12th Edition

Nutrition & Diet Therapy

Ruth A. Roth • Kathy L. Wehrle

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&
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***Nutrition & Diet Therapy*, Twelfth Edition**
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Library of Congress Control Number: 2016944162

ISBN: 9781305945821

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20 Channel Center Street
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Printed in the United States of America
Print Number: 01 Print Year: 2016

To my family and friends
who love and support me.

Brief Contents

SECTION 2

NUTRITION THROUGH THE LIFE CYCLE 169

SECTION 3

MEDICAL NUTRITION THERAPY 249

Contents

SECTION 2

NUTRITION THROUGH THE LIFE CYCLE 169

Preface

In our health-conscious society, the link between good nutrition and good health is seen everywhere, from magazine and newspaper headlines to television shows, websites, apps, and blogs. The latest diets and stories about foods that claim to prevent certain diseases and health ailments abound. This presents a challenge to nurses working with clients to help them focus on improving both their nutrition and their overall health. ***Nutrition & Diet Therapy,*** 12th edition, provides sound nutritional information based upon fact. It is important that nurses have a solid foundation in the basic principles and concepts of good nutrition; then they can help clients debunk the myths and help them move toward better health through nutritional awareness.

Section 1, **Fundamentals of Nutrition**, includes chapters on the relationship of nutrition and health; planning a healthy diet; digestion, absorption, and metabolism; as well as chapters on each of the six nutrient groups (carbohydrates, lipids, proteins, vitamins, minerals, and water). Content has been thoroughly revised to embrace the newest MyPlate guidelines.

Section 2, **Nutrition Through the Life Cycle**, includes chapters on nutritional care during the various stages of life, from pregnancy and lactation through infancy, childhood, adolescence, and adulthood. This information provides sound knowledge of the changes in nutritional requirements across the lifespan.

Section 3, **Medical Nutrition Therapy**, includes discussion and research for many nutrition-related disorders. It covers the effects of disease and surgery on nutrition and the appropriate uses of diet therapy in restoring and maintaining health. It includes chapters with specific nutritional information for clients requiring help with weight control, diabetes, cardiovascular disease, renal disease, gastrointestinal problems, and cancer. It also discusses the nutritional needs of surgical clients, clients suffering burns and infections including HIV, and clients requiring enteral and parenteral nutrition. There is also a chapter on foodborne illness, allergies, and intolerances as well as the general nutritional care of clients.

CHAPTER OUTLINE AND FEATURES

Chapters follow a consistent format to help facilitate and enhance learning:

- **Objectives**—learning goals to be achieved upon completion of the chapter
- **Key Terms**—a list of terms used in text and defined in the margin; these are also included in the master glossary

- **In The Media**—boxes highlighting current trends, events, and fads and the potential impact on clients' health
- **Supersize USA**—boxes highlighting information and current events surrounding the national obesity epidemic
- **Exploring the Web**—directions to Internet resources and websites
- **Spotlight on Lifecycle**—boxes focusing on nutritional concerns for the different stages of life
- **Health and Nutrition Considerations**—recommendations for health care professionals to help clients achieve optimal health through the knowledge of nutrition
- **Summary**—a brief narrative overview of the most important chapter highlights
- **Discussion Topics**—critical thinking activities that encourage synthesis and application of new concepts
- **Suggested Activities**—creative suggestions on how to implement the knowledge presented in the chapter
- **Review**—study questions to test understanding of content and to help prepare for examinations
- **Case in Point**—reality-based case studies that apply to the chapter topics, followed up by a "Rate This Plate" challenge that asks for evaluation of a proposed meal plan for a client
- **MyPlate guidelines**—recommended and embraced throughout the text
- **Dietary Guidelines for Americans, 2015–2020**—located in the appendices and throughout the chapters

NEW TO THIS EDITION

- **Chapter 1** *The Relationship of Nutrition and Health* now sheds light on our national targets for health, "Healthy People 2020," and introduces the concept of health disparities, health literacy, and food deserts and their effect on the health of our population. There is new information on the six standard characteristics to diagnose adult malnutrition.
- **Chapter 2** *Planning a Healthy Diet* offers a complete look at the new Dietary Guidelines for Americans 2015–2020, including the five overarching principles in detail. The new proposed food label is compared to the existing label to highlight improvements.
- **Chapter 14** *Weight Management Across the Life Cycle* includes the latest on weight regulation, obesity trends in children and adults, and inflammation as a root cause of obesity. The health consequences of being overweight are discussed as well as the latest prevention and treatment strategies for successful diet therapy. The newer behavioral techniques of motivational interviewing, coaching, mindfulness, and readiness for change are highlighted as well. There is important information on the newer weight loss drugs and a snapshot of surgical treatment for obesity including bariatric surgery, as well as the new gastric balloon placement.

- **Chapter 15** *Diet, Prediabetes, and Diabetes* includes new information on the growing problem of prediabetes. Up-to-date statistics and diagnostic criteria are presented as well as the latest list of oral medications and insulin currently available to treat diabetes. There is a new list of alternative sweeteners and their pros and cons.
- **Chapter 18** *Diet and Gastrointestinal Disorders* includes current information on celiac disease and the growing incidence of gluten sensitivity, as well as new information about irritable and short bowel syndrome.
- **In The Media** boxes have been refreshed throughout the chapters to keep students up to speed on current events and fads in nutrition and health-related topics.
- Updated **Recommended Dietary Allowances (RDA)** and **Daily Recommended Intake (DRI)** can be found in tables throughout the book.
- The **MyPlate** method gives guidelines for intake of nutrients with various calorie levels. Information about the MyPlate method is introduced in Chapter 2, and is referenced throughout the text.
- **Supersize USA** boxes have been refreshed to bring current nutrition concerns to the forefront and to generate discussion in the classroom.
- ***Dietary Guidelines for Americans, 2015–2020*** has been updated with current recommendations for nutritional intake and exercise.

LEARNING PACKAGE FOR THE STUDENT

MindTap

MindTap is the first of its kind in an entirely new category: the Personal Learning Experience (PLE). This personalized program of digital products and services uses interactivity and customization to engage students, while offering a range of choice in content, platforms, devices, and learning tools. MindTap is device agnostic, meaning that it will work with any platform or learning management system and will be accessible anytime, anywhere: on desktops, laptops, tablets, mobile phones, and other Internet-enabled devices. MindTap can be accessed at http://www.CengageBrain.com. ***Nutrition & Diet Therapy,*** 12th edition, on MindTap includes:

- An interactive eBook with highlighting, note-taking functions, and more
- Self-quizzes, multiple-choice questions, and exercises
- Client scenarios
- Flashcards for practicing chapter terms
- Video scenarios
- NCLEX-style quizzing
- Diet & Wellness app

TEACHING PACKAGE FOR THE INSTRUCTOR

Instructor Resources

The ***Instructor Resources to Accompany Nutrition & Diet Therapy***, 12th edition, contains a variety of online tools to help instructors successfully prepare lectures and teach within this subject area. This comprehensive package provides something for all instructors, from those teaching nutrition for the first time to seasoned instructors who want something new. The following components in the website are free to adopters of the text:

- A downloadable, customizable *Instructor's Manual* containing suggested learning and teaching strategies, additional discussion questions, answers to the text Review Questions, and suggested responses to the Case in Point/Rate This Plate features.
- A *Computerized Test Bank* with several hundred questions and answers, for use in instructor-created quizzes and tests.
- Chapter slides created in PowerPoint® to use for in-class lecture material and as handouts for students.

MindTap

In the new ***Nutrition & Diet Therapy,*** 12th edition, on MindTap platform, instructors customize the learning path by selecting Cengage Learning resources and adding their own content via apps that seamlessly integrate the MindTap framework with many learning management systems. The guided learning path demonstrates the relevance of basic principles in nutrition through engagement activities, interactive exercises, and real-world scenarios, elevating the study by challenging students to apply concepts to practice. To learn more, visit www.cengage.com/mindtap.

Acknowledgments

The authors wish to express their appreciation to the following people:

Lauren Mullins
Leigh Ann Brooks
Dayanne Writtenhouse
Mary Tippman Harter
Kyla Zehr
Kylee Bennett
Beth Williams
Jill Ostrem

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How to Use This Text

OBJECTIVES

Read the chapter Objectives before reading the chapter content to set the stage for learning. Return to the Objectives when the chapter study is complete to see which entries you can respond to with "Yes, I can do that."


CHAPTER 1

KEY TERMS

24-hour recall
anthropometric measurements
atherosclerosis
biochemical tests
caliper
carbohydrates (CHO)
circulation
clinical examination
cumulative effects
deficiency diseases
dietary-social history
dietitian nutritionist
digestion
elimination
essential nutrients
fats (lipids)
food diary
goiter
health disparities
health literacy
iron deficiency
malnutrition
minerals
nutrient density
nutrients
nutrition
nutrition assessment
nutritional status
nutritious
obesity
osteomalacia
osteoporosis
proteins
respiration
rickets
vitamins
water
wellness

THE RELATIONSHIP OF NUTRITION AND HEALTH

OBJECTIVES

After studying this chapter, you should be able to:

- Name the six classes of nutrients and their primary functions
- Recognize common characteristics of well-nourished people
- Recognize symptoms of malnutrition
- Describe ways in which nutrition and health are related
- List the four basic steps in nutrition assessment

Nutrition is the branch of science that studies nutrients in foods in relation to growth, maintenance, and health of the body. Food is the fuel that sustains human life and it is required for virtually all body processes. And it is the quality of food that individuals consume over time that will determine, to a large extent, their health, growth, and development.

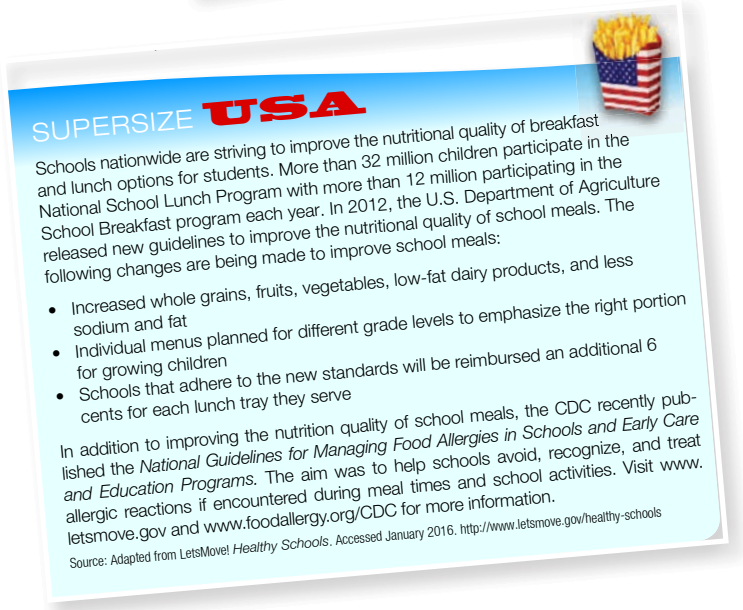
3

KEY TERMS

Glance over this list of terms before you tackle the chapter. Flip through the pages to check the definitions in the margins and make a list of those terms that are unfamiliar.

SUPERSIZE USA

Obesity has become a national health epidemic. Read over these boxes to find out why and also for suggestions on what you, as a consumer and as a nurse, can do to help curb this trend.


SUPERSIZE USA

Schools nationwide are striving to improve the nutritional quality of breakfast and lunch options for students. More than 32 million children participate in the National School Lunch Program with more than 12 million participating in the School Breakfast program each year. In 2012, the U.S. Department of Agriculture released new guidelines to improve the nutritional quality of school meals. The following changes are being made to improve school meals:

- Increased whole grains, fruits, vegetables, low-fat dairy products, and less sodium and fat
- Individual menus planned for different grade levels to emphasize the right portion for growing children
- Schools that adhere to the new standards will be reimbursed an additional 6 cents for each lunch tray they serve

In addition to improving the nutrition quality of school meals, the CDC recently published the *National Guidelines for Managing Food Allergies in Schools and Early Care and Education Programs*. The aim was to help schools avoid, recognize, and treat allergic reactions if encountered during meal times and school activities. Visit www.letsmove.gov and www.foodallergy.org/CDC for more information.

Source: Adapted from LetsMove! *Healthy Schools*. Accessed January 2016. http://www.letsmove.gov/healthy-schools

SPOTLIGHT *on Life Cycle*

Does breastfeeding a child lessen its chances of obesity later in childhood? Several studies have indicated that breastfed infants have a lower risk of childhood obesity than that of formula-fed infants while other studies have not reported a clear association. A large review study was undertaken in 2014 to provide a thorough look at the latest research. Twenty-five studies were reviewed from 1997 to 2014, with over 200,000 participants from 12 countries. This analysis revealed a dose-response effect between breastfeeding duration and reduced risk of childhood obesity and showed in particular that children breastfed for >7 months are significantly less likely to be obese in later childhood.

SPOTLIGHT ON LIFE CYCLE

Nutritional concerns and needs will change at each stage of life. Test your knowledge of the needs of children, adolescents, pregnant women, and the elderly.

In The Media

Sitting Is a Negative Even If You Work Out

According to the World Health Organization, physical inactivity has been identified as the fourth-leading risk factor for death. Sedentary behavior can lead to cardiovascular disease, cancer, and diabetes. Researchers from Toronto analyzed 47 studies of sedentary behavior. Data was adjusted to incorporate the amount someone exercises in a day; however, researchers still found that the amount of sedentary time engaged in outweighed the benefit from exercise. Tactics to help you sit less include taking frequent breaks during the work day to stretch and walk, and decreasing TV time or taking time to stand up during commercial breaks.

IN THE MEDIA

Which of these "hot topics" do you already know something about? Check here for current trends, events, and fads, and understand the potential impact on clients' health.

Exploring THE WEB

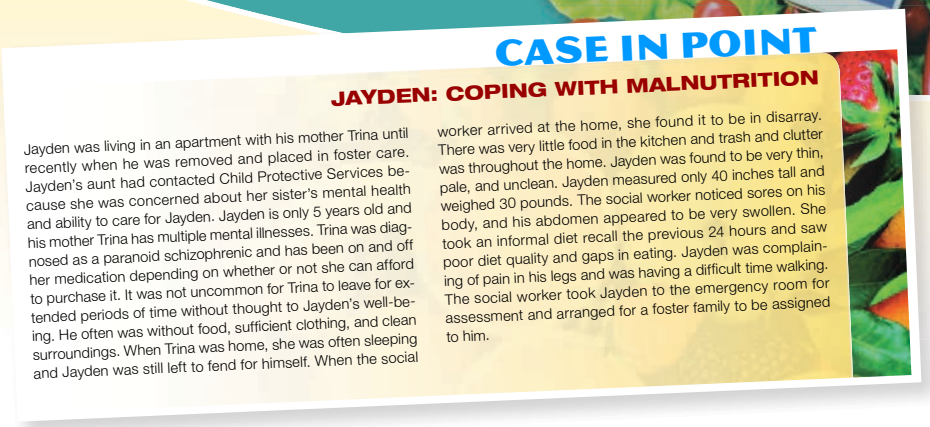
Search the Web for information on protein supplements. What are some of the claims of these products? Are they based on solid research and fact? Create fact sheets on protein supplements citing common myths and providing the truth behind the myths. How would you approach a person inquiring about the use of protein supplements?

EXPLORING THE WEB

Be sure to visit these websites for more depth on chapter topics. These are also excellent sources for information to make care plans and teaching guides.

CASE IN POINT

Two case studies conclude each chapter. Read these real-life stories, then look at the sample diet and **Rate This Plate**. Visit CengageBrain.com to see how your answers match up to those of the experts.



CASE IN POINT

JAYDEN: COPING WITH MALNUTRITION

Jayden was living in an apartment with his mother Trina until recently when he was removed and placed in foster care. Jayden's aunt had contacted Child Protective Services because she was concerned about her sister's mental health and ability to care for Jayden. Jayden is only 5 years old and his mother Trina has multiple mental illnesses. Trina was diagnosed as a paranoid schizophrenic and has been on and off her medication depending on whether or not she can afford to purchase it. It was not uncommon for Trina to leave for extended periods of time without thought to Jayden's well-being. He often was without food, sufficient clothing, and clean surroundings. When Trina was home, she was often sleeping and Jayden was still left to fend for himself. When the social worker arrived at the home, she found it to be in disarray. There was very little food in the kitchen and trash and clutter was throughout the home. Jayden was found to be very thin, pale, and unclean. Jayden measured only 40 inches tall and weighed 30 pounds. The social worker noticed sores on his body, and his abdomen appeared to be very swollen. She took an informal diet recall the previous 24 hours and saw poor diet quality and gaps in eating. Jayden was complaining of pain in his legs and was having a difficult time walking. The social worker took Jayden to the emergency room for assessment and arranged for a foster family to be assigned to him.

SUMMARY

This brief narrative overview of the most important chapter highlights is ideal for testing your grasp of the chapter material. Always start your study sessions with a quick glance at the Summary to refresh your memory on the basics of the chapter.

SUMMARY

Nutrition is directly related to health, and its effects are cumulative. Good nutrition is normally reflected by good health. Poor nutrition can result in poor health and even in disease. Poor nutrition habits contribute to atherosclerosis, osteoporosis, obesity, diabetes, and some cancers.

To be well nourished, one must eat foods that contain the six essential nutrients: carbohydrates, fats, proteins, minerals, vitamins, and water. These nutrients provide the body with energy, build and repair body tissue, and regulate body processes. When there is a severe lack of specific nutrients, deficiency diseases may develop. The best way to determine deficiencies is to do a nutrition assessment.

With sound knowledge of nutrition, the health professional will be an effective health care provider and will also be helpful to family, friends, and self.

DISCUSSION TOPICS

Critical thinking is the key to your success as a nurse. Use these activities to synthesize and apply what you have read and learned.

DISCUSSION TOPICS

1. Think about possible health disparities in your area. What have been the contributing factors? What are some solutions?
2. What relationship might nutrition and heredity have to each of the following?
   a. development of physique
   b. ability to resist disease
   c. life span
3. What habits, in addition to good nutrition, contribute to making a person healthy?
4. What are the six classes of nutrients? What are their three basic functions?
5. Why are some foods called low-nutrient-density foods? Give some examples found in vending machines.
6. Explore why it is important to support the nutrition care of a hospitalized patient from a nursing standpoint especially as it relates to malnutrition.
7. What is meant by the saying "You are what you eat"? Give specific examples of how the food we eat can affect our body and long-term consequences.
8. What is meant by the phrase "the cumulative effects of nutrition"? Describe some.
9. How could someone be overweight and at the same time suffer from malnutrition?
10. Discuss why health care professionals should be knowledgeable about nutrition.

SUGGESTED ACTIVITIES

Put your knowledge to the test; see how many of these activities you can successfully complete once you finish studying the chapter. Make a list of any areas needing additional attention.

SUGGESTED ACTIVITIES

1. List 10 signs of good nutrition and 10 signs of poor nutrition.
2. List the foods you have eaten in the past 24 hours. Underline those with low nutrient density.
3. Write a brief description of how you feel at the end of a day when you know you have not eaten
5. Write a brief paragraph discussing the nutrition assessment by a dietitian and its importance.
6. Briefly describe rickets, osteomalacia, and osteoporosis. Include their causes.
7. Ask a registered dietitian to speak to your class about nutrition problems commonly seen in your area

REVIEW

These study questions are in multiple-choice format, perfect for preparing for your nursing examinations.

REVIEW

Multiple choice. Select the *letter* that precedes the best answer.

1. The result of those processes whereby the body takes in and uses food for growth, development, and maintenance of health is
   a. respiration
   b. diet therapy
   c. nutrition
   d. digestion
2. Nutritional status is determined by
   a. heredity
   b. employment
   c. personality
9. A cumulative condition is one that develops
   a. within a very short period of time
   b. over several years
   c. only in women under 52
   d. in premature infants
10. Malnutrition is assessed by
   a. food records and measurement of vitamin status
   b. how fast weight has been lost and if there is diarrhea
   c. disease progression and blood pressure instability
   d. weight loss, muscle and fat loss, strength of handgrip, and edema

SECTION 1

Fundamentals of Nutrition

CHAPTER 1

KEY TERMS

24-hour recall
anthropometric measurements
atherosclerosis
biochemical tests
caliper
carbohydrates (CHO)
circulation
clinical examination
cumulative effects
deficiency diseases
dietary-social history
dietitian nutritionist
digestion
elimination
essential nutrients
fats (lipids)
food diary
goiter
health disparities
health literacy
iron deficiency
malnutrition
minerals
nutrient density
nutrients
nutrition
nutrition assessment
nutritional status
nutritious
obesity
osteomalacia
osteoporosis
proteins
respiration
rickets
vitamins
water
wellness

THE RELATIONSHIP OF NUTRITION AND HEALTH

OBJECTIVES

After studying this chapter, you should be able to:

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- Describe ways in which nutrition and health are related
- List the four basic steps in nutrition assessment

Nutrition is the branch of science that studies nutrients in foods in relation to growth, maintenance, and health of the body. Food is the fuel that sustains human life and it is required for virtually all body processes. And it is the quality of food that individuals consume over time that will determine, to a large extent, their health, growth, and development.

Now more than ever, science has upheld the strong influence diet has on health. Many chronic diseases such as diabetes, heart disease, and stroke are known to be largely preventable and attributed to poor diet and lifestyle habits. As a future clinician, you will likely begin to understand the urgency with which active measures need to be taken to make our social, cultural, political, and economic environment in relation to diet a health-promoting one.

For three decades, national health targets have been set. *Healthy People* is the foundational government platform that provides national objectives every 10 years for improving the health and welfare of all Americans. *Healthy People* serves to empower individuals to make informed decisions, encourages collaboration in communities for health-related behaviors, and serves to measure the impact of such strategies. *Healthy People 2020* has set targets for our nation to reach on leading health indicators that include obesity in children and adults, physical activity, and fruit and vegetable consumption. Growing attention is being given to the environmental and social determinants of health; therefore, the overarching goals of *Healthy People 2020* also include achievement of **health literacy** and equity with an elimination of **health disparities**.

Taking care of one's health is all about prevention. In the past, the focus was on treatment of diseases, with little, if any, attention to prevention. Prevention, however, can often be less costly than treatment and offers a better quality of life for an individual as well as the community. Nutrition and diet choice form a logical starting point for preventive health care measures and education to improve quality of life.

Achieving **wellness** is an active process by which individuals make informed choices toward a more successful existence. Wellness is a state of optimal well-being, not just the absence of disease. It is multidimensional and lends itself to a holistic perspective of the person in terms of mind, body, and spirit. This can be accomplished through lifestyle changes such as focusing on healthy food choices, not smoking, participating in regular physical activity, and maintaining a healthy weight. Expanding one's mind through continued education, in both nutrition and other areas, and finding a source of inner strength to deal with life changes will all contribute to one's sense of wellness.

Living a long life without major health problems is possible. The younger one is when positive changes are made, the healthier one is throughout the life span.

health literacy
the capacity to obtain, process, and understand basic health information needed to make appropriate health decisions

health disparities
a difference in health outcomes among subgroups often linked to social, economic, or environmental disadvantages

wellness
a state of physical, mental, and social well-being

nutrients
chemical substances found in food that are necessary for good health

essential nutrients
nutrients found only in food

NUTRIENTS AND THEIR FUNCTIONS

To maintain health and function properly, the body must be provided with **nutrients**. Nutrients are chemical substances that are necessary for life. They are divided into six classes:

- Carbohydrates (CHO)
- Fats (lipids)
- Proteins
- Vitamins
- Minerals
- Water

The body can make small amounts of some nutrients, but most must be obtained from food in order to meet the body's needs. Those available only in food are called **essential nutrients**. There are about 40 of them, and they are found in all six nutrient classes.

TABLE 1-1 The Six Essential Nutrients and Their Functions

ORGANIC NUTRIENTS	FUNCTION
Carbohydrates	Provide energy
Fats	Provide energy
Proteins	Build and repair body tissues; provide energy
Vitamins	Regulate body processes
INORGANIC NUTRIENTS	**FUNCTION**
Minerals	Regulate body processes
Water	Regulates body processes

The six nutrient classes are chemically divided into two categories: organic and inorganic (Table 1-1). Organic nutrients contain hydrogen, oxygen, and carbon. (Carbon is an element found in all living things.) Before the body can use organic nutrients, it must break them down into their smallest components. Inorganic nutrients are already in their simplest forms when the body ingests them, except for water.

Each nutrient participates in at least one of the following functions:

- Providing the body with energy
- Building and repairing body tissue
- Regulating body processes

Carbohydrates (CHO), **proteins**, and **fats (lipids)** furnish energy. Proteins are also used to build and repair body tissues with the help of vitamins and minerals. **Vitamins**, **minerals**, and **water** help regulate the various body processes such as **circulation**, **respiration**, **digestion**, and **elimination**.

Each nutrient is important, but none works alone. For example, carbohydrates, proteins, and fats are necessary for energy, but to provide it, they need the help of vitamins, minerals, and water. Proteins are essential for building and repairing body tissue, but without vitamins, minerals, and water, they are ineffective. Consuming foods rich in the antioxidant vitamins such as C, E, and beta-carotene may help to enhance your immune system. Foods that contain substantial amounts of nutrients are described as **nutritious**. Nutrients are discussed in detail in Chapters 4 through 9.

CHARACTERISTICS OF GOOD NUTRITION

Most people find pleasure in eating. Eating allows one to connect with family and friends in pleasant surroundings. This connection creates pleasant memories. Unfortunately, in social situations, it is easy for one to make food choices that may not be conducive to good health.

What determines when one needs to eat? Does one wait until the body signals hunger or eat when one sees food or when the clock says it is time? Hunger is the physiological need for food. Appetite is a psychological desire for food based on pleasant memories. When the body signals hunger, it indicates a decrease in blood glucose levels that supply the body with energy. If one ignores the signal and hunger becomes intense, it is possible to make poor food choices. The choices one makes will determine one's nutrition status. A person who habitually chooses to overeat, or not eat, as a way of coping with life's emotional

carbohydrates (CHO)
the nutrient class providing the major source of energy in the average diet

proteins
the only one of the six essential nutrient classes containing nitrogen

fats (lipids)
highest calorie-value nutrient class

vitamins
organic substances necessary for life although they do not, independently, provide energy

minerals
one of many inorganic substances essential to life

water
major constituent of all living cells; composed of hydrogen and oxygen

circulation
the body process whereby the blood is moved throughout the body

respiration
breathing

digestion
breakdown of food in the body in preparation for absorption

elimination
evacuation of wastes

nutritious
foods or beverages containing substantial amounts of essential nutrients

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© Digital Vision/Photodisc/Getty Images

FIGURE 1-1 Good nutrition shows in the happy faces of these children.

struggles may be suffering from an eating disorder. The various eating disorders will be discussed in Chapter 14.

Once food has been eaten, the body must process it before it can be used. **Nutrition** is the result of the processes whereby the body takes in and uses food for growth, development, and the maintenance of health. These processes include digestion, absorption, and metabolism. (They are discussed in Chapter 3.) One's physical condition as determined by diet is called **nutritional status**.

nutrition
the result of those processes whereby the body takes in and uses food for growth, development, and the maintenance of health

nutritional status
one's physical condition as determined by diet

Nutrition helps determine the height and weight of an individual. Nutrition can also affect the body's ability to resist disease, the length of one's life, and the state of one's physical and mental well-being (Figure 1-1).

Good nutrition enhances appearance and is commonly exemplified by shiny hair, clear skin, clear eyes, erect posture, alert expressions, and firm flesh on well-developed bone structures. Good nutrition aids emotional health, provides stamina, and promotes a healthy appetite. It also helps establish regular sleep and elimination habits (Table 1-2).

TABLE 1-2 Characteristics of Nutritional Status

GOOD	POOR
Alert expression	Apathy
Shiny hair	Dull, lifeless hair
Clear complexion with good color	Greasy, blemished complexion with poor color
Bright, clear eyes	Dull, red-rimmed eyes
Pink, firm gums and well-developed teeth	Red, puffy, receding gums and missing or cavity-prone teeth
Firm abdomen	Swollen abdomen
Firm, well-developed muscles and strength	Flaccid, wasted muscle, weakness, and diminished handgrip strength
Well-developed bone structure	Bowed legs, "pigeon" chest
Normal weight for height	Overweight or underweight, recent weight loss
Erect posture	Slumped posture
Emotional stability	Easily irritated; depressed; poor attention span
Good stamina; seldom ill	Easily fatigued; frequently ill
Healthy appetite	Excessive or poor appetite
Healthy, normal sleep habits	Insomnia at night; fatigued during day
Normal elimination	Constipation or diarrhea

MALNUTRITION

Malnutrition is a condition that results when the body does not receive enough nutrients: the body's cells do not receive an adequate supply of the essential nutrients because of poor diet intake or poor utilization of food. It can occur when individuals do not or cannot eat enough of the foods that provide the essential nutrients to satisfy body needs (undernutrition). Even though we think of an individual with malnutrition being at a low body weight, normal weight or even obese individuals can suffer some degree of malnourishment if their diet is of poor nutrition quality. Overweight and obese individuals with overnutrition, who develop a severe acute illness or experience a major traumatic event, are at risk for malnutrition and need intensive nutrition intervention. At other times, people may eat well-balanced diets but they may suffer from diseases of digestion or absorption that prevent normal usage of the nutrients. Malnutrition is critical to identify, as it is a major contributor to increased morbidity and mortality and increased frequency and length of hospital stay.

Nutrient Deficiency

A nutrient deficiency occurs when a person lacks one or more nutrients over a period of time. Nutrient deficiencies are classified as primary or secondary. Primary deficiencies are caused by inadequate dietary intake. Secondary deficiencies are caused by something other than diet, such as a disease condition that may cause malabsorption, accelerated excretion, or destruction of the nutrients. Nutrient deficiencies can result in malnutrition.

INDIVIDUALS AT RISK FROM POOR NUTRITIONAL INTAKE

Individuals of all ages and from all walks of life could be at risk of poor nutrition intake. Persons with recent illness, hospitalizations, or surgery likely experience a disruption in their intake that poses risk. Others may meet or exceed energy intake, but consume foods that are of low nutrient quality. Foods with low **nutrient density** provide an abundance of calories, but the nutrients are primarily carbohydrates (especially added sugars) and fats and, except for sodium, provide very limited amounts of proteins, vitamins, and minerals.

Some individuals may have heightened risk of poor nutritional intake due to budget concerns that preclude them from purchasing nourishing foods. Some lack access to healthy food simply because of their geographic location. It is known that approximately 29 million Americans lack access to healthy, affordable foods. These individuals live in a food desert, which means they do not have a grocery store within 1 mile of their home if they live in an urban area, or within 10 miles if they live in a rural area. Those individuals living in lower-income neighborhoods seem to suffer the most diet-related disease and obesity. The National Health and Nutrition Examination Survey (NHANES), which tracks the health and nutrition status of our population, is a source of information that highlights the sobering disparities in health seen in communities across America.

We think of teenagers as being a generally healthy lot; however, teenagers may eat often but at unusual hours. They may miss regularly scheduled meals, become hungry, and satisfy their hunger with foods that have low nutrient density, such as potato chips, cakes, soda, and candy. Teenagers are subject to peer pressure; that is, they are easily influenced by the opinions of their friends. If friends favor foods with low nutrient density, it can be difficult for a teenager not to go along with them. Fad diets, which unfortunately are common among teens, sometimes

Supersizing in the fast food industry and large quantities served in restaurants lead to portion distortion. Those growing up in the supersized world may have no concept of what constitutes a normal portion. Children who are encouraged to, or have been made to, eat everything on their plates may feel compelled to finish their supersized meals, easily contributing to obesity and type 2 diabetes.

malnutrition
any nutrition imbalance

nutrient density
nutrient value of foods compared with number of calories

SPOTLIGHT on Life Cycle

Infants, young children, teenage girls, and adults are at risk for iron-deficiency anemia. Full-term infants are born with enough iron stores to last four to six months. A premature infant is at even greater risk for iron-deficiency anemia. Baby foods and cereals are fortified with iron to help prevent iron deficiency in young children. Underweight teens or teenage girls who have heavy monthly periods are at increased risk for iron-deficiency anemia. Women of childbearing age are also at risk. Pregnant women are prone to anemia due to the increased need for iron during pregnancy. A supplement that is higher in iron may be prescribed for pregnant women. Internal bleeding can lead to iron-deficiency anemia due to blood loss. Clients who have undergone kidney dialysis or gastric bypass surgery are also at an increased risk. Treatments include dietary changes and supplements, medicines, and surgery.

Source: Adapted from "Who Is at Risk for Iron-Deficiency Anemia?" National Heart, Lung, and Blood Institute. U.S. Department of Health and Human Services. 2014. http://www.nhlbi.nih.gov

Exploring THE WEB

Search the Web to find information on osteomalacia and osteoporosis. What are the leading causes? Should you take a calcium plus vitamin D supplement?

result in a form of malnutrition. This condition occurs because some nutrients are eliminated from the diet when the types of foods eaten are severely restricted.

Pregnancy increases a woman's hunger and the need for certain nutrients, especially proteins, minerals, and vitamins. Pregnancy during adolescence requires extreme care in food selection. The young mother-to-be requires a diet that provides sufficient nutrients for the developing fetus as well as for her own still-growing body.

Many factors influence nutrition in the elderly. Depression, loneliness, lack of income, inability to shop, inability to prepare meals, and the state of overall health can all lead to malnutrition.

CUMULATIVE EFFECTS OF NUTRITION

There is an increasing concern among health professionals regarding the **cumulative effects** of nutrition. Cumulative effects are the results of something that is done repeatedly over many years. For example, eating excessive amounts of saturated fats (saturated fats are discussed in Chapter 5) for many years contributes to **atherosclerosis**, which leads to heart attacks. Years of overeating can cause **obesity** and may also contribute to hypertension, type 2 (noninsulin-dependent) diabetes, gallbladder disease, foot problems, certain cancers, and even personality disorders.

cumulative effects
results of something done repeatedly over many years

atherosclerosis
a form of arteriosclerosis affecting the intima (inner lining) of the artery walls

obesity
excessive body fat and BMI over 30

deficiency diseases
diseases caused by the lack of one or more specific nutrients

iron deficiency
a condition in which the body does not have enough usable iron due to inadequate intake, bleeding, or absorption problems

Deficiency Diseases

When nutrients are seriously lacking in the diet for an extended period, **deficiency diseases** can occur. The most common form of deficiency disease in the United States is **iron deficiency**, which is caused by a lack of the mineral iron and can cause iron-deficiency anemia, which is discussed further in Chapter 8. Iron deficiency is particularly common among children and women. Iron is a necessary component of the blood and is lost during each menstrual period. In addition, the amount of iron needed during childhood and pregnancy is greater than normal because of the growth of the child or the fetus.

TABLE 1-3 Nutritional Deficiency Diseases and Possible Causes

DEFICIENCY DISEASE	NUTRIENT(S) LACKING
Iron deficiency	Iron
Iron-deficiency anemia	Iron
Beriberi	Thiamin
Night blindness	Vitamin A
Goiter	Iodine
Kwashiorkor	Protein
Marasmus	All nutrients
Osteoporosis	Calcium and vitamin D
Osteomalacia	Calcium and vitamin D, phosphorus, magnesium, and fluoride
Pellagra	Niacin
Rickets	Calcium and vitamin D
Scurvy	Vitamin C
Xerophthalmia (blindness)	Vitamin A

Rickets is another example of a deficiency disease. It causes poor bone formation in children and is due to insufficient calcium and vitamin D. The same deficiencies cause **osteomalacia** in young adults and **osteoporosis** in older adults. Osteomalacia is sometimes called "adult rickets." It causes the bones to soften and may cause the spine to bend and the legs to become bowed. Osteoporosis is a condition that causes bones to become porous and excessively brittle. Too little iodine may cause **goiter**, and a severe shortage of vitamin A can lead to blindness.

Examples of other deficiency diseases (and their causes) are included in Table 1-3. Information concerning these conditions can be found in the chapters devoted to the given nutrients.

NUTRITION ASSESSMENT

That old saying, "You are what you eat," is true, indeed; but one could change it a bit to read, "You are *and will be* what you eat." Good nutrition is essential for the attainment and maintenance of good health. In a clinical setting, determining whether a person is at risk requires completion of a **nutrition assessment**, which should be part of a routine examination done by a registered **dietitian nutritionist (RDN)** or other health care professional specifically trained in the diagnosis of at-risk individuals. A proper nutrition assessment includes **anthropometric measurements**, **clinical examination**, **biochemical tests**, and **dietary-social history**. Collected data guides the RDN to make the appropriate nutrition diagnosis using the nutrition care model. Interventions are then instituted with follow-up monitoring and evaluation.

Anthropometric measurements include height and weight and measurements of the head (for children), chest, and skinfold (Figure 1-2). The skinfold measurements are done with a **caliper**. They are used to determine the percentage of adipose and muscle tissue in the body. Measurements out of line with expectations may reveal failure to thrive in children, wasting (catabolism), edema, or obesity, all of which reflect nutrient deficiencies or excesses.

rickets
deficiency disease caused by the lack of vitamin D; causes malformed bones and pain in infants and children

osteomalacia
a condition in which bones become soft, usually in adults because of calcium loss and vitamin D deficiency

osteoporosis
condition in which bones become brittle because there have been insufficient mineral deposits, especially calcium

goiter
enlarged tissue of the thyroid gland due to a deficiency of iodine

nutrition assessment
evaluation of one's nutritional condition

dietitian nutritionist (RDN)
professionals who translate the science of nutrition into practical solutions for improved health

anthropometric measurements
of height, weight, head, chest, skinfold

clinical examination
physical observation

biochemical tests
laboratory analysis of blood, urine, and feces

dietary-social history
evaluation of food habits, including client's ability to buy and prepare food

caliper
mechanical device used to measure percentage of body fat by skinfold measurement