by sampling each other's traditional foods. American consumers are particularly fortunate because they typically don't have to travel far to taste the food of different cultures. **Ethnic cuisine**, ranging from Thai to Mexican to Italian to Indian food, has become embedded in American culture.

Religion is one aspect of culture that affects the food choices of millions of people worldwide. Many cultures have long used the practice of giving and abstaining from food as a way to show devotion, respect, and love to a supreme being or power. Also, dietary customs play an important role in the practice of many of the world's major religions. As Table 1-7 shows, many religions specify which foods their followers may eat and how those foods must be prepared.

culture Knowledge, beliefs, customs, laws, morals, art, and literature acquired by members of a society and passed along to succeeding generations.

ethnic cuisine The traditional foods eaten by the people of a particular culture.

Table 1-7 Dietary Practices of Selected Religious Groups

Religious Group	Dietary Practices
Buddhist	Dietary customs vary depending on sect. Many are lacto-ovovegetarians, because of restrictions on taking a life. Some eat fish, and most eat no beef or poultry. Monks fast at certain times of the month and avoid eating solid food after the noon hour.
Hindu	All foods thought to interfere with physical and spiritual development are avoided. Many are lacto-vegetarians and/or avoid alcohol. The cow is considered sacred—an animal dear to the Lord Krishna. Beef is never consumed, and often pork is avoided.
Jewish	*Kashrut* is the body of Jewish law dealing with foods. The purpose of following the complex dietary laws is to conform to the Divine Will as expressed in the Torah. The term *kosher* denotes all foods that are permitted for consumption. To "keep kosher" means to follow dietary laws in the home. A lengthy list of prohibited foods, called *treyf*, includes pork and shellfish. The laws define how birds and mammals must be slaughtered, how foods must be prepared, and when they may be consumed. For example, dairy foods and meat products cannot be eaten at the same meal. During Passover, special laws are observed, such as the elimination of any foods that can be leavened.
Mormon	Alcoholic beverages and hot drinks (coffee, tea) are avoided. Many also avoid beverages containing caffeine. Mormons are encouraged to limit meat intake and emphasize grains in the diet. Mormons fast on the first Sunday of every month.
Muslim	Overeating is discouraged, and consuming only two-thirds of capacity is suggested. Dietary laws are called *halal*. Prohibited foods are called *haram*, and they include pork and birds of prey. Laws define how animals must be slaughtered. Alcoholic drinks are not allowed. Fasting is required from sunup to sundown during the month of Ramadan.
Roman Catholic	Meat is not consumed on Fridays during Lent (40 days before Easter). No food or beverages (except water) are to be consumed 1 hour before taking communion.
Seventh-Day Adventist	Most are lacto-ovovegetarians. If meat is consumed, pork is avoided. Tea, coffee, and alcoholic beverages are not allowed. Water is not consumed with meals, but is drunk before and after meals. Followers refrain from using seasonings and condiments. Overeating and snacking are discouraged.

SOURCE: From M. Boyle, *Community Nutrition in Action*, 8th ed. (Boston, MA: Cengage Learning, 2021), 650. © 2021.

Personal Values or Beliefs

Some people adopt a certain way of eating or making food choices based on a larger worldview. For instance, many people make food choices based on sustainability issues, animal welfare concerns, and the benefits of purchasing locally produced, seasonally available, and organically grown food.[42] *Sustainability* in the food system is defined as a society's ability to shape its economic and social systems to maintain both natural resources and human life, and it involves building locally based, self-reliant food systems.[43] When consumers purchase foods that have been produced locally, a greater proportion of the profits remains with local farmers, providing them with a livable income while supporting local economies.[44] Additionally, the purchase of locally produced foods protects the environment by reducing the use of fossil fuel (for transporting food) and packaging materials.[45] The Chapter 2 Spotlight on Food Choices and the Environment shows how food choices affect the environment and offers tips for protecting the environment with your own food choices.

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Visit your local farmers' market for foods that have been produced locally. See the Spotlight in Chapter 2 and the Nutrition Action feature in Chapter 13 for more about the benefits of purchasing locally produced, seasonally available, and organically grown foods.

Other Factors That Affect Our Food Choices

One of the main reasons you choose to eat certain foods is your preference for certain tastes.[46] Just about everyone enjoys sweet foods, for example, because humans are born with an affinity for the sweetness of sugar.[47] In addition, we usually prefer foods that have happy associations for us: foods prepared for special occasions, those given to us by a loved one when we were children, or those eaten by an admired role model. By the same token, intense aversions to certain foods—perhaps foods you were given when you were sick or foods you were forced to eat as a child—can be strong enough to last a lifetime. Your parents may have taught you to prefer certain foods and pass up others for reasons of their own, without even being aware they were doing so.

Food habits are also intimately tied to deep psychological needs, such as an infant's association of food with a parent's love. Yearnings, cravings, and addictions with profound meaning and significance sometimes surface as food behavior. Some people respond to stress—positive or negative—by eating; others use food to fill a void, such as lack of satisfying personal relationships or fulfilling work.

The influences on people's eating habits are as many and varied as the individuals themselves. Our food choices reflect our own unique cultural legacies, philosophies, and beliefs. To think of food as nothing more than a source of nutrients would deny food's rich symbolism and meaning and take away much of the pleasure of breaking bread with friends and family. As you read this book and consider ways to improve your own eating habits, take time to reflect on your unique background and think about how you can integrate your knowledge of nutrition into your cultural heritage and philosophies.

Jack Sullivan/Alamy Stock Photo

Many of the nation's public markets maintain a public space that builds on the economic, social, and cultural assets within the surrounding communities. The markets provide an opportunity to sample the foods, crafts, and other aspects of diverse cultural groups. Even at many American-style restaurants, you can experience other cultures by sampling from the various cuisines found on the menu.

Nutrition **Action**

Good and Fast—A Guide to Eating on the Run, or Has Your Waistline Been Supersized? (Obj. 1.7)

Contrary to popular belief, your professors do not conspire to plan due dates for assignments, quizzes, and exams on the same day. As a student, your schedule can get hectic, especially at midterm and the end of a semester. In the working world, much like college, you will also have deadlines and scheduling conflicts that may leave little time for everyday activities like sitting down to a meal with friends or family. Even if your life is not hectic, chances are, you've stood in line for a burger and fries, a slice of pizza, a taco, or a muffin and coffee at least once this week. Consumers spend almost 50 percent of their food budget on restaurant meals, compared with only 25 percent in 1955.[48]

Seven out of 10 consumers say they are trying to eat healthier when dining out and to pay more attention to the nutritional content of their food choices.[49] Even though a meal eaten on the run fits easily into a busy schedule, it's not necessarily as simple to work it into the dietary guidelines recommended by major health organizations. Eating away from home is not an invitation to forget about good nutrition, eat more ("supersize"), or eat differently than you would at home.[50] Can you eat away from home and still eat healthfully? It is possible, but it takes some planning.

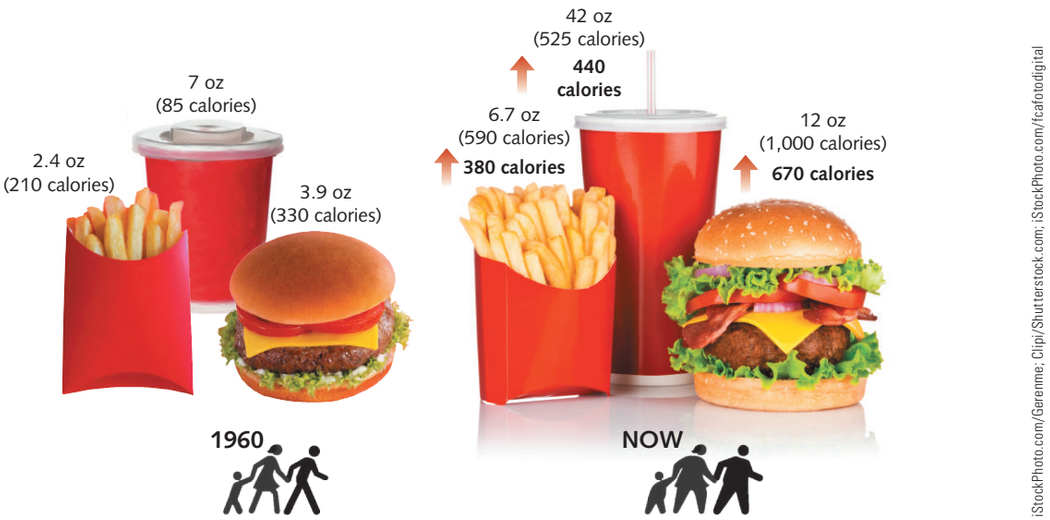
Fast food does not have to be an unhealthy option, as long as you don't supersize. Fast foods commonly contain more fat (including more saturated fat), less fiber, more cholesterol, and more calories than meals made at home.

Portion sizes of foods have been on the increase since the early 1970s.[51] In the 1960s, a single-serve bottle of a soft drink was 6 ounces. Today, a single-serve bottle is 20 ounces. A typical bagel purchased today is, at 4–7 ounces, almost twice the size bagels used to be, at 2–3 ounces.[52]

Along with the larger portions come more calories. Could these larger portions be contributing to the obesity epidemic in the United States? Yes! When people are served more food, they eat more.[53] Is it any coincidence, then, that as portion sizes have increased over the past few decades, the incidence of overweight and obesity among adults and children also has increased?[54] We don't think so.

The enlarging size of American food portions is linked to a practice used by the food industry called "value" marketing. Consumers are prompted by point-of-purchase displays and verbally by employees to spend a little extra money to "upgrade" to larger portions, leaving the customer with the feeling of "What a deal I got!"[55] For the food sellers, costs to increase portion sizes are small, but the profit margin is huge.

So, how do you, the typical harried college student, get fast meals without increasing the calories and fat in your daily diet? Remember these strategies the next time you find yourself in a time crunch and in line at the closest fast-food restaurant.



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The portion sizes of commonly consumed foods, such as soft drinks and hamburgers, have been increasing since the early 1970s. In the 1960s, an average fast-food meal of a hamburger, fries, and a cola provided 625 calories; today, some large fast-food meals deliver 2,000 calories or more. Although fast-food restaurants have recently made more size options available to customers, portion size still remains an issue.

Strategy 1: Don't supersize. It's a great marketing ploy to get you to buy more, but you will also be eating more fat, cholesterol, and salt—and weighing more as a result. Think small. Stick with smaller burgers, sliced meat, or grilled chicken sandwiches with mustard, catsup, lettuce, onion, and tomatoes.

Strategy 2: Think grilled, not fried. Frying foods adds about 50 percent more fat and/or calories compared with items that have not been fried. (A grilled chicken sandwich may have 8 grams of fat versus 16 for a deep-fried, crispy chicken sandwich.[56]) If you cannot live without French fries, get them on occasion; but most of the time, try to substitute a salad (ask for dressing on the side) or a baked potato with low-fat toppings.

Strategy 3: Hold the mayo. Each spoonful of mayonnaise adds about 100 calories, nearly all of which are from fat. Most fast-food sandwiches contain more than just one spoonful of mayo in their toppings and special sauces. The same goes for tartar sauce. Order a fish sandwich without it, and you'll trim at least 70 fat-laden calories (the amount in just 1 tablespoon) from your meal. Ask for lots of lettuce and tomatoes and less sour cream and guacamole on your nachos and tacos. A tablespoon of either sour cream or guacamole adds about 25 calories to Mexican fare. A few extra chunks of tomato, in contrast, supply a negligible number of calories, no fat, and a good deal of vitamin C.

Strategy 4: Avoid all-you-can-eat restaurants. No explanation necessary. Remember moderation and variety.

Strategy 5: "Just say no." Did you know that a 16-ounce soft drink adds 200 calories to a meal and nothing else? A medium chocolate shake can add 350 calories to a meal, and a large shake can add 770 calories. Wash your meal down with low-fat milk instead of a milk shake, and you'll cut the fat and calorie count at least in half. Better yet, in the continuing effort to get enough fluids, drink water instead.

Strategy 6: Balance fast-food meals with other food choices during the day.[57] If you cannot avoid fast food, then adjust your portion sizes and food choices at other meals. Increasing physical activity will help counterbalance extra calories.

Strategy 7: Split your order—share with a friend. A half portion is often adequate. Or split dessert. Frequently, a few bites can satisfy a sweet tooth.

Strategy 8: Bring your lunch. You'll save money and spend less time planning a healthy lunch than you would likely spend in the drive-through line. Try taking leftovers in a microwavable container. Make double batches when you cook, and put some in the freezer in single-serving containers for lunch.

Strategy 9: Choose grab-and-go foods. Keep these foods handy for a fast and nutritious snack: baby carrots, fresh fruit, dried fruit, fruit juices (not fruit drinks), low-fat yogurt, string cheese, and low-fat, unsalted popcorn.

Strategy 10: If all else fails, go for the obvious low-calorie choices. For example, Subway sells subs with 6 grams of fat or less. Don't let the word *chicken* or *fish* fool you. Many health-conscious consumers have heard the advice to choose skinless poultry and fish instead of relatively high-fat red meat—but when it comes to chicken nuggets and fish patties coated with batter and deep fried, it is a different story. Six chicken nuggets, for example, typically contain as many calories (about 300) as an entire burger. What's more, many chicken and fish sandwiches chalk up as much fat as a pint and a half of ice cream. Even rotisserie-style chicken contains a large amount of fat and calories if you don't remove the skin before eating it. When ordering a pizza, hold the sausage and pepperoni, and ask for mushrooms, green peppers, and onions instead. Pizza is an excellent source of calcium—the bone-building mineral that many Americans don't get enough of—as well as protein, carbohydrates, and a number of vitamins and minerals. Still, two slices of pepperoni pizza can easily contain 100 more calories and twice as much fat as the same amount topped with onions, green peppers, and mushrooms.

Spotlight

1.8 How Do You Tell If It's Nutrition Fact or Nutrition Fiction?

Most people want to eat a healthy diet and lower their chances of cancer and other chronic diseases. Frequently, however, information they read or hear about healthy eating from one source is contradicted by another. It's not always easy to distinguish accurate information from misinformation. Do you know which of the following statements are true or false? Check your answers with the correct answers at the end of this section.*

1. It is difficult for busy people to eat a balanced diet.
2. People who graduate from college are smart enough not to be victimized by nutrition misinformation.
3. Sugar is a major cause of hyperactivity in children.
4. No special training is legally required for a person to offer nutrition information to the public.
5. Most health food retailers have been educated about the research done regarding the products they sell.
6. Protein and/or amino acid supplements help bodybuilders, recreational weight lifters, and other athletes improve their performance by increasing muscle size.
7. Most nutrition-related books and magazine articles undergo prepublication review by experts.
8. Cigarette smoking is the leading cause of preventable death in the United States.
9. Herbal products are as safe and effective as many drugs prescribed by physicians.
10. It is illegal for manufacturers of dietary supplements to print false information on their product labels.

You've just watched a television commercial for a vitamin supplement that is guaranteed to produce a laundry list of benefits, including fewer colds, a better complexion, and a decreased risk of cancer. Should you buy it? You've just read a magazine article with a plan for quick weight loss. Should you believe it? Someone who plays the same sport as you says that improving your diet will help your game. Where do you go for help?

We all find ourselves faced with such decisions at one time or another. It's crucial to know how to protect ourselves from nutrition misinformation. Health fraud costs consumers billions of dollars each year, and money down the drain is just one problem stemming from misleading nutritional information. Although some fraudulent claims about nutrition are harmless and may make for a good laugh, others can be harmful. False claims about nutritional products have been known to bring about malnutrition, birth defects and, in extreme cases, even death.

Negative effects due to following false nutritional claims can happen in two ways. First, the product in question may cause direct harm. Even a seemingly innocuous substance such as vitamin A can cause severe liver damage over time if taken in large enough amounts. Second, using bogus nutritional remedies can cause problems because such remedies can build false hope and might keep a consumer from obtaining sound, scientifically tested medical treatment. A person who relies on a so-called anticancer diet as a cure for the disease, for example, might forgo possible lifesaving interventions such as surgery or chemotherapy.

The following questions and answers will help you learn to evaluate the nutrition information that you see in the media. They will help you develop the skills necessary to view nutrition claims with a skeptic's eye or, at the very least, to help you decide when to find a qualified professional to help you evaluate the information. Table 1-8 lists sources of credible nutrition information.

Judging by what I've read on the internet, it seems as though nutritionists are always changing their minds. One week the headlines say to take vitamin E to help prevent heart disease, and the next week they say that vitamin E may not, in fact, prevent the disease. Why is there so much controversy?

Part of the confusion stems from the way the media interpret findings of scientific research. A good case in point is the controversy over whether a high-fiber diet protects against colon and rectal cancers—diseases that affect some 148,000 Americans each year.

The fiber and colon cancer connection dates back to the early 1970s, when scientists observed that colon cancer was extremely uncommon in areas of the world where the diet consisted largely of unrefined foods and little meat. Researchers theorized that dietary fiber may protect against colon cancer by binding bile (a chemical substance needed in fat digestion) and speeding the passage of wastes and potentially harmful compounds through the colon. Since then, other studies have also suggested that those who eat a high-fiber diet have a lower risk of colon and rectal cancers.[58]

However, a flurry of headlines later threatened to pull the pedestal out from under the popular fiber theory, asking, "Fiber: Is It Still the Right Choice?" A Harvard-based study published in the *New England Journal of Medicine*, one of the most prestigious medical journals, suggested that fiber did nothing to prevent cancer.[59] The 16-year trial of almost 90,000 nurses—called the Nurses' Health Study—found that nurses who ate low-fiber diets (less than 10 grams daily) were no

*Adapted from Quackwatch. Consumer Health I.Q. Test. Available at www.quackwatch.org/04ConsumerEducation/iq.html.

Table 1-8 Credible Nutrition Resources on the Web

https://health.gov/myhealthfinder Browse topics for screening checkups; go to Everyday Healthy Living for more information on healthy lifestyles; this site offers many links to other reliable health-related sites.
www.cdc.gov/healthyliving The Centers for Disease Control and Prevention (CDC) website provides links for healthy living topics.
www.cdc.gov/nutrition/index.html The Centers for Disease Control and Prevention (CDC) maintains a nutrition home page that includes many links.
www.eatright.org The Academy of Nutrition and Dietetics home page includes many nutrition resources and links. Search the Food menu for tips on eating out, food shopping, and other topics.
https://fruitsandveggies.org This site provides resources and encourages fruit and vegetable consumption.
www.healthypeople.gov This site provides updates on the *Healthy People 2030* initiative.
www.nutrition.gov This resource provided by the United States Department of Agriculture (USDA) provides easy access to all online government information on nutrition and dietary guidance.
www.nal.usda.gov/fnic The Food and Nutrition Information Center (FNIC) provides credible, accurate, and practical information about nutrition and health. Click on Dietary Guidance and then scroll down to Fraud and Nutrition Misinformation.
www.usa.gov/scams-and-frauds This resource developed by the Federal Citizen Information Center provides access to consumer issues including food and health information.
www.nih.gov/health-information A search engine from the National Institutes of Health (NIH) with access to health information; many database links are available, such as PubMed and clinical trials.
www.nlm.nih.gov/medlineplus/healthfraud.html This government site provides health fraud resources, including how to report fraud cases.
https://fdc.nal.usda.gov FoodData Central provides free food analyses. Just type in the food you want to analyze and get a breakdown of its calories, fat, fiber, protein, vitamins, and minerals.
https://health.gov This website sponsored by the US Department of Health and Human Services (HHS) is a portal to websites of a number of multiagency government health initiatives pertaining to health and nutrition.

more likely to develop colon cancer than those eating higher levels of fiber (about 25 grams daily). As a result, the researchers concluded that the study provided no support for the theory that fiber could reduce risk of colon cancer.

The news was surprising and reinforces the need for research studies to be duplicated. All studies have some limitations, and a number of questions can be raised regarding conclusions of the Nurses' Health Study. For example, the study relied on participants to recall their eating habits accurately.

Is this type of self-reported dietary information reliable? Back in 1980, the nurses were asked for information about their intakes of "dark" breads. However, food labels at that time did not list the fiber content of breads, and some wheat breads on the shelf had amounts of fiber similar to those found in white bread. Did the nurses mistakenly consider "dark" bread to be the same as 100 percent whole-wheat bread?

Another question is, "What are the optimal levels of fiber intake for colon cancer protection?" Some experts believe it may take more than 25 grams of fiber a day to show cancer-protective effects, which might explain the lack of effect noted in the Nurses' Health Study.

This fiber story illustrates how news reports based on only one study can leave the public with the impression that scientists cannot make up their minds. It seems as if one week scientists are saying fiber is good, and the next week the word is that fiber doesn't do any good at all. The truth is that health experts and major health organizations continue to urge adults to get about 28 grams of fiber a day. (The average fiber intake today is about 16 grams.)

Contrary to what some headlines imply, reputable scientists do not base their dietary recommendations for the public on findings of one or two studies. Scientists design their research to test theories, such as the notion that eating a high-fiber diet is associated with lower risk of cancer. Other factors, however, often complicate the matter at hand. The study of fiber and colon cancer is complicated by many other factors linked with colon cancer development, including inactivity, obesity, saturated fat intake, low calcium or folate intakes, and others.

So, should you hang on to your high-fiber cereals and vegetables? Yes, according to the American Institute for Cancer Research. Its analysis of more than 7,000 research studies provides evidence that increased intake of fiber may be associated with decreased incidence of colon cancer.[60] Most important, however, the health benefits of fruits, vegetables, legumes, and whole grains go beyond possible protection from colon cancer.[61] Diets rich in fiber from these foods are also strongly associated with reduced risks of heart disease, high blood pressure, type 2 diabetes, and diverticular disease, a condition that can lead to painful inflammation of the large intestine. Fiber also promotes a feeling of fullness after you eat, which can help with weight management.

How can I tell if a nutrition news story is noteworthy and a source of credible nutrition information?

You can critique nutrition news you read by asking a series of questions. Consider the following points as a checklist for separating the bogus news stories from those worth your attention:

- Where is the study published? The study described in the news story should have been published in a journal that uses experts in the field to review research results (called *peer review*). These reviewers can point out flaws in research design and may challenge researchers' conclusions before the study is published.
- How recent is the study? Be sure that the report is about recent research. The science of nutrition continues to develop from the results of new studies that employ state-of-the-art methods and technology, and benefits from the scrutiny of experts current in the particular field of study.
- What research methods were used to obtain the data? Are the reported results from an **epidemiological study** or an **intervention study**? Epidemiological studies examine populations to determine food patterns and health status over time. These population studies are useful in uncovering **correlations** between two factors (e.g., whether a high calcium intake early in life reduces the incidence of bone fractures later in life). However, they are not considered as conclusive as intervention studies. A correlation between two factors may *suggest* a cause-and-effect relationship between the factors, but it *does not prove* a causal relationship.

  Intervention studies examine the effects of a specific treatment or intervention on a particular group of subjects and compare the results to those of a similar group of people not receiving the treatment. An example is a cholesterol-monitoring study in which half of the subjects follow dietary advice to lower their blood cholesterol and half do not. Ideally, intervention studies should be randomized and controlled—that is, subjects are assigned to either an experimental group or a control group using a random selection process. Each subject has an equal chance of being assigned to either group. The **experimental group** receives the "treatment" being tested; the **control group** receives a **placebo** or neutral substance. If possible, neither the researcher nor the participants should know which subjects have been assigned to which group until the end of the experiment. A randomized, controlled study helps ensure that the results were actually due to the treatment, and it minimizes chances that the results are due to a placebo effect or bias on the part of the researcher.
- What was the size of the study? To achieve *validity*—accuracy in results—studies generally must include a sufficiently large number of people (e.g., intervention studies of 50 or more people). This reduces the chances that the results are simply a coincidence and helps researchers generalize the conclusions of the study to a wider population.
- Who were the subjects? Was the study done with animals or humans? Look for similarities between the subjects in the study and yourself. The more you have in common with the participants (age, diet pattern, gender, and so forth), the more pertinent the study results may be for you.
- Does a consensus of published studies support the results reported in the news? Even if an experiment is carefully designed and carried out perfectly, its findings cannot be considered definitive until they have been confirmed by other research. Testing and retesting reduce the possibility that the outcome was simply the result of chance, error, or oversight on the part of the experimenter.

When making dietary recommendations for the public, experts pool the results of different types of studies, such as analyses of food patterns of groups of people and carefully controlled studies on people in hospitals or clinics. Before drawing any conclusions, they then consider the evidence from all the research. The bottom line is that if you read a report on the internet or watch one on television that advises making a dramatic change in your diet based on the results of one study, don't take it to heart. The findings might make for a good story, but they're not worth taking too seriously.

Why doesn't the government do something to prevent the media from delivering misleading nutrition information?

The **First Amendment** guarantees freedom of the press. Accordingly, people may express whatever views they like in the media, whether sound, unsound, or even dangerous. This freedom is a cornerstone of the US Constitution and to deny it would be to deny democracy. By law, writers cannot be punished for publishing misinformation unless it can be proven in court that the information has caused a reader bodily harm.

Fortunately, most professional health groups maintain committees to combat the spread of health and nutrition misinformation. For more information on separating nutrition fact from nutrition fiction, visit these websites:

- https://www.fda.gov/consumers/health-fraud-scams
- https://medlineplus.gov/healthfraud.html

Is the internet a reliable source of nutrition and health information?

Information is rampant on the internet.[62] In a sense, the internet is information, and the information is continually being revised and *created*. Internet information exists in many forms (facts, statistics, stories, opinions), is created for many purposes (to entertain, to inform, to persuade, to sell, to influence), and varies in quality from good to bad.

The information you find on the internet is only as good as its source. One method for determining whether information is reliable and of good quality is the CARS checklist. The acronym *CARS* stands for *credibility*, *accuracy*, *reasonableness*, and *support*.[63]

- ***Credibility.*** Check credentials of the author (if it lists one!) or sponsoring organization. Is the author or organization respected and well known as a source of sound, *scientific* information? Evidence of a lack

of credibility includes no posted author and even the presence of misspelled words or bad grammar. Websites should be from credible web addresses ending in .edu (an educational institution), .gov (government agency), or .org (nonprofit). Use caution on websites that end in .com (commercial) or .net (networks).

- ***Accuracy.*** Check to ensure the information is current, factual, and comprehensive. If important facts, consequences, or other information is missing, the website may not be presenting a complete story. Evidence of a lack of accuracy includes no date on the document, the use of sweeping generalizations, and the presence of outdated information. How often is the site updated? Reliable sites are updated regularly and post those dates on the site. Watch out for testimonials masquerading as scientific evidence—a common method for promoting questionable products on the internet.
- ***Reasonableness.*** Evaluate the information for fairness, balance, and consistency. Does the author present a fair, balanced argument supporting his or her ideas? Are the author's arguments rational? Has he or she maintained objectivity in discussing the topic? Does the author have an obvious—or somewhat hidden—conflict of interest? Evidence of a lack of reasonableness includes gross generalizations ("Foods not grown organically are all toxic and shouldn't be eaten") and outlandish claims ("Kombucha tea will cure cancer and diabetes").
- ***Support.*** Check to see whether supporting documentation is cited for scientific statements. Does the website refer to legitimate scientific publications? Is the source of information clearly presented? An internet document that fails to show its sources is suspect.

How can I tell whether a product is bogus?

It's not always easy. Given that many misleading claims are supposedly backed by scientific-sounding statements, it is difficult for even informed consumers to separate fact from fiction (see Figure 1-6). The general rule of thumb is: If it sounds too good to be true, it probably is. The following red flags can help you spot a quack:

- *The promoter claims that the medical establishment is against him or her and that the government won't accept this new "alternative" treatment.* If the government or medical community doesn't accept a treatment, it's because the treatment hasn't been proven to work. Reputable professionals don't suppress knowledge about fighting disease. On the contrary, they welcome new remedies for illness, provided the treatments have been carefully tested.
- *The promoter uses testimonials and anecdotes from satisfied customers to support claims.* Valid nutrition information comes from careful experimental research, not from random tales. A few people's reports that the product in question "works every time" are never acceptable as sound scientific evidence.
- *The promoter uses a computer-scored questionnaire for diagnosing "nutrient deficiencies."* Those computers are programmed to suggest

Figure 1-6

Red Flags of Nutrition Quackery

SOURCE: From Whitney/Rolfes, *Understanding Nutrition*, 14th ed. (Boston, MA: Cengage Learning, 2017), p. 34.

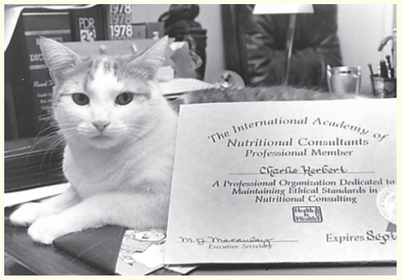
that just about everyone has a deficiency that can be reversed with supplements the promoter just happens to be selling, regardless of the consumer's symptoms or health.

- *The promoter claims that the product will make weight loss easy with guaranteed results.* Unfortunately, there is no simple way to lose weight. Again, if a claim sounds too good to be true, it probably is.
- *The promoter claims that the product is a "cure-all" for all kinds of ailments—even for conditions that have no cure (e.g., arthritis).* The broader the claims, the less likely they are to be true.
- *The recommendations are based on a single study.* Every study should be viewed as preliminary until it becomes just one addition to a significant body of evidence pointing in the same direction.
- *The promoter promises that the product is made with a "secret formula" available only from this one company.* Legitimate health professionals share their knowledge of proven treatments so that others can benefit from it.
- *The treatment is available only through the back pages of magazines, over the phone, or by mail-order ads in the form of news stories or 30-minute commercials (known as infomercials) in talk-show format.* Results of studies on credible treatments are reported first in medical journals and then administered by a health professional. If information about a treatment appears only elsewhere, it probably cannot withstand scientific scrutiny.

If I do buy a product, say, to help me lose weight, but I still need some advice about dieting, should I check with a nutritionist?

To answer that question, first consider the following story. Charlie Herbert was able to become a professional of the International Academy of Nutrition Consultants. Another member of the household, Sassafras Herbert, met all the requirements for membership in the American Association of Nutritional and Dietary Consultants, a "professional association dedicated to maintaining ethical standards in nutritional and dietary consulting." The only qualification for membership is a $50 fee, regardless of your background (or even your species). Charlie Herbert was a cat, and Sassafras was a poodle. The two obtained their "credentials" with the help of the late Victor Herbert, MD, former professor of medicine, at Mount Sinai School of Medicine, New York City, and a leader in combating nutrition fraud. Dr. Herbert had his pets added to the membership rosters of those organizations to demonstrate how easy it is for anyone to get fake nutrition credentials. This is because in some states, the term **nutritionist** is not legally defined at present.

Before you pay a fee or follow a nutritionist's advice, inquire about the person's credentials. Some "nutritionists" obtain their diplomas and titles without undergoing the rigorous training required to obtain a legitimate degree in nutrition. Lax state laws make it possible for some irresponsible correspondence schools—also called **diploma mills**—to grant degrees to unqualified individuals for nothing more than a fee.



Marilynne Herbert

Marilynne Herbert

Charlie and Sassafras display their professional credentials.

How can I check a nutritionist's credentials?

You can call the institution the person claims has awarded the degree. To find out about the existence or reputation of an institution of higher learning, you can check the directory of colleges and universities called *Accredited Institutions of Postsecondary Education*, published by the American Council on Education (www.acenet.edu). Be suspicious of diplomas or degrees issued by institutions that cannot prove that they have **accreditation** from the Council on Education.

Another option is to find out whether the person is a **registered dietitian/nutritionist (RD/RDN)**. The RD, an especially meaningful credential, has a standard definition: a professional who has fulfilled coursework required by the Academy of Nutrition and Dietetics, including courses in nutrition, food science, and other related subjects; has completed an internship that includes on-the-job training for counseling people about diet; and has passed a national registration exam. All registered dietitians must keep their credentials current by completing regular continuing education requirements. In some instances, a **nutrition and dietetics technician, registered**, assists dietitians in helping people make healthy food choices. Like dietitians, dietetic technicians maintain their national registration credential through continuing professional education.

Answers to Spotlight Nutrition Health IQ Test: All are false except numbers 4, 8, and 10. Seven correct answers suggest that you are fairly well informed about nutrition information. Ten correct answers suggest that you are very well informed.

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accreditation Approval; in the case of hospitals or university departments, approval by a professional organization of the educational program offered. There are phony accrediting agencies; the genuine ones are listed in a directory called *Accredited Institutions of Postsecondary Education.*

control group A group of individuals with characteristics that match those of the group being treated in an intervention study but who receive a placebo or no treatment at all.

correlation A simultaneous change in two factors, such as a decrease in blood pressure with regular aerobic activity (a direct or positive correlation) or the decrease in incidence of bone fractures with increasing calcium intakes (an inverse or negative correlation).

nutrition and dietetics technician, registered (NDTR) Nutrition professionals who work as part of health care and food service management teams. NDTRs have completed at least a two-year associate's degree at a US regionally accredited college or university and an accredited dietetic technician program, and passed a national examination.

diploma mill A correspondence school that grinds out degrees (sometimes worth no more than the paper they are printed on) the way a grain mill grinds out flour.

epidemiological study A study of a population that searches for possible correlations between nutrition factors and health patterns over time.

experimental group The participants in a study who receive the real treatment or intervention under investigation.

First Amendment The amendment to the US Constitution that guarantees freedom of the press.

intervention study A population study examining the effects of a treatment on experimental subjects compared to a control group.

nutritionist A person who claims to be capable of advising people about their diets. Some nutritionists are registered dietitians, whereas others are self-described experts whose training is questionable.

placebo An inert, harmless "treatment" given to the control group in a study that the group's members cannot recognize as different from the actual treatment or intervention given to the experimental group.

registered dietitian/ nutritionist (RD/RDN) A professional who has graduated from a nutrition and dietetics program accredited by the Accreditation Council for Education in Nutrition and Dietetics (ACEND) of the Academy of Nutrition and Dietetics, has completed an internship program or the equivalent to gain practical skills, has passed a registration examination, and maintains competencies through continuing education. Most states require licensing for dietitians, thereby requiring anyone who wants to use the title *dietitian* to receive permission to do so by passing a state examination.

Chapter

2 The Pursuit of a Healthy Diet

Romariolen/Shutterstock.com

Ask Yourself . . .

Which of the following statements about nutrition are true, and which are false? For each false statement, what is true?

1. It is wise to eat the same foods every day.
2. When it comes to nutrients, more is always better.
3. A person's energy needs are based on his or her age, gender, weight, and physical activity levels.
4. If a food label claims that a product is low in fat, you can believe it.

Answers found on page 33.

Learning Objectives

2.1 List and describe six characteristics of planning a healthy diet.
2.2 Describe the purpose of each of the categories of nutrient intake values that make up the Dietary Reference Intakes (DRI) for nutrients.
2.3 Describe the major goals for building healthy dietary patterns, as emphasized by the *Dietary Guidelines for Americans*.
2.4 Explain how the MyPlate food guide can help consumers make healthy meal choices.
2.5 List four nutrients whose intakes are low enough to be of public health concern in the United States.
2.6 List the information that is required on food labels that is useful when making comparisons between similar products based on health goals.
2.7 Discuss strategies for protecting the environment with your own food choices.

For most people, eating is so habitual they give hardly any thought to the foods they choose to eat. Yet, as Chapter 1 emphasized, the foods you select can have a profound effect on the quality, and possibly even the length, of your life. Designing a healthy diet may seem like a complicated matter involving a rigid regimen that excludes certain foods from the diet. Fortunately, that's not the case. The government, as well as many major health organizations, has devised dietary guidelines and tools (such as food labels) to help you build healthy dietary patterns. This chapter provides an overview of some of the best guides and tools and shows you how to use them.

> If the doctors of today will not become the nutritionists of tomorrow, the nutritionists of today will become the doctors of tomorrow.
>
> —Thomas Edison (1847–1931, American inventor)

All of your food and beverage choices matter, but the overall **dietary pattern** is what really counts. A healthy dietary pattern is not a rigid diet prescription, but rather a flexible framework that can accommodate personal and cultural food preferences and seasonal availability while fitting within your budget. The trick is choosing a healthy balance of foods. The ideal pattern contains primarily foods that supply adequate nutrients, fiber, and calories without an excess of **added sugars**, **solid fats**, or sodium.

dietary pattern An individual's complete dietary intake of foods and beverages over time.

added sugars Sugars and other caloric sweeteners that are added to foods during processing or preparation. Added sugars do not include naturally occurring sugars such as those found in milk and fruits.

solid fats Fats that are solid at room temperature. These fats may be visible or may be a constituent of foods such as milk, cheese, meats, or baked products, and most have a high percentage of saturated fat (see Chapter 5). Common solid fats include butter, beef fat, chicken fat, pork fat (lard), stick margarine, and shortening. The fat in whole milk is also considered to be solid fat because it is solid at room temperature but suspended in milk by the process of homogenization.

2.1 The ABCs of Eating for Health

We all make choices every day about what foods and beverages we will consume and how physically active we will be. You can create a healthy dietary pattern that meets nutrient needs and stays within your calorie budget—at home, in the

grocery store, or while dining out—by keeping in mind the following six dietary principles:

- **Adequacy** (to provide enough of the essential nutrients, fiber, and energy—in the form of calories)
- **Balance** (to avoid overemphasis on any food type or nutrient at the expense of another)
- **Calorie control** (to supply the amount of energy you need to maintain a healthy weight—not more, not less)
- **Nutrient density** (to create a healthy dietary pattern that meets nutrient needs and stays within calorie limits)
- **Moderation** (to avoid excess amounts of unwanted constituents, such as excess sodium, solid fats, and added sugars)
- **Variety** (to incorporate a wide selection of different foods from within and among the different food groups rather than eating the same foods day after day)

A healthy dietary pattern based on the principles of adequacy, balance, calorie-control, nutrient density, moderation, and variety can help you achieve and maintain good health. The *Healthy People* initiative presented in Chapter 1 also acknowledges that all segments of our society (homes, schools, workplaces, communities) have a role to play in addressing the **social determinants of health** and in supporting healthy food choices and opportunities for regular physical activity to help people achieve positive health outcomes (see Figure 2-1).[1] Equally important, be sure that your diet suits you—that it consists of foods that fit your personality, family and cultural traditions, lifestyle, and budget. At best, your diet can be a source of both pleasure and good health.

social determinants of health The conditions in the environments in which people are born, live, learn, work, play, worship, and age that affect a wide range of health and quality-of-life outcomes and risks. The range of personal, social, economic, and environmental factors that influence health status and the interrelationships among these factors.

Adequacy

Adequacy characterizes a diet that provides all of the nutrients and energy (calories) in amounts sufficient to maintain health. Any nutrient can be used to demonstrate the importance of dietary adequacy. For example, iron is an essential nutrient that your body loses daily; it must be replaced continually by iron-rich foods. If your diet does not provide adequate iron—that is, if it lacks food sources of the mineral—you can develop a condition known as *iron-deficiency anemia*. If you add iron-rich foods such as meat, fish, poultry, and legumes to

Miniglossary of the ABCs of Eating for Health

iStockPhoto.com/Fcafotodigital

adequacy The characteristic of a diet that provides all of the essential nutrients, fiber, and energy (calories) in amounts sufficient to maintain health.

balance A feature of a diet that provides a number of types of foods in harmony with one another, such that foods rich in one nutrient do not crowd out of the diet foods that are rich in another nutrient.

calorie control A feature of a diet that achieves balance between calories consumed in foods and beverages and calories expended through physical activity.

nutrient density A measure of the nutrients a food supplies relative to the number of calories it provides. The higher the level of nutrients and the fewer the number of calories, the higher the nutrient density.

moderation The attribute of a diet that provides no unwanted constituent in excess.

variety A feature of a diet in which a wide selection of foods from within and among the different food groups are consumed; the opposite of monotony.

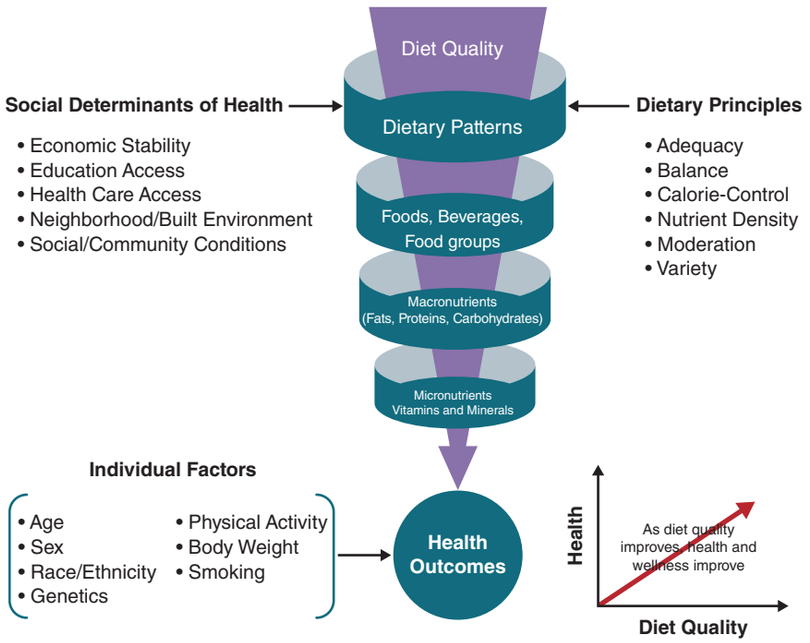

Figure 2-1

As Diet Quality Improves, Health and Wellness Improve

This figure demonstrates how foods, beverages, food groups, and nutrients are components of dietary patterns. Diet quality runs throughout each component of the pattern. As an individual adheres to a healthy dietary pattern, the pattern can play a protective role in health, and conversely, less healthy dietary patterns can negatively influence health. The figure also recognizes that social determinants of health, such as food access and environments can play a role in influencing the diet quality of a dietary pattern. Additionally, individual factors also affect health outcomes.

Adapted from Figure D8.1. Dietary Patterns And Health Outcomes, Dietary Guidelines Advisory Committee, *Scientific Report Of The 2020 Dietary Guidelines Advisory Committee: Advisory Report to the Secretary of Agriculture and the Secretary of Health and Human Services*. U.S. Department of Agriculture, Agricultural Research Service, Washington, DC, 2020.

your diet, the condition is likely to disappear soon. (More information about iron appears in Chapter 8.)

Balance Balance promotes adequacy in the diet. Balancing the whole diet is a juggling act that, if successful, provides enough, but not too much, of each of the 40-odd nutrients the body needs for good health. As you will see later in the chapter, you can design a dietary pattern that is both adequate and balanced by using food group plans that help you choose from various groups the specific amounts of foods that should be eaten each day.

To appreciate the importance of balance, consider a second essential nutrient. Calcium plays a vital role in building a strong frame that can withstand the gradual bone loss that occurs with age. Thus, adults are advised to consume three cups of milk, milk products, or fortified alternatives daily to meet their calcium needs. Foods that are rich in calcium typically lack iron, however, and vice versa; so you have to balance the two in your diet.

Calorie Control In order to maintain a healthy weight, calorie control helps ensure a balance between energy we take in from food and energy we expend in physical activity and **metabolism**. Nutrient density helps those who are trying to ensure optimal intakes of nutrients without consuming excess calories by emphasizing foods that are rich in nutrients (protein, vitamins, and minerals) but

metabolism The sum total of all the chemical reactions that go on in living cells. Energy metabolism includes all reactions by which the body obtains and expends the energy from food or body stores.

Ask Yourself Answers: 1. False. It is unwise to eat the same foods day in and day out; your diet will lack variety and probably will not supply all the nutrients your body needs. **2.** False. Too much or too little of a nutrient is often equally harmful. **3.** True. **4.** True.