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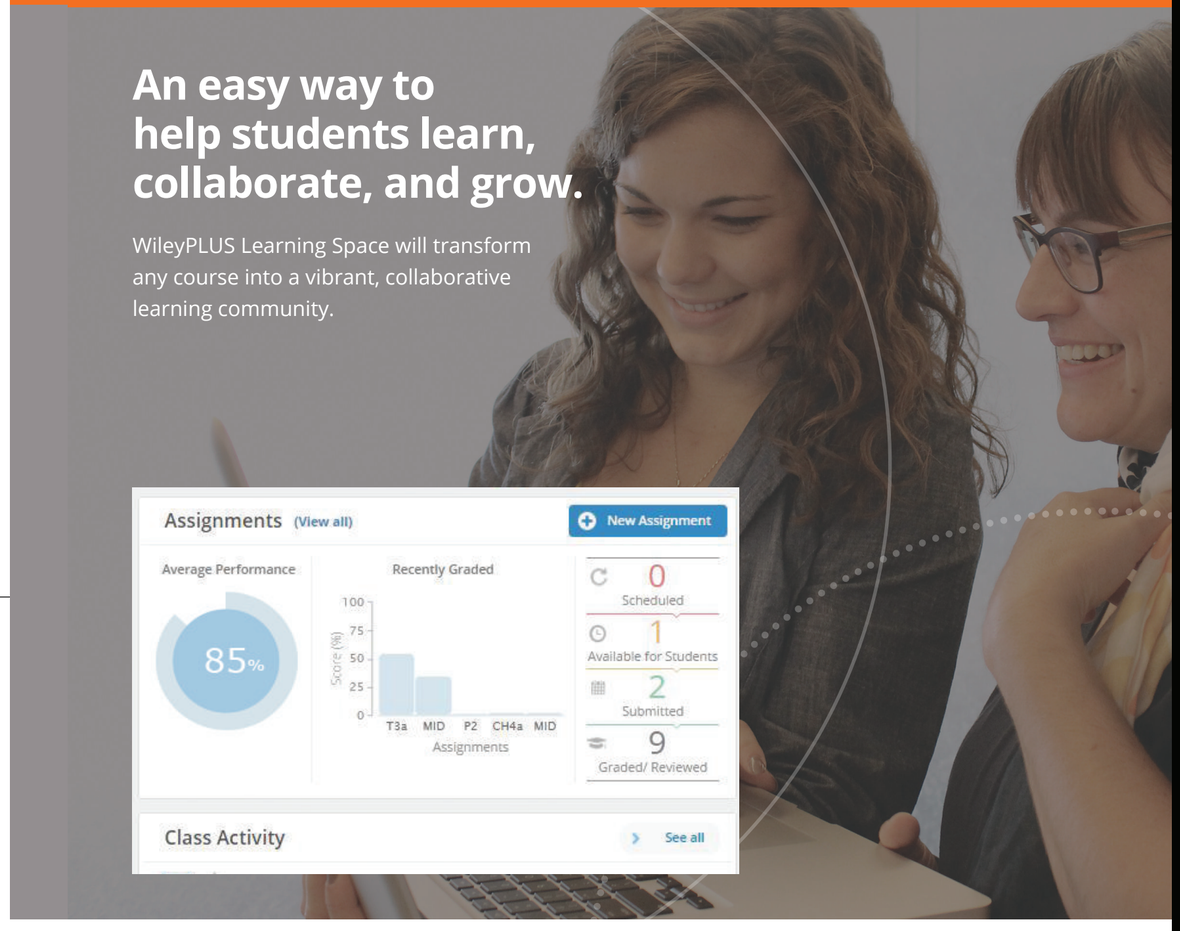

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DRUMMOND & BREFERE

NUTRITION for Foodservice and Culinary Professionals Ninth Edition

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for Foodservice and Culinary Professionals

Ninth Edition

KAREN EICH DRUMMOND & LISA M. BREFERE

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Ed.D., R.D.N., L.D.N., F.A.N.D., F.M.P. C.E.C., A.A.C.

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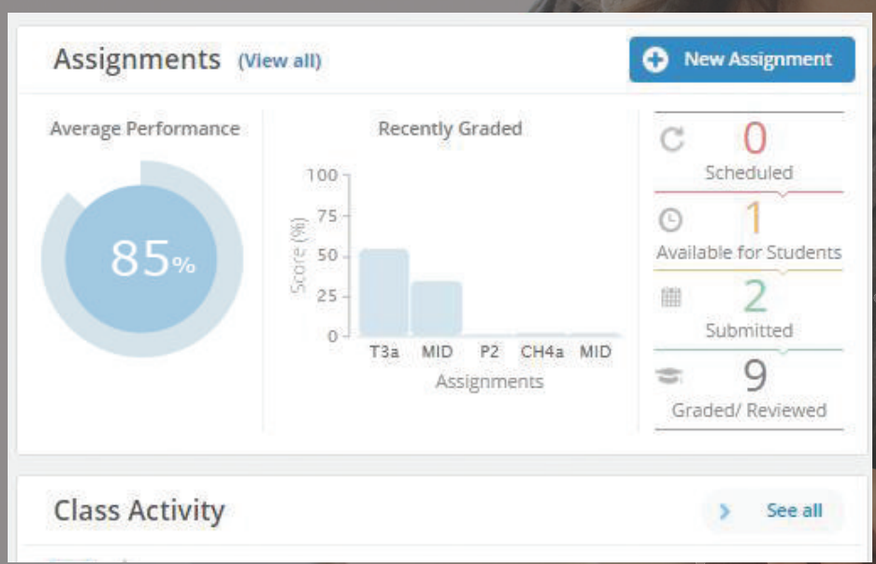

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In memory of my parents, Frank and Doris Eich.

KAREN EICH DRUMMOND

To my husband, Joe, and
my four children, Joe Jr., Julia, John, and Jeremy.

Thank you for inspiring and motivating my passion for wholesome, balanced, and pure cooking through moderation in ingredients and without compromising taste, flavor, presentation, or satisfaction. The kitchen is truly the hub of our family.

LISA M. BREFERE

Contents

Preface

Nutrition for Foodservice and Culinary Professionals, Ninth Edition, is written for students in culinary programs, as well as those in hotel, restaurant, and onsite management programs. Practicing culinary and management professionals will find it useful as well. As with previous editions, this is meant to be a practical how-to book tailored to the needs of students and professionals.

Nutrition is constantly in the news, with reports on how to lose weight, choose good fats, eat vegetarian foods, and many more topics being streamed on the Internet 24/7 and reported by other media as well. Hectic lifestyles force many people to eat out or get take-out meals several times a week. As a foodservice professional, you have a responsibility to your clients to understand contemporary cooking techniques that are balanced, moderate in rich ingredients, well prepared, and, of course, great tasting. You have a captive audience of people who depend on the chefs, cooks, and foodservice employees to prepare nutritious foods for them with the balance they require to maintain their current lifestyles.

This book is written to help you use nutritional principles to examine your own diet as well as evaluate and modify menus and recipes and respond knowledgeably to customers' questions and needs. As in the previous editions, co-author Lisa Brefere, C.E.C., A.A.C., lends her firsthand experiences applying nutrition to selecting, cooking, and menuing balanced foods in restaurants and food services.

WHAT'S NEW FOR THE NINTH EDITION

Each chapter of this book has been revised and updated using current nutrition and culinary knowledge and applications. Some major changes are noted below.

Latest nutrition news:

- The new 2015 Dietary Guidelines for Americans are included.
- The new food label to start in January 2018 is displayed, and its new features are discussed.
- Nutrition labeling in restaurants is also explained.

Overall changes:

- The text is more conversational and easier for students to read and understand.
- Many new photographs have been added to help students understand and review key concepts. For example, a chart shows the six classes of nutrients with photos of representative foods from each nutrient group.
- The "Hot Topics," which used to appear at the end of the chapters, are now incorporated into the chapters. This way, students won't miss important content such as sustainable food systems or weight loss myths.
- Chapters 1–8 have been streamlined to keep related topics together. For example, in the Carbohydrates chapter, the section on sugars includes sweeteners, low- or no-kcalorie sweeteners, and dietary recommendations for sugars.

Changes by chapter:

- Chapter 1: There is a new section, "Nutrition and Food Terms to Know," to make sure students are familiar with important terms, such as processed food or organic food, from the start. Also, sustainable food systems are discussed in detail in this chapter. New photographs show chefs, such as Daniel Humm, involved in farm-to-table activities. The chapter ends with a discussion of how to find reliable nutrition and health information.
- Chapter 2: New Dietary Guidelines for Americans (2015), changes to food labels, and nutrition labeling in restaurants are explained.
- Chapter 3–5 (Carbohydrates, Fat, Protein): In the carbohydrates chapter, a new chart with photos shows how much fiber is in different food groups. Likewise, in the fat chapter, a new chart with photos shows how much fat is in various food groups. New charts (with photos) in each of these chapters show ten ways to eat healthy carbohydrates, fats, and proteins. A new Question and Answer format in Chapter 5 introduces vegetarian eating to students.
- Chapters 6 and 7 (Vitamins, Water and Minerals): A chart at the end of each chapter summarizes the functions and sources of the vitamins or minerals. The Culinary Focus on fruits and vegetables in Chapter 6 has been expanded, with a new graphic showing how to store fruits and vegetables in a walk-in refrigerator.
- Chapter 8 (Building Flavor and Balanced Baking): The herb and spice charts have been updated and expanded, and now include photos. The chapter has been reorganized to show 10 ingredient groups, 10 preparation techniques, and 9 cooking methods to build flavor. Balanced baking is discussed at the end of chapter and includes new material and an expanded chart on baking substitutions.
- Chapters 9 (Recipe Makeovers) and 10 (Balanced Menus): More recipe makeovers and new culinary techniques and ideas are included, as well as new photos.
- Chapter 12 (Weight Management): The section on behavior modification has been expanded with a new summary chart. Also, new research on the 3500-kcalorie rule (you can lose one pound by eating 3500 fewer kcalories per week) is discussed.

ORGANIZATION

The Ninth Edition of *Nutrition for Foodservice and Culinary Professionals* is organized into three major parts, beginning with an introduction to nutrition and foods, then advice on developing healthy recipes and menus, and finally more on applying nutrition.

- **Part I: Fundamentals of Nutrition and Foods** (Chapters 1–7) consists of two introductory chapters, followed by five chapters on the nutrients. The first two chapters introduce basic nutrition concepts and explain how to use MyPlate, the Dietary Guidelines for Americans (2015), and food labels when planning menus. The next chapters focus on the nutrients: carbohydrates, fats, proteins, vitamins, water, and minerals.
- **Part II: Balanced Cooking and Menus** (Chapters 8–10) begins with a chapter dedicated to the foundations of balanced cooking, including descriptions of how to use

ingredients, preparation techniques, and cooking methods to create balanced, delicious dishes. In Chapter 9, Recipe Makeovers, Chef Lisa Brefere explains exactly how she accomplished each makeover, including many tips on ingredients and how to modify recipes and build flavor. These recipes include not only main dishes but also sauces, dressings, desserts, and others. Chapter 10, Balanced Menus, offers hundreds of examples of healthy menu items for meals and snacks, and includes examples of plate presentation.

- **Part III: Applied Nutrition** (Chapters 11–13) begins with a chapter that explains how to handle customers' special nutrition requests—such as no gluten or low sugar. Charts are given to help you determine which menu items would be appropriate for each section of the menu. Chapters 12 and 13 discuss weight management and lifespan nutrition. Chef Lisa Brefere includes many ideas on providing healthy meals to children.

LEARNING TOOLS

Nutrition for Foodservice and Culinary Professionals contains many special features that enable students to better understand concepts and extend and test their knowledge. These pedagogical tools include tables, charts, and illustrations, as well as the following.

- **Learning Objectives:** Each major section within a chapter corresponds to the learning objective for that section.
- **Key Terms and Concepts:** Whenever key terms and concepts are first introduced, their definitions can be found in the margin, located near the bolded term.
- **Chef's Tips:** Chef's Tips provide an experienced chef's advice on all aspects of cooking, including which foods go together, how to use foods' natural colors to create an attractive dish, and how to use culinary techniques to create healthy and delicious dishes.
- **Culinary Focus:** Culinary Focus examines various food groups from the perspective of a chef. Organized into "Chef's Tips: Preparing" and "Menus and Presentation," this feature is full of tips for you to use to produce tasty and healthy menu items. A Culinary Focus feature is found in Chapters 3–7, and each one covers foods that have the nutrients discussed in that chapter.
- **Summary:** Designed to help students focus on the important concepts within each section of the chapter, a summary is given at the end of each chapter.
- **Check-Out Quiz:** At the end of each chapter, a Check-Out Quiz allows students to check their comprehension of the chapter's concepts. Answers to odd-numbered questions are in Appendix C.
- **Glossary:** All key terms and definitions are listed in the Glossary, easily found in the back of the book.
- **Appendices:** A very useful reference for readers, the appendices include a variety of useful information, including serving sizes for MyPlate food groups and the Dietary Reference Intake charts. Additional appendix materials on the nutritive value of foods, food patterns, sample menus, recipes, and growth charts for children and adolescents can also be found on the Book Companion Website: www.wiley.com/college/drummond.

MEDIA AND SUPPLEMENTS

WileyPLUS Learning Space

A place where students can define their strengths and nurture their skills, **WileyPLUS Learning Space** transforms course content into an online learning community. **WileyPLUS Learning Space** invites students to experience learning activities, work through self-assessment, ask questions, and share insights. As students interact with the course content, each other, and their instructor, **WileyPLUS Learning Space** creates a personalized study guide for each student. Through collaboration, students make deeper connections to the subject matter and feel part of a community.

Through a flexible course design, instructors can quickly organize learning activities, manage student collaboration, and customize your course—having full control over content as well as the amount of interactivity between students.

WileyPLUS Learning Space lets the instructor:

- Assign activities and add your own materials
- Guide your students through what's important in the interactive e-textbook by easily assigning specific content
- Set up and monitor group learning
- Assess student engagement
- Gain immediate insights to help inform teaching

Defining a clear path to action, the visual reports in **WileyPLUS Learning Space** help both you and your students gauge problem areas and act on what's most important.

Create-a-Plate and Revise-a-Recipe

WileyPlus Learning Space contains **Create-a-Plate** and **Revise-a-Recipe** exercises for every chapter. **Create-a-Plate** interactive exercises help students create their own virtual plate of food by selecting from a menu and seeing real-time nutritional analysis based on their selections. In addition to creating balanced meals, students use this exercise to create meals with specific guidelines such as low in kcalories or high in fiber or protein.

Through the **Revise-a-Recipe** interactivity, students are provided recipes to revise to meet a specific nutritional goal. As ingredients are adjusted or substituted, they can see how the recipe's nutritional values change and if the goal is met. Both **Revise-a-Recipe** and **Create-a-Plate** activities can be saved and printed by students to hand in.

SUPPLEMENTARY MATERIALS

A ***Study Guide*** (ISBN: 978-1-119-27177-2) for students is available to help reinforce nutrition concepts and allow students to make nutrition applications.

A ***Companion Website*** (www.wiley.com/college/drummond) provides links to both the Student and Instructor Websites. The **Student Website** includes PowerPoints and interactive Worksheets for each chapter. The Student Website also includes Supplementary Recipes.

From the **Instructor Website**, instructors can download the Instructor's Manual as well as PowerPoint slides and Student Worksheets for each chapter. A selection of recipes are also available here.

An ***Instructor's Manual*** (available online) that includes class outlines, classroom activities, student worksheets, and test questions and answers is available. Please visit the Companion Website to download a copy.

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Introduction to Nutrition

LEARNING OBJECTIVES

- **Explain why nutrition is important, including the components of a healthy diet.**
- **Give examples of nutrition and food terms discussed in this section.**
- **Discuss five factors that influence what you eat.**
- **Identify factors that influence how many kcalories you burn each day, and the functions, kcalories, and Dietary Reference Intakes of each class of nutrients.**
- **Explain how food is digested and absorbed in the gastrointestinal tract.**
- **Give examples of how a chef may run a sustainable restaurant, particularly in terms of purchasing food.**
- **Identify reliable sources of nutrition and health information.**

1

INTRODUCTION

Since 2009, nutrition has been one of the top 20 food trends noted in the "What's Hot" annual survey of chefs conducted by the National Restaurant Association. Why does nutrition continue to be a hot topic for chefs and foodservice managers? Americans do continue to eat out for a meal or snack several times a week, but more importantly, surveys consistently report that over half of American adults are trying to eat more healthfully at restaurants now than they did in the past. In addition, at any point in time, more than half of American adults are watching their diets for reasons such as trying to lose weight or simply for general health.

Consumer habits have been changing. Fresh, quality foods have become more important to different ages—from millennials to baby boomers. Locally grown food and sustainability are not only chefs' priorities but also customer priorities. Growing chains around the country—including Tender Greens and LYFE Kitchen—offer organic produce, sustainable seafood, and local products. Other chains such as Seasons 52 use seasonally inspired ingredients and limit the kcalories in their menu items. Obviously, few restaurants limit kcalories, but most do offer some balanced options on their menus to bring in more customers.

As foodservice professionals, we have a responsibility to our clients to understand contemporary cooking techniques that are balanced, moderate in rich ingredients, and well prepared to possess nutrition stability. Balanced cooking encompasses an understanding of ingredients that help develop flavor. You can no longer rely on more than moderate use of salt, sugar, and butter/cream for flavor.

WHY IS NUTRITION IMPORTANT AND WHAT IS A HEALTHY DIET?

Nutrition A science that studies nutrients found in foods and their actions in the body. Nutrition also explores the relationship between nutrients and disease, as well as why you choose the type of diet you eat.

Nutrients The nourishing substances in food that provide energy and/or promote the growth and maintenance of your body.

Diet The foods and beverages you normally eat and drink, also called *eating pattern*.

Nutrition is a science that studies nutrients (such as protein or vitamin C) found in foods and their actions in the body. Nutrition is important because what you eat can affect your health. Almost daily you may hear or read news reports that something in the food you eat, perhaps a nutrient such as sugar, may not be good for you—that it may indeed cause or complicate conditions such as heart disease. Nutrition researchers look closely at the relationships between nutrients and disease, as well as how you choose what to eat.

Nutrients are the nourishing substances in food that give you energy, allow your body to grow, and keep you feeling healthy. They help regulate many processes that go on in your body, such as the beating of your heart and the digesting of food in your stomach. Examples of nutrients include carbohydrates, fats, protein, water, and vitamins.

In summary, nutrition is a science that studies nutrients and other substances in foods, and how they affect the body, especially in terms of health and disease. Nutrition also explores why you choose the foods you do—in other words, why you eat a certain type of diet.

Diet is a word that has several meanings. Anyone who has tried to lose weight has no doubt been on a diet. In this sense, diet means a weight-reducing diet and is often thought of in a negative way. But a more general definition of diet is the foods and beverages you normally eat and drink every day. Of course, your normal diet, or eating pattern, may change—for instance when you started college and had new places to eat.

So why are nutrition and diet important? Your lifestyle choices, such as diet and exercise, strongly influence whether you might get diseases such as heart disease. According to the Dietary Guidelines (2015) Committee, about half of all American adults have one or more preventable diseases that are related to poor diet and physical inactivity, including heart disease, high blood pressure, diabetes, and some cancers. In addition, more than two-thirds of

adults and nearly one-third of children and youth are overweight or obese, which also increases their risk for diseases.

Unfortunately, few, if any, improvements in Americans' food choices have been seen in recent decades. On average, the American diet is:

- *low* in vegetables, fruit, whole grains (such as whole-wheat bread or brown rice), and dairy; and
- *high* in kcalories, sodium (in salt), saturated fat (found in animal fats such as in beef or cheese), refined grains (anything made with white flour), and added sugars (such as in regular soft drinks).

Our intake of fruits and vegetables is especially low, and eating more has several benefits. First, most vegetables and fruits are major contributors of a number of nutrients that Americans don't get enough of—such as fiber and potassium. Second, consumption of vegetables and fruits is associated with reduced risk of heart disease and stroke. Third, most vegetables and fruits, when prepared without added fats or sugars, are low in calories.

The evidence examined by the 2015 Dietary Guidelines Committee identified a *healthy diet* as:

- *higher* in vegetables, fruits, whole grains, low- or non-fat dairy, seafood, legumes (beans and peas), and nuts;
- *moderate* in alcohol; and
- *lower* in red and processed meats and low in sugar-sweetened foods/drinks and refined grains.

Figure 1-1 shows components of a healthy diet.

FIGURE 1-1 A healthy dietary pattern is higher in vegetables, fruits, whole grains, low- or non-fat dairy, seafood, legumes, and nuts; moderate in alcohol; lower in red and processed meats; and low in refined grains and sugar-sweetened foods and drinks.
Photo by Peter Pioppo.

You can combine foods in a variety of flexible ways to achieve a healthy or balanced diet, and these strategies should be tailored to meet your health needs, dietary preferences, and cultural traditions. For most people, this will mean:

- improving food and menu choices, modifying recipes, and watching portion sizes
- including more fresh vegetables and fruits (processed are fine as long as they are not high in sodium or sugar)
- including more whole grains, seafood, nuts, legumes, and low/non-fat dairy or dairy alternatives, such as soymilk (without added sugars)
- reducing consumption of red and processed meats, refined grains, added sugars, and sodium
- replacing solid animal fats (such as butter) with vegetable oils and nuts (except palm or coconut oil)

Current research also strongly demonstrates that regular physical activity promotes health and reduces chronic disease risk.

Understanding good nutrition is important for you on both a personal and a professional level. This introductory chapter explores why we choose the foods we eat and then explains several important nutrition concepts that build a foundation for the remaining chapters. You will learn more about how to recognize whole foods, processed foods, and organic foods; kcalories and nutrients; and digestion.

NUTRITION AND FOOD TERMS TO KNOW

Whole foods Foods as we get them from nature; some may be minimally processed.

When people talk about food, you may hear some terms that you are not familiar with or are unsure of. **Whole foods** (besides being the name of a chain of natural and organic grocery stores) are foods pretty much as we get them from nature. Examples include eggs, fresh fruits and vegetables, beans and peas, whole grains, and fish (Figure 1-2). Whole foods are generally not processed or refined and do not have any added ingredients. Some whole foods, such as milk, are minimally processed to make it safe to drink. Fresh meat is also minimally processed so that consumers can buy just what they want.

Processed foods Foods that have been prepared using certain procedures such as canning, cooking, freezing, dehydration, or milling.

Processed foods (Figure 1-3) have been prepared using a certain procedure: milling (wheat is milled to make white flour), cooking and freezing (such as frozen pancakes or dinners), canning (canned vegetables), dehydrating (dried fruits), or culturing with bacteria (yogurt). In some cases, processing removes nutrients, as when whole wheat is milled to make white flour. In other cases, processing helps retain nutrients, as when freshly picked vegetables are frozen.

Whereas the food supply once contained mostly whole farm-grown foods, today's supermarket shelves are stocked with a lot of processed foods. Many processed foods contain parts of whole foods and often have added ingredients such as sugars and fats.

For instance, cookies are made with eggs and flour. Then sugar and fat are added. Highly processed foods, such as many breakfast cereals, cookies, crackers, sauces, canned or frozen soups, baking mixes, frozen entrées, snack foods, and condiments, are staples nowadays.

FIGURE 1-2 Whole foods are generally not processed or refined.

Photo by Peter Pioppo.

FIGURE 1-3 Processed foods are prepared various ways such as milling, cooking, freezing, or canning.

Photo by Peter Pioppo.

Enriched A food to which nutrients are added to replace the same nutrients that were lost in processing.

Fortified A food to which nutrients are added that were not present originally or nutrients are added that increase the amount already present.

When processing adds nutrients, the resulting food is either an **enriched** or a **fortified** food. For example, white flour must be enriched with several vitamins and iron to make up for some of the nutrients lost during milling. A food is considered enriched when nutrients are added to it to replace the same nutrients that are lost in processing.

Milk is often fortified with vitamin D because there are few good food sources of this vitamin. A food is considered fortified when nutrients are added that were not present originally or nutrients are added that increase the amount already present. For example, orange juice does not contain calcium, so when calcium is added to orange juice, the product is called calcium-fortified orange juice. Many breakfast cereals are fortified with some vitamins and minerals (Figure 1-4). Probably the most notable fortified food is iodized salt, introduced in 1924 to decrease iodine deficiency in Americans.

Natural Meat or poultry products that contain no artificial ingredient or added color and are only minimally processed; for other foods, natural means that there are no added colors, artificial flavors, or synthetic ingredients.

Another term you see on food labels is **natural**. When you are buying meat or poultry, natural products contain no artificial ingredient or added color and are only minimally processed. For other foods, natural means that there are no added colors, artificial flavors, or synthetic ingredients.

Organic foods Food produced without antibiotic or growth hormones, most conventional pesticides, fertilizers made with synthetic ingredients or sewage sludge, bioengineering, or ionizing radiation.

Organic foods are produced by farmers who emphasize the use of renewable resources and the conservation of soil and water to improve the environment for future generations. Organic meat, poultry, eggs, and dairy products come from animals that are given no antibiotics or growth hormones, and have access to the outdoors. Organic food is produced without using most conventional pesticides, fertilizers made with synthetic ingredients, bioengineering, or ionizing radiation. Before a product can be labeled organic, a government-approved certifier inspects the farm where the food is grown to make sure the farmer is following all the rules necessary to meet USDA organic standards. Companies that handle or process organic food before it gets to your local supermarket or restaurant must be certified, too.

Sometimes when consumers see a box of organic crackers or cookies, they mistakenly think that the product must be healthier and lower in kcalories than a nonorganic product. The truth is that an organic cookie does contain organic ingredients, but it could still use white flour, butter, and sugar just like the nonorganic cookie and contain an equal number of kcalories.

FIGURE 1-4 Fortified foods provide additional sources of nutrients.

Courtesy of B. Calkins/Shutterstock.

Products labeled "100 percent organic" must contain only organically produced ingredients. Products labeled "organic" must consist of at least 95 percent organically produced ingredients. Products meeting the requirements for "100 percent organic" and "organic" may display the USDA Organic seal (Figure 1-5).

Processed products that contain at least 70 percent organic ingredients can use the phrase "made with organic ingredients" and list up to three of the organic ingredients or food groups on the label. Processed products that contain less than 70 percent organic ingredients *cannot* use the term organic other than to identify in the ingredients statement the specific ingredients that are organically produced.

FIGURE 1-5 The USDA Organic seal signifies that the product is at least 95 percent organic.

Courtesy of the U.S. Department of Agriculture.

Some studies show that organic foods may be higher in certain vitamins and/or minerals compared with conventionally grown foods. However, there is no solid body of research yet. The nutrient composition of any food grown in soil will vary due to many factors, such as differences in soil quality, the amount of sunshine, and the amount of rain. Vitamins in plants are created by the plants themselves as long as they get adequate sunshine, water, carbon dioxide, and fertilizer. Minerals must come from the soil.

Many chefs feel that organic foods taste better than their conventional counterparts. Whether organic foods taste better is to some extent a matter of personal taste. Also, taste will vary among any fresh produce, depending on their freshness, the seeds used, where they were grown, and so on.

Another food term you may have heard is **superfood**. Certain foods, such as blueberries or spinach, have been advertised as superfoods because they are nutrient-rich and promote your health. Many of the health-promoting ingredients in superfoods are called phytochemicals. **Phytochemicals** are compounds found in plant foods, such as fruits and vegetables, and many promote health and may even decrease your risk of certain diseases. Following are some examples of what you can think of as superfoods because they naturally contain lots of phytochemicals and have health benefits.

Superfood Nutrient-rich food that promotes your health.

Phytochemicals Compounds found in plant foods, such as fruits and vegetables, that promote health and may decrease your risk of certain diseases.

- *Nuts.* A growing number of clinical studies indicate that the beneficial effect of tree nuts may be due not only to the fact that they contain healthy types of fats—monounsaturated and polyunsaturated fats—but also that they contain phytochemicals that may be heart healthy.
- *Cocoa.* Cocoa, which is used to make chocolate, is made from cacao beans. Cocoa is a rich source of antioxidants that may help protect your blood vessels and heart. Dark chocolate contains more cocoa than milk chocolate and therefore contains more antioxidants.
- *Tea.* In recent years, scientists have investigated the potential benefits of green and black tea because tea is a rich source of polyphenols, which act as antioxidants in the body. Green tea goes through a fermentation process in order to be made into black tea. Black tea also contains polyphenols, but not quite as much as green tea. Polyphenols in tea appear to be heart healthy and may have a cancer-fighting role.
- *Spinach.* Spinach contains lutein, a phytochemical that seems to help protect the eyes from cataracts and macular degeneration, a progressive condition affecting the central part of the retina that leads to the loss of sharpness in vision. Spinach is a powerhouse of antioxidants.

Moderate diet A diet that avoids excessive amounts of kcalories or any particular food/food group.

Balanced diet A diet in which foods are chosen to provide kcalories and nutrients in the right proportions.

Varied diet A diet in which you eat a wide selection of foods to get necessary nutrients.

Figure 1-6 gives more information on four classes of phytochemicals.

Finally, let's take a look at some nutrition terms related to diet. A nutritious diet is considered to be moderate, balanced, and varied. A **moderate diet** means you avoid excessive amounts of kcalories or eating more of one food or food group than is recommended. So you choose appropriate portion sizes of different foods, and indulge occasionally in "junk foods" such as ice cream or cookies. A **balanced diet** is one in which you choose foods to provide kcalories and nutrients in the right proportions that you need. A **varied diet**, meaning you eat a wide selection of foods in each food group, helps you to eat a balanced diet. By eating a wide variety of foods, you are more likely to get the nutrients you need in the right amounts, as well as helpful phytochemicals.

Four Classes of Phytochemicals

Phytochemicals	Foods	Health Effects
Carotenoids 	Yellow, orange, and red pigmented fruits and vegetables, as well as some green vegetables such as yellow, orange, red bell peppers; carrots; pumpkin; winter squash; sweet potato; spinach; collards; kale	Act as antioxidants, possibly reducing risk of cancer.
Flavonoids (Phenols) 	Citrus fruits, berries, purple grapes Onions Tea (black and green) Cocoa and chocolate Legumes, soybeans, and soy products Whole wheat	Act as antioxidants and also fight inflammation, possibly reducing risk of heart disease.
Indoles 	Cruciferous vegetables such as broccoli, Brussels sprouts, cabbage, cauliflower, kale, rutabaga, horseradish	May help combat cancer cells.
Allicin 	Garlic, chives, leeks, onions, scallions, shallots	May prevent cancer, lower cholesterol and blood pressure. Stimulates the immune system.

FIGURE 1-6 The four classes of phytochemicals include carotenoids, flavonoids, indoles, and allicin. These compounds are found in fruits and vegetables of all colors.

Photos by Peter Pioppo.

WHY DO YOU EAT THE FOODS YOU DO?

Think about what you ate for your last meal yesterday. Did you eat at your job, at home, or out with friends? Were you making food choices based on cost or convenience, taste, or simply what foods were available to you? As you can see from this list, many factors influence what you eat:

- Flavor
- Other aspects of food (such as cost, convenience, nutrition)
- Demographics
- Culture and religion
- Health
- Social and emotional influences
- Marketing and the media
- Environmental concerns

Now we will look at these factors in depth.

FLAVOR

The most important consideration when choosing something to eat is the taste of the food (Figure 1-7). You may think that taste and flavor are the same thing, but taste is actually a component of flavor. **Flavor** is an attribute of a food that includes its taste, smell, feel in the mouth or texture, temperature, and even the sounds made when it is chewed. Flavor is a combination of all five senses: taste, smell, touch, sight, and sound. The taste buds in your mouth and the smell receptors in your nose work together to deliver signals to the brain that are translated into the flavor of food.

Taste

Taste comes from 10,000 **taste buds**—clusters of cells that resemble the sections of an orange. Taste buds, found on the tongue, cheeks, throat, and roof of the mouth, house 60 to 100 receptor cells each. The body regenerates taste buds about every three days.

These taste cells bind food molecules dissolved in saliva and alert the brain to interpret them. Although the tongue is often depicted as having regions that specialize in particular taste sensations—for example, the tip is said to detect sweetness—researchers know that taste buds for each sensation (sweet, salty, sour, bitter, and umami) are actually scattered around the tongue. In fact, a single taste bud can have receptors for all five sensations. We also know that the back of the tongue is more sensitive to bitter, and that food temperature can influence taste. For example, sugar seems sweeter at warmer temperatures whereas salt tastes stronger at colder temperatures.

Taste buds are most numerous in children under age six, and this might explain why youngsters are such picky eaters (Figure 1-8). We know that many children do not like bitter

Flavor An attribute of a food that includes its taste, smell, feel in the mouth, texture, temperature, and even the sounds made when it is chewed.

Taste Sensations perceived by the taste buds on the tongue.

Taste buds Clusters of cells found on the tongue, cheeks, throat, and roof of the mouth. Each taste bud houses 60 to 100 receptor cells that bind food molecules dissolved in saliva and alert the brain to interpret them.

FIGURE 1-7 The most important consideration when choosing something to eat is taste.

Courtesy of Monkey Business Images/Shutterstock.

FIGURE 1-8 Taste buds are most numerous in children under age six, which might explain why they can be picky eaters.

Courtesy of Angela Waye/Shutterstock.

taste, thereby interfering with vegetable consumption. However, their heightened sensitivity to bitter tastes will decrease with age and they will eventually eat more vegetables as long as they are presented with them. As for older adults, it is normal for smell and taste to gradually decline. By age 50, the number of taste buds begins to decrease, which may explain why some older people like saltier and spicier foods. Smoking and some medications also reduce the ability to taste food normally.

Umami, the fifth basic taste, differs from the traditional sweet, sour, salty, and bitter tastes by providing a savory, sometimes meaty sensation. *Umami* is a Japanese word and the taste is evident in many Japanese ingredients and flavorings, such as seaweed, dashi stock, soy sauce, and mushrooms, as well as other foods. The umami taste receptor is very sensitive to glutamate, an amino acid found in protein that occurs in foods such as meat, fish, and milk, and it is often added to processed foods in the form of the flavor enhancer monosodium glutamate (MSG). MSG is an inexpensive, intensely umami ingredient with no off-flavors. Despite the frequent description of umami as meaty, many foods, including mushrooms, tomatoes, and Parmesan cheese, have more glutamate than an equal amount of beef or pork. This explains why foods cooked with mushrooms or tomatoes seem to have a fuller, rounder taste than when cooked alone.

Umami A taste often referred to as "savory" that is characteristic of monosodium glutamate and is associated with meats, mushrooms, tomatoes, Parmesan cheese, and other foods. It is a basic taste along with sweet, sour, salty, and bitter.

Umami flavor is strengthened when sodium is present, which explains why tomatoes have a strong taste after adding salt. Many popular sauces for cooking combine savory and salty tastes—think of ketchup, soy sauce, or fish sauce.

When incorporating umami ingredients such as Parmesan cheese and tomato products into recipes, chefs can reduce the fat and salt content of foods without sacrificing flavor. Chefs can also build umami flavor through cooking techniques. Any process that breaks down protein—such as drying, aging, curing, and slow cooking—increases umami because glutamate is released from protein.

If you like to eat hot chili peppers, you may wonder what kind of taste they have. The heat of chili peppers is not felt by the taste buds. The substance that makes a chili so hot is called capsaicin. Capsaicin actually binds with pain receptors in the mouth and throat that are responsible for sensing heat (Figure 1-9). When you eat, you perceive heat or cooling in the food.

FIGURE 1-9 The heat of hot peppers is felt not by the taste buds but by pain receptors in the mouth that sense heat.

Courtesy of taboga/Shutterstock.

Smell

If you could only taste sweet, salty, sour, bitter, and umami, how could you taste the flavor of cinnamon, chicken, or any other food? This is where smell comes in. Your ability to identify the flavors of specific foods requires the sense of smell.

The ability to detect the strong scent of a fish market, the antiseptic odor of a hospital, the aroma of a ripe melon or a glass of wine, and thousands of other smells comes from a yellowish patch of tissue the size of a quarter high up in your nose (Figure 1-10). This patch is actually a layer of 12 million specialized cells, each sporting 10 to 20 hairlike growths that bind with the smell and send a message to the brain. Our sense of smell may not be as refined as that of dogs, which have billions of olfactory cells, but we can distinguish among about 10,000 scents.

Of course, if you have a bad cold and mucus clogs up your nose, you lose some sense of smell and everything tastes bland. With a cold, you can still taste salty and sweet, but you will have a hard time distinguishing the difference between flavors.

You can smell foods in two ways. If you smell coffee brewing while you are getting dressed, you smell it directly through your nose. But if you are drinking coffee, the smell of the coffee goes to the back of your mouth and then up into your nose. To some extent, what you smell (or taste) is determined by your genetics and also your age.

FIGURE 1-10 The sense of smell and detecting the aromas in wine is the way wine is tasted.

Courtesy of bikeriderlondon/ Shutterstock.

Touch

All foods have **texture**—think of a tender cookie or a smooth soup. The human body is very adept at evaluating a food's texture. We use not only the sense of feeling in our mouths—or **mouthfeel**, as food professionals refer to it—but also our other senses to evaluate the texture of foods. Textures can range from moist to dry, tender to tough, fluid to solid, thick to thin, gritty/rough to smooth, coarse to fine, hard to soft, crunchy to soggy. Even carbonated drinks have texture—they tingle in your mouth as you drink them.

Texture Those physical properties of food that can be felt with the tongue, mouth, teeth, or fingers—such as tender, juicy, or firm.

Mouthfeel How the texture of a food is perceived in the mouth.

Textures that most people like include crispy, crunchy, juicy, creamy, tender, and firm. Consumers generally don't like foods that are tough, crumbly, lumpy, soggy, or watery. Whichever the texture, it influences whether you like the food and also can tell you whether the food is fresh. Think about eating a crispy cracker—when it is stale, it loses its crispness and has less appeal. Green beans that are overcooked lose their al dente texture and become floppy and undesirable.

The natural texture of a food may not be the most desirable texture for a finished dish, and so a cook may create a different texture. For example, a fresh apple may be too crunchy to serve at dinner, so it is baked or sautéed for a softer texture. Or a cream soup may be too thin, so a thickening agent is used to increase the viscosity of the soup or, simply stated, make it harder to pour.

Sight and Sound

Appearance creates the first impression of food and strongly influences which foods you choose to eat. Color is very important—think of the eye appeal of a juicy red tomato or a nicely browned loaf of bread. Color gives us a clue about the quality of a food as well as its flavor. We make decisions about foods before we actually eat them. For example, if the skin of an apple looks wrinkly, then the apple has probably lost its crunchy bite. Qualities such as color, size, shape, consistency, and arrangement all contribute to eye appeal. Eye appeal is especially important

FIGURE 1-11 Eye appeal is important for all menu items.
Photo by Peter Pioppo.

for cold foods because they lack the appeal of an appetizing aroma (Figure 1-11). Just the sight of something delicious to eat can start your digestive juices flowing. It is certainly true that "you eat with your eyes."

The sound made when a food is eaten, such as the snap of a carrot, is also part of the enjoyment of eating. Think of the sizzle of fajitas or the crunch of a crispy cookie. These sounds also help stimulate appetite.

Other Aspects of Food

Food cost is a major consideration in what foods you eat. Cost is a factor in many purchasing decisions, whether one is buying dry beans at $1.99 per pound or fresh salmon at $16.99 per pound at the supermarket, or choosing where to eat out. We continually feel the pinch at the grocery store as food prices go up for a wide variety of reasons, such as drought, tight supplies, or fuel costs.

Convenience is also a major consideration. You may not have the time or inclination to prepare meals from scratch. Instead, you can choose ready-to-eat foods, frozen dinners, precut fruits and vegetables, and baked goods. Of course, convenience foods are more expensive than their raw counterparts, and not every budget can afford them. Take-out meals are also more expensive, but very popular.

Your food choices are also affected by availability, familiarity, and habits. Whether you have a wide choice of foods at an upscale supermarket or a choice of only two eating places within walking distance of where you work or go to school, you can eat only what is available. Fresh fruits and vegetables are perfect examples of foods that are most available (and at their lowest prices) when in season. Of course, you are more likely to eat fruits and vegetables, or any food for that matter, with which you are familiar and have eaten before and enjoyed. So what are some of your food habits? Do you eat cold cereal for breakfast, pizza out with friends, popcorn at the movies? Do you love ramen noodles? These are some typical eating habits of college students. Yours might be similar or very different.

The nutritional content of a food can be an important factor in deciding what to eat. You probably have watched people reading nutrition labels on a food package, or perhaps you have read nutrition labels yourself. Some consumers are looking out for kcalories, others for sodium

or saturated fat content. Current estimates show that over 60 percent of Americans use nutrition information labels. Older people tend to read labels more often than younger people do.

Demographics

Demographic factors that influence your food choices include age, gender, educational level, income, and cultural background (discussed next). Women and older adults tend to consider nutrition more often than men or young adults when choosing what to eat. Older adults are probably more nutrition-minded because they have more health problems, such as heart disease and high blood pressure, and are more likely to have to change their diet for health reasons. Older adults also have more concerns with poor dental health, swallowing problems, and digestive problems. People with higher incomes and educational levels tend to think about nutrition more often when choosing what to eat.

Culture and Religion

Culture can be defined as the behaviors and beliefs of a certain social, ethnic, or age group. A culture strongly influences the eating habits of its members. Each culture has norms about which foods are edible, which foods have high or low status, how often foods are consumed, what foods are eaten together, when foods are eaten, and what foods are served at special events and celebrations (such as weddings).

Culture The behaviors and beliefs of a certain social, ethnic, or age group.

In short, your culture influences your attitudes toward and beliefs about food. For example, some French people eat horsemeat, but Americans do not consider horsemeat acceptable to eat. Likewise, many common American practices seem strange or illogical to persons from other cultures. For example, what could be more unusual than boiling water to make tea and adding ice to make it cold again, sugar to sweeten it, and then lemon to make it tart? When immigrants come to live in the United States, their eating habits gradually change, but they are among the last habits to adapt to the new culture.

For many people, religion affects their day-to-day food choices. For example, many Jewish people abide by the Jewish dietary laws, called the Kashrut. They do not eat pork, nor do they eat meat and dairy products together. Muslims also have their own dietary laws. Like Jews, they will not eat pork. Their religion also prohibits drinking alcoholic beverages. For other people, religion influences what they eat mostly during religious holidays and celebrations. Religious holidays such as Passover are observed with appropriate foods. Table 1-1 explains the food practices of different religions.

Health

Have you ever dieted to lose weight? Most Americans are trying to lose weight or keep from gaining it. You probably know that obesity and overweight can increase your risk of heart disease, diabetes, and other health problems. What you eat influences your health. Even if you are healthy, you may base food choices on a desire to prevent health problems and/or improve your appearance.

A knowledge of nutrition and a positive attitude toward nutrition may or may not translate into nutritious eating practices. Just knowing that eating lots of fruits and vegetables may prevent heart disease does not mean that someone will automatically start eating more of those foods.

TABLE 1-1 Food Practices of World Religions

Religion	Dietary Practices
Judaism	Kashrut: Jewish dietary law of keeping kosher. 1. Meat and poultry. Permitted: Meat of animals with a split hoof that chew their cud (includes cattle, sheep, goats, deer); a specific list of birds (includes chicken, turkey, goose, pheasant, duck). Not permitted: Pig and pork products, mammals that don't have split hooves and chew their cud (such as rabbit), birds not specified (such as ostrich). All animals require ritual slaughtering. All meat and poultry foods must be free of blood, which is done by soaking and salting the food or by broiling it. Forequarter cuts of mammals are also not eaten. 2. Fish. Permitted: Fish with fins and scales. Not permitted: Shellfish (scallops, oysters, clams), crustaceans (crab, shrimp, lobster), fishlike mammals (dolphin, whale), frog, shark, and eel. Do not cook fish with meat or poultry. 3. Meat and dairy are not eaten or prepared together. Meals are dairy or meat, not both. It is also necessary to have two sets of cooking equipment, dishes, and silverware for dairy and meat. 4. All fruits, vegetables, grains, and eggs can be served with dairy or meat meals. 5. A processed food is considered kosher only if the package has a rabbinical authority's name or insignia.
Roman Catholicism	1. Abstain from eating meat on Fridays during Lent (the 40 days before Easter). 2. Fast (one meal is allowed) and abstain from meat on Ash Wednesday (beginning of Lent) and Good Friday (the Friday before Easter).
Eastern Orthodox	Numerous feast days and fast days. On fast days, no fish, meat, or other animal products (including dairy products) are allowed. Also abstain from wine and oil, except for certain feast days that may fall during a fasting period. Shellfish are allowed. Wednesdays and Fridays are also fast days throughout the year.
Protestantism	1. Food on religious holidays is largely determined by a family's cultural background and preferences. Some churches within Protestantism prohibit alcohol. 2. Fasting is uncommon.
Mormonism	1. Prohibit tea, coffee, and alcohol. Some Mormons abstain from anything containing caffeine. 2. Eat only small amounts of meat and base diet on grains. 3. Some Mormons fast once a month.
Seventh-Day Adventist	1. Many members are lacto-ovo vegetarians (eat dairy products and eggs but no meat or poultry). 2. Avoid pork and shellfish. 3. Prohibit coffee, tea, and alcohol. 4. Drink water before and after meals, not during. 5. Avoid highly seasoned foods and eating between meals.
Islam	1. All foods are permitted (halal) except for swine (pigs), four-legged animals that catch prey with the mouth, birds of prey that grab prey with their claws, animals (except fish and seafood) that have not been slaughtered according to ritual, and alcoholic beverages. Use of coffee and tea is discouraged. 2. Celebrate many feast and fast days. On fast days, do not eat or drink from sunup to sundown.
Hinduism	1. Encourages eating in moderation. 2. Meat is allowed, but the cow is sacred and is not eaten. Also avoided are pork and certain fish. Many Hindus are vegetarian. 3. Many Hindus avoid garlic, onions, mushrooms, and red foods such as tomatoes. 4. Water is taken with meals. 5. Some Hindus abstain from alcohol. 6. Hindus have a number of feast and fast days.
Buddhism	1. Dietary laws vary, depending on the country and the sect. Many Buddhists do not believe in taking life, and so they are lacto-ovo vegetarians (eat dairy products and eggs but no meat or poultry). 2. Celebrate feast and fast days.

For most people, knowledge is not enough and change is difficult. Many circumstances and beliefs prevent change, such as a lack of time or money to eat right. But some people manage to change their eating habits, especially if they take small, realistic steps toward their goal and feel that the advantages (such as losing weight or preventing diabetes) outweigh the disadvantages.

Social and Emotional Influences

Your food choices are influenced by the social situations you find yourself in, such as when you are eating with others. Peer pressure no doubt influences many of your food choices. Have you ever noticed that there are a lot of college students who become vegetarians? Perhaps social influences during the college years have something to do with that. Even as adults, we tend to eat the same foods that our friends and neighbors eat. This is due to cultural influences as well.

Food is often used to convey social status. For example, getting your morning coffee beverage from Starbucks is certainly more upscale than picking up coffee at a convenience store. Social class, and how much money you have, definitely can influence what you choose to eat.

Emotions are closely tied to some of our food selections. As a child, you may have been given something sweet to eat, such as cake or candy, whenever you were unhappy or upset. As an adult, you may gravitate to those kinds of foods, called comfort foods, when in a stressful situation such as studying and taking final exams. Carbohydrates, such as those in cake or candy, tend to have calming effects. Eating in response to emotions can lead to overeating and overweight.

Marketing and the Media

The food industry very much influences what you choose to eat. After all, the food companies decide what foods to produce and where to sell them. They also use advertising, product labeling and displays, and websites to sell their products.

On a daily basis, the media (television, newspapers, magazines, radio, Internet) portray food in many ways: paid advertisements, articles on food in magazines and newspapers, foods eaten on television shows, or simply a tweet on Twitter that gives you the location of your favorite food truck.

Much research has been done on the impact of television food commercials on children. Quite often, the commercials succeed in getting children to eat foods such as cookies, candies, and fast food. Television commercials are likely contributing to higher kcalorie and fat intakes.

Environmental Concerns

There is growing concern about the environmental impacts of our food. Conventional farming/food production and transportation use considerable amounts of energy and create undesirable waste. Consumers are clamoring for sustainable food choices and environmentally friendly restaurants, and indeed the restaurant industry is responding to this with practices such as purchasing locally, using organic produce and sustainable seafood, growing gardens, and implementing green practices in the facility. At the end of this chapter, there is more information on some of the environmental concerns of commercial food production and how it influences food choices.

Now that you have a better understanding of why we eat the foods we do, we can look at some basic nutrition concepts and terms.

KCALORIES AND NUTRIENTS

Kcalories

Food energy, as well as the energy needs of the body, is measured in units of energy called kilocalories. The number of kilocalories in a particular food can be determined by burning a weighed portion of that food and measuring the amount of heat (or kilocalories) produced. A kilocalorie raises the temperature of 1 kilogram of water by 1 degree Celsius.

When you read in a magazine that a cheeseburger has 350 calories, understand that it is actually 350 kilocalories. The American public has been told for years that an apple has 80 calories, a glass of regular milk has 150 calories, and so on, when the correct term is not calories but kilocalories. This has been done in part to make the numbers easier to read and to ease calculations. Imagine adding up your calories for the day and having most numbers be six digits long, such as 350,000 calories for a cheeseburger. This book uses the term **kilocalorie** and its abbreviations, kcalorie and kcal, throughout.

Kilocalarie A unit of measure used to express the amount of energy found in different foods.

The number of kcalories you need is based on three factors: your energy needs when your body is at rest and awake (referred to as basal metabolism), your level of physical activity, and the energy you need to digest and absorb food. For every 100 kcalories you eat, about 10 are used for digestion, absorption, and metabolism of nutrients, our next topic.

Basal metabolic needs include energy needed for vital bodily functions when the body is at rest but awake. For example, your heart is pumping blood to all parts of your body, your cells are making proteins, and so on. Your **basal metabolic rate (BMR)** is basically the number of kcalories you would burn if you just sat down and did nothing. Whether your BMR is fast, slow, or just average depends in part on genetics and the following factors:

Basal metabolic rate (BMR) The minimum energy needed by the body for vital functions when at rest and awake.

- *Gender.* Men have a higher BMR than women do because men have a higher proportion of muscle tissue (muscle requires more energy for metabolism than fat does).
- *Age.* As you get older, you generally gain fat tissue and lose muscle tissue. BMR declines about 2 percent per decade after age 30.
- *Growth.* Children, pregnant women, and lactating women have higher BMRs.
- *Height.* Tall people have more body surface than shorter people and lose body heat faster. Their BMR is therefore higher.
- *Temperature.* BMR increases in both hot and cold environments, to keep the temperature inside the body constant.
- *Fever and stress.* Both of these increase BMR. The body reacts to stress by secreting hormones that speed up metabolism so that the body can respond quickly and efficiently.
- *Exercise.* Exercise increases BMR for several hours afterward.
- *Smoking and caffeine.* Both cause your BMR to increase.
- *Sleep.* Your BMR is at its lowest when you are sleeping.

The basal metabolic rate also decreases when you diet or eat fewer kcalories than normal. The BMR accounts for most of the energy you burn—about two-thirds of your energy if you are not very active.

Your level of physical activity strongly influences how many kcalories you need. The number of kcalories burned depends on the type of activity, how long and how hard it is

TABLE 1-2 Kcalories per Hour Expended in Common Physical Activities

Moderate Physical Activity	In 1 Hour	In 30 Minutes
Hiking	370	185
Light gardening/yard work	330	165
Dancing	330	165
Golf (walking and carrying clubs)	330	165
Bicycling (less than 10 miles per hour)	290	145
Walking (3½ miles per hour)	280	140
Weight training (general light workout)	220	110
Stretching	180	90
Vigorous Physical Activities	**In 1 Hour**	**In 30 Minutes**
Running/jogging (5 miles per hour)	590	295
Bicycling (more than 10 miles per hour)	590	295
Swimming (slow freestyle laps)	510	255
Aerobics	480	240
Walking (4½ miles per hour)	460	230
Heavy yard work (chopping wood)	440	220
Weight lifting (vigorous effort)	440	220
Basketball (vigorous)	440	220

Source: www.choosemyplate.gov 2012.

performed, and your size (Table 1-2). The larger your body is, the more energy you use in physical activity. Aerobic activities such as walking, jogging, cycling, and swimming are excellent ways to burn calories if they are brisk enough to raise heart and breathing rates. Physical activity accounts for 25 to 40 percent of your total energy needs (Figure 1-12).

Nutrients

As stated, nutrients provide energy or kcalories, promote the growth and maintenance of the body, and/or regulate body processes. The approximately 50 nutrients can be arranged into six groups:

1. Carbohydrates
2. Fats
3. Protein
4. Vitamins
5. Minerals
6. Water

Foods rarely contain just one nutrient. Most foods provide a mix of nutrients. For example, bread often is thought of as providing primarily carbohydrates, but it is also an important source of certain vitamins and minerals. Food contains more than just nutrients. Depending on the food, it may contain colorings, flavorings, caffeine, phytochemicals, and other substances.

FIGURE 1-12 Physical activity accounts for 25 to 40 percent of total energy needs.

Energy-yielding nutrients Nutrients that can be burned as fuel to provide energy for the body, including carbohydrates, fats, and proteins.

Carbohydrates, fats, and protein are called **energy-yielding nutrients** because they can be burned as fuel to provide energy for the body. They provide kcalories as follows:

- Carbohydrates: 4 kcalories per gram
- Fats: 9 kcalories per gram
- Protein: 4 kcalories per gram

A gram is a unit of weight in the metric system; there are about 28 grams in 1 ounce. Vitamins, minerals, and water do not provide energy or kcalories. Alcohol, although not considered a nutrient because it does not promote growth or maintenance of the body, does yield energy: seven kcalories per gram.

Micronutrients Nutrients needed by the body in small amounts, including vitamins and minerals.

Macronutrients Nutrients needed by the body in large amounts, including carbohydrates, fats, and proteins.

The body needs vitamins and minerals in small amounts, and so these nutrients are called **micronutrients** ("micro" means small). In contrast, the body needs large amounts of carbohydrates, fats, and protein, and so they are called **macronutrients** ("macro" means large).

Carbohydrates A large class of nutrients, including sugars, starch, and fibers, that function as the body's primary source of energy.

Carbohydrates include sugars, starches, and fibers that function as the body's primary source of energy. You are probably most familiar with sugar in its refined forms, such as the sugars used in soft drinks, cookies, cakes, pies, candies, jams, jellies, and other sweetened foods. You also find sugar in its natural form in fruits and milk (even though milk does not taste sweet). Starch is found in breads, breakfast cereals, pastas, potatoes, and beans. Both sugar and starch are important sources of energy for the body.

Good sources of fiber include legumes (dried beans and peas), fruits, vegetables, nuts and seeds, and whole-grain foods such as whole-wheat bread and cereal. Fiber can't be broken down in your digestive tract, and so it is mostly excreted. It therefore does not provide energy for the body. However, fiber does a number of good things in the body, such as improve the health of the digestive tract.

Fats A nutrient that provides a rich source of energy to the body and makes food tasty.

Fats provide a rich source of energy to cells. Familiar fats and oils are found in butter, margarine, vegetable oils, mayonnaise, and salad dressings. Fats are also found in the fatty streaks in meat, the fat under the skin of poultry, the fat in milk and cheese (except fat-free milk and products made with them), baked goods such as cakes, fried foods, nuts, and many processed foods, such as microwave popcorn and frozen dinners. Most breads, cereals, pasta, fruits, and vegetables have little or no fat.

Most of the kcalories we eat come from carbohydrates or fats. Only about 15 percent of total kcalories come from protein. This doesn't mean that protein is less important. On the contrary, **protein** is part of every cell, tissue, and organ in the body. Besides its role as an important part of cells, protein regulates processes in your body and can be burned to provide energy (although the body prefers to burn carbohydrates and fat so protein can be used to build new cells). You probably know some of the good sources of protein, which are typically animal foods such as beef, pork, poultry, fish, eggs, milk, and cheese. Protein appears in plant foods, such as grains, beans, and vegetables, but in smaller quantities. Fruits contain only very small amounts of protein.

Protein A nutrient that is a major part of the body's cells and is found in high quantities in animal foods. Made of amino acids assembled in chains; performs many functions in the body.

Vitamins Noncaloric organic nutrients found in a wide variety of foods that are essential in small quantities to regulate body processes, maintain the body, and allow growth and reproduction.

There are 13 different vitamins in food. **Vitamins** are found in a wide variety of foods. They are essential in small quantities to regulate body processes, maintain the body, and allow growth and reproduction. Instead of being burned to provide energy for the body, vitamins work as helpers. They assist in the processes of the body that keep you healthy. For example, vitamin A is needed by the eyes for vision in dim light. Vitamins are found in fruits, vegetables, grains, meat, dairy products, and other foods. Unlike other nutrients, many vitamins are susceptible to being destroyed by heat, light, and other agents.

Minerals are also required by the body in small amounts and do not provide energy. Like vitamins, they regulate body processes, maintain the body, and allow growth and reproduction. Some minerals, such as calcium and phosphorus, become part of the body's structure by building bones and teeth. Unlike vitamins, minerals are indestructible.

Minerals Noncaloric nutrients found in a wide variety of foods; needed to regulate body processes, maintain the body, and allow growth and reproduction.

Although deficiencies of energy or nutrients can be sustained for months or even years, a person can survive only a few days without water. Experts rank water second only to oxygen as essential to life. Water plays a vital role in all bodily processes and makes up just over half the body's weight. It supplies the medium in which various chemical changes of the body occur and aids digestion and absorption, circulation, and lubrication of body joints. For example, as a major component of blood, water helps deliver nutrients to body cells and removes waste to the kidneys for excretion.

It's been said many times, "You are what you eat." This is certainly true; the nutrients you eat can be found in your body. As mentioned, water is the most plentiful nutrient in the body, accounting for about 50 to 60 percent of your weight. Protein accounts for about 15 percent of your weight, fat for 15 to 25 percent, and carbohydrates for only 0.5 percent. The remainder of your weight includes minerals, such as calcium in bones, and traces of vitamins (Figure 1-13).

The functions of the six nutrients are summarized in Figure 1-14. Most, but not all, nutrients are considered **essential nutrients**. Essential nutrients either cannot be made in the body or cannot be made in the quantities needed by the body; therefore, we must obtain them from food.

Essential nutrients Nutrients that either cannot be made in the body or cannot be made in the quantities needed by the body; therefore, we must obtain them from food.

Dietary Reference Intakes (DRIs)

The **Dietary Reference Intakes (DRIs)** estimate how much you need daily of various nutrients as well as when you might be taking in too much of a nutrient. The DRI is only useful for healthy individuals, and was developed for use in the United States and Canada. They include the following.

Dietary Reference Intake (DRIs) Nutrient standards set for healthy Americans and Canadians that estimate how much you need daily of various nutrients, as well as when you might be taking in too much of certain nutrients.

- **Recommended Dietary Allowance (RDA)** and **Adequate Intake (AI)**. The RDAs represent how much of a nutrient you should be getting on a daily basis. If there is not enough scientific evidence to set an RDA, an Adequate Intake is given.

Recommended Dietary Allowance (RDA) The dietary intake value that represents what you need to take in on a daily basis.

Adequate Intake (AI) The dietary intake value that is used when there is not enough scientific research to support an RDA.

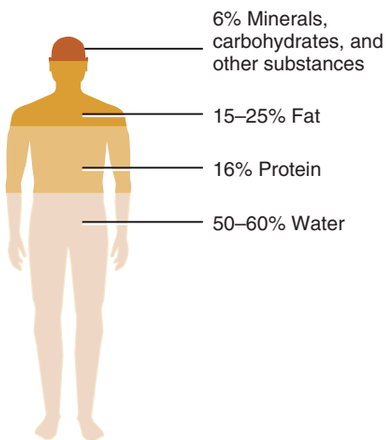

FIGURE 1-13 Your body is 50 to 60 percent water and 15 to 25 percent fat.

Carbohydrates—A large class of nutrients including sugar, starches, and fibers that are the body's primary source of energy.	 Stockvision/Shutterstock.
Lipids (Fats)—A group of fatty substances including triglycerides and cholesterol that are not soluble in water and that provide a rich source of energy and structure to the body's cells.	 Elena Elisseeva/Shutterstock.
Proteins—A nutrient that is the major structural part of the body's cells and is found in large quantities in animal foods.	 Africa Studio/Shutterstock.
Vitamins and Minerals—Nutrients with no kcalories that are found in a wide variety of foods (especially fruits and vegetables). They are essential in small amounts to maintain the body, regulate body processes, and allow for growth and reproduction.	 Lu Huanfeng/Shutterstock.
Water—The most vital nutrient that plays a role in all bodily processes and makes up just over half of your weight.	 Mariyana M/Shutterstock.

FIGURE 1-14 Nutrients are classified into six groups.

Tolerable Upper Intake Level (UL) The maximum intake level of a nutrient above which you may feel adverse health effects.

- **Tolerable Upper Intake Level (UL)**. The UL is the maximum you should take in of a nutrient—if you take more than the UL, you risk side effects that can be bad for your health. For most nutrients, the UL includes how much you take in from foods and supplements. A UL cannot be established for some nutrients, due to inadequate research.

The DRIs (see Appendix B) vary, depending on age and gender, and there are separate DRIs for pregnant and lactating women. The DRIs are meant to help healthy people maintain health and prevent disease. They are not designed for seriously ill people, whose nutrient needs may be much different.

TABLE 1-3 Acceptable Macronutrient Distribution Ranges

Age	AMDR for Carbohydrates	AMDR for Fats	AMDR for Proteins
1 to 3 years old	45–65%	30–40%	5–20%
4 to 18 years old	45–65%	25–35%	10–30%
Over 18 years old	45–65%	20–35%	10–35%

Another important concept related to the DRIs is **Acceptable Macronutrient Distribution Ranges (AMDR)**. As you recall, macronutrients are carbohydrates, fats, and proteins—the only nutrients that provide kcalories. AMDR is simply the percent of kilocalories you should eat from carbohydrates, fats, or proteins to reduce your risk of chronic disease while providing adequate intake and nutrients. For example, adults (and children over 1 year old) should obtain 45 to 65 percent of their total kcalories from carbohydrates (Table 1-3). The AMDR for adults is 20 to 35 percent of total kcalories from fat and 10 to 35 percent of total kcalories from protein. The wide range allows for more flexibility in dietary planning for healthy people.

Acceptable Macronutrient Distribution Ranges (AMDR) The percent of total kilocalories coming from carbohydrates, fats, or proteins that is associated with a reduced risk of chronic disease while providing adequate intake.

WHAT HAPPENS WHEN YOU EAT?

To become part of the body, food must be digested and absorbed. **Digestion** is the process by which food is broken down into its components in the mouth, stomach, and small intestine, with the help of digestive **enzymes** and fluids. For example, when you eat a hamburger, the bun and meat are broken apart by your teeth and stomach acid, which helps to release nutrients and other components. Nutrients such as carbohydrates, fats, and proteins must be broken down into their components before they can be absorbed from the stomach or small intestines into the body. Water, vitamins, and minerals do not need to be broken down any further.

Before the body can use any nutrients that are present in food, the nutrients must pass through the walls of the stomach or intestines into the body's tissues, a process called **absorption**. Much digestion occurs in the small intestine, so that nutrients such as carbohydrates, fats, and proteins can be absorbed. Nutrients are then transported in the blood through the body to the cells.

Within each cell, **metabolism** takes place. Metabolism refers to all the chemical processes by which nutrients are used to support life. Metabolism has two parts: the building up of substances and the breaking down of substances. Within each cell, nutrients such as glucose are split into smaller units to release energy. The energy is used to make heat to maintain body temperature or perform work within the cell. Substances such as protein are built from their building blocks in every cell.

Once we have smelled and tasted food, our meal goes on a journey through the **gastrointestinal tract** (also called the digestive tract), a hollow tube that runs down the middle of your body (Figure 1-15). The top of the tube is your mouth, which is connected, in turn, to your pharynx, esophagus, stomach, small intestine, large intestine, rectum, and anus,

Digestion The process by which food is broken down into its components in the mouth, stomach, and small intestine with the help of digestive enzymes and fluids.

Enzymes Compounds that speed up the breaking down of food so that nutrients can be absorbed. Enzymes also perform other functions in the body.

Absorption The passage of digested nutrients through the walls of the intestines or stomach into the body's tissues. Nutrients are then transported through the body to the cells in the blood.

Metabolism All the chemical processes by which nutrients are used to support life.

Gastrointestinal tract A hollow tube running down the middle of the body in which digestion of food and absorption of nutrients take place.

The digestive system consists of the organs of the digestive tract—mouth, pharynx, esophagus, stomach, small intestine, and large intestine—plus four accessory organs—salivary glands, liver, gallbladder, and pancreas.

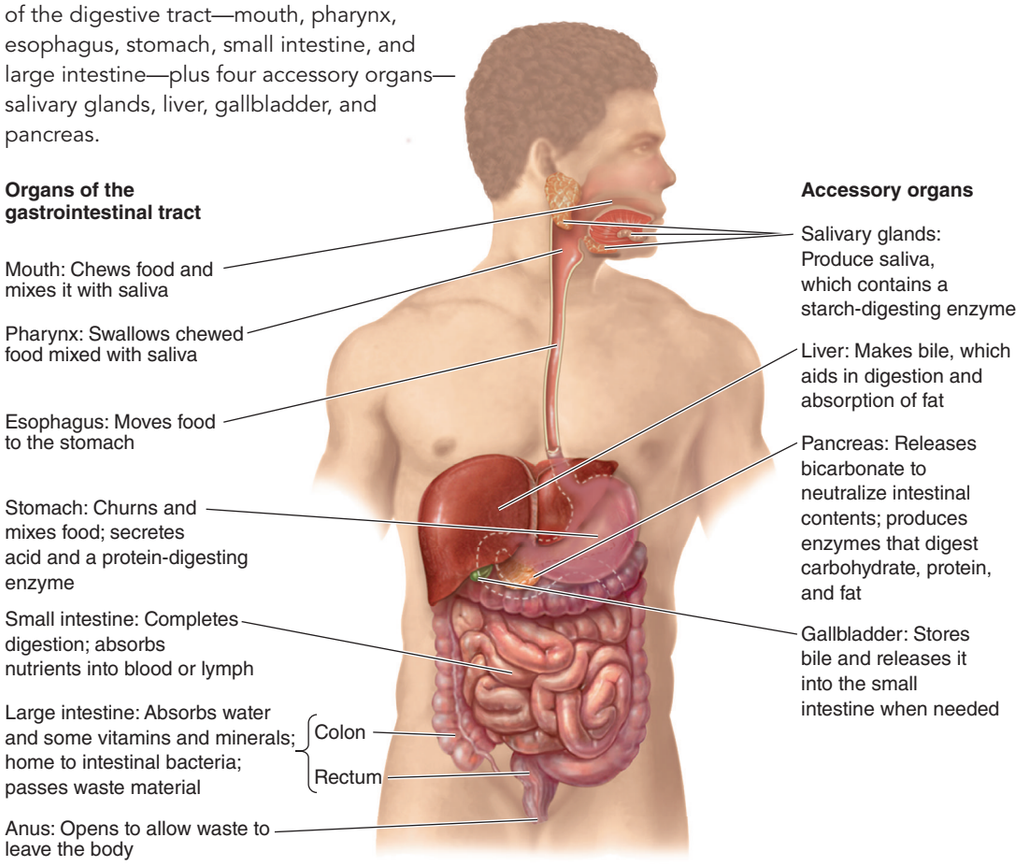

FIGURE 1-15 The human digestive tract digests and absorbs nutrients and removes solid wastes.

Saliva A fluid secreted into the mouth from the salivary glands that contains important digestive enzymes and lubricates the food so that it may readily pass down the esophagus.

Pharynx A passageway that connects your mouth to the esophagus.

Esophagus The muscular tube that connects the pharynx to the stomach.

Peristalsis Involuntary muscular contraction that forces food through the entire digestive system.

where solid wastes leave the body. The gastrointestinal tract is such a busy place that the cells lining it are replaced every few days.

The digestive system starts with the mouth. Your tongue and teeth help with chewing. The tongue, which extends across the floor of the mouth, moves food around the mouth during chewing. Your 32 permanent teeth grind and break down food. Chewing is important because it breaks up the food into smaller pieces so that it can be swallowed. **Saliva**, a fluid secreted into the mouth from the salivary glands, contains important digestive enzymes and lubricates the food so that it may pass readily down the esophagus. Digestive enzymes help break down food into forms of nutrients that can be used by the body. The tongue rolls the chewed food into a ball to be swallowed.

When you swallow, food enters the **pharynx** (just 5 inches long) and then the **esophagus**, a muscular tube about 10 inches long that leads to the stomach. Food is propelled down the esophagus by **peristalsis**, rhythmic contractions of muscles in the wall of the esophagus. You might think of this contraction that forces food through the entire digestive system as squeezing a marble through a rubber tube. Peristalsis also helps break up food into smaller and smaller particles.

Food passes from the esophagus into the **stomach**. The stomach, a muscular sac, holds about 4 cups (1 liter) of food when full. The stomach makes an enzyme that helps in protein digestion and an acid that destroys harmful bacteria.

The stomach has the strongest muscles and thickest walls of all the organs in the gastrointestinal tract. The food now has a semiliquid consistency and is passed into the first part of the small intestine in small amounts (the small intestine can't process too much food at one time). Liquids leave the stomach faster than solids do, and carbohydrate or protein foods leave faster than fatty foods do. The stomach absorbs few nutrients, but it does absorb alcohol. It takes 1.5 to 4 hours after you have eaten for the stomach to empty.

The **small intestine** receives the digested food from the stomach as well as enzymes from other organs in the body, such as the pancreas. The small intestine itself produces digestive enzymes, and the liver makes bile to break down fat.

Most digestion and absorption are completed in the first half of the small intestine. On the folds of the intestinal wall (and throughout the entire small intestine) are tiny, fingerlike projections called **villi**. Nutrients are absorbed across the villi into the body where they are transported to your cells through the blood.

The **large intestine** (also called the **colon**) is located between the small intestine and the rectum. One of the functions of the large intestine is to receive the waste products of digestion and pass them on to be eliminated. Waste products are the materials that were not absorbed into the body. The large intestine does absorb water, some minerals, and a few vitamins made by bacteria residing there. Bacteria are normally found in the large intestine and are necessary for a healthy intestine. Intestinal bacteria make some important substances, such as vitamin K. They also can digest some components of food, such as fiber.

The **rectum** stores the waste products until they are released as solid feces through the **anus**, which opens to allow elimination.

Two common digestive problems are heartburn and peptic ulcers. It is the acid in the stomach that contributes to heartburn. **Heartburn** is a painful burning sensation in the esophagus, just below or behind the breastbone. Heartburn occurs when your stomach contents back up (also called reflux) into the esophagus. This partially digested material is usually acidic and can irritate the esophagus. Frequent, ongoing heartburn may be a sign of gastroesophageal reflux disease (GERD). Ways to treat heartburn and GERD include eating small meals, avoiding foods and beverages such as fatty foods if they aggravate heartburn, losing weight (if overweight), and possibly taking medications.

Ulcers are a common digestive problem that can affect part of the small intestine or the stomach. A **peptic ulcer** is a sore or defect on the lining of the stomach or small intestine. Peptic ulcers are common: One in ten Americans develops an ulcer at some time in his or her life. One cause of peptic ulcer is bacterial infection, but some ulcers are caused by long-term use of nonsteroidal anti-inflammatory agents (NSAIDs), such as aspirin and ibuprofen. Taking antibiotics, quitting smoking, limiting foods/drinks causing symptoms, and reducing stress can speed healing and prevent ulcers from recurring.

Probiotics are live bacteria and yeasts that are called the "good" microorganisms because they benefit the digestive system and keep it healthy. Probiotics, available in some foods and dietary supplements, are similar to bacteria that exist naturally in your gut. Yogurt and fermented foods, such as sauerkraut, are sources of "good" bacteria.

Stomach A muscular sac that holds about 4 cups of food when full and helps in digestion. Some alcohol is absorbed through the stomach.

Small intestine The digestive tract organ that extends from the stomach to the opening of the large intestine. The site of most digestion and absorption.

Villi Tiny fingerlike projections in the wall of the small intestines that are involved in absorption.

Large intestine (colon) The part of the gastrointestinal tract between the small intestine and the rectum. It absorbs some water, vitamins, and minerals, as well as passes on waste products.

Rectum The last section of the large intestine, in which feces, the waste products of digestion, are stored until elimination.

Anus The opening of the digestive tract through which feces travel out of the body.

Heartburn A painful, burning feeling in your chest or throat. It happens when stomach acid backs up into your esophagus.

Peptic ulcer A sore on the lining of the stomach or duodenum.

Probiotics Live bacteria and yeasts that are called the "good" microorganisms because they keep the digestive system healthy.

SUSTAINABLE FOOD SYSTEMS

Our current method of producing food is not sustainable. In other words, at some point the damage being done to the environment will make it impossible to continue to farm. These harmful environmental consequences will become yet more worrisome as the world's population grows and demand for food increases. One answer to this dilemma can be found in sustainable agriculture.

Sustainable agriculture The production of food using farming techniques that protect the environment, animal welfare, and public health.

Sustainable agriculture produces food without depleting the Earth's resources (water, soil, fuel) or polluting its environment. It is agriculture that follows the principles of nature to develop systems for raising crops and livestock that are, like nature, self-sustaining. In recent decades, sustainable farmers and researchers around the world have used a variety of techniques, such as those found in organic farming, to farm with nature. Sustainable practices lend themselves to smaller farms. These farms, in turn, tend to find their best niches in local markets, within local food systems, often selling directly to consumers in farmers' markets or to local restaurants. Some farms offer consumers the possibility of buying shares of the harvest ahead of time. Then the consumers are entitled to pick up a bag or box of produce at certain time intervals, such as weekly, from the farm during the growing season. This is referred to as community-supported agriculture. You can find a farm in your area that offers shares at the Local Harvest website.

Sustainable agriculture is part of a sustainable food system. Sustainable food systems involve not only growing crops and producing livestock in a sustainable manner but also processing, packaging, and distributing foods without depleting the Earth's resources or causing excessive pollution. In a sustainable food system, food should be affordable and workers, such as farm workers, should make a living wage.

Commercial farming, although producing an abundance of relatively inexpensive food, depletes natural resources such as topsoil and water. In addition, pesticides enter groundwater systems and fertilizers threaten ecosystems. Emissions from nitrogen fertilizers add to greenhouse gas emissions and chemical runoff from farms cause algae blooms in freshwater lakes and rivers.

As you drive by many farms across the United States, you might be inclined to think that we eat a lot of corn, soybeans, and grains. However, it is not Americans who are eating most of these foods: it is our livestock such as beef cattle, dairy cattle, hogs, chickens, and turkeys. Eventually, these livestock (except dairy cattle, which give us milk) will be slaughtered to produce meat and poultry. The typical American eats a lot more beef, poultry, and fish than the global average.

Producing large quantities of meat in America uses many resources and has serious environmental consequences, such as the following:

1. When forests have been cut down to create pastures for livestock, there are negative effects. The trees help balance the oxygen–carbon dioxide balance of the earth by absorbing carbon dioxide from the environment and releasing oxygen. Fewer trees lead to the accumulation of greenhouse gases, such as carbon dioxide and methane, in the atmosphere. The accumulation of these greenhouse gases leads to global warming.

Trees also absorb rainfall by soaking up moisture through their roots, thus preventing runoff and the accompanying soil erosion and flooding.

2. Livestock farms are major air and water polluters. Cattle naturally produce methane, a strong greenhouse gas that contributes to global climate change. Livestock production systems also produce other greenhouse gases such as nitrous oxide and carbon dioxide. People who live near or work at these farms breathe in hundreds of gases, which are formed as manure decomposes. The stench can be unbearable. And, of course, there is the problem of what to do with millions of tons of manure each year.
3. Enormous quantities of water, fuel, fertilizers, and pesticides are required to grow the feed for livestock, utilizing many acres of farmland. In drier climates, huge amounts of irrigation water are used to produce feed grains such as corn. Fertilizers require a lot of energy to produce, and along with pesticides, they often wind up polluting waterways and drinking water.

To produce 100 kcalories of plant foods requires only about 50 kcalories from fossil fuels, but to get the equivalent amount of kcalories from beef requires many times more kcalories from fossil fuels. Basically, the money you use to purchase a hamburger in the United States doesn't even start to cover the environmental costs of producing it.

So what are restaurants doing to embrace sustainable food systems? Lots! Let's take a look at what chefs are doing in the kitchen.

1. *Sourcing local foods, farm-to-table.* When chefs such as Daniel Humm, chef/co-owner of Eleven Madison Park and The NoMad in New York City (Figure 1-16), source local foods, less fuel is used to transport food to the restaurant. The average distance food travels from farm to plate—referred to as "food miles"—is 1500 miles,

FIGURE 1-16 On the right, Daniel Humm, Chef/Co-Owner of Eleven Madison Park Restaurant and also NoMad (NYC), shares time with Alex Paffenroth, of Paffenroth Farms, Warwick, NY (specializing in local root vegetables).
Courtesy: Daniel Humm, CMC.

but it is less than 100 miles for locally produced items. Although food miles account for about 10 percent of the food system's greenhouse gas emissions, buying local and choosing efficient modes of transportation do help save fuel and reduce emissions.

2. *Buying organic foods.* Organic food is produced by farmers who emphasize the use of renewable resources and the conservation of soil and water to enhance environmental quality for future generations. Organic meat, poultry, eggs, and dairy products come from animals with outdoor access and that are given no antibiotics or growth hormones. Organic food is produced without using most conventional pesticides, fertilizers made with synthetic ingredients or sewage sludge, genetic engineering, or irradiation. Before a product can be labeled organic, a government-approved certifier inspects the farm where the food is grown to make sure the farmer is following all the rules necessary to meet U.S. Department of Agriculture organic standards. Companies that handle or process organic food before it gets to your local supermarket or restaurant must be certified, too.
3. *Buying sustainable fish.* Chef Rick Moonen is a pioneer in sustainable seafood (Figure 1-17). Fishing practices worldwide are depleting fish populations, destroying habitats, and polluting the water. Sustainable seafood comes from species of fish that are managed in a way that provides for today's needs without damaging the availability of the species to future generations. Most fish and shellfish caught in U.S. federal waters are harvested under fishery management plans that must meet standards to ensure fish

FIGURE 1-17 Fresh-caught dinner in Alaska. Chef Rick Moonen, an advocate of sustainable fish and seafood, serves a thoughtful selection of seafood on his menus, illustrating his committment.
Courtesy: Chef Rick Moonen.

stocks are maintained. Unfortunately, more than 75 percent of the seafood eaten in the U.S. is imported, and some US seafood is overfished or caught or farmed in ways that harm the environment.

- For information on specific seafood to purchase, visit the websites of the Monterey Bay Aquarium Seafood Watch (United States) or SeaChoice (Canada).
- Green Chefs, Blue Ocean is a comprehensive, interactive online sustainable seafood training program and resource center.
- The FishChoice website helps seafood buyers source sustainable seafood.

4. *Starting a garden to grow herbs, vegetables, and other foods.* More chefs, such as Rich Rosendale, CMC, are growing some of their own produce and herbs (Figure 1-18).
5. *Serving meals that are lower on the food chain.* An animal-based diet requires more fertilizer, water, energy, and pesticides than a vegetarian diet. Recent studies show that changing from beef to chicken, fish, eggs, or vegetable-based entrees can reduce greenhouse gases. Beef is more costly to produce than any other meat or poultry. Chefs have been adding more vegetarian options to the menu and using smaller portions of meat.
6. *Buying coffee and tea from sustainable operations.* To keep up with demand, some growers have been using mass-production methods involving excessive chemicals and pesticides. Several certification programs exist, such as from Rainforest Alliance, and you can also buy organic coffee.
7. *Reducing bottled beverages.* Encourage the use of reusable cups and "bottleless" beverage options, and source bottles from companies that use less plastic or glass in their bottles.

Table 1-4 gives definitions for many terms used in sustainable food purchasing. Table 1-5 lists the fruits and vegetables that are most likely to be have pesticide residue and those that are unlikely to have pesticide residue.

FIGURE 1-18 Rich Rosendale, Certified Master Chef, is an advocate of locally sourced products and ingredients. He spends time with his two sons, Laurence and Liam, tending to their garden and visiting local farms every chance he gets.
Courtesy: Richard Rosendale, CMC.

TABLE 1-4 Glossary for Sustainable Food Purchasing

Antibiotic claims—The USDA does not allow "antibiotic free" to be put on meat or poultry labels. It does allow "raised without antibiotics" or "no antibiotics administered" as long as no antibiotics were ever administered to the animal.
Cage free—This is a claim made by the producer that the poultry were raised without cages. There is usually no independent verification of "cage-free" claims. This does not guarantee that birds were raised on grass or had access to the outdoors. Birds may simply live in flocks in barns.
Certified Humane Raised & Handled®—The Certified Humane Raised & Handled® program is the only farm animal welfare and food labeling program in the United States dedicated to improving the welfare of farm animals in food production and include all stages of the animal's life including handling and slaughter. Humane Farm Animal Care's Animal Care Standards require that animals have ample space, shelter, and gentle handling to limit stress and additionally require that: • The use of growth hormones and antibiotics is prohibited. • Animals must be free to move and not be confined—Cages, crates, and tie stalls are prohibited. This means that chickens are able to flap their wings and dust bathe, and pigs have the space to move around and root. • Livestock have access to sufficient, clean, and nutritious feed and water. • They must have sufficient protection from weather elements and an environment that promotes well-being. • Managers and caretakers must be thoroughly trained, skilled, and competent in animal husbandry and welfare, and have good working knowledge of their system and the livestock in their care. • Farmers and ranchers must comply with food safety and environmental regulations.
Conventionally grown—Foods grown using chemical fertilizers, pesticides, and herbicides (in the case of farmed products) or hormones and antibiotics (in the case of animals).
Ecologically grown—An uncertified label that signifies that a crop is grown without using chemical fertilizers or herbicides. Products with this label can be grown using integrated pest management practices, which minimizes but does not rule out the use of chemical pesticides.
Fair trade certified—Fair trade goods, such as coffee, come from farmers, often around the world, who are justly compensated. Fair Trade USA helps farmers in developing countries build businesses that positively influence their communities. It encourages sustainable farming practices, and discourages the use of child labor and certain pesticides. Fair Trade USA is the third-party certifier of Fair Trade goods in the United States and one of the members of Fair Trade Labeling Organizations International.
Family farm—A farm managed by a family or individual who owns the animals or land gets a good portion of his or her livelihood from the farm, and participates in the daily labor to work and manage the farm. The USDA defines a family farm as having less than $250,000 gross receipts annually.
Food Alliance certified—Food Alliance provides comprehensive third-party certification for social and environmental responsibility in agriculture and the food industry. Their products include meats, shellfish, eggs, dairy, grains, legumes, a variety of fruits and vegetables, and prepared products made with these certified ingredients. Their certification addresses these issues: safe and fair working conditions, humane treatment of animals, and environmental stewardship.
Free range—Free-range poultry must be allowed access to the outside; however, it is not required that they be outside. The term is regulated by the USDA and allowed to be used only on poultry labels, not egg labels.
Genetically modified organism (GMO) claims—When a gene from one organism is purposely moved to improve or change another organism in a laboratory, the result is a genetically modified organism (GMO). Many genetically modified crops, such as corn, have been modified to resist insects or herbicides. Some companies label their foods as "GMO free" but there is normally no independent verification (unless the food is certified as Organic or Food Alliance).
Grassfed (American Grassfed Association Certified)—The American Grassfed Association defines grassfed products from ruminants, including cattle, bison, goats and sheep, that have eaten nothing but their mother's milk and fresh grass or grass-type hay all their lives. For grassfed nonruminants, including pigs and poultry, grass is a significant part of their diets but not their entire diet, since these animals need to consume grains. To be American Grassfed certified, the animals must live on pasture and not receive hormones or antibiotics. In the USDA definition for grassfed, animals can receive hormones and antibiotics and also be confined.

TABLE 1-4 Glossary for Sustainable Food Purchasing *(continued)*

Hormone claims—Hormones are not allowed in raising hogs or poultry. Therefore, the claim "no hormones added" cannot be used on the labels of pork or poultry unless it is followed by a statement that says "Federal regulations prohibit the use of hormones." The term "no hormones administered" may be approved for use on the label of beef products if sufficient documentation is provided to the USDA by the producer showing no hormones have been used in raising the animals. The term "no antibiotics added" may be used on labels for meat or poultry products if producers provide sufficient documentation to the USDA.
Integrated pest management (IPM)—IPM is an effective and environmentally sensitive approach to pest management that relies on a combination of commonsense practices. IPM programs use current, comprehensive information on the lifecycles of pests and their interaction with the environment. This information, in combination with available pest control methods, is used to manage pest damage by the most economical means and with the least possible hazard to people, property, and the environment. Pesticides are normally used as a last resort.
Local—How *local* is defined will vary by location. Foodservices often choose to define *local* as food grown within a specific distance from the point of consumer purchase, such as 200 miles.
Monterey Bay Aquarium Seafood Watch—This organization provides Seafood Watch regional guides that contain the latest information on sustainable seafood choices available in different regions of the United States. Its "Best Choices" are abundant, well managed, and fished or farmed in environmentally friendly ways. Their seafood to "avoid" are overfished and/or fished or farmed in ways that harm other marine life or the environment. View the guides online at their website.
Natural—When you are buying meat or poultry, natural products contain no artificial ingredients or added color and are only minimally processed. For other foods, *natural* means that there are no added colors, artificial flavors, or synthetic ingredients.
Organic—Organic food is produced by farmers who emphasize the use of renewable resources and the conservation of soil and water. Organic meat, poultry, eggs, and dairy products come from animals that are given no antibiotics or growth hormones and have access to the outdoors. Organic food is produced without using most conventional pesticides and fertilizers made with synthetic ingredients or sewage sludge, bioengineering, or ionizing radiation. Before a product can be labeled *organic,* a government-approved certifier inspects the farm where the food is grown to make sure the farmer is following all the rules necessary to meet USDA organic standards. Companies that handle or process organic food before it gets to your local supermarket or restaurant must be certified, too.

TABLE 1-5 Pesticides on Produce

Most Pesticide Residue	Least Pesticide Residue
Apples	Avocados
Peaches	Corn
Nectarines	Pineapples
Strawberries	Cabbage
Grapes	Sweet peas (frozen)
Celery	Onions
Spinach	Asparagus
Sweet bell peppers	Mangoes
Cucumbers	Papayas
Cherry tomatoes	Kiwi
Snap peas (imported)	Eggplant
Potatoes	Grapefruit
	Cantaloupe
	Cauliflower
	Sweet potatoes

Source: Environmental Working Group, 2015.

FINDING RELIABLE NUTRITION AND HEALTH INFORMATION

Millions of consumers get nutrition and health information from the Internet, magazines, TV, and publications. Some is reliable and up to date, some is not. So, where can you find accurate nutritional information? In the United States, over 80,000 registered dietitians (R.D.s) represent the largest and most visible group of professionals in the nutrition field. The medical profession recognizes registered dietitians as legitimate providers of nutrition care. They have specialized education in human anatomy and physiology, chemistry, medical nutrition therapy, foods and food science, the behavioral sciences, and foodservice management. Registered dietitians must complete at least a bachelor's degree from an accredited college or university, a program of college-level dietetics courses, a supervised practice experience, and a qualifying examination. Continuing education is required to maintain R.D. status.

Registered dietitians work in private practice, hospitals, nursing homes, wellness centers, business and industry, and many other settings. Most are members of the Academy of Nutrition and Dietetics, and many are licensed or certified by the state in which they live. The majority of states have enacted laws that regulate the practice of dietetics.

In addition to using the expertise of an R.D., you can ask some simple questions that will help you judge the validity of nutrition information seen online or in the media or heard from friends or family. By answering the following questions, you should be able to tell the good from the bad when looking at websites. Many of these details can be found under the heading "About Us" or "Contact Us."

1. Who sponsors the website, and are they recognized, responsible authorities? Is it a branch of the federal government (.gov), professional organization (.org), university (.edu), or commercial company (.com)? There is a big difference between a site that says, "I developed this site after my heart attack" and the website for the American Heart Association.
2. Is the site supported by public funds or through commercial advertising? There is a big difference (again) between a website developed by a company trying to sell you something and a website developed using strong scientific evidence—such as nutrition.gov. Reliable health information comes from scientific research that has been conducted in government, university, hospital, or private laboratories.
3. Is it obvious how you can reach the sponsor? Trustworthy websites will have contact information for you to use. They often have a toll-free telephone number. The website home page should list an e-mail address, phone number, or a mailing address where the sponsor and/or the authors of the information can be reached.
4. Who wrote the information? Authors and contributors should be identified. Their affiliation and any financial interest in the content should also be clear. Be careful about case histories or testimonials. You should rely on medical research involving lots of people, not one person's opinion.
5. Who reviews the information? Does the website have an editorial board? Click on the "About Us" page to see if there is an editorial board that checks the information before putting it online. Find out if the editorial board members are experts in the subject you

are researching. Reliable websites will tell you where the health information came from and how it has been reviewed.

6. When was the information written? New research findings can make a difference in making medically smart choices. So, it's important to find out when the information you are reading was written. The date is often found at the bottom of the page.
7. Does the website make claims that seem too good to be true? Are quick, miraculous cures promised? Be careful of claims that any one remedy will cure a lot of different illnesses. Be skeptical of sensational writing or dramatic cures. Make sure you can find other websites with the same information. Don't be fooled by a long list of links—any website can link to another, so no endorsement can be implied from a shared link.
8. Is your privacy protected? There should be a link saying "Privacy" or "Privacy Policy." Read the policy to verify that your privacy is protected. If registration is required, notice what questions you must answer before you can view content.

Table 1-6 lists organizations with websites with reliable nutrition and health information.

Of course, a very reliable source of nutrition and health information is your physician or healthcare professional. Patient/provider partnerships lead to the best medical decisions.

TABLE 1-6 Websites with Reliable Nutrition Information

GOVERNMENT WEBSITES:	
U.S. guide offering access to all government websites.	www.nutrition.gov
U.S. National Library of Medicine—offering up-to-date information on diseases, conditions, and overall health.	www.nlm.nih.gov/medlineplus/
U.S. Department of Agriculture—MyPlate website.	www.choosemyplate.gov
U.S. Department of Agriculture Food and Nutrition Information Center—providing nutrition resources.	http://fnic.nal.usda.gov
U.S. Department of Agriculture Center for Nutrition Policy and Promotion—promoting dietary guidance.	www.cnpp.usda.gov
Let's Move!—offering advice on nutrition and activity for kids.	www.letsmove.gov
U.S. Department of Health and Human Services—offering information on many health and nutrition topics.	www.healthfinder.gov
PROFESSIONAL HEALTH ORGANIZATIONS:	
Academy of Nutrition and Dietetics	www.eatright.org
American College of Sports Medicine	www.acsm.org
VOLUNTEER HEALTH AGENCIES:	
American Cancer Society	www.cancer.org
American Diabetes Association	www.diabetes.org
American Heart Association	www.americanheart.org
REPUTABLE CONSUMER GROUPS:	
Center for Science in the Public Interest—offers information on many nutrition issues based on sound science.	www.cspinet.org
Quackwatch—offers resources on questionable health practices and how to avoid scams.	www.quackwatch.com

SUMMARY

1. **Why Is Nutrition Important and What Is a Healthy Diet?**
   a. Nutrition is a science that studies nutrients found in foods and their actions in the body. Nutrition also explores the relationship between nutrients and disease, as well as why you choose the diet you eat.
   b. About half of all American adults have one or more preventable diseases that are related to poor diet and physical inactivity, including heart disease, high blood pressure, diabetes, and some cancers.
   c. The American diet is low in vegetables, fruit, whole grains, and dairy. Our diet is also high in kcalories, sodium, saturated fat, refined grains, and added sugars.
   d. A healthy diet is higher in vegetables, fruits, whole grains, low- or non-fat dairy, seafood, beans and peas, and nuts. A healthy diet is lower in red and processed meats and low in sugar-sweetened foods/drinks and refined grains. Moderate use of alcohol is fine.
   e. Regular physical activity promotes health and reduces chronic disease risk.
2. **Nutrition and Food Terms to Know**
   a. Whole foods are foods pretty much as we get them from nature. Processed foods have been canned or cooked and frozen.
   b. Enriched foods have nutrients added to them that were lost in processing (such as B vitamins being added to white bread). Fortified foods have nutrients added that were not present originally.
   c. Natural foods mean they don't contain added colors, artificial flavors, or synthetic ingredients. Organic food is produced without using most conventional pesticides, fertilizers made with synthetic ingredients, bioengineering, or ionizing radiation. Organic foods are not necessarily more nutritious or tastier than conventional foods.
   d. Superfoods are nutrient-rich and promote your health. Many of the health-promoting ingredients in superfoods are phytochemicals—compounds found mostly in fruits and vegetables that promote health in a variety of ways.
   e. A moderate diet avoids excessive amounts of kcalories or any particular food/food group or nutrient. A balanced diet means choosing foods to provide essential nutrients in the right proportions. A varied diet is important, too—meaning you eat a wide selection of foods to get necessary nutrients.
3. **Why Do You Eat the Foods You Do?**
   a. Many factors influence what you eat: flavor (includes taste, smell, touch, sight and sound), cost, convenience, nutrition, demographics, culture and religion, health, social and emotional influences, marketing and the media, and environmental concerns.
4. **Kcalories and Nutrients**
   a. The number of kcalories (energy) that you need to eat each day is based on: your energy needs when your body is at rest and awake (referred to as basal metabolism), your level of physical activity, and the energy you need to digest and absorb

food. For every 100 kcalories you eat, about 10 are used for digestion, absorption, and metabolism of nutrients.

b. Men have a higher basal metabolic rate than women, and the basal metabolic rate decreases after age 30. BMR increases in both hot and cold environments. Fever, stress, exercise, smoking, and caffeine all increase BMR, while your BMR is at its lowest when sleeping.

c. Physical activity accounts for 25 to 40% of your total energy needs.

d. Six groups of nutrients include carbohydrates, fats, protein, vitamins, minerals, and water (Figure 1-14).

e. Carbohydrates and proteins contain 4 kcalories/gram, fats contain 9 kcalories/gram, and the remaining nutrients have 0 kcalories.

f. Although deficiencies of kcalories or nutrients can be sustained for months, a person can survive only a few days without water.

g. Water makes up about 50 to 60 percent of your weight, protein about 15 percent, and fat about 15 to 25 percent.

h. The Dietary Reference Intakes estimate how much you need daily of various nutrients and includes the Recommended Dietary Allowance (RDA) and Adequate Intake (AI). The Tolerable Upper Intake Level is the maximum you should take in of a nutrient.

i. The Acceptable Macronutrient Distribution Ranges shows what percent of your kcalories should come from carbohydrate, fat, and protein.

5. **What Happens When You Eat?**

a. Before the body can use the nutrients in food, the food must be digested and the nutrients absorbed through the walls of the stomach and/or intestine to be distributed through the blood to the cells. Digestion is the process by which food is broken down into its components in the mouth, stomach, and small intestine with the help of digestive enzymes.

b. Within each cell, metabolism (all the chemical processes by which nutrients are used to support life) takes place. Metabolism involves building substances such as bone or protein, and also breaking down substances such as sugar to produce energy.

c. Figure 1-15 summarizes food digestion and absorption.

d. Two common digestive problems are heartburn and peptic ulcers. Probiotics are useful to maintain a healthy digestive tract.

6. **Sustainable Food Systems**

a. Sustainable agriculture produces food without depleting resources, such as water or soil, or polluting its environment. Sustainable agriculture is part of a sustainable food system in which workers are paid a living wage, food is affordable, and foods are packaged and distributed without depleting or polluting the Earth's resources.

b. Chefs are doing many things to embrace sustainability: sourcing local foods, buying organic foods, buying sustainable fish, gardening, serving meals lower on the food chain, buying coffee and tea from sustainable operations, and reducing bottled beverages.

c. Table 1-4 gives information on terminology for food purchasing and Table 1-5 lists fruits and vegetables with the most, and the least, pesticide residue.

7. **Finding Reliable Nutrition and Health Information**

a. Registered dietitians are reliable sources of nutrition information.

b. Guidelines are given for evaluating nutrition and health information on the Internet, such as judging the sponsor of the site, who wrote the information, and when it was written.

c. Table 1-6 lists websites with reliable nutrition and health information.

CHECK-OUT QUIZ

1. Carbohydrate, fat, and protein give you energy and allow the body to grow.
   a. true b. false

2. What you eat influences whether you might get a disease such as heart disease.
   a. true b. false

3. The American diet is high in fruits and vegetables.
   a. true b. false

4. A healthy diet includes plenty of red and processed meats.
   a. true b. false

5. Canned corn is an example of a whole food.
   a. true b. false

6. Milk is an example of a processed food.
   a. true b. false

7. White bread is enriched with vitamins.
   a. true b. false

8. Organic foods are always healthier than conventionally grown foods.
   a. true b. false

9. Superfoods are nutrient-rich and contain phytochemicals that promote health.
   a. true b. false

10. Flavor is an attribute of a food that includes its taste, smell, texture, temperature, and any sounds made when chewed.
    a. true b. false

11. The fifth basic taste, which provides a savory sensation, is called salty.
    a. true b. false

12. Food cost and convenience are often major considerations in choosing which foods to eat.
    a. true b. false

13. Emotions are rarely a factor in choosing what to eat.
    a. true b. false

14. Kcalories are a measure of energy.
    a. true b. false

15. The number of kcalories you need is based on your basal metabolism, your physical activity, and the energy needed to digest and absorb food.
    a. true b. false

16. As you get older, your basal metabolic rate increases.
    a. true b. false

17. Exercise, smoking, and caffeine increase basal metabolic rate.
    a. true b. false

18. Fat and protein contain 4 kcalories per gram.
    a. true b. false

19. Most of the kcalories we eat come from protein.
    a. true b. false

20. Vitamins, minerals, and water contain no kcalories.
    a. true b. false

21. The body is over 50% water.
    a. true b. false

22. The *maximum* of what you should take in of a nutrient is called the Recommended Dietary Allowance.
    a. true b. false

23. In absorption, the nutrients pass through the walls of the intestines into the body.
    a. true b. false

24. Most digestion and absorption are completed in the large intestine.
    a. true b. false

25. Yogurt is a popular probiotic that helps keep the digestive tract healthy.
    a. true b. false

26. Commercial farming depletes natural resources such as topsoil and water.
    a. true b. false

27. Producing large quantities of meat in American is sustainable.
    a. true b. false

28. Reliable health information comes from scientific research that has been conducted in government, university, hospital, or private laboratories.
    a. true b. false

29. If a website makes claims that seem too good to be true, they probably are.
    a. true b. false

30. Name and briefly describe five factors that influence what you eat.

32. Is flavor the same as taste? Explain why or why not?

33. Briefly describe each of the six categories of nutrients, including how many kcalories each nutrient contains.

34. Describe two functions of the mouth, esophagus, stomach, and small and large intestines in digestion and/or absorption.

35. Describe five ways that chefs are embracing sustainable food systems in restaurants.

Using Food Guides, Dietary Recommendations, and Nutrition Labels to Plan Menus

LEARNING OBJECTIVES

2

- **Explain how MyPlate works, including identifying nutritional contributions from each food group and writing a one-day menu using a MyPlate food pattern.**
- **Discuss the major concepts in the Dietary Guidelines for Americans, 2015–2020.**
- **Interpret information on a packaged food label and restaurant menu.**
- **Plan and evaluate menus using MyPlate and the Dietary Guidelines for Americans.**

INTRODUCTION

Dietary recommendations Guidelines that discuss food groups, foods, and nutrients to eat for optimal health.

Dietary recommendations have been published for the healthy American public for many years and are referred to as the Dietary Guidelines for Americans. Early recommendations centered on encouraging Americans to eat certain foods and nutrients to prevent nutrient deficiencies and fight disease. Although deficiency diseases have been virtually eliminated, they have been replaced by diseases such as cardiovascular disease, overweight and obesity, and type 2 diabetes—diseases related to poor-quality diets and lack of physical activity. About half of all American adults have one or more preventable, diet-related diseases.

Dietary recommendations are quite different from Dietary Reference Intakes (DRIs). Whereas DRIs deal with specific nutrients, dietary recommendations discuss

specific foods and food groups that will help individuals meet the DRIs. Dietary recommendations are generally written in easy-to-understand terms.

Whereas dietary recommendations discuss specific foods to eat for optimum health, **food guides** tell us the *amounts* of foods we need to eat to have a nutritionally adequate diet. Their primary role, whether in the United States or around the world, is to communicate an optimum diet for the overall health of the population. Food guides are typically based on current dietary recommendations, the nutrient content of foods, and the eating habits of the targeted population.

MyPlate, a food guide developed by the U.S. Department of Agriculture (USDA), is based on the Dietary Guidelines for Americans and DRIs. MyPlate (Figure 2-1) includes what and how much to eat from five food groups for a variety of kcalorie levels and also for a variety of eating styles, including vegetarian and Mediterranean style.

Other healthful food guides include the traditional Mediterranean and Asian diets (Figures 2-2 and 2-3), as well as vegetarian diets (discussed in Chapter 5). The Asian diet is high in plant foods, including rice, vegetables, fruits, beans, legumes, nuts, and vegetable oil. The diet varies, of course, from country to country and region to region. For example, people who live near the sea tend to eat more seafood. People who eat an Asian-style diet are likely to have less heart disease, obesity, and certain cancers.

The Mediterranean diet also varies a lot. It can be described in general terms as an eating pattern that emphasizes vegetables, fruits, nuts, olive oil, and grains—often whole grains. Only small amounts of meats and full-fat milk and milk products are usually consumed. Wine is often included with meals. Individuals following Mediterranean diets tend to have less chronic disease such as cardiovascular disease.

Food guides Guidelines that tell us the kinds and amounts of foods to make a nutritionally adequate diet. They are typically based on current dietary recommendations, the nutrient content of foods, and the eating habits of the targeted population.

MyPlate A food guide developed by the U.S. Department of Agriculture as a guide to the amounts of different types of foods needed to provide an adequate diet and comply with current nutrition recommendations.

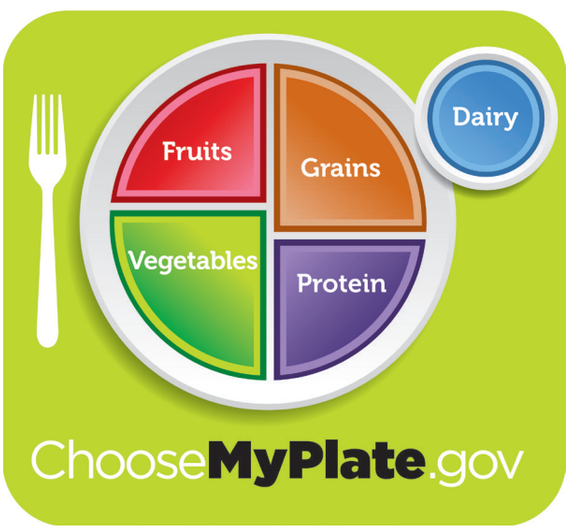

FIGURE 2-1 MyPlate was developed by the U.S. Department of Agriculture.
Courtesy of the U.S. Department of Agriculture.

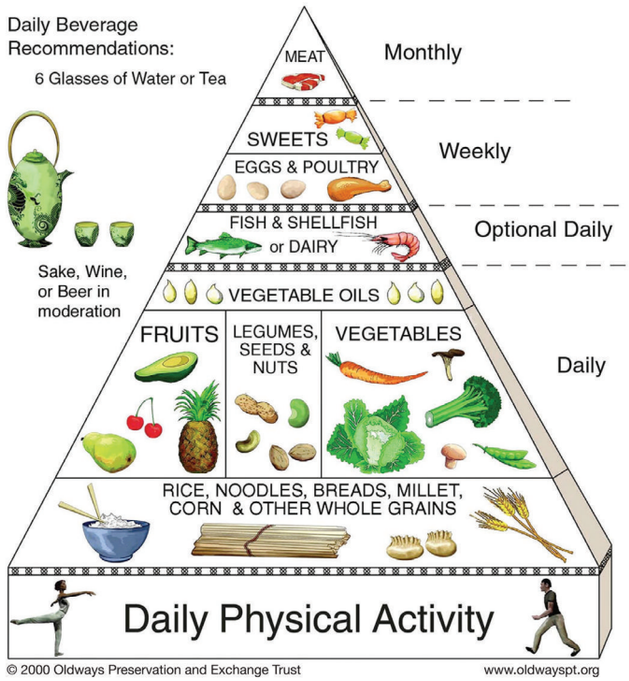

FIGURE 2-2 The traditional healthy Asian diet pyramid.

Courtesy of Oldways Preservation & Exchange Trust, Cambridge, MA.

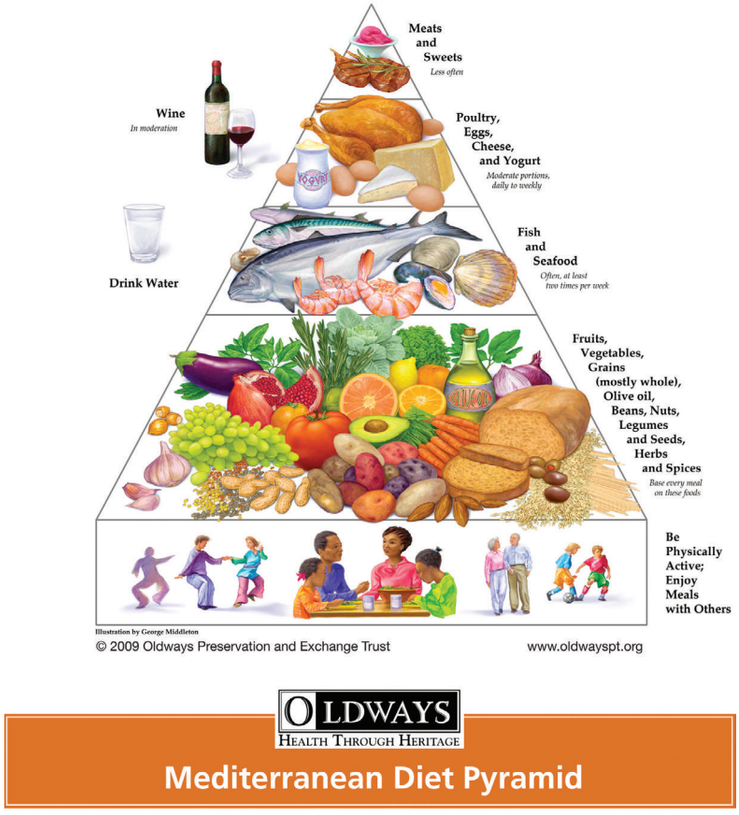

FIGURE 2-3 The traditional healthy Mediterranean diet pyramid.

Courtesy of Oldways Preservation & Exchange Trust, Cambridge, MA.

MYPLATE

MyPlate (Figure 2-1), developed by the US Department of Agriculture in 2011, has replaced the original Food Guide Pyramid. MyPlate translates the principles of the Dietary Guidelines for Americans and other nutritional standards to help you make healthier food choices.

As you can see, MyPlate includes five food groups: Fruits, Vegetables, Grains, Protein, and Dairy. Half of your plate should consist of fruits and vegetables, with slightly more vegetables than fruits. The other half of the plate includes grains and proteins, with slightly more grains than protein. Dairy is depicted as a circle—signifying a glass of milk—off to the side of the plate. Desserts are not shown—they are part of your daily "Empty Kcalorie" allowance, which is explained later in this discussion.

One very important point about choosing foods from the five food groups is that your food choices are expected to be *in their most nutrient-dense forms*—lean or low-fat, with no sugars added. If choices that are not nutrient dense are routinely eaten, you will eat too many total kcalories due to too much fat and sugar. The **nutrient density** of a food looks at how many nutrients it contains compared to how many kcalories are in the food. For example, broccoli is considered to have a high nutrient density because it is high in nutrients and low in kcalories—so it packs a lot of nutrition in a small amount of kcalories. Nutrient-dense foods and beverages are low in fat and added sugars.

Nutrient density A measure of the nutrients provided in a food per kcalorie of that food.

First you need to determine how many kcalories you should be eating each day. Using Table 2-1, you can estimate what your kcalorie needs are daily by using your age, gender, and physical activity level. Once you know your kcalorie level, you can see how much you need to eat from each food group using Table 2-2.

TABLE 2-1 Estimated Kcalorie Needs per Day by Age, Gender, and Physical Activity Level

Age and Gender	Total Daily Kcalorie Needs*
Children 2–3 yrs	1000–1400 kcals
Children 4–8 yrs	1200–2000 kcals
Girls 9–13 yrs	1400–2200 kcals
Boys 9–13 yrs	1600–2600 kcals
Girls 14–18 yrs	1800–2400 kcals
Boys 14–18 yrs	2000–3200 kcals
Females 19–30 yrs	2000–2400 kcals
Males 19–30 yrs	2600–3000 kcals
Females 31–50 yrs	1800–2200 kcals
Males 31–50 yrs	2400–2800 kcals
Females 51+ yrs	1600–2000 kcals
Males 51+ yrs	2200–2400 kcals

*The kcalorie range shows the amount of calories needed by people who are sedentary, at the low end, to people who are active (walk at least 3 miles per day in addition to activity associated with typical day-to-day life). Those who are more active need more total kcalories. To find your personal total kcalorie needs, go to the MyPlate website (www.choosemyplate.gov).

TABLE 2-2 Healthy U.S. Style Eating Pattern

Kcalorie Level	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000
Fruits	1 cup	1½ cups	1½ cups	1½ cup	2 cups	2 cups	2 cups	2 cups	2½ cups	2½ cups
Vegetables	1½ cups	1½ cups	2 cups	2½ cups	2½ cups	3 cups	3 cups	3½ cups	3½ cups	4 cups
Grains	4 oz.	5 oz.	5 oz.	6 oz.	6 oz.	7 oz.	8 oz.	9 oz.	10 oz.	10 oz.
Protein Foods	3 oz.	4 oz.	5 oz.	5 oz.	5.5 oz.	6 oz.	6.5 oz.	6.5 oz.	7 oz.	7 oz.
Dairy	2½ cups	2½ cups	3 cups	3 cups	3 cups	3 cups	3 cups	3 cups	3 cups	3 cups
Oils	17 g	17 g	22 g	24 g	27 g	29 g	31 g	34 g	36 g	44 g
Limit on Other Calories	100	110	130	170	270	280	350	380	400	470

Source: U.S. Department of Health and Human Services and U.S. Department of Agriculture. *2015–2020 Dietary Guidelines for Americans*, 8th Edition. December 2015. Available at: http://health.gov/dietaryguidelines/2015/guidelines.

For example, if you need 2000 kcalories a day to maintain a healthy weight, you can eat:

- 6 ounces or the equivalent of grains
- 2.5 cups of vegetables
- 2 cups of fruit
- 3 cups of milk or the equivalent
- 5.5 ounces or the equivalent of lean meat and beans
- 5.5 teaspoons of oil
- 270 empty kcalories

Figure 2-4 shows three meals and snacks that total 2,000 kcalories and use the MyPlate guidelines. The exact amounts of foods in these plans do not need to be achieved every day, but on average, over time.

Now, let's take a look at each food group (vegetables, fruits, grain, dairy, and protein) and then see how to use your allowance of oils and empty kcalories so you can use MyPlate. The nutrient contribution of each food group is summarized in Table 2-3. Complete serving size information for each group is in Appendix A.

FIGURE 2-4 A 2000-kcalorie pattern. Breakfast (shirred egg with sautéed broccoli rabe and tomato salsa, grapefruit supremes, cranberry thyme juice), Lunch (turkey vegetable wrap, dried vegetable chips, Greek yogurt with berries, coconut orange water), Snack (crudités with roasted pepper hummus), Dinner (sliced sirloin with mushroom ragu, wheat berry pilaf with roasted rutabagas).

Photos by Peter Pioppo.