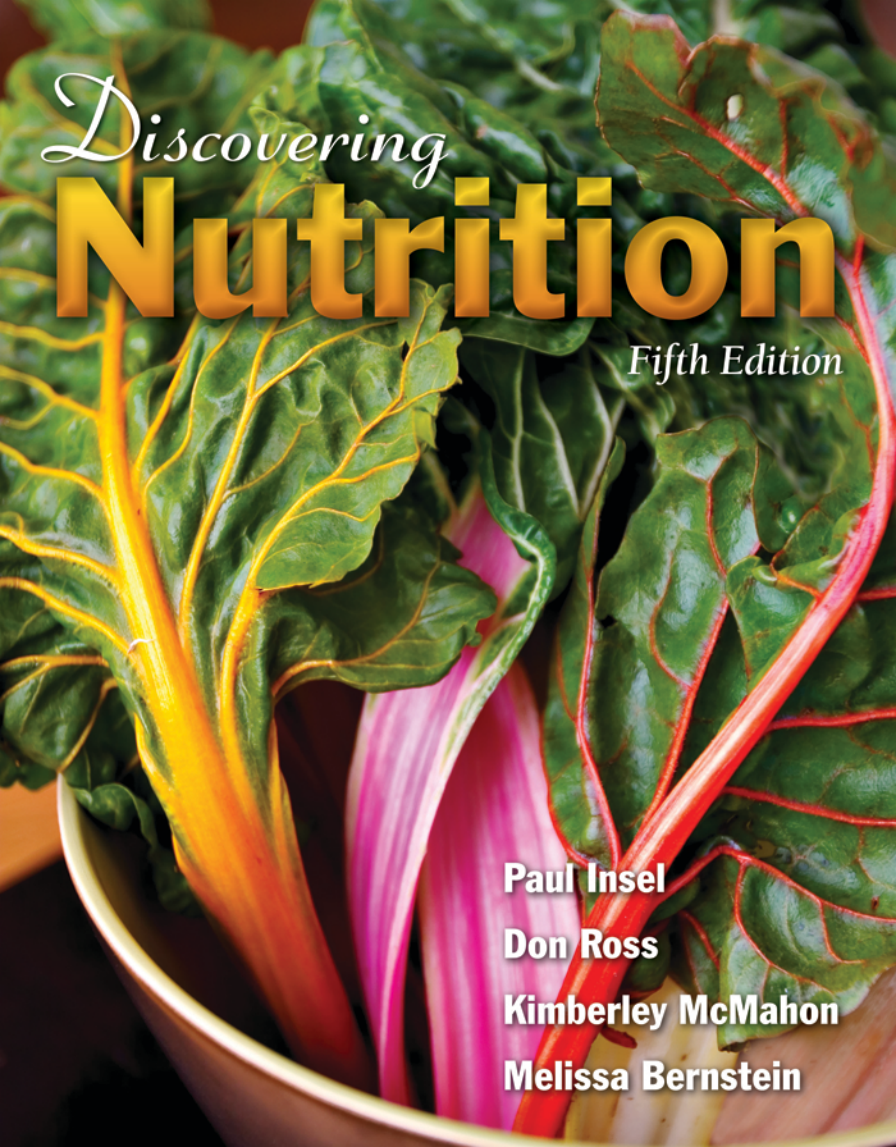
Discovering
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Fifth Edition
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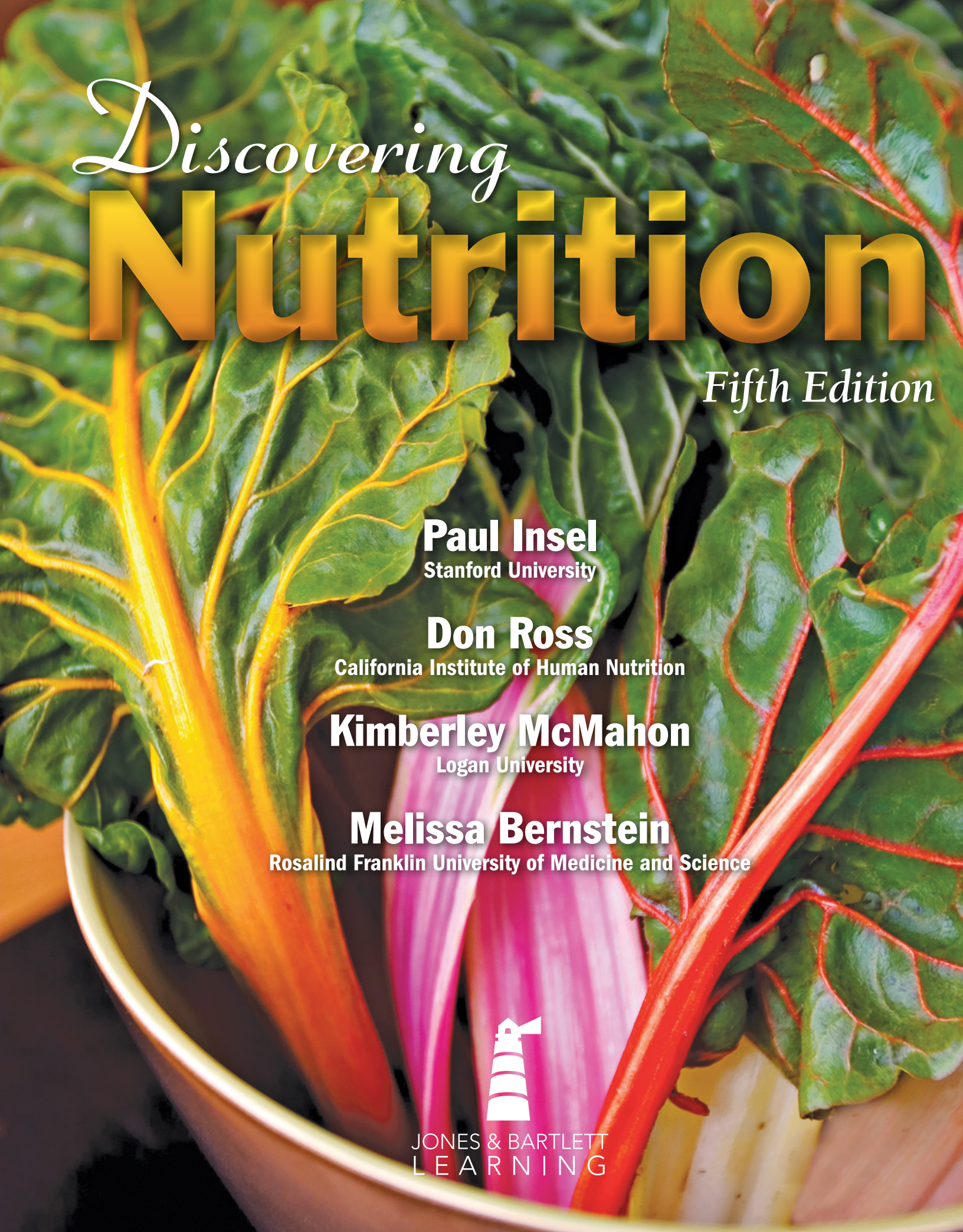

Discovering Nutrition

Fifth Edition

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Brief Contents

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Preface

Learning nutrition can be exciting and engaging. *Discovering Nutrition, Fifth Edition* takes students on a fascinating journey beginning with curiosity and ending with a solid knowledge base and a healthy dose of skepticism for the endless ads and infomercials promoting "new" diets and food products. We want students to learn enough about their nutritional and health status to use this new knowledge in their everyday lives. Our mission is to give students the tools to logically interpret the nutrition information provided by the evening news, on food labels, in popular magazines, and by government agencies. Our goal is to help them become sophisticated consumers of both nutrients and nutrition information. Hopefully, students will come to understand that knowledge of nutrition allows them to personalize information rather than follow every guideline issued for an entire population.

Discovering Nutrition is unique in its behavioral approach. It challenges students to act, not just memorize the material. Familiar experiences and choices draw students into each chapter, and analogies illuminate difficult concepts. In addition, we address important topics that students are curious about, such as ethnic diets, functional foods, nutrient supplements, phytochemicals, vegetarianism, diets for athletes, diet and chronic diseases, food safety, and fad diets. We focus attention on alcohol, eating disorders, obesity, and complementary nutrition. Some instructors may wish to cover metabolism, so we have included a *Spotlight on Metabolism and Energy Balance* to provide a friendly tour of the metabolic pathways. *Discovering Nutrition* brings up-to-date nutritional research into your classroom. It features the latest standards: the Dietary Reference Intakes, *2010 Dietary Guidelines for Americans*, and USDA's Choose MyPlate.

Spotlight on Obesity and Weight Management

Obesity is a growing epidemic in the United States and worldwide, affecting over one-third of the American adult population and almost 20 percent of children and teens. New to the fifth edition of *Discovering Nutrition*, the *Spotlight on Obesity and Weight Management* takes an in-depth scientific, behavioral, and social look at this escalating problem. Rising rates of obesity resulting from overconsumption of energy-dense, sugar-laden, high-fat foods that are convenient, widely available, and inexpensive have become a significant public health concern. Overconsumption in combination with low intakes of nutrient-dense foods such as whole fruits, vegetables, unrefined grains, and low-fat dairy products is creating a nutritional imbalance that favors weight gain and poor health. To make matters worse, an increasingly sedentary lifestyle and decreased exercise and physical activity pave a path toward obesity and other serious, chronic, degenerative conditions. The *Spotlight on Obesity and Weight Management* takes a candid look at the obesity crisis, including the causes and health consequences of excess weight, and provides guidance for moving toward a healthier lifestyle.

Diet and Health

New to the fifth edition, Chapter 10, *Diet and Health*, explores the connection between nutrition and chronic diseases, including cardiovascular disease, hypertension, cancer, diabetes, and osteoporosis. For some, the linkage is pronounced; for example, the dramatic surge in obesity rates in the United States is a major reason why the incidence of type 2 diabetes has tripled since 1970. For others, the link is more surprising, such as evidence that shows a generous intake of vegetables and fruits can reduce the risk of cancer.

Spotlight on Dietary Supplements and Functional Foods

The revised *Spotlight on Dietary Supplements and Functional Foods* takes a hard look at the latest science behind the potential benefits and harmful effects of dietary and herbal supplements, as well as the professed benefits of functional foods. Making decisions about nutrition and health requires both consumers and professionals to stay informed and consult reliable sources before trying a new product or embarking on a new health regimen. The *Spotlight on Dietary Supplements and Functional Foods* considers claims made for products and therapies in terms of current scientific knowledge, but it also takes into account the regulatory and safety issues that are present.

Dietary Guidelines for Americans

The seventh edition of the *Dietary Guidelines for Americans* places stronger emphasis on improving poor diets

and increasing physical activity, two of the most important factors for combating the obesity epidemic. Eating a healthy balance of nutritious foods continues as a central point in the *Dietary Guidelines*, but simply balancing nutrients is not enough for health. Total calories also count, especially as more Americans are gaining weight. Because almost two-thirds of Americans are overweight or obese and more than half get too little physical activity, the *2010 Dietary Guidelines* place a stronger emphasis on calorie control and physical activity. The report identifies several key recommendations. As you read the chapters, look for these recommendations highlighted in the margins.

Choose MyPlate

Choose MyPlate is part of an overall food guidance system that emphasizes the need for a more individualized approach to improving diet and lifestyle. MyPlate incorporates recommendations from the *Dietary Guidelines for Americans* and uses interactive technology found at www.ChooseMyPlate.gov. These interactive activities allow individuals to obtain more personalized recommendations for daily calorie levels based on the *Dietary Guidelines for Americans* and to find general food guidance and suggestions for making smart choices from each food group. Concepts from MyPlate and the *Dietary Guidelines* are covered throughout the text and are fully integrated into the text.

Accessible Science

Discovering Nutrition makes use of the latest in learning theory and balances the behavioral aspects of nutrition with an accessible approach to scientific concepts. This text is intended to be a comprehensive resource that communicates nutrition both graphically and personally.

We present technical concepts in an engaging, nonintimidating way with an appealing, stepwise, and parallel development of text and annotated illustrations. Illustrations in all chapters use consistent representations. Each type of nutrient, for example, has a distinct color and shape. Icons of an amino acid, a protein, a triglyceride, and a glucose molecule represent "characters" in the nutrition story and are instantly recognizable as they appear throughout the text.

This text is unique in the field of nutrition and leads the way in depicting important biological and physiological phenomena, such as emulsification, glucose regulation, digestion and absorption, and fetal development. Extensive graphic presentations make nutrition and physiological principles come alive. The illustrations use pictures to teach and are part of a multimedia package that coordinates the text with illustrations and software. The EatRight Analysis program is a fully integrated ancillary designed to help students track their diets, make choices, and hone their nutritional skills.

New to This Edition

For this *Fifth Edition*, the latest scientific evidence, recommendations, and national standards have been incorporated throughout. Specific updates include the following:

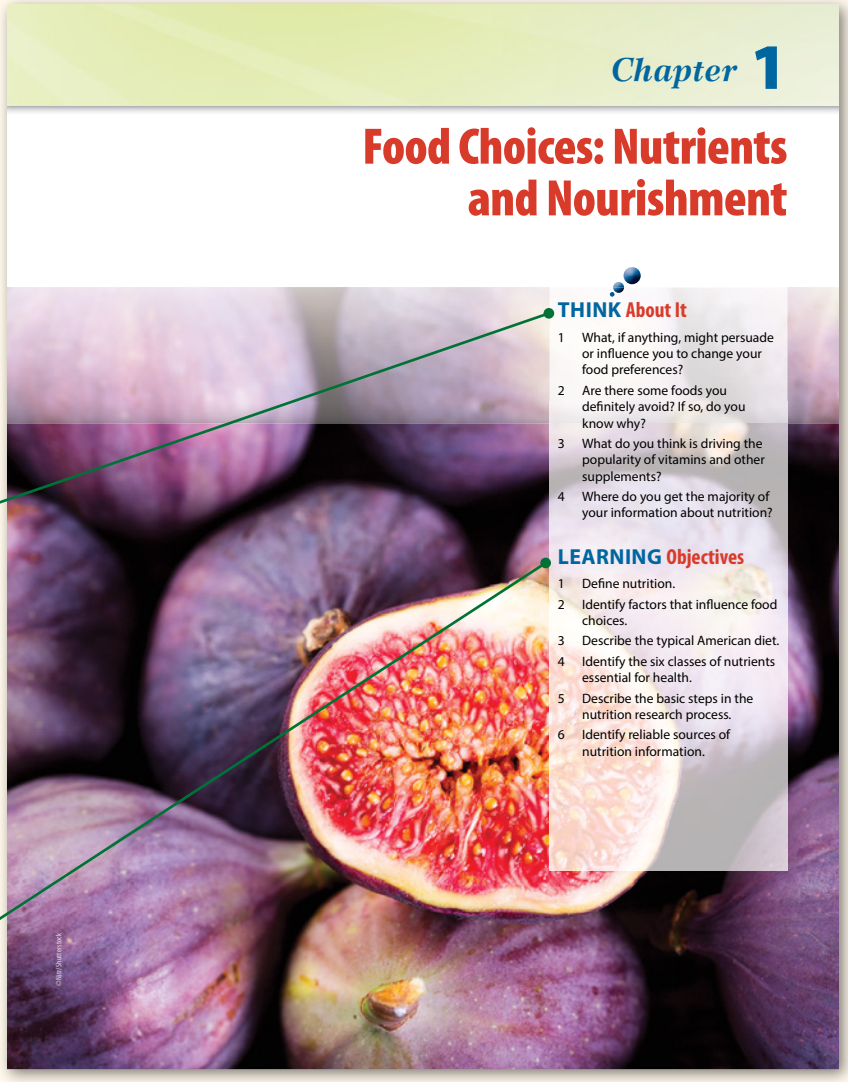
- New organization of the chapters allowing the material to flow in a more intuitive fashion
- New *Learning Objectives* clearly mapping to chapter content
- New *Spotlight on Obesity and Weight Management* offering a candid look at the obesity crisis
- New *Diet and Health* chapter examining the connection between nutrition and chronic disease
- New section on dietary guidelines around the world, including the Japanese Food Guide and Canadian recommendations
- Revised *Spotlight on Dietary Supplements and Functional Foods* providing a look at the professed benefits of dietary and herbal supplements as well as functional foods
- Revised and new *FYI* and *Quick Bite* features covering the Affordable Care Act, nutritional coaching, high protein diets, and more
- Updated *Position Statements* from the Academy of Nutrition and Dietetics (formerly the American Dietetic Association), the American Heart Association, the American College of Sports Medicine, and Dietitians of Canada
- Expanded discussion on preventing eating disorders, the impact of the college environment on eating disorders, and maladaptive coping patterns

How to Use This Text

Discovering Nutrition focuses on teaching behavioral change, personal decision making, and up-to-date scientific concepts in a number of novel ways. This interactive approach addresses different learning styles, making it the ideal text to ensure mastery of key concepts. Beginning with Chapter 1, the material engages students in considering their own behavior in light of the knowledge they are gaining. The pedagogical aids that appear in most chapters include the following:

The **Think About It** questions at the beginning of each chapter present realistic nutrition-related situations and ask students to consider how they would behave in such circumstances.

Learning Objectives, new to the *Fifth Edition*, focus students on the key concepts of each chapter and the material they will need to learn.



FYI For Your Information

Portion Distortion

The prevalence of obesity is of increasing concern in the United States. A notable increase in obesity has occurred over the past 20 years. Studies that look at prevalence of Self-Reported Obesity among U.S. adults by state for 2013 indicate the following: No state had an obesity rate less than 20 percent; 7 states (Montana, California, Utah, Colorado, Hawaii, Vermont, and Massachusetts) and the District of Columbia had a prevalence of obesity between 20% and <25%; 23 states had a prevalence of obesity between 25% and <30%; 18 states had a prevalence of obesity between 30% and <35%; and 2 states (Mississippi and West Virginia) had a prevalence of obesity of 35% or greater. Southern states have the highest prevalence of obesity, followed by the Midwest, the Northeast, and the West.[1]

Many factors are contributing to Americans' growing waistlines, but one observation in particular cannot be overlooked: the incidence of obesity has increased in parallel with increasing portion sizes.[2, 3] In almost every eating situation, we are now confronted by huge portions, which are perceived as "normal" or "a great value." This perception that large portion sizes are appropriate has created an environment of *portion distortion*.[4] We find portion distortion in supermarkets, where the number of larger sizes has increased significantly over the past 30 years. We find portion distortions in restaurants, where the jumbo-sized portions are consistently 250 percent larger than the regular portions.[5] We even find portion distortions in our homes, where the sizes of our bowls and glasses have steadily increased and where the surface area of the average dinner plate has increased 36 percent since 1960.[6] Research shows that people unintentionally consume more calories when faced with larger portions. In addition, research also shows that portion distortion seems to affect the portion sizes selected by young adults and children for some foods.[7] Consuming larger portion sizes can contribute to positive energy balance, which, over time, leads to weight gain and ultimately may result in obesity.

The phenomenon of portion distortion has the potential to hinder weight loss, weight maintenance, and health improvement efforts. Food and nutrition professionals must develop ways to "undistort" what people perceive to be typical portion sizes and help individuals recognize what is an appropriate amount to eat at a single eating occasion.[8]

To see whether you know how today's portions compare to the portions available 20 years ago, take the interactive portion distortion quizzes on the National Heart, Lung, and Blood Institute's Portion Distortion website (www.nhlbi.nih.gov/health/public/heart/obesity/wecan/eat-right/distortion.htm). You can also learn about the amount of physical activity required to burn off the extra calories provided by today's portions.

FYI Figure 2.1A Prevalence of obesity.

FYI Figure 2.1B 45 kcals, 8 oz with milk and sugar.

FYI Figure 2.1C 350 kcals, 16 oz mocha coffee.

1 Centers for Disease Control and Prevention. U.S. obesity trends: Trends by state, 1985–2010. http://www.cdc.gov/obesity/data/trends.html. Accessed May 2, 2014.
2 French SA, Mitchell NR, Wolfson J, et al. Portion size effects on weight gain in a free living setting. *Obesity (Silver Spring)*. 2014. Jun;22(6):1400-5.
3 Steenhuis IH, Vermeer WM. Portion size: Review and framework for interventions. *Int J Behav Nutr Phys Act*. 2009;6:58.
4 Wansink B, van Ittersum K. Portion size me: Downsizing our consumption norms. *J Am Diet Assoc*. 2007;7(7):1103–1106.
5 Ibid.
6 Ibid.
7 Wansink B, van Ittersum K. Portion size me: Plate-size induced consumption norms and win-win solutions for reducing food intake and waste. *J Exp Psychol Appl*. 2013;19(4):320–332.
8 Lawhun SA, Starkoff B, Sundararajan S. et al. Influence of larger portion sizes on the diet of overweight children and adolescents. J Am Diet Assoc. 2008; 108(9):A38.

For Your Information offers more in-depth treatment of controversial and timely topics, such as unfounded claims about the effects of sugar, whether athletes need more protein, nutritional coaching, and the usefulness of the glycemic index.

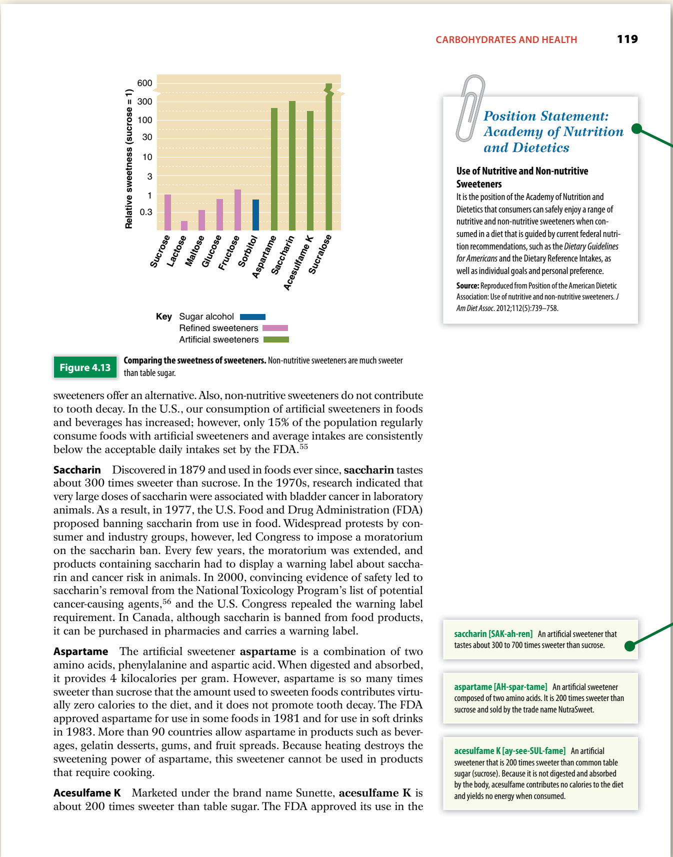


Figure 4.13 **Comparing the sweetness of sweeteners.** Non-nutritive sweeteners are much sweeter than table sugar.

Position Statement: Academy of Nutrition and Dietetics

Use of Nutritive and Non-nutritive Sweeteners

It is the position of the Academy of Nutrition and Dietetics that consumers can safely enjoy a range of nutritive and non-nutritive sweeteners when consumed in a diet that is guided by current federal nutrition recommendations, such as the *Dietary Guidelines for Americans* and the Dietary Reference Intakes, as well as individual goals and personal preference.

Source: Reproduced from Position of the American Dietetic Association: Use of nutritive and non-nutritive sweeteners. *J Am Diet Assoc*. 2012;112(5):739–758.

sweeteners offer an alternative. Also, non-nutritive sweeteners do not contribute to tooth decay. In the U.S., our consumption of artificial sweeteners in foods and beverages has increased; however, only 15% of the population regularly consume foods with artificial sweeteners and average intakes are consistently below the acceptable daily intakes set by the FDA.[55]

Saccharin Discovered in 1879 and used in foods ever since, **saccharin** tastes about 300 times sweeter than sucrose. In the 1970s, research indicated that very large doses of saccharin were associated with bladder cancer in laboratory animals. As a result, in 1977, the U.S. Food and Drug Administration (FDA) proposed banning saccharin from use in food. Widespread protests by consumer and industry groups, however, led Congress to impose a moratorium on the saccharin ban. Every few years, the moratorium was extended, and products containing saccharin had to display a warning label about saccharin and cancer risk in animals. In 2000, convincing evidence of safety led to saccharin's removal from the National Toxicology Program's list of potential cancer-causing agents,[56] and the U.S. Congress repealed the warning label requirement. In Canada, although saccharin is banned from food products, it can be purchased in pharmacies and carries a warning label.

Aspartame The artificial sweetener **aspartame** is a combination of two amino acids, phenylalanine and aspartic acid. When digested and absorbed, it provides 4 kilocalories per gram. However, aspartame is so many times sweeter than sucrose that the amount used to sweeten foods contributes virtually zero calories to the diet, and it does not promote tooth decay. The FDA approved aspartame for use in some foods in 1981 and for use in soft drinks in 1983. More than 90 countries allow aspartame in products such as beverages, gelatin desserts, gums, and fruit spreads. Because heating destroys the sweetening power of aspartame, this sweetener cannot be used in products that require cooking.

Acesulfame K Marketed under the brand name Sunette, **acesulfame K** is about 200 times sweeter than table sugar. The FDA approved its use in the

saccharin [SAK-ah-ren] An artificial sweetener that tastes about 300 to 700 times sweeter than sucrose.

aspartame [AH-spar-tame] An artificial sweetener composed of two amino acids. It is 200 times sweeter than sucrose and sold by the trade name NutraSweet.

acesulfame K [ay-see-SUL-fame] An artificial sweetener that is 200 times sweeter than common table sugar (sucrose). Because it is not digested and absorbed by the body, acesulfame contributes no calories to the diet and yields no energy when consumed.

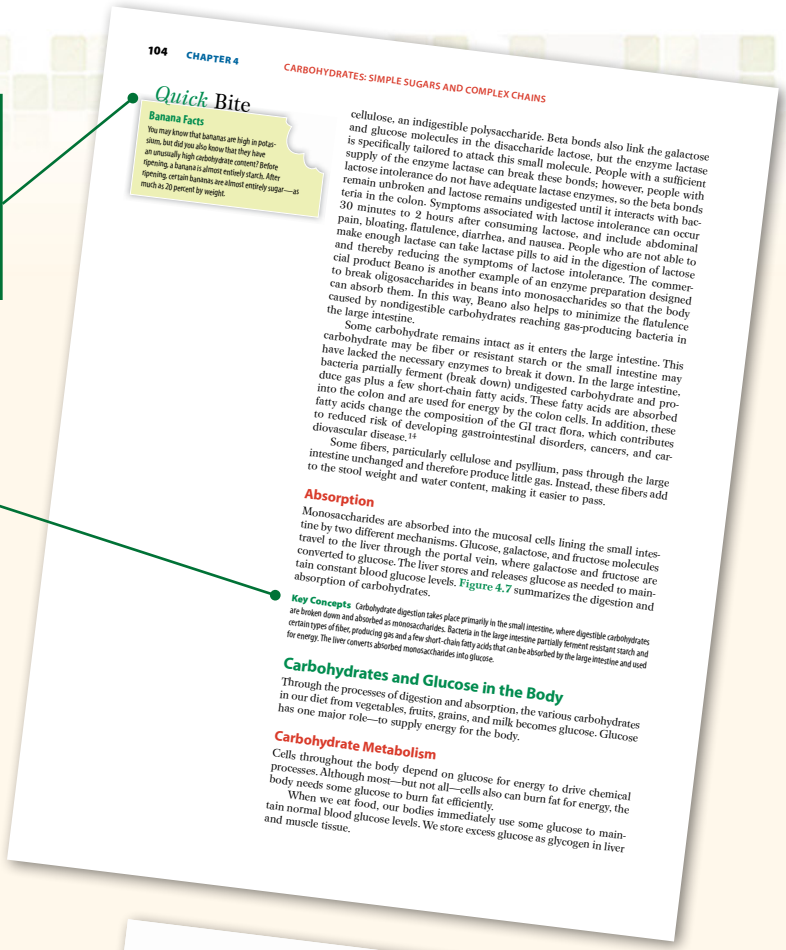
Position Statements from distinguished organizations such as the Academy of Nutrition and Dietetics, the American College of Sports Medicine, and the American Heart Association relate to the chapter topics and bolster the assertions made by the authors by showcasing concurrent opinions held by some of the leading organizations in nutrition and health.

Key Terms appear in boldface type the first time they are mentioned, with the accompanying definitions in the margin, making it easy for students to comprehend and retain material.

Quick Bites sprinkled throughout the book offer fun facts about nutrition-related topics such as exotic foods, social customs, origins of phrases, folk remedies, medical history, and so on.

Key Concepts summarize previous content as well as highlight important information.

Label to Table helps students apply their new decision-making skills at the supermarket. It walks students through the various types of information that appear on food labels, including government-mandated terminology, misleading advertising phrases, and amounts of ingredients.


104 CHAPTER 4 CARBOHYDRATES: SIMPLE SUGARS AND COMPLEX CHAINS

Quick Bite

Banana Facts

You may know that bananas are high in potassium, but did you also know that they have an unusually high carbohydrate content? Before ripening, a banana is almost entirely starch. After ripening, certain bananas are almost entirely sugar—as much as 20 percent by weight.

cellulose, an indigestible polysaccharide. Beta bonds also link the galactose and glucose molecules in the disaccharide lactose, but the enzyme lactase is specifically tailored to attack this small molecule. People with a sufficient supply of the enzyme lactase can break these bonds; however, people with lactose intolerance do not have adequate lactase enzymes, so the beta bonds remain unbroken and lactose remains undigested until it interacts with bacteria in the colon. Symptoms associated with lactose intolerance can occur 30 minutes to 2 hours after consuming lactose, and include abdominal pain, bloating, flatulence, diarrhea, and nausea. People who are not able to make enough lactase can take lactase pills to aid in the digestion of lactose and thereby reducing the symptoms of lactose intolerance. The commercial product Beano is another example of an enzyme preparation designed to break oligosaccharides in beans into monosaccharides so that the body can absorb them. In this way, Beano also helps to minimize the flatulence caused by nondigestible carbohydrates reaching gas-producing bacteria in the large intestine.

Some carbohydrate remains intact as it enters the large intestine. This carbohydrate may be fiber or resistant starch or the small intestine may have lacked the necessary enzymes to break it down. In the large intestine, bacteria partially ferment (break down) undigested carbohydrate and produce gas plus a few short-chain fatty acids. These fatty acids are absorbed into the colon and are used for energy by the colon cells. In addition, these fatty acids change the composition of the GI tract flora, which contributes to reduced risk of developing gastrointestinal disorders, cancers, and cardiovascular disease.[14]

Some fibers, particularly cellulose and psyllium, pass through the large intestine unchanged and therefore produce little gas. Instead, these fibers add to the stool weight and water content, making it easier to pass.

Absorption

Monosaccharides are absorbed into the mucosal cells lining the small intestine by two different mechanisms. Glucose, galactose, and fructose molecules travel to the liver through the portal vein, where galactose and fructose are converted to glucose. The liver stores and releases glucose as needed to maintain constant blood glucose levels. Figure 4.7 summarizes the digestion and absorption of carbohydrates.

Key Concepts Carbohydrate digestion takes place primarily in the small intestine, where digestible carbohydrates are broken down and absorbed as monosaccharides. Bacteria in the large intestine partially ferment resistant starch and certain types of fiber, producing gas and a few short-chain fatty acids that can be absorbed by the large intestine and used for energy. The liver converts absorbed monosaccharides into glucose.

Carbohydrates and Glucose in the Body

Through the processes of digestion and absorption, the various carbohydrates in our diet from vegetables, fruits, grains, and milk becomes glucose. Glucose has one major role—to supply energy for the body.

Carbohydrate Metabolism

Cells throughout the body depend on glucose for energy to drive chemical processes. Although most—but not all—cells also can burn fat for energy, the body needs some glucose to burn fat efficiently.

When we eat food, our bodies immediately use some glucose to maintain normal blood glucose levels. We store excess glucose as glycogen in liver and muscle tissue.


Label to Table

LIPIDS AND HEALTH 183

The Nutrition Facts panel shown here highlights all of the lipid-related information you can find on a food label. Look at the top of the label, where it states that this product contains 35 calories from fat. Do you know how you can estimate this number from another part of the label? Recall that each gram of fat contains 9 kilocalories (or look at the bottom of the label). If this food item has 4 grams of fat, then it should make sense that there are approximately 36 kilocalories provided by fat.

Total fat is the second thing you'll see, along with saturated and trans fat. Manufacturers are required to list only saturated and trans fat content on the label, but they can voluntarily list monounsaturated and polyunsaturated fat. Using this food label, you can estimate the amount of unsaturated fat by simply looking at the highlighted sections. There are 4 total grams of fat—2.5 are saturated and 0.5 are trans. That means the remaining 1.0 grams are either polyunsaturated, monounsaturated, or a mix of both. Without even knowing what food item this label represents, you can see that it contains more saturated and trans fat than unsaturated fat (3.0 grams versus 1.0 gram).

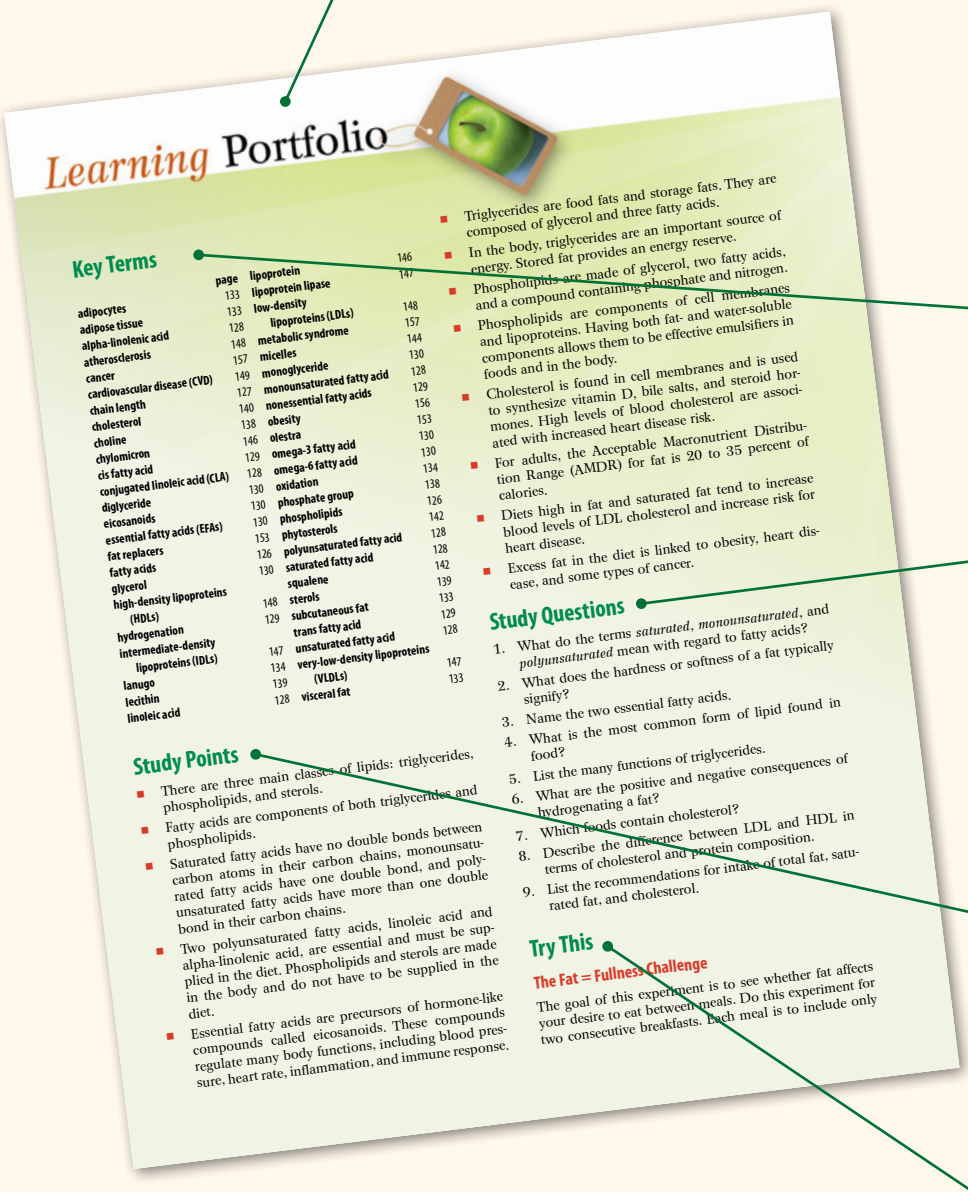
Do you see the "6%" to the right of "Total Fat"? This does not mean that the food item contains 6 percent of its calories from fat. In fact, this food item contains 23 percent of its calories from fat (35 fat kilocalories ÷ 154 total kilocalories = 0.23, or 23 percent fat kilocalories). The 6 percent refers to the Daily Values. You can see that a person who consumes 2,000 kilocalories per day could consume up to 65 grams of fat per day. This product contributes just 4 grams per serving, which is 6 percent of that amount (4 ÷ 65 = 0.06, or 6 percent). Note that the Percent Daily Value (%DV) for saturated fat is 12 percent, so just a few servings of this food can contribute quite a bit of saturated fat to your diet. There is no %DV for trans fat, but intake should be kept as low as possible. Cholesterol also is listed on this label (20 milligrams), along with its Daily Value contribution (7 percent).

Nutrition Facts
Serving Size: 1 cup (248g)
Servings Per Container: 4
Amount Per Serving
Calories 154 — Calories from fat 35
Total Fat 4g — 6%
Saturated Fat 2.5g — 12%
Trans Fat 0.5g
Cholesterol 20mg — 7%
Sodium 170mg — 7%
Total Carbohydrate 19g — 6%
Dietary Fiber 0g — 0%
Sugars 14g
Protein 11g
Vitamin A 4% · Vitamin C 6%
Calcium 40% · Iron 0%
* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

	Calories:	2,000	2,500
Total Fat	Less Than	65g	80g
Sat Fat	Less Than	20g	25g
Cholesterol	Less Than	300mg	300mg
Sodium	Less Than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Calories per gram:
Fat 9 · Carbohydrate 4 · Protein 4

The **Learning Portfolio** at the end of each chapter collects—in one place—all aspects of nutrition information students need to solidify their understanding of the material. The various formats will appeal to students according to their individual learning and studying styles.



Learning Portfolio

Key Terms

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Study Points

- There are three main classes of lipids: triglycerides, phospholipids, and sterols.
- Fatty acids are components of both triglycerides and phospholipids.
- Saturated fatty acids have no double bonds between carbon atoms in their carbon chains, monounsaturated fatty acids have one double bond, and polyunsaturated fatty acids have more than one double bond in their carbon chains.
- Two polyunsaturated fatty acids, linoleic acid and alpha-linolenic acid, are essential and must be supplied in the diet. Phospholipids and sterols are made in the body and do not have to be supplied in the diet.
- Essential fatty acids are precursors of hormone-like compounds called eicosanoids. These compounds regulate many body functions, including blood pressure, heart rate, inflammation, and immune response.
- Triglycerides are food fats and storage fats. They are composed of glycerol and three fatty acids.
- In the body, triglycerides are an important source of energy. Stored fat provides an energy reserve.
- Phospholipids are made of glycerol, two fatty acids, and a compound containing phosphate and nitrogen.
- Phospholipids are components of cell membranes and lipoproteins. Having both fat- and water-soluble components allows them to be effective emulsifiers in foods and in the body.
- Cholesterol is found in cell membranes and is used to synthesize vitamin D, bile salts, and steroid hormones. High levels of blood cholesterol are associated with increased heart disease risk.
- For adults, the Acceptable Macronutrient Distribution Range (AMDR) for fat is 20 to 35 percent of calories.
- Diets high in fat and saturated fat tend to increase blood levels of LDL cholesterol and increase risk for heart disease.
- Excess fat in the diet is linked to obesity, heart disease, and some types of cancer.

Study Questions

1. What do the terms *saturated*, *monounsaturated*, and *polyunsaturated* mean with regard to fatty acids?
2. What does the hardness or softness of a fat typically signify?
3. Name the two essential fatty acids.
4. What is the most common form of lipid found in food?
5. List the many functions of triglycerides.
6. What are the positive and negative consequences of hydrogenating a fat?
7. Which foods contain cholesterol?
8. Describe the difference between LDL and HDL in terms of cholesterol and protein composition.
9. List the recommendations for intake of total fat, saturated fat, and cholesterol.

Try This

The Fat = Fullness Challenge

The goal of this experiment is to see whether fat affects your desire to eat between meals. Do this experiment for two consecutive breakfasts. Each meal is to include only

Key Terms lists all new vocabulary alphabetically with the page number of the first appearance. This arrangement allows students to review any terms they do not recall and turn immediately to the definition and discussion of it in the chapter. This approach promotes the acquisition of knowledge rather than simple memorization.

Study Questions encourage students to probe deeper into the chapter content, making connections and gaining new insights. Although these questions can be used for pop quizzes, they also will help students review the chapter, especially students who study by writing out material.

Study Points summarize the content of each chapter with a synopsis of each major topic. The points are in the order in which they appear in the chapter, so related concepts flow together.

Try This activities provide suggestions for hands-on activities that encourage students to put theory into practice. It will especially help students whose major learning style is experiential.

The Integrated Learning and Teaching Package

Qualified instructors can receive extensive Instructor Resources by contacting their Nutrition Account Specialist. Available resources include:

- Test Bank, including more than 850 questions
- Slides in PowerPoint format, featuring more than 500 slides
- Instructor's Manual, containing lecture outlines, discussion questions, and answers to the in-text Study Questions
- Image Bank, supplying key figures from the text
- Sample Syllabus, showing how a course can be structured around this text
- Transition Guide, providing guidance in switching from the previous edition

EatRight Analysis

Dietary analysis software is an important component of the behavioral change and personal decision-making focus. **EatRight Analysis**, developed by ESHA Research and available through Jones & Bartlett Learning, provides software that enables students to analyze their diets by calculating their nutrient intake and comparing it to recommended intake levels. EatRight Analysis offers dietary software online at eatright.jblearning.com. With this online tool, you and your students can access personal records from any computer with Internet access. Through a variety of reports, students learn to make better choices regarding their diet and activity levels.

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Chapter 1

Food Choices: Nutrients and Nourishment

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THINK About It

1. What, if anything, might persuade or influence you to change your food preferences?
2. Are there some foods you definitely avoid? If so, do you know why?
3. What do you think is driving the popularity of vitamins and other supplements?
4. Where do you get the majority of your information about nutrition?

LEARNING Objectives

1. Define nutrition.
2. Identify factors that influence food choices.
3. Describe the typical American diet.
4. Identify the six classes of nutrients essential for health.
5. Describe the basic steps in the nutrition research process.
6. Identify reliable sources of nutrition information.

A group of friends goes out for pizza every Thursday night. A young adult greets his girlfriend with a box of chocolates. A 5-year-old imitates her parents after they salt their food. A firefighter who is asked to explain why hot dogs are his favorite food says it has something to do with going to baseball games with his father. A parent punishes a misbehaving child by withholding dessert. What do these people have in common? They are all using food for something other than its nutrient value. Can you think of a holiday that is not celebrated with food? For most of us, food is more than a collection of nutrients. Many factors affect what we choose to eat. Many of the foods people choose are nourishing and contribute to good health. The same, of course, may be true of the foods we reject.

nutrition The science of foods and their components (nutrients and other substances), including the relationships to health and disease (actions, interactions, and balances); processes within the body (ingestion, digestion, absorption, transport, functions, and disposal of end products); and the social, economic, cultural, and psychological implications of eating.

The science of **nutrition** helps us improve our food choices by identifying the amounts of nutrients we need, the best food sources of those nutrients, and the other components in foods that may be helpful or harmful. Learning about nutrition will help us make better choices and not only improve our health, but also reduce our risk of disease and increase our longevity. Keep in mind, though, that no matter how much you know about nutrition, you are still likely to choose some foods simply for their taste or just because they make you feel good.

Why Do We Eat the Way We Do?

Do you "eat to live" or "live to eat"? For most of us, the first is certainly true—you must eat to live. But there may be times when our enjoyment of food is more important to us than the nourishment we get from it. We use food to project a desired image, forge relationships, express friendship, show creativity, and disclose our feelings. We cope with anxiety or stress by eating or not eating; we reward ourselves with food for a good grade or a job well done; or, in extreme cases, we punish failures by denying ourselves the benefit and comfort of eating. Food choices are influenced by many factors, such as age, gender, genetic makeup, occupation, lifestyle, family, and cultural background. Exploring each of these areas may help you understand why you prefer certain foods.

Personal Preferences

What we eat reveals much about who we are. Food preferences begin early in life and then change as we interact with parents, friends, and peers. Further experiences with different people, places, and situations often cause us to expand or change our preferences. Taste and other sensory factors such as texture are the most important things that influence our food choices; next are cost and convenience.[1]

Age is a factor in food preferences. Consider how taste preferences might be influenced even before birth. Science shows that children naturally prefer higher levels of sweet and salty tastes and reject lower levels of bitter tastes compared to adults.[2] This might help explain why kids are especially vulnerable to our current food environment, which is filled with foods high in salt and refined sugars.[3] In support of this idea, studies have found that sensory experiences, beginning early in life, can shape preferences in both a positive and a negative way.[4] For example, an expecting mother who consumes a diet rich in healthy foods can help develop her child's taste preferences in a positive way because flavors from foods that the mother eats are transmitted to amniotic fluid and to mother's milk, creating an environment in which breastfed infants are more accepting of these flavors. In contrast, infants fed formula learn to prefer its unique flavor profile and may have more difficulty

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Figure 1.1 **Adventures in eating.** Babies and toddlers are generally willing to try new things.

Sensory Influence

Taste
Smell
Texture

Environmental Factors

Economic
Lifestyle
Food availability
Culture
Religion
Geographic location
Environment

Social, Emotional, and Cognitive Factors

Habits
Food likes and dislikes
Knowledge and attitudes related to diet and health
Personal values
Comfort/discomfort foods
Food marketing, advertising, and promotion
Food and diet trends

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Figure 1.2 **Factors that affect food choices.** We often select a food to eat automatically without thought. But in fact, our choices are complex events involving the interactions of a multitude of factors.

initially accepting flavors not found in formula, such as those of fruit and vegetables.[5] Early-life experiences with healthy tastes and flavors may go a long way toward promoting healthy eating throughout a person's life span.[6]

Young children prefer sweet or familiar foods; babies and toddlers are generally willing to try new things. (See **Figure 1.1**.) Experimental evidence suggests that when children are repeatedly exposed to a variety of foods, particularly when the caregiver encourages the child's willingness to eat that food, they are more likely to accept those foods. As a result, the child will add more variety to their diet and, therefore, eat more healthy.[7] Preschoolers typically go through a period of food **neophobia**, a dislike for anything new or unfamiliar. School-age children tend to accept a wider array of foods, and teenagers are strongly influenced by the preferences and habits of their peers. If you track the kinds of foods you have eaten in the past year, you might be surprised to discover how few basic foods your diet includes. By the time we reach adulthood, we have formed a core group of foods we prefer. Of this group, only about 100 basic items account for 75 percent of our food intake.

neophobia A dislike for anything new or unfamiliar.

Like many aspects of human behavior, food choices are influenced by many interrelated factors. Generally, hunger and satiety dictate when we eat, but what we choose to eat is not always determined by physiological or nutritional needs. When we consider that our food preferences are also dictated by factors such as the sensory properties of foods (taste, smell, and appearance), social, emotional, and cognitive factors (habits, food likes and dislikes, knowledge and attitudes related to diet and health, personal values, etc.), and environmental factors (economics, lifestyle, food availability, culture, religion, and socio-economics), we can better understand why we choose to eat the foods that we do. (See **Figure 1.2**.)

Quick Bite

Try it Again, You Just Might Like It

Studies have found that neophobia is most common in children between the ages of 2 and 6 years. This is also the time when kids are most likely to reject vegetables. Kids can overcome this tendency if they are repeatedly exposed to the food they initially reject.

Sensory Influences: Taste, Texture, and Smell

In making food choices, what appeals to our senses also contributes to our personal preferences. People often refer to **flavor** as a collective experience that describes both taste and smell. Texture also plays a part. You may prefer

flavor The collective experience that describes both taste and smell.

foods that have a crisp, chewy, or smooth texture. You may reject foods that feel grainy, slimy, or rubbery. Other sensory characteristics that affect food choice are color, moisture, and temperature.

We are familiar with the classic four tastes—sweet, sour, bitter, and salty—but studies show that there are more. One of these additional taste sensations is **umami**. Umami is a Japanese term for the taste produced by glutamate.[8] It is the brothy, meaty, savory flavor in foods such as meat, seafood, and vegetables. Monosodium glutamate (MSG) enhances this flavor when it is added to such foods.

umami [ooh-MA-mee] A Japanese term that describes a delicious meaty or savory sensation. Chemically, this taste detects the presence of glutamate.

Social, Emotional, and Cognitive Influences

Habits

Your eating and cooking habits likely reflect what you learned from your parents. We typically learn to eat three meals a day, at about the same times each day. Quite often we eat the same foods, particularly for breakfast (e.g., cereal and milk) and lunch (e.g., sandwiches). This routine makes life convenient, and we don't have to think much about when or what to eat. But we don't have to follow this routine! How would you feel about eating mashed potatoes for breakfast and cereal for dinner? Some people might get a stomachache just thinking about it, whereas others may enjoy the prospect of doing things differently. Look at your eating habits and see how often you make the same choices every single day.

Quick Bite

Sweetness and Salt

Salt can do more than just make your food taste salty. Researchers at the Monell Chemical Senses Center demonstrated that salt also suppresses the bitter flavors in foods. When combined with chocolate, for example, in a chocolate-covered pretzel, salt blocks some of the bitter flavor, making the chocolate taste sweeter. This may explain why people in many cultures salt their fruit.

Comfort/Discomfort Foods

Our desire for particular foods often is based on behavioral motives, even though we may not be aware of them. For some people, food becomes an emotional security blanket. Consuming our favorite foods can relieve stress, reduce anxiety, and make us feel better. (See **Figure 1.3**.) Starting with the first days of life, food and affection are intertwined. Breastfed infants, for example, experience physical, emotional, and psychological satisfaction when nursing. As we grow older, this experience is continually reinforced. For example, chicken soup and hot tea with honey may be favorites when we feel under the weather because someone had prepared those foods for us when we were not feeling well. If we were rewarded for good behavior with a particular food (e.g., ice cream, candy, cookies), our positive feelings about that food may persist for a lifetime.

In contrast, children who have negative associations with certain foods are unlikely to choose those foods as adults. Maybe you avoid a certain food because you think it will make you sick. At some point in your childhood, you may have gotten sick soon after eating that food; consequently, the two events are linked forever.

Figure 1.3 **Comfort foods.** Depending on your childhood food experiences, a bowl of traditional soup, a remembered sweet, or a mug of hot chocolate can provide comfort in times of stress.

Food Advertising and Promotion

It may not surprise you that some of the most popular food products are high-fat and high-sugar baked goods and alcoholic beverages. Aggressive and sometimes deceptive advertising programs can influence people to buy foods of poor nutritional quality. However, we are seeing more innovative and aggressive advertising from the commodity boards that promote milk, meat, cranberries, and other more nutrient-dense products.

According to the Federal Trade Commission (FTC), businesses spend $9.6 billion annually marketing food and beverages. More than $1.79 billion specifically targets children and adolescents, promoting items such as sugared breakfast cereals, fast food, and soft drinks.[9] Food companies have increased spending on media such as online, mobile, and viral marketing

to children and teens.[10] Children and teens see about 12–16 TV advertisements per day for products generally high in saturated fat, sugar, or sodium.[11] Some researchers have linked the high prevalence of obesity among U.S. children to their exposure to TV food advertisements. When compared to other countries, for children ages 6 to 11 years old, the contribution of TV food ads to the occurrence of childhood obesity was greatest among the U.S. population.[12]

Some advertising is positive. Ads like the one shown in **Figure 1.4**, for example, can be helpful, especially to consumers whose diets need improvement.

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Courtesy of the Milk Processor Education Program.

Figure 1.4 **Healthy advertising.** Got milk? is an example of a successful healthy advertising campaign.

Eating Away from Home

Americans spend almost half of their food budget on foods prepared away from home.[13] Many people, however, underestimate the amount of calories and fat in foods prepared away from home, which is likely contributing to increasing weight and obesity.[14] This trend has promoted an increase in interest for information on calories, fat, sodium, and other nutrients on menus. When calories are present on menus, people order foods with fewer calories compared to those ordering from menus without calories identified,[15] and parents order foods with fewer calories for their children.[16] A number of cities and states have implemented laws that require full-service restaurant chains to list values for calories, sodium, fat, and carbohydrates for each item on all printed menus. This effort has been associated with better food choices among a segment of the public who is dining at these restaurants.[17]

Food and Diet Trends

The popularity of different diets can influence changes in food product consumption. Beginning in the late 1980s, low-fat diets became popular and were accompanied by an explosion of reduced-fat, low-fat, and fat-free products. When the low-carbohydrate diet became popular, there was a rise in low-carb and no-carb products. Diet and health-related products also compete for consumer dollars. For example, sales of gluten-free products in the United States continue to rise due to the increased diagnosis of celiac disease and the belief that eliminating gluten from the diet will treat other conditions as well.[18] Current consumer trends include locally grown and prepared foods, a desire for raw and whole foods, foods that are free from common allergens, healthy snack foods, and of course, foods that are easy to prepare. These food trends are sure to have an effect on consumer food purchases.

Social Factors

Social factors exert a powerful influence on food choice. Food is at the center of many social gatherings, parties, and events. Food often is the focus of family reunions, ice cream socials, and office holiday parties. When someone moves in, is sick, has a birthday, or has had a bad day at work—we bring food. Parents are influential models for infants and children. They learn which foods and combinations of foods are appropriate to consume and under what circumstances. Perhaps even more influential, though, are the messages from peers about what to eat or how to eat.

As **Figure 1.5** illustrates, eating is a social event that brings together different people for a variety of purposes (e.g., religious or cultural celebrations, business meetings, family dinners). Social pressures, however, also can restrict our food intake and selection. We might, for example, order nonmeat dishes when dining with a group of vegetarian friends.

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Figure 1.5 **Social facilitation.** Interactions with others can affect your eating behaviors.

Figure 1.6 **Where do you get your nutrition information?** We are constantly bombarded by food messages. Which sources do you find most influential? Are they also the most reliable?

Nutrition and Health Beliefs

Many people select and emphasize certain foods they think are "good for them." (See **Figure 1.6**.) Consumer health beliefs, perceptions of disease susceptibility, and desires to take action to prevent or delay disease onset can have powerful influences on diet and food choices. For example, people who feel vulnerable to disease and believe that dietary change might lead to positive results are more likely to pay attention to information about links among dietary choices, dietary fat, and health risks. A desire to lose weight or alter one's physical appearance also can be a powerful force shaping decisions to accept or reject particular foods.

Key Concepts Many factors influence our decisions about what to eat and when to eat. Some of the main factors include personal preferences such as taste, texture, and smell; our habits with eating; the emotional connections of comfort or discomfort that are linked to certain foods; advertisements and promotions; and whether we choose to eat our meals at home or away from home. The cultural environment in which people live also has a major influence on what foods they choose to eat.

Environmental Influences

Your environment—where you live, how you live, who you live with—has a lot to do with what you choose to eat. People around us influence our food choices, and we prefer the foods we grew up eating. Environmental factors that influence our food choices include economics, lifestyle, culture, and religion. Where you live and the surrounding climate also influence which foods are most accessible to you. Environmental factors such as location and climate affect food costs, a major determinant of food choice. In the United States, our environment and the choices we make play a large role in the current obesity epidemic. The **obesogenic environment** in which many of us live promotes overconsumption of calories while at the same time discourages physical activity. Other environmental factors include economics, lifestyle, availability, cultural influences, religion, and the social-ecological model.

obesogenic environment Circumstances in which a person lives, works, and plays in a way that promotes the overconsumption of calories and discourages physical activity and calorie expenditure.

Economics

Where you live and the surrounding climate influence which foods are most accessible to you. Environmental factors such as location and climate also affect food costs, a major determinant of food choice. You may have "lobster taste" but a "hot dog budget." The types of foods purchased and the percentage of income used for food are affected by total income. Households spend more money on food when incomes rise. In 2012, middle income families spent an average of $5,798 annually on food, representing about 12 percent of income, whereas the lowest income households spent an average of $3,502 on food, representing 35 percent.[19] How much does it cost to follow dietary recommendations? For adults on a 2,000-calorie diet, the cost of meeting the *Dietary Guidelines for Americans* recommendations for fruit and vegetable consumption is $2.00 to $2.50 per day, according to an analysis by the U.S. Department of Agriculture (USDA).[20]

Lifestyle

Another influential factor dictating our food choices is lifestyle. Our fast-paced society has little time or patience for food preparation. Convenience foods, from frozen entrees to complete "meals in a box," saturate supermarket shelves. Rising incomes and busier lifestyles have led consumers to spend less time cooking and more time seeking the convenience of food prepared away from home.[21]

Food Availability

Poor access to healthy, nutritious foods can negatively affect food choices, and therefore health and well-being. Approximately 23.5 million Americans, including 6.5 million children, live in nutritional wastelands commonly referred to as *food deserts*. According to the Centers for Disease Control and Prevention (CDC), "Food deserts are areas that lack access to affordable fruits, vegetables, whole grains, low-fat milk, and other foods that make up the full range of a healthy diet."[22]

Not only do many people who live in food deserts lack the ability to get fresh, healthy, and affordable foods easily, but they often rely on "quick markets" that offer mostly highly processed, high-sugar, and high-fat foods. Their communities often lack healthy food providers, such as grocery stores and farmers' markets. In these neighborhoods, food needs typically are served by inexpensive restaurants and convenience stores, which offer little fresh food. As part of its Let's Move! initiative, the Healthy Food Financing Initiative (HFFI) plans to help revitalize neighborhoods by eliminating food deserts that exist across urban and rural areas in the United States.[23]

Cultural Influences

One of the strongest influences on food preferences is tradition or cultural background. In all societies, no matter how simple or complex, eating is the primary way of initiating and maintaining human relationships.

To a large extent, culture defines our attitudes. "One man's food is another man's poison." Look at **Figure 1.7**. How does the photo make you feel? Insects, maggots, and entrails are delicacies to some, whereas just the thought of ingesting them is enough to make others retch. So powerful are cultural forces that if you were permitted only a single question to establish someone's food preferences, a good choice would be "What is your ethnic background?"[24] (See the FYI feature "Food and Culture.")

Knowledge, beliefs, customs, and habits all are defining elements of human culture.[25] Although genetic characteristics tie people of ethnic groups together, culture is a learned behavior and, consequently, can be modified through education, experience, and social and political trends.[26]

In many cultures, food has symbolic meanings related to family traditions, social status, and even health.[27] Indeed, many folk remedies rely on food. Some of these have gained wide acceptance, such as the use of spices and herbal teas for purposes ranging from allaying anxiety to preventing cancer and heart disease.[28] Just as cultural distinctions eventually blur when ethnic groups take part in the larger U.S. culture, so do many of the unique expectations about the ability of certain foods to prevent disease, restore health among those with various afflictions, or enhance longevity. Food habits are among the last practices to change when an immigrant adapts to a new culture.[29]

Religion

Food is an important part of religious rites, symbols, and customs. Some religious rules apply to everyday eating whereas others are concerned with special celebrations. Christianity, Judaism, Hinduism, Buddhism, and Islam, for example, all have distinct dietary laws, but within each religion different interpretations of these laws give rise to variations in dietary practices.

Social-Ecological Model

The social-ecological model included in the *Dietary Guidelines for Americans* is designed to illustrate how individual factors, environmental settings, various sectors of influence, and social and cultural elements of society overlap

Quick Bite

Bad Food Habits Are Hard to Break

Developing bad habits like eating while watching TV, eating in the car, skipping breakfast, or eating too quickly are easy to develop and hard to break. If you are guilty of eating too quickly, slow down, relax, chew your food, and enjoy the taste of what you are eating. It takes about 20 minutes for your stomach to tell your brain that it is full. If you wait to stop eating until you actually feel full, you have already overeaten, and if you end the meal with a high calorie dessert—that is a lot of extra calories!

© DK. Khattiya/Alamy Images.

Figure 1.7 **Cultural influences.** If you were visiting China, would you sample the local delicacy—deep-fried scorpion?

Quick Bite

Nerve Poison for Dinner?

The puffer fish is a delicacy in Japan. Danger is part of its appeal; eating a puffer fish can be life threatening! The puffer fish contains a poison called tetrodotoxin (TTX), which blocks the transmission of nerve signals and can lead to death. Chefs who prepare the puffer fish must have special training and licenses to prepare the fish properly, so diners feel nothing more than a slight numbing feeling.

Quick Bite

Does Being Overweight Spread from Person to Person?

The spread of obesity in social networks appears to be a factor in the obesity epidemic. Likewise, this also suggests that it may be possible that peers can have the same effect in the opposite direction, slowing the spread of obesity.

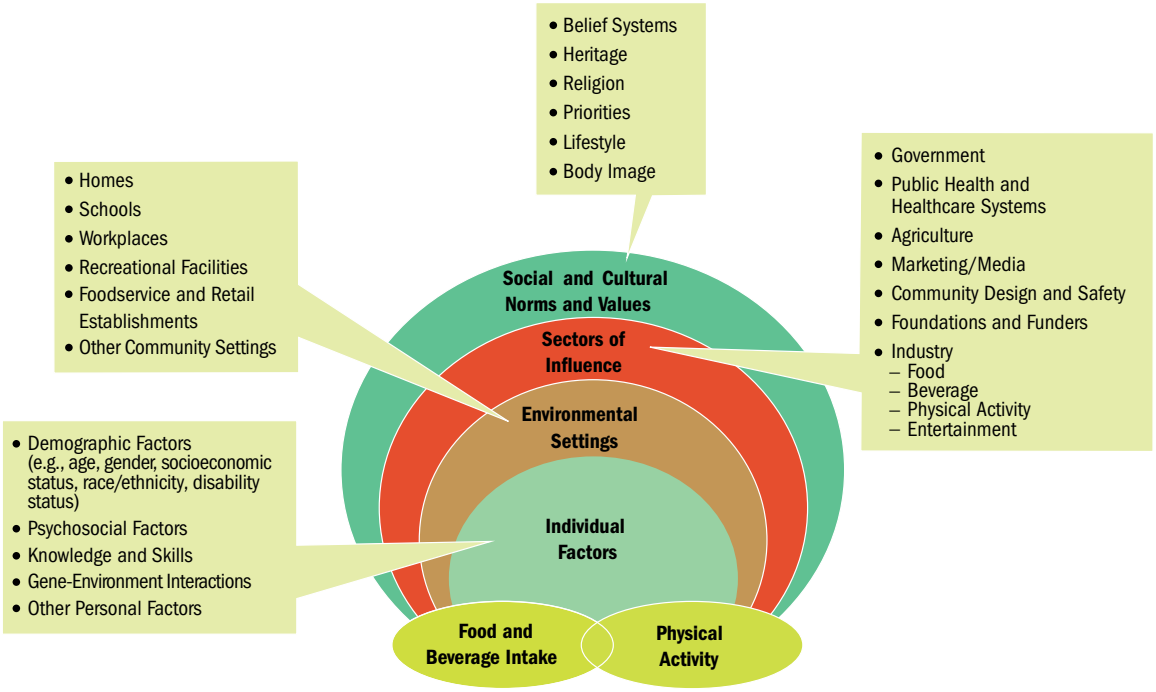

Figure 1.8 **A social ecological framework for nutrition and physical activity decisions.**
Sources: Adapted from: Centers for Disease Control and Prevention, Division of Nutrition, Physical Activity, and Obesity. State *Nutrition, Physical Activity and Obesity (NPAO) program: Technical assistance manual.* January 2008, page 36. http://www.cdc.gov/obesity/downloads/TA_Manual_1_31_08.pdf. Accessed April 21, 2010; Institute of Medicine. Preventing Childhood Obesity: Health in the Balance. Washington, DC: National Academies Press; 2005: 85; Story M, Kaphingst KM, Robinson-O'Brien R, Glanz K. Creating healthy food and eating environments: Policy and environmental approaches. *Annu Rev Public Health.* 2008;29:253–272.

to form the food and physical activity choices for an individual.[30] You can use the social-ecological model to think about how your current food and physical activity choices affect your calorie balance and risk for chronic diseases (**Figure 1.8**).

Key Concepts The cultural environments in which people grow up have a major influence on what foods they prefer, what foods they consider edible, and what foods they eat in combination and at what time of day. Many factors work to define a group's culture: environment, economics, access to food, lifestyle, traditions, and religious beliefs. As people from other cultures immigrate to new lands, they will adopt new behaviors consistent with their new homes. However, food habits are among the last to change. The social-ecological model of food and physical activity behavior shows how individual factors, environmental settings, sectors of influence, and cultural social values influence our food and physical activity behavior.

The American Diet

What, then, is a typical *American diet*? As a country influenced by the practices of so many cultures, religions, backgrounds, and lifestyles, there is no easy, single answer to this question. The U.S. diet is as diverse as Americans themselves, even though many people around the world imagine that the American diet consists mainly of hamburgers, french fries, and cola drinks. Our fondness for fast food and the marketability of such restaurants overseas make them seem like icons of American culture—and many of the stereotypes are true. The most commonly consumed grain product in the United States is white bread, the favorite meat is beef, and the most frequently eaten vegetable is the potato, usually as french fries. Despite the variety available to us, the American diet is still heavy on meat and potatoes and light on fruits, vegetables, low-fat dairy, and whole grains. Americans ages 2 and older consume, on average, 2,157 calories daily.[31] Grain-based desserts (e.g., cookies, cakes, pastries), soda, pizza, and alcohol are among the top 10 sources of

Table 1.1 Top 10 Sources of Calories Among Americans Age 2 Years or Older, NHANES 2005-2006[a]

Rank	Overall, Age 2+ Years (Total Daily Calories = 2,157)
1	Grain-based desserts[b] (138 kcal)
2	Yeast breads[c] (129 kcal)
3	Chicken and chicken mixed dishes[d] (121 kcal)
4	Soda/energy/sports drinks[e] (114 kcal)
5	Pizza (98 kcal)
6	Alcoholic beverages (82 kcal)
7	Pasta and pasta dishes[f] (81 kcal)
8	Tortillas, burritos, and tacos[g] (80 kcal)
9	Beef and beef mixed dishes[h] (64 kcal)
10	Dairy desserts[i] (62 kcal)

[a] Data are drawn from analyses of usual dietary intakes conducted by the National Cancer Institute. Foods and beverages consumed were divided into 97 categories and ranked according to calorie contribution to the diet. Table shows each food category and its mean calorie contribution for each age group. Additional information on calorie contribution by age, gender, and race/ethnicity is available at http://riskfactor.cancer.gov/diet/foodsources.
[b] Includes cake, cookies, pie, cobbler, sweet rolls, pastries, and donuts.
[c] Includes white bread or rolls, mixed-grain bread, flavored bread, whole-wheat bread, and bagels.
[d] Includes fried or baked chicken parts and chicken strips/patties, chicken stir-fries, chicken casseroles, chicken sandwiches, chicken salads, stewed chicken, and other chicken mixed dishes.
[e] Sodas, energy drinks, sports drinks, and sweetened bottled water, including vitamin water.
[f] Includes macaroni and cheese, spaghetti, other pasta with or without sauces, filled pasta (e.g., lasagna, ravioli), and noodles.
[g] Also includes nachos, quesadillas, and other Mexican mixed dishes.
[h] Includes steak, meatloaf, beef with noodles, and beef stew.
[i] Includes ice cream, frozen yogurt, sherbet, milk shakes, and pudding.
Source: U.S. Department of Agriculture and U.S. Department of Health and Human Services. *Dietary Guidelines for Americans, 2010*. 7th Edition, Washington, DC: U.S. Government Printing Office; December 2010.

Table 1.2 Usual U.S. Intake, Average Daily Intake at or Adjusted to a 2,000-Calorie Level

Pattern *Food Groups*	Usual U.S. Intake Adults[a]
Vegetables: total (c)	1.6
Dark-green (c)	0.1
Beans and pasta (c)	0.1
Red and orange (c)	0.4
Other (c)	0.5
Starchy (c)	0.5
Fruit and juices (c)	1.0
Grains: total (oz)	6.4
Whole grains (oz)	0.6
Milk and milk products (dairy products) (c)	1.5
Protein Foods	
Meat (oz)	2.5
Poultry (oz)	1.2
Eggs (oz)	0.4
Fish/seafood (oz)	0.4
Beans and pasta (oz)	See vegetables
Nuts, seeds, and soy products (oz)	0.5
Oils (g)	18
Solid fats (g)	43
Added sugars (g)	79
Alcohol (g)	9.9

c = cups; oz = ounces; g = grams
[a] **Source:** U.S. Department of Agriculture, Agricultural Research Service, and U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. What We Eat in America, NHANES 2001–2004. 1 day mean intakes for adult males and females, adjusted to 2,000 calories and averaged. http://www.cdc.gov/nchs/nhanes/wweia.htm. Accessed Nov 12, 2014.
Source: U.S. Department of Agriculture, U.S. Department of Health and Human Services. *Dietary Guidelines for Americans, 2010*. 7th ed. Washington, DC: US Government Printing Office; December 2010.

daily calories (see **Table 1.1**).[32] **Table 1.2** shows the usual U.S. intake from each food group based on a 2,000-calorie diet.

So, how healthful is the "American" diet? As shown in **Figure 1.9**, Americans are not eating enough nutrient-dense foods that are important for good health and too much of the foods known to be harmful. Together, solid fats and added sugars contribute nearly 800 calories per day while providing no important nutrients.[33] Soda, sugar-sweetened beverages, and grain-based desserts are the major sources of added sugars for many Americans. Regular cheese, grain-based desserts, and pizza are the top contributors of solid and saturated fat in the American diet. In addition, Americans of all age groups are eating more than the recommended amounts of sodium, mainly in the form of processed foods.[34]

Although we are bombarded with information about health and nutrition, this doesn't necessarily translate into better food choices. People are not