

Florida Nutrition Training Guide

Nutrition Education Series

Basic Nutrition Module

Revised June 2007



**Florida Department of Health
Bureau of WIC and Nutrition Services**

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Nutrition Education Series

Basic Nutrition Module



State of Florida
Department of Health
Bureau of WIC and Nutrition Services

Revised June 2007

Developed and produced by:

Florida Department of Health
Bureau of WIC and Nutrition Services
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Introduction to the Basic Nutrition Module

for the Supervising Nutritionist and the Staff Member Studying the Module

The *Basic Nutrition Module* is part of the *Nutrition Education Series* of the *Florida Nutrition Training Guide*. Other modules in the *Nutrition Education Series* are: *Preschool Child Nutrition*, *Prenatal & Postpartum Nutrition*, *Infant Nutrition*, and *Breastfeeding*.

The *Basic Nutrition Module* consists of the following 3 components:

- the module itself, to be studied by the staff member. The module is the “textbook” which contains information about basic nutrition.
- the workbook, to be completed by the staff member. The workbook contains: the self-checks, the answer key to the self-checks, and the practical activity.
- the evaluation materials for the supervising nutritionist. The evaluation materials contain: the answer key to the practical activity, the posttest, and the answer key to the posttest.

Instructions for using the module, the workbook, and the evaluation materials are contained within each of these documents. Staff members, while progressing through the module and workbook, should read all the instructions—in the order in which they are presented—to ensure proper completion of all requirements. The supervising nutritionist should also read the instructions in both the module and the workbook, as well as in the evaluation materials, in order to understand their basic format, his/her responsibilities as a supervising nutritionist, and the appropriate evaluation procedures to use.

The *Nutrition Education Series* of the *Florida Nutrition Training Guide* (formerly called *Florida’s Nutrition Paraprofessional Training Guide*) provides standardized nutrition training to staff members such as dietetic technicians and clerical staff (who provide newsletter nutrition education contacts).¹ In addition, the *Nutrition Education Series* has been developed for other staff such as entry-level nutrition professional staff or other professional staff such as nurses.

The learning materials in each module of the *Florida Nutrition Training Guide* are developed for individualized, self-paced instruction and are competency-based. In most cases, the staff member will be studying the modules independently, and not in a group setting. The supervising nutritionist should serve as a facilitator, assisting the staff member as needed and evaluating the staff member’s performance of specified activities. The study of each module, its workbook activities, and its posttest should take about 10 to 12 hours to complete. Therefore, the entire *Nutrition Education Series* of the *Florida Nutrition Training Guide* is approximately a 50-hour training program. (*over*)

1. Refer to the *WIC Procedure Manual* (DHM 150-24) for complete information and policies regarding which staff members are required to complete the *Florida Nutrition Training Guide* before they are eligible to provide specific nutrition services to WIC clients.

If you have any questions about the *Florida Nutrition Training Guide*, please contact the Nutrition Unit, Bureau of WIC and Nutrition Services, Florida Department of Health at (850) 245-4202.

Instructions on HOW TO DO this Module

1. Read the Knowledge Objectives and the Performance Objectives that follow these instructions. These objectives specify what you are expected to learn (Knowledge Objectives) and what you will be expected to do (Performance Objectives) as a result of studying this *Module*.
2. Begin reading and studying the *Module*. This *Module* is designed for individualized instruction. Read the information at your own pace, or according to the timelines established by your supervising nutritionist.
3. Stop when you come to a *Self-Check* section and complete the assigned *Self-Check* questions right away. The *Self-Check* questions can be found in the *Workbook for the Basic Nutrition Module*. Request this *Workbook* from your supervising nutritionist; it is yours to work in and keep. The *Workbook* contains the: *Self-Check questions*, *Answer Key to the Self-Check questions*, and *Practical Activity*. **Use your Workbook to record your answers—please do not write in this book.**
4. After you complete a *Self-Check* section, immediately check your answers against the *Answer Key*, which follows the *Self-Check* questions in your *Workbook*. If you have incorrect answers, re-read the appropriate section of text to find, and then record, the correct answer(s). Then, move onto the next new section in the module.
5. Continue to read and study the *Module*—repeating steps 2, 3, and 4 of these instructions—until you reach the end of the *Module*. At the end of the *Module*, you are asked to do the *Practical Activity for the Performance Objective*.
6. Complete the *Practical Activity*, which also can be found in your *Workbook*. When you complete your *Practical Activity*, submit it to your supervising nutritionist, who will, in turn, grade and evaluate it.¹ If you answer at least 85% of the questions and assignments correctly and completely, this is considered acceptable completion.
7. Arrange for a convenient time to take the *Posttest*, and also for the follow-up conference between you and your supervising nutritionist.¹ The supervising nutritionist will give you a copy of the *Posttest* at the arranged time. The *Posttest* is **not** an open book test.

Note: The *Posttest* measures your mastery of the Knowledge Objectives. Thus, to prepare for the *Posttest*, **review the Knowledge Objectives**. Each *Posttest* question is directly related to one of the Knowledge Objectives.

1. **Note to the Supervising Nutritionist:** The *Answer Key to the Practical Activity*, the *Posttest*, and the *Answer Key to the Posttest* can be found in the *Evaluation Materials for the Supervising Nutritionist*.

Objectives of the Basic Nutrition Module

Knowledge Objectives

The staff member will be able to:

1. Define the following terms: nutrition, nutrients, and calorie.
2. List several factors that affect food choices.
3. Understand the digestive process.
4. State the six major categories of nutrients, their main functions in the body, the food sources for each nutrient, and recommended intake.
5. Understand the differences between animal and plant proteins.
6. List the two major types of carbohydrates and know food sources for each type.
7. State the food sources of fiber, benefits of fiber, and recommended daily amount.
8. Describe the types of fatty acids in foods and the amounts that are recommended in the diet.
9. Briefly explain the basic functions of vitamins and minerals in the body and identify food sources of the vitamins and minerals.
10. List the diseases linked to poor diet and physical inactivity.
11. Be familiar with the basic concepts of the *Dietary Guidelines for Americans*.
12. State the physical activity recommendations of the *Dietary Guidelines for Americans*.
13. State the daily fat intake recommendations of the *Dietary Guidelines for Americans*.
14. List dietary measures that may help people lower their blood pressure.
15. List the five food groups of the MyPyramid food guidance system, the foods contained in each food group, and recommended daily amounts from each food group.
16. Understand the concept of portion sizes and serving sizes.
17. Be able to explain the MyPyramid recommended daily amount for the various groups of individuals.
18. Interpret key words and information on food labels.
19. Explain several reasons people make the food choices they do.
20. Understand the differences in the classification of vegetarians.
21. Define lactose intolerance and explain how it affects food choices.
22. List the basic weight management techniques used for the treatment of overweight and obesity in adults.
23. List several ways to eat healthy foods away from home.

Performance Objectives

The staff member will be able to demonstrate a clear understanding of the MyPyramid food guidance system. His/her performance on all of the following tasks should be rated “acceptable.”

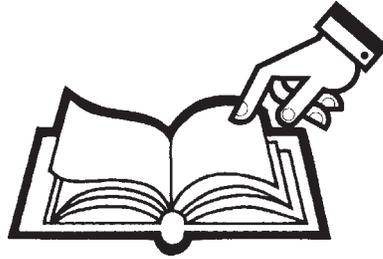
1. The staff member will complete a personal five-day food record.
2. The staff member will categorize all the foods eaten each day into their appropriate food categories, using the MyPyramid food guidance system.
3. Based on the information gathered, the staff member will assess and evaluate his/her daily meal pattern, pointing out its adequacies and inadequacies.
4. Based on his/her findings, the staff member will present a plan for improvement of the daily meal pattern.

Note: Knowledge Objectives 1–23 directly relate to the *Posttest* that the staff member takes as the final requirement for successful completion of this *Module*.

Performance Objectives 1–4 directly relate to the *Practical Activity* that the staff member completes after his/her study of this module; the *Practical Activity* is located in the *Workbook for the Basic Nutrition Module*.

The *Posttest* and the *Practical Activity* will be graded/evaluated by the supervising nutritionist.

Glossary for the Basic Nutrition Module



Absorption. After digestion of food, nutrients are taken into the intestinal cells so the nutrients can be used by the body.

Amino Acids. The building blocks of protein.

Anaphylactic shock. A life threatening, whole-body allergic reaction to a food or substance.

Antioxidant. A compound that protects other compounds from oxygen by itself reacting with oxygen.

Bioavailability. The absorbability of a nutrient. The absorbability of a nutrient can vary depending on the food source from which it is obtained and other foods eaten at the same meal.

Body Mass Index (BMI). Measures weight in relation to height. For most people, this is a fairly accurate measure of the person's total body fat compared with the assessment of body weight alone.

Caffeine. A stimulant that in small amounts may produce alertness and reduced reaction time in some people. Caffeine is a diuretic (compound that causes increased urinary water excretion). Overdoses may cause headaches, trembling, an abnormally fast heart rate, and other undesirable effects.

Calorie. The unit used to measure the energy in food is a *kilocalorie* (*kcalorie* or *Calorie*). It is the amount of heat energy needed to raise the temperature of a kilogram (a liter) of water 1 degree Celsius. This module will use the lowercase *calorie* to mean the same thing.

Carbohydrates. Carbohydrates are an energy nutrient and supply a major source of energy in the American diet. The two major types of carbohydrates in foods are sugars and complex carbohydrates.

Carotenoids. A group of pigments found in fruits and vegetables that are yellow, orange, green, and deep red in color. Carotenoids act as antioxidants and may help reduce the risk of cancer. The body converts the carotenoids in these fruits and vegetables to retinol which is an active form of vitamin A.

Cholesterol. A soft waxy substance that is a member of the group of lipids known as sterols. It is manufactured in the body for a variety of purposes and is also found in foods derived from animals such as meat, eggs, cheese, whole milk, 2% reduced fat milk, and butter. Plant foods do not contain cholesterol.

Collagen. A type of protein which gives strength and flexibility to connective tissue.

Complementary Proteins. Two foods which each supply the amino acids which are in limited amounts in the other.

Cretinism. An extreme and irreversible mental and physical retardation of infants caused by severe iodine deficiency in pregnant women.

Dietary Fiber. That part of whole grains, vegetables, fruits, legumes, and nuts that is not digested in the gastrointestinal tract.

Digestion. The process or act of converting food into chemical substances that can be absorbed and changed into living tissue.

Empty Calorie Foods. Usually referred to as foods that are high in calories and low in nutrients.

Fat. Fat is made up of basic units called fatty acids. Fats are important in the diet because they supply energy and are sources of essential fatty acids. They are also the most concentrated source of calories. See pages 35 and 36 of this module for an explanation of the different types of fatty acids.

Foodborne Illness. An illness that is caused by eating food that contains harmful bacteria, toxins, parasites, viruses, or chemical contaminants.

Glucose. The end product of carbohydrate metabolism and the major source of energy for the body. Also referred to as *blood sugar* or *dextrose*.

Glycogen. The body's major carbohydrate reserve. It is stored primarily in the liver and muscle.

Goiter. An enlargement of the thyroid gland, due to lack of iodine in the body.

Health Care Provider. For purposes of this module, "health care provider" refers to the person or facility providing the primary source of medical care for an individual; such as a family doctor, obstetrician, pediatrician, or health clinic.

Hormones. Chemical substances produced in the body by an organ, cells of an organ, or scattered cells. Hormones serve as messengers that act on other organs to maintain constant conditions within the body.

Insoluble Fiber. A type of fiber that is not soluble in water. This type of fiber works to increase the bulk of the stool.

Ketones. Compounds in the blood that result from an incomplete breakdown of fats. When ketones accumulate in the blood, the body goes into a state of *ketosis*.

Lactase. The enzyme that helps the body digest lactose.

Lactose. The sugar in milk.

Legumes. Dry beans, peas, or lentils. These plant foods are rich in high quality protein compared with those of most other plant foods.

Lipids. A family of compounds soluble in organic solvents, but not in water. Lipids include triglycerides (fats and oils), phospholipids, and sterols.

Malnutrition. Any condition caused by an unbalanced or insufficient diet or to the inability to properly digest and absorb foods. It also includes undernutrition (nutrient or energy deficiencies) and overnutrition (nutrient or energy excesses).

Megaloblastic Anemia. An anemia characterized by the presence of large red blood cells in the bone marrow, such as pernicious anemia. This type of anemia can be caused by insufficient vitamin B₁₂ or folic acid.

Metabolism. The sum total of all chemical reactions that occur inside all cells in the body. It includes all the processes the body carries out to obtain and utilize energy from food.

Minerals. Chemical elements needed by the body in small amounts to maintain life and promote growth. Minerals are considered to be *micronutrients*.

MyPyramid food guidance system. MyPyramid, which replaces the Food Guide Pyramid introduced in 1992, is part of an overall food guidance system that emphasizes the need for a more individualized approach to improving diet and lifestyle. The MyPyramid information is available at www.MyPyramid.gov.

Nutrients. Components of food that are essential for the body's functioning. Nutrients provide energy, serve as building material, help maintain or repair body parts, and support growth. The nutrients include water, carbohydrate, fat, protein, vitamins, and minerals.

Nutritionist. For purposes of this module, "nutritionist" refers to a licensed nutritionist. In some cases, however, nutrition education and counseling services can be provided by other staff members, e.g., nutrition educators, nurses, and dietetic technicians. Refer to the WIC Procedure Manual (DHM 150-24), Chapter 6, Nutrition Education, for policies regarding the staff members who are qualified to provide nutrition education and counseling services to medically high risk, high risk, and low risk clients.

Obese/Overweight. Overweight is defined as an adult who has a Body Mass Index (BMI) from 25 up to 30. Obese is defined as an adult who has a BMI of 30 or higher. Obese persons are also overweight.

Osteoporosis. A condition that develops due to lack of calcium in the bone. The bones become porous or full of holes. The bones lose their strength and can break more easily.

Peristalsis. The movement of the walls of the esophagus, stomach, and intestine that propels food and liquid through the digestive system and also can mix the contents within each organ.

Phytates. Compounds present in plant foods such as whole grains that bind with minerals such as calcium, iron, and zinc and prevent their absorption by the body.

Protein. A protein is made up of a chain of individual units called amino acids. Amino acids are the building blocks of all proteins. There are 20 different amino acids that join into different combinations, thus making the great variety of proteins needed by the body.

Retinol. The form of vitamin A found in animal products.

Scurvy. A condition due to a deficiency of vitamin C marked by weakness and anemia.

Soluble fiber. A type of fiber that absorbs water and causes it to swell and acts to decrease the rate of stomach emptying and increasing transit time of food through the digestive system.

Vegetarian. A person who does not eat meat, poultry, and fish and possibly animal-derived products such as milk, cheese, and eggs. Here are the main types of vegetarians:

- *Vegans* (pronounced VAY-guns or VEJ-uns), also referred to as *pure or strict vegetarians*, exclude all animal-derived products.
- *Lacto-ovo vegetarians* consume dairy products, eggs, vegetables, grains, legumes, fruits, and nuts; exclude meat, poultry, and fish.
- *Lacto-vegetarians* consume dairy products, vegetables, grains, legumes, fruits, and nuts; exclude meat, poultry, fish, and eggs.
- *Semi-vegetarians* eat plant foods, as well as eggs, milk and milk products, plus small amounts of fish or poultry on occasion.

Vitamins. Organic compounds that are required for body functions, in very small amounts. Vitamins are noncaloric essential nutrients.

Part 1: The Basics of Nutrition

Factors Influencing Food Choices

As you begin this Basic Nutrition Module, it is important to realize that there are many reasons why people eat certain foods. Different people like different foods and like to prepare the same foods in different ways. Individuals make decisions about what they eat based on many different factors, including:

- whether foods taste good
- whether foods are familiar, convenient, available, or affordable
- culture
- family background
- religion
- ethical reasons
- moral beliefs
- life experiences
- income level
- nutrition and health reasons, such as food intolerances or allergies
- knowledge and beliefs about nutrition and health
- advertising and marketing issues
- foods provided by the government or other assistance programs
- availability of cooking equipment and the ability to purchase, store, and prepare food

Role of Nutrition in Health Promotion

Nutrition is the study of the food that a person eats and the way the human body uses that food. Eating the right amounts and kinds of food positively affects health, energy, appearance, and the way a person feels. There are a wide variety of foods that: provide the necessary nutrition, taste good, and are convenient. Helping clients practice healthy eating habits goes beyond telling them information about nutrition. The key to consistently practicing healthy eating habits is to translate the knowledge of nutrition needs and requirements into eating habits that fit into each client's cultural, social, and economic settings. The staff member will be able to help to "translate" this information for clients. The staff member will be helping clients to:

- Gain accurate knowledge of nutrient needs and food sources of those nutrients.
- Apply that knowledge to food planning, shopping, preparation, and eating.

In addition, some staff members will be working individually with clients or parents/caregivers to help them set reasonable nutrition goals to help them improve their nutrition and health status.

Foods alone cannot make a person healthy. Other factors that influence health status include:

- physical or medical conditions
- environment: poverty, adverse living or work conditions
- lifestyle: activity level; stress; adequate sleep; and use of alcohol, cigarettes, or drugs
- heredity or genetics
- mental attitude and beliefs regarding health

There are many ways in which people can positively influence their chances for good health through the daily choices they make. For most adult Americans who do not smoke and do not drink excessively, what a person eats has a greater influence on long-term health more than anything else. For young children, the types and quantities of food eaten may have long-term effects on mental and physical development. This module will guide you through the basic knowledge needed to help ensure good nutrition.

The Digestive System¹

The digestive system is a series of hollow organs joined in a long, twisting tube from the mouth to the anus as shown in Figure 1. Inside this tube is a lining called the mucosa. In the mouth, stomach, and small intestine, the mucosa contains tiny glands that produce juices to help digest food.

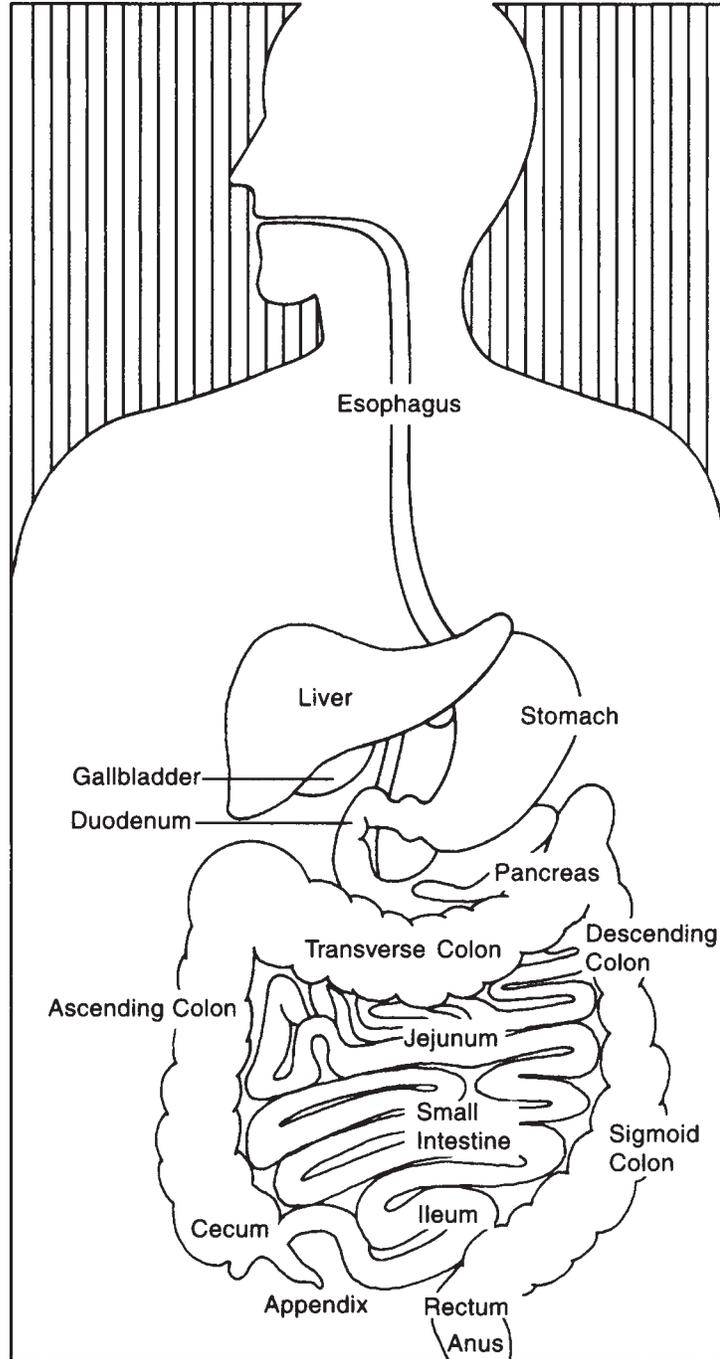
There are also two solid digestive organs, the liver and the pancreas, which produce juices that reach the intestine through small tubes. In addition, parts of other organ systems (for instance, nerves and blood) play a major role in the digestive system.

Why Is Digestion Important?

When individuals eat such things as bread, meat, and vegetables, they are not in a form that the body can use as nourishment. The food and drink must be changed into smaller molecules of nutrients before they can be absorbed into the blood and carried to cells throughout the body. **Digestion** is the process by which food and drink are broken down into their smallest parts so that the body can use them to build and nourish cells and to provide energy.

1. This section and Figure 1 was adapted from *Your Digestive System and How It Works* published by the National Digestive Diseases Information Clearinghouse, National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health (NIH), US Department of Health and Human Services, NIH Publication No. 04–2681, May 2004.

Figure 1. The Digestive System



How Is Food Digested?

Digestion involves the mixing of food, its movement through the digestive tract, and chemical breakdown of the large molecules of food into smaller molecules. Digestion begins in the mouth, with chewing and/or swallowing of food or liquid, and is completed in the small intestine. The chemical process varies somewhat for different kinds of food.

Movement of Food Through the System

The large, hollow organs of the digestive system contain muscle that enables their walls to move. The movement of organ walls can propel food and liquid and also can mix the contents within each organ. Typical movement of the esophagus, stomach, and intestine is called *peristalsis*. The action of peristalsis looks like an ocean wave moving through the muscle. The muscle of the organ produces a narrowing and then propels the narrowed portion slowly down the length of the organ. These waves of narrowing push the food and fluid in front of them through each hollow organ.

The first major muscle movement occurs when food or liquid is swallowed. Although individuals are able to start swallowing by choice, once the swallow begins, it becomes involuntary and proceeds under the control of the nerves.



The **esophagus** is the organ into which the swallowed food is pushed. It connects the throat above with the stomach below. At the junction of the esophagus and stomach, there is a ringlike valve closing the passage between the two organs. However, as the food approaches the closed ring, the surrounding muscles relax and allow the food to pass.

The food then enters the **stomach**, which has three mechanical tasks to do. First, the stomach must store the swallowed food and liquid. This requires the muscle of the upper part of the stomach to relax and accept large volumes of swallowed material. The second job is to mix up the food, liquid, and digestive juice produced by the stomach. The lower part of the stomach mixes these materials by its muscle action. The third task of the stomach is to empty its contents slowly into the **small intestine**.

Several factors affect emptying of the stomach, including the nature of the food (mainly its fat and protein content) and the degree of muscle action of the emptying stomach and the next organ to receive the stomach contents (the small intestine). As the food is digested in the small intestine and dissolved by the juices from the pancreas, liver, and intestine, the contents of the intestine are mixed and pushed forward to allow further digestion.

Finally, all of the digested nutrients are absorbed through the intestinal walls. The waste products of this process include undigested parts of the food, known as fiber, and older cells that have been shed from the mucosa (the cells that line the digestive tract). These materials are propelled into the **colon or large intestine**, where they remain, usually for a day or two, until the feces are expelled by a bowel movement.

Production of Digestive Juices

The glands that act first are in the mouth—the salivary glands. Saliva produced by these glands contains an enzyme that begins to digest the starch from food into smaller molecules.

The next set of digestive glands is in the stomach lining. They produce stomach acid and an enzyme that digests protein. One of the unsolved puzzles of the digestive system is why the acid juice of the stomach does not dissolve the tissue of the stomach itself. In most people, the stomach mucosa is able to resist the juice, although food and other tissues of the body cannot.

After the stomach empties the food and juice mixture into the small intestine, the juices of two other digestive organs mix with the food to continue the process of digestion. One of these organs is the **pancreas**. It produces a juice that contains a wide array of enzymes to break down the carbohydrates, fat, and protein in food. Other enzymes that are active in the process come from glands in the wall of the intestine or even a part of that wall.

The liver produces yet another digestive juice—bile. Between meals, the bile is stored in the gallbladder. At mealtime, it is squeezed out of the gallbladder into the bile ducts to reach the intestine and mix with the fat in the food. The bile acids dissolve the fat into the watery contents of the intestine, much like detergents that dissolve grease from a frying pan. After the fat is dissolved, it is digested by enzymes from the pancreas and the lining of the intestine.

Absorption and Transport of Nutrients

Digested molecules of food, as well as water and minerals from the diet, are absorbed from the upper small intestine. Most absorbed materials cross the mucosa into the blood and are carried off in the bloodstream to other parts of the body for storage or further chemical change.

Carbohydrates

It is recommended that about 45 to 65 percent of total daily calories be from carbohydrates. Some of the most common foods contain mostly carbohydrates. Examples are bread, potatoes, legumes, rice, pasta, fruits, and vegetables. Many of these foods contain both starch and fiber.

The digestible carbohydrates are broken into simpler molecules by enzymes in the saliva, in juice produced by the pancreas, and in the lining of the small intestine. Starch is digested in two steps: First, an enzyme in the saliva and pancreatic juice breaks the

starch into molecules called maltose; then an enzyme in the lining of the small intestine (maltase) splits the maltose into glucose molecules that can be absorbed into the blood. Glucose is carried through the bloodstream to the liver, where it is stored or used to provide energy for the work of the body.

Table sugar is another carbohydrate that must be digested to be useful. An enzyme in the lining of the small intestine digests table sugar into *glucose* and *fructose*, each of which can be absorbed from the intestines into the blood. Milk contains yet another type of sugar, *lactose*, which is changed into absorbable molecules by an enzyme called *lactase*, also found in the intestinal lining.

Protein

Foods such as meat, eggs, and beans consist of giant molecules of protein that must be digested by enzymes before they can be used to build and repair body tissues. An enzyme in the juice of the stomach starts the digestion of swallowed protein. Further digestion of the protein is completed in the small intestine. Here, several enzymes from the pancreatic juice and the lining of the intestine carry out the breakdown of huge protein molecules into small molecules called *amino acids*. These small molecules can be absorbed from the small intestine into the blood and then be carried to all parts of the body to build the walls and other parts of cells.

Fats

Fat molecules are a rich source of energy for the body. The first step in digestion of a fat such as vegetable oil is to dissolve it into the watery content of the intestinal cavity. The bile acids produced by the liver act as natural detergents to dissolve fat in water and allow the enzymes to break the large fat molecules into smaller molecules, some of which are fatty acids and cholesterol. The bile acids combine with the fatty acids and cholesterol and help these molecules to move into the cells of the mucosa. In these cells the small molecules are formed back into large molecules, most of which pass into vessels (called lymphatics) near the intestine. These small vessels carry the reformed fat to the veins of the chest, and the blood carries the fat to storage depots in different parts of the body.



Vitamins and Minerals

Vitamins and minerals are absorbed in the small intestine. They eventually enter the bloodstream to nourish the body's tissues.

Water

Most of the material absorbed from the small intestine is water in which minerals are dissolved. Water and some minerals are also absorbed in the large intestine.

Fiber

Some fiber fragments are absorbed in the large intestine. However, most fiber is not absorbed and passes out of the colon as feces.

How Is the Digestive Process Controlled?

Hormone Regulators

A fascinating feature of the digestive system is that it contains its own regulators. The major hormones that control the functions of the digestive system are produced and released by cells in the mucosa of the stomach and small intestine. These hormones are released into the blood of the digestive tract, travel back to the heart and through the arteries, and return to the digestive system, where they stimulate digestive juices and cause organ movement.

Nerve Regulators

There are extrinsic (outside) nerves and intrinsic (inside) nerves that help control the action of the digestive system. The extrinsic nerves come from the unconscious part of the brain or from the spinal cord. They release a chemical called acetylcholine and another called adrenaline. The intrinsic nerves are in the walls of the esophagus, stomach, small intestine, and colon. The intrinsic nerves are triggered to act when the walls of the hollow organs are stretched by food. They release many different substances that speed up or delay the movement of food and the production of juices by the digestive organs.



*This begins a series of **Self-Check Questions** that occur throughout this module. The Self-Checks are contained in the **Workbook for the Basic Nutrition Module**.*

*Each time you come to a Self-Check assignment in this module (highlighted with the food logo—see above), go to your workbook and complete the assigned Basic Nutrition Self-Check Questions right away. Record your answers directly in your workbook. **Please do not write in the module textbook!***

*After completing each assigned set of Self-Check Questions in your workbook, you should immediately correct your responses by using the **Answer Key to the Self-Check Questions** that is also contained in the workbook.*

 **GO TO the Workbook for the Basic Nutrition Module and complete Self-Check Questions 1–6 right now.**

After completing Questions 1–6, immediately check your answers against the Answer Key to the Self-Check Questions (contained in your workbook) before proceeding to the next section of the module.

Follow this procedure for all the Self-Checks.

Nutrients

Nutrients are substances present in food. Nutrients are needed by the human body for energy, growth, maintenance and repair of body tissue, and regulation of body functions. Food provides the energy for the body's activities whether it is for physical activities such as walking, running, crawling, or doing housework or for internal activities inside the body such as breathing, digesting food, or the heart beating. The energy value of a food is measured in **calories**. The body is in "**energy balance**" when the number of calories eaten is equal to the number of calories used. Food provides the energy and building blocks needed for growth and development. From the moment of conception to birth, the mental and physical development of the unborn baby is dependent on the mother's food intake. Good nutrition is essential for growth throughout infancy, childhood, and adolescence, since these populations are in a critical period of growth and development. Good nutrition is also essential to maintenance of good health as an adult.

Nutrients in food are necessary to maintain and repair body tissues. Body cells are constantly being worn down and must be replaced. Some cells need to be replaced often, such as red blood cells, skin cells, or the cells in the intestine. Nutrients from food are necessary to keep the body functioning, to maintain normal body temperature, to maintain the balance of body fluids, to excrete waste products, and to allow blood to clot when there is an injury.

All nutrients can be divided into six major categories:

- **Water**
- **Protein**
- **Carbohydrates**
- **Fats**
- **Vitamins**
- **Minerals**

Each nutrient performs one or more specific functions in the body. The nutrients depend on each other to work properly. Excesses of one nutrient will not make up for a deficiency of another. Practically all foods contain mixtures of nutrients. Except for breastmilk for infants, no single food contains all the nutrients in amounts sufficient to sustain life and promote optimal growth. One must consume a variety of foods daily in order to obtain all the necessary nutrients.

Most healthy people can get enough of the required nutrients from eating a variety of foods. The body stores some nutrients and uses them as needed. Other nutrients are not stored very well by the body and must be supplied in the diet more frequently.

In addition to the nutrients provided by foods, under some conditions it is necessary to take vitamin and mineral supplements. For example, supplements are needed during critical periods of growth, such as pregnancy, or in a few specific medical conditions. There are several exceptions to this general rule, which will be discussed in the section on vitamins.

Each nutrient will be discussed in detail, including its function and its major food sources.

Dietary Reference Intakes

The Institute of Medicine of the National Academy of Sciences develops reference values for the intake of nutrients by Americans. These reference values are known as ***Dietary Reference Intakes (DRIs)***. DRIs can be used for planning and assessing diets for healthy populations and are a way of presenting information about recommended nutrient intakes. The reference values are updated periodically based on new scientific research findings.

The DRIs include:

- **Recommended Dietary Allowances (RDAs)**;
- **Adequate Intake (AI)**;
- Estimated Average Requirement (EAR); and
- Tolerable Upper Intake Level (UL).

For this module, we will discuss only the **RDAs** and **AIs**.

Definitions of RDA and AI

Recommended Dietary Allowance (RDA): the average daily dietary nutrient intake level sufficient to meet the nutrient requirement of nearly all (97 to 98 percent) of healthy individuals in a particular life stage and gender group.

Adequate Intake (AI): the recommended average daily intake level based on observed or experimentally determined approximations or estimates of nutrient intake by a group (or groups) of apparently healthy people that are assumed to be adequate. It is used when there is not enough scientific evidence to calculate an RDA.

The RDAs and AIs are nutrient levels that, when consumed, should decrease the risk of developing a condition associated with ill health. Nutrient intake at the level of the RDA or AI would not necessarily *replenish* individuals who are undernourished or who have a disease.

Energy (Calories)

Before reviewing the six major categories of nutrients in detail, it's important to talk about energy. When food is eaten, it gives the body energy. **The body “burns” foods much like gasoline is burned in a car engine.** From the “burning” of food fuel, each person obtains the energy to grow, to move, to maintain his/her temperature, to think, to repair tissue, and to carry on functions like breathing and digestion. Extra energy is stored in body fat for later use.



The unit used to measure the energy in food is a *kilocalorie* (*kcalorie* or *Calorie*). It is the amount of heat energy needed to raise the temperature of a kilogram (a liter) of water 1 degree Celsius. This module will use the lowercase *calorie* to mean the same thing.

The only nutrients that provide energy to the body are proteins, fats, and carbohydrates. The other nutrients—vitamins, minerals, and water—do not have any calories, so the body is unable to use them for energy, however, these nutrients are necessary for other reasons that will be discussed later.

Alcohol contributes calories that can be used for energy or is stored as fat, however, alcohol is not considered a nutrient. The body is unable to use the calories from alcohol for growth, maintenance, or repair of body cells. In fact, body organs can be damaged when a large portion of the calories consumed come from alcohol.

**Grams are a measure of weight.
1 gram is about the weight of 1 paper clip.**



The chart below indicates the number of calories that are contained in 1 gram (g) of protein, carbohydrate, fat, and alcohol.

Calorie Sources	Number of Calories
1 gram of protein	4 calories
1 gram of carbohydrate	4 calories
1 gram of fat	9 calories
1 gram of alcohol	7 calories

Fat contributes more than twice the amount of calories as protein or carbohydrates. What does this mean as it relates to amounts that are consumed by individuals?

- A teaspoon of sugar (which is 100 percent carbohydrate) contains 4 grams of carbohydrate. A teaspoon of sugar will provide 16 calories (4 grams x 4 calories per gram).
- A teaspoon of oil (which is 100 percent fat) contains 5 grams of fat. A teaspoon of oil will provide 45 calories (5 grams x 9 calories per gram).

By looking at this information, it can be seen that:

- To decrease calories, a person needs to eat less fat and decrease the total amount of food consumed.
- To increase calories, a person needs to eat a greater amount of food and/or foods higher in fat.

In the United States, there has been a progressive increase in the percentage of both children and adults who are **overweight**. Can you guess the causes for the increase in overweight? In the United States there has been an **increase in total calories** eaten and a **decrease** in the amount of time spent in **physical activity**, which results in fewer calories being “burned.” Weight management depends on energy balance—regularly taking in the number of calories needed for growth and daily activities.

What are “empty calorie” foods? “Empty calorie” foods usually refer to foods that are high in calories and low in nutrients such as vitamins and minerals. Often these foods are very concentrated sources of energy such as fats, sugars, honey, syrup, and other sweeteners. Examples of “empty calorie” foods that are high in sugar and/or fat include: sodas or soft drinks, candy, sugar, syrup, butter, margarine, oil, mayonnaise, cream cheese, chips, doughnuts, sweet rolls, cakes, cookies, and pie. Most people should eat these foods sparingly.

Water

Water is the most abundant nutrient in the body, making up about 60 percent of an adult’s weight. Water is the main component of body fluids, and is contained in every cell in the body. Without water to consume, a person can survive only a few days. In contrast, survival time is much longer when a person goes without one or more of the other nutrients. Note: Water is *not* an energy nutrient; it provides *no* calories to the body.

Functions of Water

There are many reasons why the body is so dependent on water. Some of the important ways that water functions in the body are:

- Water is needed for almost all of the life supporting functions such as breathing, digestion, and circulation.
- Water lubricates cells and organs and acts as a cushion for joints. In the amniotic sac in the womb, water acts as a shock absorber for the unborn baby.
- Water is a cleansing agent; it carries waste products out of the body.
- Water helps regulate body temperature. The body gets rid of excess heat by sweating. Evaporation of the water in sweat helps cool the body.
- Water transports nutrients and oxygen to the cells.

Recommended Amount of Water Intake

According to the National Academy of Sciences' report on Dietary Reference Intakes, an Adequate Intake (AI) level for total daily water intake was determined. The report concluded that the vast majority of healthy people adequately meet their daily water needs by letting thirst be their guide. The AIs for total water for each life stage group are shown in Figure 2 below.

Figure 2. Adequate Intake (AI) for Total Water¹

AI in liters (L) per day of Total Water	
Infants	
0 to 6 months	0.7 L - Assumed to be from human milk.
7 to 12 months	0.8 L - Assumed to be from human milk and complementary foods and beverages. This includes 0.6 L or 3 cups as fluid.
Children	
1 to 3 years	1.3 L - This includes about 0.9 L or 4 cups as fluid.
4 to 8 years	1.7 L - This includes about 1.2 L or 5 cups as fluid.
Males	
9 to 13 years	2.4 L - This includes about 1.8 L or 8 cups as fluid.
4 to 18 years	3.3 L - This includes about 2.6 L or 11 cups as fluid.
19 years and older	3.7 L - This includes about 3.0 L or 13 cups as fluid.
Females	
9 to 13 years	2.1 L - This includes about 1.6 L or 7 cups as fluid.
14 to 18 years	2.3 L - This includes about 1.8 L or 8 cups as fluid.
19 years and older	2.7 L - This includes about 2.2 L or 9 cups as fluid.
Pregnancy	3.0 L - This includes about 2.3 L or 10 cups as fluid.
Lactation	3.8 L - This includes about 3.1 L or 13 cups as fluid.

Note: Moisture in food accounts for 20 percent of water intake, therefore, actual fluid intake from drinking water and beverages such as juice, milk, formula, coffee, tea, and soda is about 80 percent of AI for total liters of water per day.

Conversion factors: 3 L = 33.8 fluid oz; 1 L = 1.06 qt; 1 cup = 8 fluid oz.

1. Source of data: National Academy of Sciences, Institute of Medicine, *Dietary Reference Intakes for Water, Potassium, Sodium, Chloride, and Sulfate*, 2004. This report may be accessed via www.nap.edu.

The recommended intakes for water are based on median intakes of water of generally healthy individuals who are adequately hydrated. Individuals can be adequately hydrated at levels below as well as above the AIs provided. The AIs are for total water in temperate climates, i.e., climates that are not too hot or too cold. Those who are very physically active or who live in hot climates may need to consume more water.

All dietary sources can contribute to total water needs: beverages (including tea, coffee, juices, sodas, and drinking water) and moisture found in foods. In fact, moisture in food accounts for about 20 percent of total water intake, therefore, you only need to drink 80 percent of the AI for the life stage group. The percent of water in various foods is shown below in Figure 3. Also, while consumption of beverages containing caffeine have been shown in some studies to have a diuretic effect, the available information indicates that this effect may be only temporary. (Note: Diuretic effect refers to the increased excretion of urine.) Therefore, when it comes to meeting daily hydration needs, beverages that contain caffeine can contribute to total water intake.



Figure 3. The Percent of Water in Various Foods

Food	Average percent of water in the food
Dry Cereal, Crackers	3 percent
Breads.....	30 to 38 percent
Cheese and Cheese Spreads	37 to 49 percent
Meats	54 to 62 percent
Fish	72 to 76 percent
Eggs	75 percent
Fresh Fruits.....	75 to 90 percent
Vegetables, fresh and cooked	75 to 95 percent
Juices.....	88 percent
Milk.....	88 to 92 percent

Dehydration

If the water lost by the body is not replaced, the body becomes dehydrated. Essentially, the body overheats, resulting in weakness, dizziness, and headache. Severe dehydration is dangerous—the symptoms can progress rapidly from exhaustion to delirium and end in death. In Florida, where extreme summer temperatures are common, dehydration is a very real concern. People who work or play outdoors during the day or those who don't have air conditioning in their homes need to be extremely careful and drink plenty of fluids.

Self-Check
Basic Nutrition Module

GO TO the Workbook for the Basic Nutrition Module and complete Self-Check Questions 7–15 right now. Then, immediately check your answers against the Answer Key to the Self-Check Questions (contained in your workbook) before proceeding to the next section of the module.

Protein

Protein is the second most abundant substance in the body. Each type of cell in every animal and plant contains its own particular kinds of protein.

Functions of Protein

Proteins perform many vital functions in the body. These are just a few of the important functions:

- Protein is needed for the building, maintaining, and repairing of all body cells. Cells are continually being replaced throughout a person's life. For example, the cells that line the mouth and intestines live less than a week and constantly need to be replaced.
- Protein is an important part of red and white blood cells and aid in the clotting of blood. Red blood cells (RBC) only last for about three months and then need to be replaced by new RBC.
- Enzymes are important protein-containing substances formed in the body. They start essential chemical reactions in the body. For example, there are specific digestive enzymes that break down food into smaller components that allow nutrients to be absorbed and then used by the body.
- Antibodies are proteins produced by the body to help fight infections.
- Many hormones are made of proteins. Hormones are chemical substances produced in the body by an organ, cells of an organ, or scattered cells. Hormones serve as messengers that act on other organs to maintain constant conditions within the body. For example, when the pancreas detects that there is a high level of sugar in the blood, it releases a hormone called insulin. Insulin acts on muscle and other cells to take the extra sugar out of the blood and to store it.
- Protein can also serve as a source of energy. When the body does not get enough carbohydrates and fats for energy, it uses protein for energy. On the other hand, any extra calories from protein not used will be stored as body fat. One gram of protein has 4 calories.

Amino Acids – The Building Blocks of Protein

Proteins are made up of *amino acids*. Amino acids are the building blocks of all proteins. When a person eats a food that contains protein, the body breaks it down into amino acids, and then recombines these building blocks to make new proteins that it needs. The human body needs 20 different amino acids to make proteins. The human body can make 11 of these amino acids, but the other 9 need to come from food. These 9 amino acids are called the essential amino acids.

Protein Quality

The requirement for protein is really a requirement for the 9 essential amino acids. Animal proteins provide all 9 essential amino acids in sufficient amounts to meet a person's needs, so they are known as **complete proteins**. Foods of plant origin, however,

usually lack adequate amounts of certain essential amino acids, so they are known as **incomplete proteins**.

Animal Proteins. Animal proteins contain all of the essential amino acids in amounts the body can easily use. The animal protein sources include:

- beef, veal
- milk, cheese, and yogurt
- fish, shellfish
- poultry, eggs
- lamb, goat
- pork, ham

Plant Proteins. Plant proteins also contain all the essential amino acids, but generally have one or more essential amino acids in limited amounts. Cereals (wheat, oats, rice, barley, corn, etc.) are low in two essential amino acids, while legumes (dry beans and peas) are low in two different essential amino acids. Eating a small amount of animal protein with plant foods or eating combinations of plant foods helps to improve the overall quality of the proteins in those foods. For example, cereal eaten along with legumes would give a person **complementary proteins**. Complementary proteins are two foods which each supply the amino acids which are in limited amounts in the other. Here are some examples of complementary protein foods: **black beans and rice; pinto beans and corn tortillas; and peanut butter and bread.**

Previously, it was thought that the complementary proteins needed to be consumed at the same meal. We now know that, generally, this is not necessary as long as sufficient amounts of the complementary proteins are consumed within the same day. Vegetarian adults, who eat no meat products, are usually able to meet their protein needs by eating a varied diet, as long as they eat enough calories to maintain weight. However, it may be more important for infants and young children to eat complementary proteins within the time frame of a meal (or meal and a snack a few hours later).



Plant proteins include:

- Legumes such as black-eyed peas, kidney beans, lentils, lima beans, navy beans, pinto beans, red beans, soybeans, tofu (made from soybean curd), split peas, peanuts, peanut butter
- Cereal, pasta, and bread products
- Grains such as barley, corn, oats, rice, wheat, or grain milks (such as rice milk)
- Seeds such as pumpkin, sesame, sunflower, or seed butters (such as tahini which is made from sesame seeds)
- Nuts such as almonds, cashews, pecans, walnuts, or nut butters

Soybeans provide a high quality plant protein with a balance of amino acid patterns similar to animal products. Soy protein sources include: soybeans; soy infant formula (artificial baby milk); soymilk; tempeh (fermented soybeans pressed into a solid cake); and tofu.

Eating plant proteins can be considerably less expensive and lower in fat and calories than some animal proteins. For information about vegetarian diets, see Part 4 of this module.

Protein Needs of Athletes

Adequate protein is needed for building and protecting muscles. Athletes who train for long periods of time, other people doing intense exercise, untrained people starting an exercise program, and growing teenage athletes may need somewhat more protein than the sedentary person of the same height and weight. However, consuming **extra** protein (above what your body needs) either as animal protein, protein drinks, or protein supplements will not build extra muscles, but will be stored as fat. In fact, consuming protein supplements and/or amino acid supplements may be dangerous.

The MyPyramid food guidance system, as discussed in Part 3 of this module, will help individuals obtain the amount of protein that their bodies need. The amounts listed in the MyPyramid plan are adapted to meet the protein and other nutrient requirements based on age, gender, and activity level.



 **Self-Check**  **Basic Nutrition Module**

 **GO TO** the Workbook for the Basic Nutrition Module and complete Self-Check Questions 16–18 right now. Then, immediately check your answers against the Answer Key to the Self-Check Questions (contained in your workbook) before proceeding to the next section of the module.

Carbohydrates

Carbohydrates are an energy nutrient and supply a major source of energy in the American diet.

Functions of Carbohydrates

Carbohydrates are essential for the following reasons:

- Carbohydrates provide energy for the body. Carbohydrates are considered the ideal energy source (fuel) for most bodily functions.
- The body uses carbohydrates first for its energy needs. When a person does not consume enough carbohydrates to meet the body's energy needs, then protein and fats are used to provide the body with needed energy. When protein is used to meet energy needs, this can result in the loss of lean body (muscle) tissue.
- The brain and other tissues of the central nervous system can only use *glucose* (sugar) for their energy supply. Glucose primarily comes from carbohydrates.
- When carbohydrates are not available in the diet to assist in the breakdown of fats, then fats are not able to be broken down as completely as they should be. An incomplete breakdown of fats results in compounds, called *ketones*, being formed in the body. When ketones accumulate in the blood, the body goes into a state of *ketosis*. Ketosis can be especially harmful during pregnancy. Ketosis in the pregnant woman may cause brain damage and mental retardation in her newborn. Therefore, a low carbohydrate diet can be dangerous, especially for the pregnant woman and her unborn child.

Because of these important functions of carbohydrates, it is easy to understand why health care providers and nutritionists encourage carbohydrate consumption as part of a healthy diet and **strongly discourage** a “low carbohydrate” diet. In addition, carbohydrates make foods taste good!

Types of Carbohydrates

There are two major types of carbohydrates in foods: **sugars** and **complex carbohydrates**. Complex carbohydrates include starch and fiber. There is also a form of carbohydrate stored in the body, called *glycogen*.

Sources of Carbohydrates

- Plants are the major food source of carbohydrates. Fruits and vegetables contain carbohydrates as a mixture of starch, naturally occurring sugars, and fiber. The amount of starch, sugar, and fiber will depend on the type and maturity of the fruit or vegetable.
- Breads, cereals, legumes, pasta, rice, and oatmeal are rich with complex carbohydrates.



- Vegetable sources such as corn, green peas, dry beans, winter squash, and potatoes are sometimes referred to as “starchy vegetables” because of the large proportion of complex carbohydrates that they contain.
- Milk and some milk products, such as yogurt and cottage cheese, are food sources of the carbohydrate *lactose*. (Most cheeses contain only a minimal amount of lactose.) See the Food Intolerance section on page 128 of this module for information about lactose intolerance.
- Meats and fats do **not** contain any carbohydrates.

Simple Carbohydrates (Sugars)

There are two categories of sugar:

Simple Sugars. Examples of simple sugars are **glucose**, **fructose**, and **galactose**. Glucose is found in foods alone or as part of other sugars or starch. Glucose is also the form of sugar that circulates in the bloodstream. Fructose is the sugar found in fruit and honey and is the sweetest of all the sugars. Galactose is bound to glucose to form the sugar in milk. All carbohydrates that are used by the body for energy are broken down into these three simple sugars in the digestive tract. The liver converts fructose and galactose into glucose.

Double Sugars. Other sugars are formed when two sugars combine. These are known as double sugars. Examples include **sucrose**, **lactose**, and **maltose**.

Sucrose is formed by combining **fructose + glucose**, which is known as table sugar.

Lactose is formed by combining **galactose + glucose**, which is known as milk sugar.

Maltose is formed by combining **glucose + glucose**, which is known as malt sugar. Maltose is produced from the breakdown of starch.

It is important to distinguish between naturally occurring sugar and concentrated sugar sources, because of the other nutrients that accompany these foods. However, the body cannot tell the difference between naturally occurring and added concentrated sugar sources because they are identical chemically.

Naturally occurring sugar is sugar naturally found in fruits such as apples, oranges, peaches, pears, pineapples, grapes, strawberries, melon, and bananas; and vegetables such as peas, corn, and tomatoes. The sugars in whole fruits are “diluted” with water. (Remember, fruits and vegetables contain 75 to 95 percent water.) Fruits and vegetables also contain other nutrients needed by the body such as vitamins, minerals, and dietary fiber.



Concentrated sugars include the following:

- table sugar (sucrose), lactose, glucose (dextrose), maltose or maltose syrup
- brown sugar
- corn syrup
- fruit juice concentrate
- honey (Note: Honey should not be given to infants under the age of 1 year due to the risk of botulism. See the Infant Nutrition Module for more information on this topic.)
- maple syrup
- molasses
- high fructose corn syrup—This is the sweetener commonly used in soft drinks (sodas) and other beverages. Beverages such as *fruit drinks* and *juice cocktails* generally contain a *small* percentage of real fruit juice and the remaining beverage contains water, high fructose corn syrup, and flavorings.
- invert sugar (A mixture of equal parts of glucose and fructose resulting from the hydrolysis of sucrose. It is found naturally in fruits and honey and produced artificially for use in the food industry.)



Sources of concentrated sugar contain few, if any, vitamins and minerals or other nutrients needed for good health.

- Concentrated fruit juices such as white grape juice or apple juice are sometimes added as the sweetener to fruit candies such as fruit bites, fruit roll-ups, and jelly beans, as well as to other food products. These concentrated fruit juice additions are an added sugar source. The amount of nutrients such as vitamins and minerals that are in the concentrated juice are insignificant. These candies should be considered “sweets” and not a source of fruit.
- Much of the sugar consumed is an ingredient in other foods, such as cookies, cakes, ice cream, sweetened beverages, and a number of processed foods. This may make it more difficult for individuals to know how much sugar they are actually consuming.

As mentioned previously, added sugars are in foods like candy, soft drinks, jams, jellies, and sugars added at the table. Some added sugars are also in foods from the food groups, such as fruit canned in heavy syrup and chocolate milk. Figure 4 on the following page shows the approximate amount of sugars in some popular foods.

Figure 4. **Added Sugars in Selected Foods and Beverages¹**

	Added Sugars (teaspoons)
Grains Group	
Bread, 1 slice	0
Doughnut, 1 medium plain	2
Pound cake, 1 oz	2
Cookies, 2 medium	3
Granola bar, 1	3
Muffin, 1 medium	3
Ready to eat cereal, sweetened	3 to 4
Toaster pastry	4
Pie, fruit, 1/6 of a 9" pie	5
Angel food cake, 1/12 tube cake	6
Cake, frosted, 1/16	9
Fruits Group	
Fruit, canned in juice, 1/2 cup	0
Fruit, canned in light syrup, 1/2 cup	2
Fruit, canned in heavy syrup, 1/2 cup	4
Milk Group	
Milk, plain, 1 cup	0
Chocolate milk, reduced fat 2%, 1 cup	3
Lowfat yogurt, plain, 8 oz	0
Lowfat yogurt, flavored, 8 oz	5
Lowfat yogurt, fruit, 8 oz	7
Ice cream, ice milk, or frozen yogurt, 1/2 cup	3
Chocolate shake, 10 fluid oz	9
Sweets	
Sugar, jam, or jelly, 1 teaspoon	1
Syrup or honey, 1 tablespoon	3
Chocolate bar, 1 oz	3
Fruit sorbet, 1/2 cup	3
Jelly beans, 1 oz	4
Gelatin dessert, 1/2 cup	5
Sherbet, 1/2 cup	5
Carbonated soda, 12 fluid oz	9 to 10
Fruit drink, ade, 12 fluid oz	12

1. This chart was adapted from: U.S. Department of Agriculture, Home and Garden Bulletin Number 252, August 1992. For more specific information on added sugars in foods and beverages go to www.nal.usda.gov/fnic/foodcomp/Data/add_sug/addsug01.pdf for *USDA Database for the Added Sugars Content of Selected Foods*.

Complex Carbohydrates (Starches)

Complex carbohydrates include *starch and fiber*. Starch contains a number of glucose units linked together. This structure is more complex than that of sugars, so starches are referred to as “complex carbohydrates.” Whole grains such as wheat, rice, corn, and oats are the richest sources of starch and fiber. Other sources include legumes (dry beans, peas, and lentils) and starchy vegetables.

Why do people think starchy foods are fattening?

People have often avoided starchy foods, like potatoes and bread, because these foods are thought to be fattening. In reality, these are nutritious foods. These foods do contain calories, but usually they become “fattening” when *calorie-rich additions* are added. These “additions” include butter or margarine and/or jams and jellies on bread; cream or cheese sauces on pasta; and butter, sour cream, or gravy on potatoes. However, it must be remembered that while grains, fruits, and vegetables are nutritious foods, an excess of *any* food can lead to an excess of calories and being overweight.

Dietary Fiber

Fiber is part of the category of complex carbohydrates. Dietary fiber is different from the other carbohydrates of starch and sugar. Fiber cannot be broken down by human digestive enzymes and is not absorbed by the body. Instead of entering the blood to be used by various cells of the body, fiber passes through the digestive system mostly intact. The very fact that fiber is unable to be digested is what makes it so important. **Fiber acts like a sponge, absorbing water as it travels through the digestive tract. This adds bulk to the stool,**

which forces the colon to work harder to push the stool through. This extra bulk reduces constipation, hemorrhoids, and other intestinal problems such as diverticulosis and may help prevent some diseases, such as colon and rectal cancer. Fiber may also help reduce the risks of diseases of the heart and arteries by lowering blood cholesterol.

There are a number of different kinds of fibers. These fibers can generally be divided into **soluble** and **insoluble** fibers. **Insoluble** refers to lack of solubility in water, but with water-attracting properties that help to increase bulk, soften stools and shorten transit time through the intestinal tract. **Soluble** indicates a fiber source that would readily dissolve in water. Most plant foods contain a mixture of insoluble and soluble fibers. See the shaded box on page 33 for the main types of fiber, what each type of fiber does in the body, and what foods to eat to get each type of fiber.

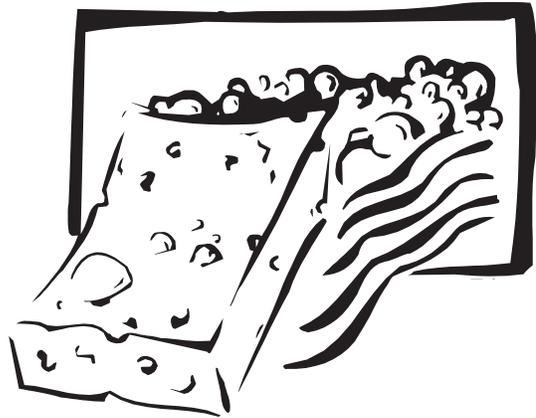
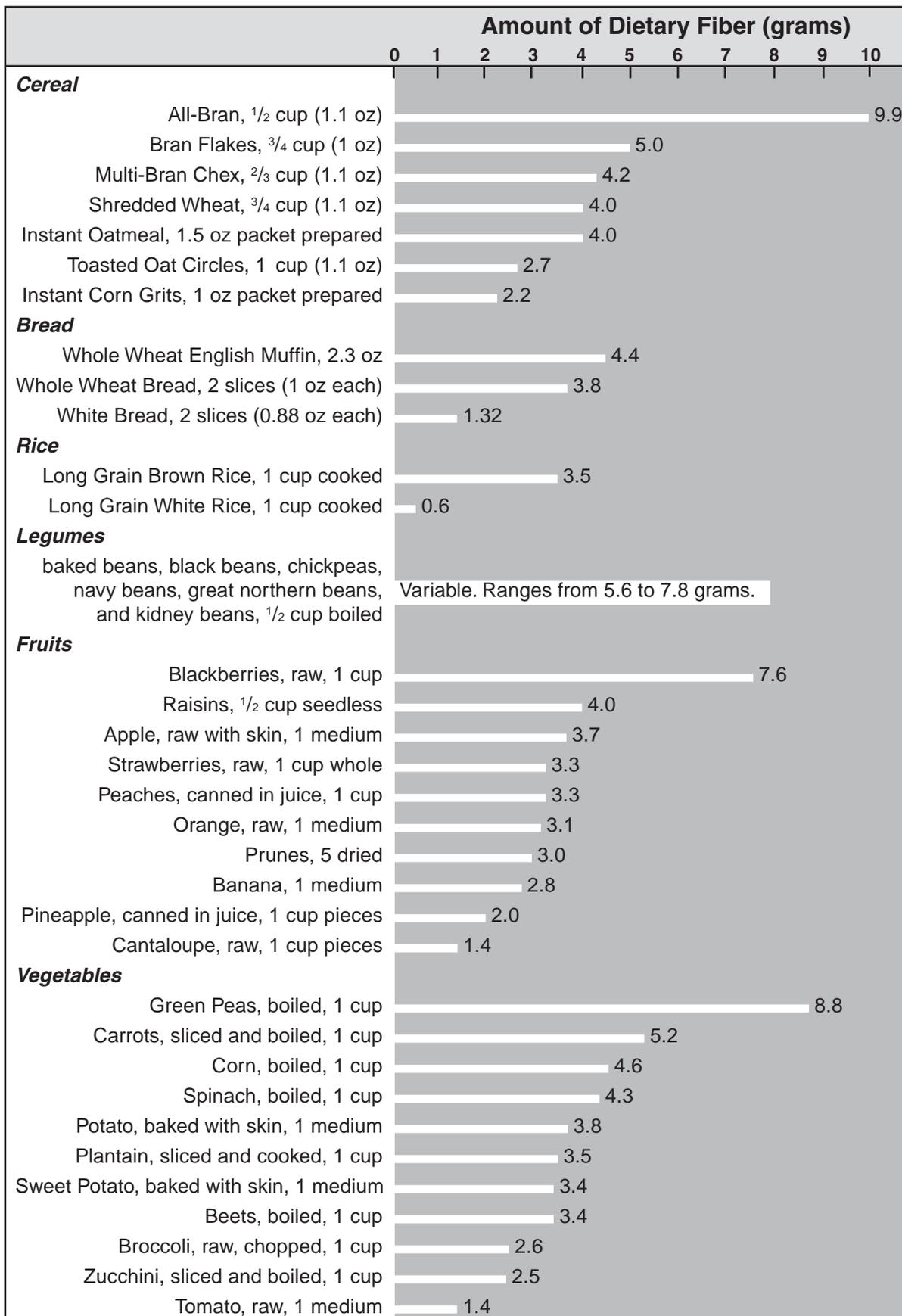


Figure 5. Sources of Dietary Fiber¹



1. Source of data: Pennington, JAT, Douglass JS. *Bowes and Church's Food Values of Portions Commonly Used*. 18th ed. Philadelphia: Lippincott Williams & Wilkins; 2005.

Type of Dietary Fiber	What does this dietary fiber do?	What foods contain this type of dietary fiber?
Soluble	May lower cholesterol. Promotes feeling of fullness.	Fruits, especially apples and citrus Oatmeal Vegetables
Insoluble	Provides bulk. Absorbs water and softens stools. Promotes feeling of fullness.	Whole wheat cereals and breads Dry beans, peas, and lentils Most fruits and vegetables such as carrots, broccoli, apples, prunes

Food Sources of Dietary Fiber

Many foods high in complex carbohydrates contain fiber. Food sources of fiber include:

- Whole grain breads and cereals
- Fruits and vegetables (preferably with the skin)
- Legumes, which include dry beans, peas, and lentils
- Nuts, seeds, and nut/seed butters

See Figure 5 on page 32 for a list of foods containing fiber and their actual fiber content.

Meats can be fibrous, but these meat fibers are not dietary fiber—only plant foods contain dietary fiber. There are different kinds of fiber in foods. The best advice for overall health is to consume a variety of fiber-containing foods, which will enable individuals to obtain a variety of fibers in their diet and a variety of nutrients in the different foods. Refer clients to a nutritionist if they have questions about consuming specific fiber containing foods to lower risk for a specific disease.

Benefits of Fiber

- Aids normal bowel function, helps maintain regularity, and decreases constipation as long as enough fluids are also consumed.
- May lower risk of colon and rectal cancer.
- May lower blood cholesterol levels and reduce risk of heart disease.
- May help control diabetes.
- May contribute to weight loss. Diets rich in fiber take longer to chew and add bulk to the gastrointestinal tract so you will feel full for a longer period of time. As a result, consuming a high fiber diet may be more satisfying than a low fiber diet and may help an individual to control the amount of food and calorie intake.

Recommendations for Fiber

For adults and children ages 1 year and older, the National Academy of Sciences, Institute of Medicine recommends 14 grams of fiber per day for every 1,000 calories per day that are consumed. Therefore, an individual consuming 2,000 calories per day should consume 28 grams of fiber per day. This includes dietary fiber naturally present in grains (such as found in oats, wheat, or unmilled rice) and functional fiber synthesized or isolated from plants or animals and shown to be of benefit to health. (Note: While occasional adverse gastrointestinal symptoms are observed when individuals consume some isolated or synthetic fibers, serious chronic adverse effects have not been observed.)

Clients with special needs should receive individualized guidance from their health care provider and nutritionist in determining the amount of fiber needed. Fiber supplements may be recommended by the health care provider for individuals with some disease conditions.

How to Add Fiber to the Diet

Fruits and Vegetables: Whenever possible, the skins of fruits and vegetables should be eaten.¹ They contain valuable fiber.

Legumes (Dry Beans, Peas, and Lentils): Protein-rich legumes are excellent sources of fiber and other nutrients. (Note: The protein-rich foods of animal origin such as meat, fish, poultry, and dairy products contain no fiber.)

Breads, Cereals, and Grain Products: Individuals should read food labels carefully to ensure that they are buying a whole grain product. Some refined grain products have been artificially colored to resemble a whole grain. Bread and cracker products made from whole grain flours such as 100% whole wheat bread, corn bread, and bran muffins should be selected. Breakfast cereals made with whole grains (whole oats, whole wheat) or with bran added should be selected. In addition, some cooked cereals such as oatmeal are made from the whole grain. Whole wheat pasta products and brown rice are higher fiber choices than the regular version and add a nice variety to meals. Popcorn is a high fiber grain that may be eaten as a snack.¹

Nuts, Seeds, and Nut Butters: Seeds, nuts, and peanut butter contain fiber but are also high in fats and calories.¹

1. Note: Foods such as fruit skins, raw vegetables, popcorn, seeds, nuts, and peanut butter can cause choking in young children. See the Infant Nutrition Module and the Preschool Child Nutrition Module for more information on this topic.



Self-
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Basic Nutrition
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Fat

Fat is an important and essential component of the diet. Fat is the most concentrated source of energy in the diet. Fat has over twice as many calories as carbohydrates and protein, with 9 calories per gram for fat versus 4 calories per gram for carbohydrates and 4 calories per gram for protein.

Fats are made up of basic units called fatty acids. Fats are important in the diet because they are sources of essential fatty acids. The body can produce some of the fatty acids it needs, however other types of fatty acids are needed that the body cannot make on its own. These are the essential fatty acids that must be provided by fat in the diet. At times various fatty acids have been in the news as being important for health, for example, omega 3-fatty acids. If clients have questions about specific fatty acids, please refer them to the nutritionist.

Other terms that you may have heard that relate to the type of fatty acids are **saturated and unsaturated** fats. The “saturation” portion of these words refers to the chemical structure of the particular fatty acid. Other fat terms that are frequently mentioned and will be discussed here are *trans fatty acids* and **dietary cholesterol**.

Functions of Fat

Fat is the main source of stored energy for the body. It provides most of the energy to fuel muscular work. Fat is an important component of the membranes surrounding all of the body’s cells. It also protects vital organs of the body such as the heart, kidneys, and liver by providing padding to prevent them from shock. Body fat provides insulation to guard against rapid body temperature changes or excessive heat loss. Some vitamins are fat soluble, meaning that fat is needed to transport these essential nutrients. Fat is also converted to other compounds in the body, such as hormones, as needed.

Fat serves many functions in foods as well. Fat adds to the flavor and aroma of foods, making foods smell and taste good and stimulating the appetite. Fat helps to make food more tender in texture. Fat in the diet helps to contribute to feeling full, or to a sense of “satiety.”

Most foods contain some fat. See Figure 6 on page 37 for a list of a variety of foods and the grams of fat per serving. Some fat is *visible*, for example, the creamy white part of meat; the yellow part of raw chicken; and the fat that rises to the top from meat juices and hardens when cooled. Margarine, butter, oils, shortening are also considered visible fats. Other *invisible* or *hidden* fats are contained in foods such as nuts, seeds, egg yolks, baked goods, dairy products made from whole milk, chocolate, and salad dressings.

Types of Fatty Acids

It is important to understand that fat in foods are not generally made up of only one type of fatty acid, but contain some saturated, monounsaturated, and polyunsaturated fatty acids.

Saturated fats. Foods high in saturated fats tend to raise blood cholesterol. These foods include high-fat dairy products (like cheese, whole milk, cream, butter, and regular ice cream), fatty fresh and processed meats, the skin and fat of poultry, lard, palm oil, and coconut oil. Saturated fats are generally solid at room temperature.

Unsaturated fats. Unsaturated fats (oils) do not raise blood cholesterol. Unsaturated fats are usually liquid at room temperature and occur in vegetable oils, most nuts, olives, avocados, and fatty fish like salmon. Unsaturated oils include both *monounsaturated fats* and *polyunsaturated fats*.

Oils high in monounsaturated fat:

Olive, canola, sunflower, and peanut oils.

Oils high in polyunsaturated fats:

Soybean oil, corn oil, and cottonseed oil and many kinds of nuts.

Some fish, such as salmon, tuna, and mackerel, contain omega-3 fatty acids that are being studied to determine if they offer protection against heart disease.

Trans fatty acids. Foods high in *trans* fatty acids tend to raise blood cholesterol. These foods include those high in partially hydrogenated vegetable oils, such as many hard margarines and shortenings. Foods with a high amount of these ingredients include some commercially fried foods and some bakery goods.

Dietary cholesterol. Foods that are high in cholesterol also tend to raise blood cholesterol. Cholesterol is found only in animal products such as meats, poultry, dairy products, and seafood. Liver, other organ meats, and egg yolks are particularly high in cholesterol. Vegetables, fruits, grains, and legumes do not contain cholesterol.

Blood cholesterol. In addition to the cholesterol consumed in foods and liquids, the body also manufactures cholesterol. Cholesterol is often said to be “bad” for the human body. Cholesterol actually has important functions in the body. Cholesterol is an important part of brain and nerve cells and is found in all body cells. Cholesterol is also involved in the production of hormones and vitamin D. The “problem” with cholesterol is that it plays a role in plaque formation in the body’s blood vessels. When plaque forms, the blood vessels get narrower, which can lead to heart attacks and strokes. The main dietary factors associated with high blood cholesterol are a high saturated fat intake and high total fat consumption.

Review the Grams of Fat Chart on the following page which shows the grams of fat in various foods. You may want to help clients do some comparison of fat in foods within the same food group. Remember there are 9 calories in every gram of fat.



- Compare the amount of fat in 1 slice of bread versus 1 doughnut. How many calories from fat are there in each item?
- Compare the amount of fat in 3 oz of lean meat versus 1 oz of bologna.

Figure 6. **Grams of Fat Chart**¹

	Fat (grams)
Grains Group	
Bread, 1 slice	1
Hamburger roll, bagel, English muffin, 1	2
Tortilla, 1	3
Rice, pasta, cooked, 1/2 cup	Trace amount
Plain crackers, small, 3-4.....	3
Breakfast cereal, 1 oz	Check product label
Pancakes, 4" diameter, 2	3
Croissant, 1 large (2 oz)	12
Doughnut, 1 medium (2 oz)	11
Danish, 1 medium (2 oz).....	13
Cake, frosted, 1/16 average	13
Cookies, 2 medium.....	4
Pie, fruit, 2-crust, 1/6 of 8" pie.....	19
Vegetables Group	
Vegetables, 1/2 cup cooked or chopped raw	Trace amount
Vegetables, leafy, raw, 1 cup	Trace amount
Potatoes, scalloped, 1/2 cup	4
Potato salad, 1/2 cup	8
French fries, 10.....	8
Fruits Group	
Whole fruit: medium apple, orange, banana	Trace amount
Fruit, raw or canned, 1/2 cup	Trace amount
Fruit juice, unsweetened, 3/4 cup	Trace amount
Avocado, 1/4 whole	9
Meat & Beans Group	
Lean meat, poultry, fish, 3 oz cooked weight ...	6
Ground beef, lean, 3 oz cooked weight	16
Chicken, with skin, fried, 3 oz cooked weight.....	13
Bologna, 2 slices (1 oz)	16
Egg, 1	5
Dried beans and peas, cooked, 1/2 cup	Trace amount
Peanut butter, 2 tablespoons	16
Nuts, 1/3 cup	22

This chart is continued on the following page.

1. Source of data: U.S. Department of Agriculture, Home and Garden Bulletin Number 252, August 1992.

Figure 6. Grams of Fat Chart (continued)

	Fat (grams)
Milk Group	
Reduced fat milk, 2%, 1 cup	5
Fat free milk, 1 cup	Trace amount
Nonfat yogurt, plain, 8 oz	Trace amount
Lowfat milk, 1%, 1 cup	2.5
Whole milk, 1 cup	8
Lowfat yogurt, plain, 8 oz	4
Natural cheddar cheese, 1 ¹ / ₂ oz	14
Processed cheese, 2 oz	18
Mozzarella, part skim, 1 ¹ / ₂ oz	7
Ricotta, part skim, ¹ / ₂ cup	10
Cottage cheese, 4% fat, ¹ / ₂ cup	5
Ice cream, ¹ / ₂ cup	7
Ice milk, ¹ / ₂ cup	3
Frozen yogurt, ¹ / ₂ cup	2
Fats & Oils	
Butter, margarine, 1 teaspoon	4
Mayonnaise, 1 tablespoon	11
Salad dressings, 1 tablespoon	7
Reduced calorie salad dressing, 1 tablespoon	Check product label
Sour cream, 2 tablespoons	6
Cream cheese, 1 oz	10
Sweets	
Sugar, jam, jelly, 1 teaspoon	0
Regular soda, 12 fluid oz	0
Fruit drink, ade, 12 fluid oz	0
Chocolate bar, 1 oz	9
Sherbet, ¹ / ₂ cup	2
Fruit sorbet, ¹ / ₂ cup	0

1. Source of data: U.S. Department of Agriculture, Home and Garden Bulletin Number 252, August 1992.

Fat Matters, But Calories Count¹

A calorie is a calorie, whether it comes from fat or carbohydrate. Anything eaten in excess can lead to weight gain. Reducing the amount of fat that is eaten is one easy way to limit overall calorie intake. However, eating fat free or reduced fat foods is not always the answer to weight loss. Fat free foods sometimes contain more sugar than the regular food it replaces. This is especially true when individuals eat more of the reduced fat food than they would have eaten of the regular item. For example, eating twice as many fat free cookies as regular cookies results in actually increasing overall calorie intake. The following list of foods and their fat free or reduced fat varieties will show that just because a product is fat free or low in fat does not mean that it is “calorie free” and sometimes it contains almost as many calories. Remember, calories do count!

Reduced fat peanut butter, 2 tablespoons	187 calories	
Regular peanut butter, 2 tablespoons	191 calories	
Reduced fat chocolate chip cookies, 3 cookies (30 grams)	118 calories	
Regular chocolate chip cookies, 3 cookies (30 grams)	142 calories	
Fat free fig cookies, 2 cookies (30 grams)	102 calories	
Regular fig cookies, 2 cookies (30 grams)	111 calories	
Nonfat vanilla frozen yogurt (< 1% fat), 1/2 cup	100 calories	
Regular whole milk vanilla frozen yogurt (3-4% fat), 1/2 cup	104 calories	
Light vanilla ice cream (7% fat), 1/2 cup	111 calories	
Regular vanilla ice cream (11% fat), 1/2 cup	133 calories	
Lowfat granola cereal, approximately 1/2 cup (55 grams)	213 calories	
Regular granola cereal, approximately 1/2 cup (55 grams)	257 calories	
Baked tortilla chips, 1 oz	113 calories	
Regular tortilla chips, 1 oz	143 calories	
Lowfat blueberry muffin, 1 small (2 1/2 inch)	131 calories	
Regular blueberry muffin, 1 small (2 1/2 inch)	138 calories	
Lowfat cereal bar, 1 bar (1.3 oz)	130 calories	
Regular cereal bar, 1 bar (1.3 oz)	140 calories	

1. This information and graphics were adapted from page 48 of *The Practical Guide: Identification, Evaluation, and Treatment of Overweight and Obesity in Adults* published by the National Heart, Lung, and Blood Institute, National Institutes of Health, US Department of Health and Human Services, NIH Publication No. 00-4084, October 2000.



Self-Check



Basic Nutrition Module

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Overview of Vitamins and Minerals

Vitamins and minerals are micronutrients, so the body only needs them in small amounts. Although they are only needed in small amounts, they have large responsibilities. Vitamins and minerals do not provide calories for energy, but they are involved in numerous chemical reactions that help the body stay healthy.

Vitamins and minerals are widely distributed in food. Some are found mostly in fruits and vegetables, others in grain products, while others are found in meats and dairy products. Needless to say, the best way to get enough vitamins and minerals is for individuals to eat a wide variety of foods.

Vitamin and Mineral Requirements

The RDAs and AIs for vitamins and minerals are located in Appendices A and B at the end of this module. These are summary tables of the current vitamin and mineral recommendations for various life stage groups. For more information about Dietary Reference Intakes see page 19 of this module.

Vitamin and Mineral Supplements

A balanced and varied diet provides all the vitamins and minerals most people need. However, someone experiencing rapid growth, stress to the body, or other conditions may need extra vitamins and minerals in the form of supplements. Sometimes vitamins or minerals are prescribed for meeting nutrient needs or for therapeutic purposes. For example:

- Women who could become pregnant are advised to eat foods fortified with folic acid or to take a folic acid supplement in addition to consuming folate-rich foods to reduce the risk of some serious birth defects.
- Pregnant women are prescribed a vitamin/mineral supplement high in iron and folic acid.
- Older Americans; people with little exposure to sunlight; and infants, children, and adolescents who do not drink at least 16 fluid ounces of vitamin-D fortified milk (or formula for infants) each day may need a vitamin D supplement. See the Infant and Preschool Child Nutrition Modules for more information regarding vitamin D supplements for infants and children.



- People who seldom eat dairy products or other rich sources of calcium need a calcium supplement. (Detailed information regarding calcium supplements can be found on page 55 of this module.)
- Individuals who eat no animal foods need to take a vitamin B₁₂ supplement.

Many consumers, who are not at risk of a deficiency, feel the need to take vitamin and mineral supplements. In fact, according to a survey by the American Dietetic Association, about half of the adults in the United States take a vitamin/mineral supplement on a daily basis.¹ While some people feel that supplements provide “extra” insurance for days when they do not eat well, others see supplements as cure-alls or preventives for numerous discomforts and illnesses. Nutrition experts stress that supplements should not take the place of a healthy diet. People should try to improve their eating habits rather than rely on supplements. Also, contrary to what many people believe, vitamins and minerals do not supply extra energy. Remember, calories only comes from carbohydrates, proteins, and fats.

For persons who do want to take a supplement, it is safe to take one that provides no more than 100 percent of the recommended levels like a daily multivitamin/mineral supplement. Unfortunately, many people routinely take supplements that supply megadoses, which are levels of nutrients in excess of 10 times the amount the body needs. Taking excessive amounts of nutrients without medical supervision is dangerous. Depending on the supplement and the dosage, the effects can include anything from hair loss, fatigue, or gastrointestinal distress to more serious results such as kidney stones, nerve damage, birth defects, and even death. Also, dietary supplements currently do not have to be tested for safety and approved by the Food and Drug Administration.

Vitamins

There are 13 vitamins that are known to be needed by humans. They fall into two groups, **water-soluble** and **fat-soluble**, based on the body’s means of absorption, transport, storage, and excretion of the vitamin. Figure 7 on pages 42 and 43 provides a summary of the food sources and major functions of the water-soluble and fat-soluble vitamins.

Water-Soluble Vitamins

In general, water-soluble vitamins are typically carried in the blood; are excreted in the urine; are needed in small, frequent doses; and are unlikely to reach toxic levels in the body. Because of their water solubility, these vitamins can be easily removed from foods by improper preparation, such as overcooking. A good supply of water-soluble vitamins are needed on a daily basis because the body does not store water-soluble vitamins, but rather excretes them in the urine when they are taken in excess of the body’s needs. The **water-soluble vitamins** include **vitamin C (ascorbic acid)** and the **B vitamins**. The B vitamins include: **thiamin (B₁)**; **vitamin B₆**; **riboflavin (B₂)**; **vitamin B₁₂ (also called cobalamin)**; **niacin**; **biotin**; **folic acid (folate)**; and **pantothenic acid**.

1. *Half of Americans Use Daily Vitamin and Mineral Supplements but Most Never Use Herbals, American Dietetic Association’s New Survey Finds*. American Dietetic Association Press Release dated January 3, 2000. Accessed at: www.eatright.org/cps/rde/xchg/ada/hs.xsl/media_3852_ENU_HTML.htm

Figure 7. Food Sources and Functions of Key Vitamins

Water-Soluble Vitamins	Food Sources	Major Functions
Vitamin C	Citrus fruits and juices (oranges, grapefruit) strawberries, papaya, mango, tomato, green pepper, broccoli, kale, cabbage, cantaloupe	<ul style="list-style-type: none"> • Increases resistance to infection • Necessary for collagen formation • Helps to heal wounds, develop healthy gums and teeth • Strengthens blood vessels
Thiamin (B₁)	Whole cereal grains, enriched breads and cereals, lean pork, and nuts	<ul style="list-style-type: none"> • Aids in utilization of energy • Promotes normal appetite
Riboflavin (B₂)	Milk, yogurt, cottage cheese, eggs, liver, enriched bread and cereals	<ul style="list-style-type: none"> • Aids in utilization of energy • Promotes healthy skin, eyes, and clear vision
Niacin	Liver, meat, poultry, fish, whole grains, fortified cereal products, eggs	<ul style="list-style-type: none"> • Aids in utilization of energy • Promotes healthy skin, nerves, and digestive tract • Assists in digestion • Fosters normal appetite
Vitamin B₆	Liver, meats, fish, eggs, whole grains, green leafy vegetables, bananas	<ul style="list-style-type: none"> • Necessary for metabolism of amino acids • Helps form hemoglobin (the red substance in blood that carries oxygen to and carbon dioxide from the cells)
Vitamin B₁₂	Animal protein foods (meats, fish, poultry, eggs, milk, and milk products)	<ul style="list-style-type: none"> • Necessary for development of healthy red and white blood cells • Maintains healthy nervous system
Folic Acid (Folate)	Green leafy vegetables, liver, citrus fruits and juices, dry beans, peas, and lentils, nuts, seeds, wheat germ, bread, flours, corn meal, pasta, rice, and some fortified breakfast cereals	<ul style="list-style-type: none"> • Necessary for development of healthy red and white blood cells • Maintains healthy skin • Proper fetal brain and spinal cord development

Figure 7. Food Sources and Functions of Key Vitamins (continued)

Fat-Soluble Vitamins	Food Sources	Major Functions
Vitamin A	Liver, carrots, sweet potatoes, winter squash, pumpkin, apricots, mango, plantain, cantaloupe, dark green leafy vegetables, broccoli, tangerine, mandarin oranges, sapote, papaya, red peppers, tomatoes, milk, eggs, and cheese	<ul style="list-style-type: none"> • Promotes healthy eye tissues and adaptation to dim light • Maintains the health of external skin and mucous membranes that line the insides of the nose, mouth, throat, and intestinal tract
Vitamin D	<p>Vitamin D-fortified milk, fish oils, and liver</p> <p>Note: The skin produces vitamin D when exposed to sunlight.</p>	<ul style="list-style-type: none"> • Helps maintain the proper levels of calcium and phosphorus in the blood, which results in healthy bone structure
Vitamin E	Whole grains, vegetable oils, liver, nuts	<ul style="list-style-type: none"> • Helps preserve body cells
Vitamin K	Pork, liver, dark green leafy vegetables	<ul style="list-style-type: none"> • Needed for normal blood clotting

Fat-Soluble Vitamins

In general, fat-soluble vitamins are absorbed into the lymph and then carried in the blood by protein carriers, stored in body fat, and more likely to be toxic when consumed in excess of needs. Any excess of what is needed by the body is stored in the liver and body fat. The **fat-soluble vitamins** include **vitamins A, D, E, and K**.

Vitamins A, C, and Folic Acid

While all vitamins are important, staff members need to spend extra time teaching clients about vitamins A, C, and folic acid. Many people don't get enough of these key vitamins. Since they are crucial for growth and healthy tissues, they are especially significant for pregnant and breastfeeding women, infants, and children.

Vitamin A

The body needs vitamin A to resist infection and keep the eyes, skin, and internal organs moist. And thanks to vitamin A, healthy, moist surfaces inside the mouth, air passages and other mucous membranes are more resistant to infection. Also, vitamin A helps people see in dim light, and it is needed for proper bone growth, tooth development, and reproduction. The body stores vitamin A in the liver and then transports it to various tissues when needed. Beta-carotene, which is the precursor of vitamin A found in plants, is also an effective antioxidant in the body.

Different Forms of Vitamin A in Foods

In foods, vitamin A exists in two different forms: **retinol** (in animal foods) and **carotenoids** (in plant foods).

- **Retinol**—Retinol is found in animal products such as eggs, liver, and fortified milk and cheese. Retinol is also found in small amounts in fish, butter, and fortified margarine. The body is able to absorb most of the retinol from these foods. Retinol is the form the body uses to store and use vitamin A.
- **Carotenoids**—Carotenoids, such as beta-carotene, exist in some fruits and vegetables. These include bright orange fruits and vegetables, dark green vegetables, and bright red vegetables. See Figure 8 on page 46 for a list of food sources of vitamin A. The body converts the carotenoids in these fruits and vegetables to retinol. It takes about 12 micrograms of beta-carotene and 24 micrograms of other carotenoids (such as alpha-carotene and beta-cryptoxanthin) to equal the biological activity of 1 microgram of retinol.

Because the vitamin A in plant foods is not the same as the vitamin A in animal products, it is not easy to compare the two. In 2001, the National Academies of Sciences described a measure of the vitamin A content of food—called Retinol Activity Equivalent (RAE). It takes into account information that indicated that the conversion of carotenoids from fruits and vegetables to the equivalent amount of retinol had been significantly overestimated in the past. This change means that at least twice as much of the carotenoids contained in fruits and vegetables are required to provide a given amount of vitamin A than was previously thought.

Not Getting Enough Vitamin A

Vitamin A deficiency may cause eye changes, inability to see in dim light, and even blindness. Vitamin A deficiency also decreases resistance to infection, slows growth, affects tooth formation, and results in dry, scaly skin. In children, failure to grow is one of the first signs of poor vitamin A status. When these children receive vitamin A supplements, they gain weight and grow taller. Children who receive adequate amounts of vitamin A are better able to survive infectious diseases. In many poor countries, severe vitamin A deficiency is a serious problem. Lack of vitamin A causes more than 3 million children throughout the world to suffer from signs of severe vitamin A deficiency such as blindness and stunted growth, while another 275 million children suffer from a milder deficiency which can lead to infections due to lowered immunity.¹

Luckily, few people in the United States have such low levels of vitamin A to cause serious problems. However, many Americans' diets are low enough in vitamin A that they may have less severe symptoms. People at risk for inadequate vitamin A intake include groups who have a tendency not to eat enough fruits and vegetables, such as preschoolers and the elderly. Individuals with alcoholism or liver disease can also have poor vitamin A status. Also, people with diseases that affect fat absorption can become deficient in vitamin A.

Getting Too Much Vitamin A

Megadoses of vitamin A from supplements can cause vitamin A toxicity. Vitamin A toxicity can cause many symptoms including skin rashes, hair loss, hemorrhages, bone abnormalities, fractures, liver failure, and even death. Intake of 3 to 4 times the Recommended Dietary Allowance (RDA) of vitamin A supplements have been found to cause birth defects. Accutane, an oral prescription medicine made from vitamin A that is used to treat severe acne, should not be used prior to or during pregnancy since it can cause serious birth defects. Retin-A, the topical form of this medicine should only be used when prescribed by an individual's health care provider. Children are also at special risk from vitamin A overdose because they need less vitamin A and are more sensitive to overdoses than adults.

On the other hand, eating large amounts of vitamin A-rich fruits and vegetables does not appear to be dangerous. One side effect from eating large amounts of carotene from plant foods such as carrots, carrot juice, and sweet potatoes is a harmless condition called hypercarotenemia. When this happens, the skin takes on a yellow-orange color as a result of high levels of carotene in the body.

Tips for Including Vitamin A in the Diet

One good strategy for including vitamin A in the diet is to snack on fresh fruits and vegetables throughout the day. Also, everyone should try to eat one or more fruits or vegetables that are sources of vitamin A on a daily basis. A good tip to pass along is that dark green, orange, and red fruits and vegetables are good choices, so it helps to prepare colorful meals.

1.Sizer and Whitney, *Nutrition: Concepts and Controversies*, 8th edition, 2000, page 213.

Figure 8. Sources of Vitamin A¹

Excellent Sources

- 1½ oz cooked liver (chicken, beef, turkey, or pork) or liverwurst
- 1 sweet potato
- 1 carrot*

Good Sources

- ¼ cup canned pumpkin
- 1 mango
- 1 cup cantaloupe pieces
- ½ cup cooked spinach, collards, kale, or callaloo
- 1 cup cooked plantain
- ½ cup cooked dandelion, turnip, or beet greens
- ½ cup cooked butternut squash, hubbard squash, or calabaza
- ½ cup raw or cooked sweet red peppers or red chili peppers (*Green and yellow peppers also contain vitamin A, but a very small amount.*)

Fair Sources

- ½ cup cooked swiss chard or mustard greens
- ½ cup shredded bok choy
- ¾ cup V8® juice* or tomato juice*
- ¼ cup tomato paste
- ½ cup mandarin oranges
- 1 medium apricot, nectarine, tangerine, papaya, or sapote
- ½ cup cooked broccoli
- 1 cup milk*
- 2 eggs*
- 1½ oz cheese*

* WIC foods



Note: Adult serving sizes are listed. Children under age 4 should be given smaller serving sizes.

1. Source of data: Pennington, JAT, Douglass JS. *Bowes and Church's Food Values of Portions Commonly Used*. 18th ed. Philadelphia: Lippincott Williams & Wilkins; 2005.

Vitamin C

Vitamin C is also known as *ascorbic acid* or *ascorbate*. It helps the body resist infection and can also help increase iron absorption. Vitamin C also produces and maintains collagen, an important protein which holds the cells of the body together. Plus, it helps heal wounds, gives structure to blood vessels, and helps mend broken bones.

Not Getting Enough Vitamin C

A severe vitamin C deficiency causes a disease known as scurvy. Symptoms include slow wound healing, poor appetite, slow growth, loose teeth, bleeding gums, bruises, and swollen, painful joints. (Note: Keep in mind that bleeding gums are often a result of poor dental hygiene rather than vitamin C deficiency.) Scurvy is very rare in the United States; however, there are a number of groups at risk for either severe or moderate vitamin C deficiency.



- **Infants who drink fresh cow's milk, evaporated milk, goat's milk, or powdered milk, instead of breastmilk or infant formula**, do not get enough vitamin C unless they receive fruit juice or other foods with vitamin C. Breastmilk and infant formula, however, do supply adequate amounts of vitamin C.
- **Certain groups with poor eating habits** have low vitamin C intake, particularly teenagers who do not eat fruits or vegetables, and the elderly who cook for themselves and avoid "acid foods" because of heartburn.
- **People who smoke** need about twice as much vitamin C each day when compared to non-smokers. Smoking cigarettes, among its many harmful effects, interferes with the body's use of vitamin C.
- **People who drink large amounts of alcohol** can experience a vitamin C deficiency due to inadequate intake and/or altered liver metabolism.

Getting Too Much Vitamin C

Vitamin C is a water-soluble vitamin, so the body excretes (gets rid of) excess amounts. However, many people have heard that taking megadoses of vitamin C helps prevent colds and cure infections. Adequate levels of vitamin C do help to fight infection, but current research does not support taking large doses of vitamin C. Most healthy people can easily get enough vitamins and minerals from foods or with a daily multivitamin/mineral supplement, without the risk of getting too much. In a case where someone has a need for a supplement, a health care provider should prescribe it.

Food Sources of Vitamin C

Numerous fruits and vegetables provide significant amounts of vitamin C as shown in Figure 9 on the following page. Be aware that vitamin C is easily destroyed by things such as heat, light, and air. Therefore, the vitamin C content of a food varies depending on whether the food is eaten raw, steamed, or boiled; has been freshly harvested; or has been previously stored.

Tips for Including Vitamin C in the Diet

Everyone should try to eat one vitamin C food every day. Since vitamin C is easily destroyed, here are suggestions for getting the most vitamin C from foods:

- When washing fresh produce, avoid soaking for a long time.
- Steam vegetables or cook them in a small amount of water for a short time.
- Cook potatoes in their skins.
- Cover and refrigerate juices for storage.
- When choosing fresh produce, choose items that look fresh and are not wilted.
- Grow some of your own fruits and vegetables and use them soon after they are picked.
- Choose either fresh produce in season or frozen produce. Fresh and frozen produce will generally offer more vitamin C than canned.

Figure 9. Approximate Vitamin C Content of Various Foods¹

	Serving Size	Vitamin C (mg)
Guavas	1/2 cup	150
Red bell pepper, raw	1/2 cup sliced	85
Kiwi fruit	1 medium	75
Orange juice*	6 fluid oz	75
Orange	1 medium	70
Cantaloupe	1 cup cubes	60
Broccoli, cooked	1/2 cup chopped	60
Strawberries	8 medium	55
Grapefruit juice*	6 fluid oz	55
Vegetable juice, canned*	6 fluid oz	50
Brussels sprouts, cooked	1/2 cup	50
Grapefruit	1/2 medium	45
Papaya	1/2 cup cubes	45
Green bell pepper, raw	1/2 cup sliced	40
Potato with skin, baked	1 medium (5 in. long)	30
Sweet potato with skin, baked	1 medium (5 in. long)	30
Cauliflower, cooked	1/2 cup	25
Tomato, raw	1 medium	25
Mango	1/2 cup sliced	25
Green or red chili peppers, canned	1/4 cup	25
Green cabbage, raw	1 cup shredded	20
Turnip greens, cooked	1/2 cup cooked	20

*WIC foods

Note: Adult serving sizes are listed. Children under age 4 should be given smaller serving sizes.

1. Source of data: Texas Department of Health, *Basic Nutrition Module*, June 2001, page 1-47 with data from USDA Nutrient Database for Standard Reference, Release 13.

Folic Acid

Folic acid is also called *folate* or *folacin*. Folic acid is the synthetic form of the vitamin *folate* and is the form used in vitamin supplements and fortification of food. *Folate* is the form of the vitamin naturally found in foods. Food folates may be destroyed by lengthy cooking and are not as well absorbed as synthetic folic acid. (About 85% of the synthetic form is absorbed by the body, while only about 50% of the food folate is absorbed by the body.) The term folic acid is used in this discussion to designate both the synthetic and the naturally occurring forms of this vitamin.



The body uses folic acid to make new cells, including red blood cells. Also, it is needed for protein synthesis and growth. Folic acid is especially important for women because it can help prevent a serious group of birth defects known as **neural tube defects (NTDs)**. With this type of birth defect, the baby's brain, spinal cord, or both do not develop properly and the results can be very serious to the fetus. All women who are capable of becoming pregnant should consume 400 micrograms per day of synthetic folic acid from supplements or fortified foods, in addition to consuming food folate from a varied diet. In addition, children and infants need ample amounts of folic acid during periods of rapid growth.

Not Getting Enough Folic Acid

Besides increasing the risk of NTDs, folic acid deficiency interferes with normal cell division, protein synthesis, and growth. Inadequate folic acid intake can lead to megaloblastic anemia. In this type of anemia, which is different from iron-deficiency anemia, the blood cells are malformed and cannot carry enough oxygen. Cases of megaloblastic anemia do occur in the United States, especially among pregnant women and people with alcoholism.

Getting Too Much Folic Acid

Like vitamin C, folic acid is water-soluble, so the body excretes excess amounts. However, megadoses of folic acid could interfere with medication and could also mask a vitamin B₁₂ deficiency.

Naturally Occurring Sources of Folic Acid (Folate)

Folic acid is naturally present in a variety of foods as food *folate*. These foods include:

- **dark green leafy vegetables** such as spinach, collard/mustard/turnip greens, romaine lettuce and bok choy
- **other vegetables** such as asparagus, beets, Brussels sprouts, broccoli, corn, endive, green peas, parsnips, and cauliflower
- **citrus and other fruits and their juices** such as oranges, orange juice, pineapple juice, avocados, mangos, and papayas
- **cooked dry beans, peas, and lentils**
- **liver and giblets**
- **nuts and seeds**
- **wheat germ**

Folic acid is sensitive to heat, so it is best to include raw vegetables in the diet. When cooking vegetables, try to limit cooking time to 5 or 10 minutes.

Sources of Synthetic Folic Acid

In 1998, in an effort to reduce the incidence of NTDs, the Food and Drug Administration began requiring that synthetic folic acid be added to grain products such as breads, flours, corn meal, rice, and pasta. A single serving of most of these fortified products supplies about 40 micrograms of folic acid (10% of the 400 micrograms recommended for women of childbearing age). However, a number of fortified breakfast cereals provide 50 to 100% of the recommended amount (200 to 400 micrograms of folic acid) in just one serving. Clients should be educated on reading the Nutrition Facts panel on cereal labels.



 **GO TO** the Workbook for the Basic Nutrition Module and complete Self-Check Questions 34–46 right now. Then, immediately check your answers against the Answer Key to the Self-Check Questions (contained in your workbook) before proceeding to the next section of the module.

Minerals

Minerals are micronutrients. This means that they are needed by the body to maintain life and promote growth, but only in small amounts. While minerals make up only 5 to 6 pounds of total body weight, they are necessary for life. They are single, inorganic elements that are widely distributed in nature.

Types of Minerals

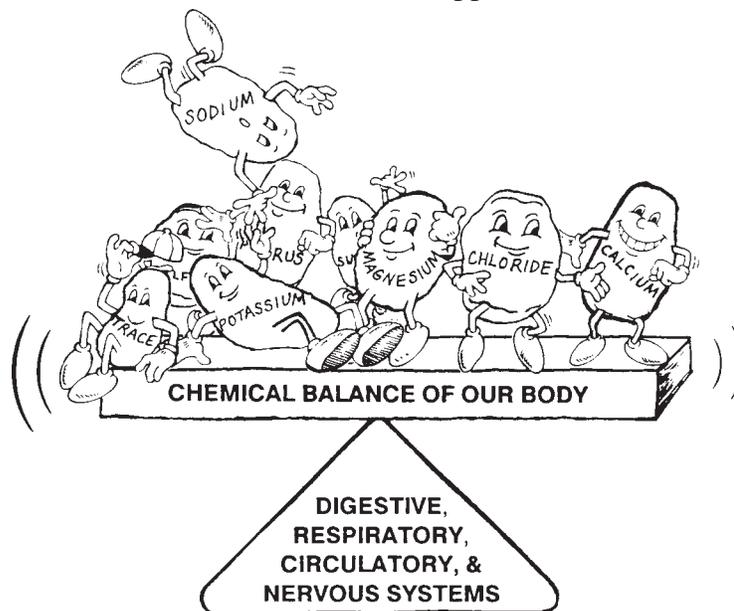
Minerals are divided into two categories, based on how much the body needs. These categories are **major minerals** and **trace minerals**.

Major Minerals

- calcium
- chloride
- magnesium
- phosphorus
- potassium
- sodium
- sulfur

Trace Minerals

- iron
- zinc
- iodine
- selenium
- copper
- manganese
- fluoride
- chromium
- molybdenum
- cobalt



Functions of Minerals

The major function of minerals are to:

- Help maintain proper chemical balance for the functioning of the respiratory, circulatory, digestive, and nervous systems.
- Help keep the right amount of fluid between each body cell and within each cell in the body.

Each mineral has a specific function within the body, for example:

Sodium plays a role in water balance and muscle action (transmission of nerve impulse and resulting contraction). For more information about sodium, see the Sodium and Potassium section on page 88 of this module.

Zinc is involved in the transfer of carbon dioxide, taste process, and protein synthesis.

Iron is a mineral with a very important function. It plays a role in the formation of healthy red blood cells. Iron combines with protein to form hemoglobin, which is the red substance in the blood that carries oxygen to the cells and carbon dioxide away from the cells.

Iodine is part of the hormone thyroxin, which is important in energy metabolism. In iodine deficiency, the thyroid gland enlarges—a condition known as *goiter*. In a pregnant woman, severe iodine deficiency causes *cretinism* which is extreme and irreversible mental and physical retardation of the infant. In developing nations, both cretinism and goiter are significant problems.

Calcium

Calcium is a mineral important for the formation and maintenance of bones; but calcium’s role goes beyond the skeleton. The bones are in a continuous state of change, i.e., they constantly take up calcium and then release it back into the blood. This action helps maintain a steady calcium supply in the bloodstream for functions such as forming teeth, blood clotting, muscle contraction and relaxation, heart action, and nerve transmission. As the body uses calcium, individuals need to replace it by eating more calcium-rich foods. When a person does not eat enough calcium, the bones end up releasing more calcium than they take up. This leaves space in the bones where calcium should be, so the bones become porous and fragile. People who eat a healthy diet with plenty of calcium-rich foods will have stronger bones. Recommendations for calcium intake are shown in Figure 10 below.

Figure 10. Adequate Intakes (AI) for Calcium¹

Life Stage Group	AI
1 to 3 years	500 mg
4 to 8 years	800 mg
9 to 18 years	1,300 mg
19 to 50 years	1,000 mg
Over 50 years	1,200 mg
Pregnant & Lactating (up to 18 years)	1,300 mg
Pregnant & Lactating (19 to 50 years)	1,000 mg

1. Source of data: National Academy of Sciences, *Dietary Reference Intakes for Calcium, Phosphorus, Magnesium, Vitamin D, and Fluoride*, 1997. This report may be accessed via www.nap.edu.

Calcium During Childhood and Adolescence

Nearly *half* of the body's bone mass is formed between the ages of 11 and 15 years in girls and between the ages of 12 and 17 years in boys. Calcium recommendations are higher for adolescents, in addition to the fact that their bones are programmed to take up calcium more easily. It is crucial that children and adolescents get enough calcium in their diets. Those who do not get enough calcium put themselves at risk because they start their adult lives with a calcium deficit.

Calcium During Adulthood

After age 19 years or so, the bones stop growing, but bone mass still continues to be built throughout the twenties. Then, after about age 30 or 35 years, the bones start to lose more calcium than they gain, a natural part of the aging process. This slow bone loss that occurs in adulthood gradually weakens the skeleton. For women in their childbearing years, the hormone estrogen helps protect bones but, after menopause, bone loss seems to speed up due to hormonal changes.

Osteoporosis

One of the effects of a prolonged calcium deficiency is evident when an older person develops osteoporosis. *Osteoporosis* occurs when the bones actually become porous or full of holes. *Osteo* means **bones** and *porosis* means **porous**. The bone loss usually occurs in the pelvis, causing a break in the pelvic bone or hip; or in the spine, causing great pain and an actual loss of inches in one's height. Although a calcium deficiency is not the only factor which can cause osteoporosis, it certainly can and does contribute to the disease.

Certain people are more likely to develop osteoporosis than others. Factors that increase the likelihood of developing osteoporosis are called "risk factors." **The following risk factors have been identified:**

- being a woman (80 percent of those affected by osteoporosis are women.)
- advanced age
- early menopause or abnormal absence of menstrual periods (amenorrhea)
- family history of osteoporosis
- being of Caucasian or Asian race, although African Americans and Hispanic Americans are at significant risk as well
- having a thin and/or small frame
- cigarette smoking
- excessive use of alcohol
- sedentary lifestyle
- anorexia nervosa or bulimia
- low intake of dietary calcium and vitamin D
- use of certain medications such as corticosteroids and anticonvulsants

The best way for individuals to avoid osteoporosis is to make sure they reach adulthood with a strong skeleton and to try to reduce calcium loss as they age. In young people, eating a diet rich in calcium helps build and maintain strong bones. For adults, a high

calcium diet helps reduce bone loss. Other ways to help prevent osteoporosis are: being physically active (both weight-bearing activities such as walking and gardening and resistance exercises such as weight training), not smoking, and not abusing alcohol. There are also some prescription medications that are used to prevent and/or treat osteoporosis in postmenopausal women.

Sources of Calcium

Milk and milk products such as cheese, yogurt and pudding are the richest sources of calcium. Fair sources of calcium are: dark green leafy vegetables, dry beans (cooked), canned sardines (with bones), canned salmon (with bones).

A person who does not drink milk should obtain calcium from other sources. Figure 11 on the following page shows the various food sources of calcium and the serving size that provides the same amount of calcium as the amount in one cup of milk.



Who is in Danger of Not Getting Enough Calcium?

- *Women and girls*—From the age of about 10 years on, many females do not consume enough calcium. They are concerned about getting too much fat and too many calories so they avoid many foods including dairy products. This is a misconception because some dairy products rich in calcium, such as fat free milk or lowfat yogurt, have little or no fat.
- *Vegans*—Strict vegetarians who do not consume any dairy products have to be very careful about getting calcium from other sources or they will not be able to meet their calcium needs. (See Part 4 of this module for detailed information about vegans.)
- *Persons with lactose intolerance*—People in this group tend to avoid dairy products due to their difficulty in digesting the milk sugar called lactose. (See Part 4 of this module for detailed information about persons with lactose intolerance.)

**Figure 11. Calcium Equivalents to
One Cup (8 fluid oz) of Milk¹**

Milk Products	Serving Size
*Fluid milk (fat free, lowfat, reduced fat, or whole)	1 cup
Yogurt	1 cup
*Cheese	1 ¹ / ₂ oz
*Non-fat dry milk powder	¹ / ₃ cup
*Evaporated milk	¹ / ₂ cup
Cottage cheese	2 cups
Cream soup	2 cups
Pudding or custard	1 cup
Ice Cream, Ice Milk, or Frozen Yogurt	1 ¹ / ₂ cups
Other Food Sources	Serving Size
Soymilk, calcium fortified	1 cup
Tofu (if coagulated with a calcium salt)	2 ¹ / ₂ " cube
Broccoli, cooked	3 cups
*Dry beans, cooked	3 cups
Almonds	1 cup
Sardines with bones	3 oz
Blackstrap molasses (not regular molasses)	2 tablespoons
Salmon, canned with bones	4 oz
*Calcium-fortified orange juice	1 cup
*Calcium-fortified cereals ²	varies

1. Note: 1 cup of milk contains approximately 300 mg calcium or 30% of the Daily Value (DV) for calcium that is listed on the Nutrition Facts food label.

2. Some cereals are fortified with calcium in ranges from 10% of the DV (100 mg calcium) up to 100% of the DV (1,000 mg calcium).

* WIC foods

Calcium Supplements

It is recommended that individuals who do not meet their daily calcium requirements through foods and beverages take a calcium supplement. The following are guidelines for taking calcium supplements:

- Choose calcium supplements with familiar brand names. Look for labels that state “purified” or have the USP (United States Pharmacopeia) symbol. Avoid calcium from unrefined oyster shell, bone meal, or dolomite without the USP symbol, because it may contain high levels of lead or other toxic metals.

- Look for the amount of *elemental* calcium in the supplement. Elemental calcium is the portion of the supplement that will be absorbed by the bloodstream. The amount of elemental calcium in a tablet is based on 1,000 mg and will be expressed in a percentage. Example: If the Nutrition Facts panel on the label states that the tablet contains 50 percent of the recommended daily dose, it will contain 500 mg of elemental calcium.
- The two main forms of calcium found in supplements are carbonate and citrate. Calcium carbonate is the most common because it is inexpensive and convenient. The absorption of calcium citrate is similar to calcium carbonate. For instance, a calcium carbonate supplement contains 40 percent calcium while a calcium citrate supplement only contains 21 percent calcium. However, you have to take more pills of calcium citrate to get the same amount of calcium as you would get from a calcium carbonate pill since citrate is a larger molecule than carbonate. One advantage of calcium citrate over calcium carbonate is better absorption in those individuals who have decreased stomach acid. Calcium citrate malate is a form of calcium used in the fortification of certain juices and is also well absorbed. Other forms of calcium in supplements or fortified foods include calcium gluconate, lactate, and phosphate.
- Take calcium supplements in doses. Calcium is best absorbed in split doses throughout the day. Generally, the body can only absorb about 500 to 600 mg of elemental calcium at a time. It is recommended that individuals choose a particular hour or mealtime to take the supplement regularly, thereby establishing a habit.
- Don't forget vitamin D. The body needs vitamin D to make calcium available to the bloodstream. All age groups 50 years and younger need 5 micrograms [200 International Units (IU)] of vitamin D per day. Older Americans have increased needs for this vitamin—ages 51 to 70 need 10 micrograms (400 IU) of vitamin D per day and ages over 70 years need 15 micrograms (600 IU) of vitamin D per day. Some calcium supplements also contain vitamin D.
- For certain people, some calcium supplements may cause side effects such as gas or constipation. If simple measures (such as increasing your intake of fluids and high-fiber foods) do not solve the problem, you should try another form of calcium. Also, it is important to increase the dose of your supplement gradually: take just 500 mg a day for a week, then slowly add more calcium. Do not take more than the recommended amount of calcium without your doctor's approval.
- It is important to talk with a doctor or pharmacist about possible interactions between over-the-counter and prescription medications, and calcium supplements. For example, calcium supplements may reduce the absorption of the antibiotic tetracycline. Calcium also interferes with iron absorption. Calcium supplements should not be taken at the same time as an iron supplement, unless the calcium supplement is calcium citrate, or unless the iron supplement is taken with vitamin C. Also, any medication that must be taken on an empty stomach should not be taken with calcium supplements.

Fluoride

Fluoride is a mineral found naturally at varying concentrations in all drinking water as well as in soil. Fluoride is important for preventing and controlling dental caries.

Frequent exposure to small amounts of fluoride each day through drinking fluoridated water and brushing with fluoride toothpaste reduces the risk for dental caries in all age groups. For persons at high risk for dental caries, additional fluoride measures, such as mouth rinses and professionally applied fluorides, may be needed. In areas with fluoride-deficient drinking water, dietary fluoride supplements may be considered. Fluoride reduces the prevalence and severity of dental caries by:



- inhibiting the demineralization of sound enamel,
- enhancing the remineralization of demineralized enamel, and
- affecting the metabolism of cariogenic bacteria (bacteria that can cause tooth decay).

The results of numerous long-term studies in which fluoride was added to community water supplies at an optimal concentration of 0.7 to 1.2 parts per million (ppm) have shown its effectiveness, safety, and economy in reducing the prevalence of dental caries. Some people oppose water fluoridation, claiming that it can lead to cancer and other chronic health problems. However, extensive research has shown that such claims are unfounded.

Currently almost 70 percent of Florida's population receive optimally fluoridated water. You can go to the following website to find out which communities in Florida have optimally fluoridated water systems: www.doh.state.fl.us/family/dental/fluoridation. Systems listed are fluoridated. The communities that are greyed out are naturally fluoridated.

Sources of Fluoride

The primary source of fluoride for the prevention of dental caries is fluoridated water. In bottled water, the fluoride content is highly variable and often low. Home water treatment systems may affect the fluoride content of the filtered water. More expensive reverse osmosis systems and distillation units do remove significant amounts of fluoride from the water. The less expensive water filters vary in the amount of fluoride they remove from the water, but generally do not remove significant amounts of fluoride.

Fluoride Supplements

The use of fluoride supplements may be recommended for children in non-fluoridated areas. Fluoride supplements should not be given to children when the water supply is optimally fluoridated, because children who consume excessive fluoride during the early stages of tooth development may develop dental fluorosis. Most fluorosis in the United States is the very mild to mild forms which appear as chalklike, lacy markings across a tooth's enamel surface that are not readily apparent to the affected person or casual

observer. In the moderate form, over 50 percent of the enamel surface is opaque white. The rare, severe form manifests as pitted and brittle enamel and may develop areas of brown stain.

For more information on preventing dental caries in children and for the recommended fluoride supplementation levels for children, refer to the Dental Caries section of the Preschool Child Nutrition Module. Also, you can go to the American Dental Association website at www.ada.org/public/topics/fluoride/ for further information about fluoride.

Iron

The body needs only small amounts of iron, but getting enough in the diet can be a challenge. Iron needs are highest during periods of rapid growth. Infants, children, teenagers, women in their childbearing years, breastfeeding women, and pregnant women are at increased risk for becoming iron deficient. One of the goals of the WIC program is to prevent iron-deficiency anemia.

Iron is a trace mineral that the body needs for normal growth, to prevent infections, and to promote learning. Iron's main job is to help form hemoglobin, a protein in red blood cells. Specifically, iron carries oxygen within the hemoglobin. When the hemoglobin combines with oxygen, it turns red, giving blood its red color. Then hemoglobin travels to all of the body's cells, taking oxygen to the tissues for energy production.

If a person does not get enough iron in his/her diet or if the body's iron stores get too low, the red blood cells cannot carry as much oxygen. Therefore, there is less oxygen going to the body's cells, so they cannot produce as much energy and the person feels tired, weak, and irritable—symptoms of **iron-deficiency anemia**.

Iron-Deficiency Anemia

Iron-deficiency anemia is a widespread health problem, especially among infants, growing children, and women in their childbearing years. The main causes are poor dietary intake, rapid growth, major blood loss, or a combination of these factors. The symptoms of iron-deficiency anemia include difficulty learning; slow growth; shorter attention span; poor appetite; problems breathing, especially during exercise; less resistance to infection; pale skin and nails; reduced ability to exercise; less ability to regulate body temperature; and changes in behavior.

Young children who drink too much milk and do not eat enough foods high in iron are at risk for developing iron-deficiency anemia. Children 1 to 3 years old should drink about 16 ounces of milk per day, and children 4 to 5 years old should drink no more than about 24 ounces of milk per day.

Some people have low-iron blood because they eat too many foods high in sugar and fat. They fill up on these foods and do not eat as many foods high in iron. Foods high in sugar and fat such as soda, fruit drinks, candy, and chips have little or no iron in them.

The pregnant woman has a particularly critical need for iron—both for herself and the developing fetus. Also, women of childbearing age need more iron to replace the iron that is lost each month during menstruation.

Tea, decaffeinated tea, regular coffee, and decaffeinated coffee can keep the body from using iron. If a person drinks coffee or tea, they should drink it in moderation between meals instead of with meals.

Food Sources of Iron

Iron is found in many foods as shown in Figure 12 on the following page. Iron is present in foods in two different forms: heme and non-heme iron.

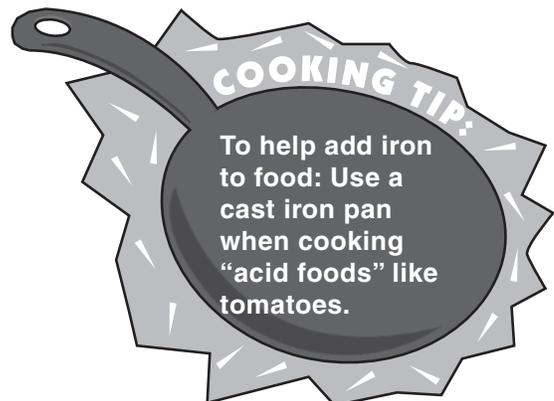
Heme iron—Most of the iron found in **animal sources** is heme iron. The body absorbs about 15 to 35 percent of heme iron, which is pretty good when compared to non-heme. Excellent sources of heme iron are found in beef, pork, poultry, and fish.

Non-heme iron—The iron found in **plant sources** is called non-heme iron. The body only absorbs about 2 to 20 percent of non-heme iron. Moderately good sources include dry beans, tofu, blackstrap molasses, baked potatoes with the skin, dried fruit, and fortified cereals.

Iron Absorption

It is possible to help or hinder the amount of iron the body absorbs. For example, eating vitamin C-rich foods along with foods containing iron increases iron absorption. Also, heme iron helps the body absorb non-heme iron. On the other hand, tea, coffee, spinach, chocolate, soy protein, wheat bran, calcium supplements, and fiber all interfere with iron absorption. Here are some ways that individuals can increase the amount of iron absorbed:

- **Include vitamin C-rich foods when planning meals.** For example, serve green or red peppers along with chicken or beef, or orange juice along with iron-fortified cereal.
- **Avoid drinking tea and coffee with meals, including decaffeinated coffee and tea.** Note: It's not the caffeine that decreases iron absorption, but substances called tannins or polyphenols that are in the tea and coffee.
- **Cook foods in iron pots or skillets.** When highly acidic foods such as tomatoes in spaghetti sauce or chili are cooked in iron pots or skillets, a small amount of the iron is absorbed into the food, increasing its iron content.
- **Include meat in the diet.** The iron in meat is well absorbed, and it also helps the body absorb iron from plant sources.



Iron Supplements

People with iron-deficiency anemia, as well as pregnant and breastfeeding women, sometimes need to take iron drops or pills. The health care provider's instructions should be followed when the individual is taking iron drops or pills. Continue eating foods high in iron. **Caution:** Keep iron pills and vitamin pills with iron out of the reach of children. Pills with iron could be deadly to children if they ate too many by accident!



 **GO TO** the Workbook for the Basic Nutrition Module and complete Self-Check Questions 47–60 right now. Then, immediately check your answers against the Answer Key to the Self-Check Questions (contained in your workbook) before proceeding to the next section of the module.

Part 2: Dietary Guidelines¹

Here is an overview and key recommendations of each chapter of the *2005 Dietary Guidelines*.

Chapter 1. Background and Purpose of the Dietary Guidelines for Americans

The *Dietary Guidelines for Americans* provides science-based advice to promote health and to reduce risk for chronic diseases through **diet** and **physical activity**. The recommendations contained within the *Dietary Guidelines* are targeted to the general public over 2 years of age who are living in the United States. By law, the *Dietary Guidelines* is reviewed, updated if necessary, and published every 5 years. Because of its focus on health promotion and risk reduction, the *Dietary Guidelines* form the basis of federal food, nutrition education, and information programs.

The *Dietary Guidelines* helps promote health and reduce the risk of chronic diseases. Some specific diseases linked to poor diet and physical inactivity include cardiovascular disease, type 2 diabetes, hypertension, osteoporosis, and certain cancers. Furthermore, poor diet and physical inactivity, resulting in an energy imbalance (more calories consumed than expended), are the most important factors contributing to the increase in overweight and obesity in the United States. Combined with physical activity, following a diet that does not provide excess calories according to the recommendations in the *Dietary Guidelines* should enhance the health of most individuals.

Chapter 2. Adequate Nutrients Within Calorie Needs

Key Recommendations

- Consume a variety of nutrient-dense foods and beverages within and among the basic food groups while choosing foods that limit the intake of saturated and *trans* fats, cholesterol, added sugars, salt, and alcohol.
- Meet recommended intakes within energy needs by adopting a balanced eating pattern, such as the MyPyramid food guidance system.

1. Part 2 of this module was adapted from *Dietary Guidelines for Americans 2005* published by US Department of Agriculture (USDA) and US Department of Health and Human Services (HHS), USDA Publication number: Home and Garden Bulletin No. 232; HHS publication number: HHS-ODPHP-2005-01-DGA-A.

Key Recommendations for Specific Population Groups

- **People over age 50.** Consume vitamin B₁₂ in its crystalline form (i.e., fortified foods or supplements).
- **Women of childbearing age who may become pregnant.** Eat foods high in heme-iron and/or consume iron-rich plant foods or iron-fortified foods with an enhancer of iron absorption, such as vitamin C-rich foods.
- **Women of childbearing age who may become pregnant and those in the first trimester of pregnancy.** Consume adequate synthetic folic acid daily (from fortified foods or supplements) in addition to food forms of folate from a varied diet.
- **Older adults, people with dark skin, and people exposed to insufficient ultraviolet band radiation (i.e., sunlight).** Consume extra vitamin D from vitamin D-fortified foods and/or supplements.

Meeting Recommended Intakes Within Energy Needs

A basic premise of the *Dietary Guidelines* is that food guidance should recommend diets that will provide all the nutrients needed for growth and health. This food guidance should encourage individuals to achieve the most recent nutrient intake recommendations of the Institute of Medicine, referred to collectively as the Dietary Reference Intakes (DRIs). (See Appendixes A and B in this document for the DRI tables for vitamins and minerals.)

An additional premise of the *Dietary Guidelines* is that the nutrients consumed should come primarily from foods. Foods contain not only the vitamins and minerals that are often found in supplements, but also hundreds of naturally occurring substances, including carotenoids, flavonoids and isoflavones, and protease inhibitors that may protect against chronic health conditions. There are instances when fortified foods may be advantageous. These include providing additional sources of certain nutrients that might otherwise be present only in low amounts in some food sources, providing nutrients in highly bioavailable forms, and where the fortification addresses a documented public health need.

An eating pattern that follows the *Dietary Guidelines* is the MyPyramid food guidance system. (MyPyramid will be discussed in detail in Part 3 of this module.) MyPyramid differs in important ways from common food consumption patterns in the United States. In general, it includes:

- **More** dark green vegetables, orange vegetables, legumes, fruits, whole grains, and lowfat milk and milk products.
- **Less** refined grains, total fats (especially cholesterol, and saturated and *trans* fats), added sugars, and calories.



Variety Among and Within Food Groups

Each basic food group is the major contributor of at least one nutrient while making substantial contributions of many other nutrients. Because each food group provides a wide array of nutrients in substantial amounts, it is important to include all food groups in the daily diet. Selecting a variety of foods within the grain, vegetable, fruit, and meat groups may help to ensure that an adequate amount of nutrients and other potentially beneficial substances are consumed. For example, fish contains varying amounts of fatty acids that may be beneficial in reducing cardiovascular disease risk.

Nutrient-Dense Foods

Nutrient-dense foods are those foods that provide substantial amounts of vitamins and minerals (micronutrients) and relatively few calories. Foods that are low in nutrient density are foods that supply calories but relatively small amounts of micronutrients, sometimes none at all. The greater the consumption of foods or beverages that are low in nutrient density, the more difficult it is to consume enough nutrients without gaining weight, especially for sedentary individuals. The consumption of added sugars, saturated and *trans* fats, and alcohol provides calories while providing little, if any, of the essential nutrients.

Selecting appropriate portions of low-fat forms of foods in each group and forms free of added sugars—in other words, choosing nutrient-dense versions of foods—provides individuals a way to meet their nutrient needs while avoiding the overconsumption of calories and of food components such as saturated fats. However, Americans generally do not eat nutrient-dense forms of foods. Most people will exceed calorie recommendations if they consistently choose higher fat foods within the food groups—even if they do not have dessert, sweetened beverages, or alcoholic beverages.

Nutrients of Concern

Based on these considerations, dietary intakes of the following nutrients may be low enough to be of concern for:

- Adults: calcium, potassium, fiber, magnesium, and vitamins A (as carotenoids), C, and E.
- Children and adolescents: calcium, potassium, fiber, magnesium, and vitamin E.
- Specific population groups: vitamin B₁₂, iron, folic acid, and vitamins E and D.

Efforts to promote increased dietary intakes of the following may be warranted: potassium, fiber, and possibly vitamin E, regardless of age; increased intakes of calcium and possibly vitamins A (as carotenoids) and C and magnesium by adults. Efforts are warranted to increase intakes of calcium and possibly magnesium by children age 9 years or older. Efforts may be especially warranted to improve the dietary intakes of adolescent females in general.

Low intakes of fiber tend to reflect low intakes of whole grains, fruits, and vegetables. Low intakes of calcium tend to reflect low intakes of milk and milk products. Low intakes of vitamins A (as carotenoids) and C and magnesium tend to reflect low intakes of fruits and vegetables. Selecting fruits, vegetables, whole grains, and lowfat and fat free milk and milk products in the amounts suggested by the MyPyramid food guidance system will provide adequate amounts of these nutrients.

Most Americans of all ages also need to increase their potassium intake. To meet the recommended potassium intake levels, potassium-rich foods from the fruit, vegetable, and dairy groups must be selected in the MyPyramid food guidance system.

Most Americans may need to increase their consumption of foods rich in vitamin E while decreasing their intake of foods high in energy but low in nutrients. The vitamin E content in the MyPyramid food guidance system is greater than current consumption, and specific vitamin E-rich foods need to be included in the eating patterns to meet the recommended intake of vitamin E. Breakfast cereal that is fortified with vitamin E is an option for individuals seeking to increase their vitamin E intake while consuming a low-fat diet.

In addition, most Americans need to decrease sodium intake. When using the MyPyramid food guidance system, selecting foods that are lower in sodium than others is especially necessary to meet the recommended intake level at calorie levels of 2,600 per day and above. Food choices that are lower in sodium are identified in Chapter 8 of the *Dietary Guidelines for Americans* (page 88 of this module).



 **GO TO** the Workbook for the Basic Nutrition Module and complete Self-Check Questions 61–65 right now. Then, immediately check your answers against the Answer Key to the Self-Check Questions (contained in your workbook) before proceeding to the next section of the module.

Chapter 3. Weight Management

Key Recommendations

- To maintain body weight in a healthy range, balance calories from foods and beverages with calories expended.
- To prevent gradual weight gain over time, make small decreases in food and beverage calories and increase physical activity.

Key Recommendations for Specific Population Groups

- *Those who need to lose weight.* Aim for a slow, steady weight loss by decreasing calorie intake while maintaining an adequate nutrient intake and increasing physical activity.
- *Overweight children.* Reduce the rate of body weight gain while allowing growth and development. Consult a health care provider before placing a child on a weight-reduction diet.
- *Pregnant women.* Ensure appropriate weight gain as specified by a health care provider.
- *Breastfeeding women.* Moderate weight reduction is safe and does not compromise weight gain of the nursing infant.
- *Overweight adults and overweight children with chronic diseases and/or on medication.* Consult a health care provider about weight loss strategies prior to starting a weight-reduction program to ensure appropriate management of other health conditions.

Overweight and Obesity in the United States

Overweight and obesity in the United States among adults and children has increased significantly over the last two decades. An individual following a typical American eating pattern and activity pattern are likely to be consuming a diet that contains a daily calorie intake that is in excess of their body's calorie needs. However, calorie intake is only one side of the energy balance equation. In order to maintain body weight, i.e., to not gain or lose weight, the number of calories used by the body needs to be in balance with the number of calories taken in by the body. To achieve weight loss, calories used by the body must be greater than calories taken in by the body. ***To reverse the trend toward obesity, most Americans need to eat fewer calories, be more active, and make wiser food choices.***

The prevention of weight gain is critical because prevention of weight gain is easier to accomplish than what is required to be done to lose weight. Since many adults gain weight slowly over time, even small decreases in calorie intake can help avoid weight gain, especially if accompanied by increased physical activity. For example, for most

adults a decreased intake of 50 to 100 calories per day may prevent gradual weight gain, while decreased intake of 500 calories or more per day is a common initial goal in weight-loss programs. Similarly, up to 60 minutes of moderate-intensity to vigorous-intensity physical activity per day may be needed to prevent weight gain, but as much as 60 to 90 minutes of moderate-intensity physical activity per day is recommended to sustain weight loss for previously overweight people. It is advisable for men over age 40, women over age 50, and those with a history of chronic diseases such as heart disease or diabetes to consult with a health care provider before starting a vigorous exercise program. However, many people can safely increase their physical activity without consulting a health care provider.

Monitoring body fat regularly can be a useful strategy for assessing the need to adjust calorie intake and energy expenditure. One measure used to approximate body fat is body mass index (BMI). For adults, weight status is based on the absolute BMI level. For children and adolescents, weight status is determined by comparison of the individual's BMI with age-specific and gender-specific percentile values. The adult BMI chart is shown as Figure 13 on pages 70 and 71 of this module. Charts for children and adolescent can be found at the Centers for Disease Control website at <http://www.cdc.gov/growthcharts>. BMI is more accurate at approximating body fat than is measuring body weight alone. However, BMI has some limitations. BMI overestimates body fat in people who are very muscular and underestimates body fat in people who have lost muscle mass.

Some proposed calorie-lowering strategies include eating foods that are low in calories for a given measure of food (e.g., many kinds of vegetables and fruits and some soups). However, when making changes to improve nutrient intake, one needs to make substitutions to avoid excessive calorie intake. The healthiest way to reduce calorie intake is to reduce one's intake of added sugars, fats, and alcohol, which all provide calories but few or no essential nutrients.



Special attention should be given to portion sizes, which have increased significantly over the past two decades (20 years). There are studies that show that controlling portion sizes helps limit calorie intake, particularly when eating calorie-dense foods (foods that are high in calories for a given measure of food). Therefore, it is essential that the public understand how portion sizes compare to a recommended amount of food from each food group at a specific calorie level. The understanding of portion size is important in following the MyPyramid food guidance system. When using packaged foods with nutrient labels, people should pay attention to the serving sizes, the number of servings per container, and how they compare to the recommended amounts in the MyPyramid system.

Lifestyle changes in diet and physical activity are the best first choice for weight loss. A reduction of 500 calories or more per day is commonly needed. When it comes to body

weight control, it is calories that count—not the proportions of fat, carbohydrates, and protein in the diet. However, when individuals are losing weight, they should follow a diet that is within the acceptable ranges of fat, carbohydrates, and protein, which are 20 to 35 percent of total calories from fat, 45 to 65 percent of total calories from carbohydrates, and 10 to 35 percent of total calories from protein. Diets that provide very low or very high amounts of protein, carbohydrates, or fat are likely to provide low amounts of some nutrients and are not advisable for long-term use. Although these kinds of weight-loss diets have been shown to result in weight reduction, the maintenance of a reduced weight ultimately will depend on a change in lifestyle. Successful and sustainable weight loss and weight maintenance strategies require attention to both sides of the energy balance equation, i.e., calories taken in and energy expended.



Self-
Check



Basic Nutrition
Module

 **GO TO** the Workbook for the Basic Nutrition Module and complete Self-Check Questions 66–69 right now. Then, immediately check your answers against the Answer Key to the Self-Check Questions (contained in your workbook) before proceeding to the next section of the module.

Figure 13. Body Mass Index (BMI) Table

Locate the height of interest in the left-most column and read across the row for that height to the weight of interest. Follow the column of the weight up to the top row that lists the BMI. BMI of 18.5-24.9 is the healthy weight range, BMI of 25-29.9 is the overweight range, and BMI of 30 and above is in the obese range.

BMI	18.4	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Height	Body Weight (in pounds)																
4'10" (58")	88	91	96	100	105	110	115	119	124	129	134	138	143	148	153	158	162
4'11" (59")	91	94	99	104	109	114	119	124	128	133	138	143	148	153	158	163	168
5' (60")	94	97	102	107	112	118	123	128	133	138	143	148	153	158	163	168	174
5'1" (61")	97	100	106	111	116	122	127	132	137	143	148	153	158	164	169	174	180
5'2" (62")	101	104	109	115	120	126	131	136	142	147	153	158	164	169	175	180	186
5'3" (63")	104	107	113	118	124	130	135	141	146	152	158	163	169	175	180	186	191
5'4" (64")	107	110	116	122	128	134	140	145	151	157	163	169	174	180	186	192	197
5'5" (65")	111	114	120	126	132	138	144	150	156	162	168	174	180	186	192	198	204
5'6" (66")	114	118	124	130	136	142	148	155	161	167	173	179	186	192	198	204	210
5'7" (67")	117	121	127	134	140	146	153	159	166	172	178	185	191	198	204	211	217
5'8" (68")	121	125	131	138	144	151	158	164	171	177	184	190	197	203	210	216	223
5'9" (69")	124	128	135	142	149	155	162	169	176	182	189	196	203	209	216	223	230
5'10" (70")	128	132	139	146	153	160	167	174	181	188	195	202	209	216	222	229	236
5'11" (71")	132	136	143	150	157	165	172	179	186	193	200	208	215	222	229	236	243
6' (72")	136	140	147	154	162	169	177	184	191	199	206	213	221	228	235	242	250
6'1" (73")	139	144	151	159	166	174	182	189	197	204	212	219	227	235	242	250	257
6'2" (74")	143	148	155	163	171	179	186	194	202	210	218	225	233	241	249	256	264
6'3" (75")	147	152	160	168	176	184	192	200	208	216	224	232	240	248	256	264	272
6'4" (76")	151	156	164	172	180	189	197	205	213	221	230	238	246	254	263	271	279

Source: "Evidence Report of Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults" NIH/National Heart, Lung, and Blood Institute (NHLBI), 1998.

BMI Formula:

BMI = [weight in pounds divided by height in inches divided by height in inches] x 703

Example: A person weighing 210 pounds and is 6 feet tall would have a BMI = 210 pounds divided by 72 inches divided by 72 inches multiplied by 703 = 28.5

BMI	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51
<i>Height</i>	<i>Body Weight (in pounds)</i>																
4'10" (58")	167	172	177	181	186	191	196	201	205	210	215	220	224	229	234	239	244
4'11" (59")	173	178	183	188	193	198	203	208	212	217	222	227	232	237	242	247	252
5' (60")	179	184	189	194	199	204	209	215	220	225	230	235	240	245	250	255	261
5'1" (61")	185	190	195	201	206	211	217	222	227	232	238	243	248	254	259	264	269
5'2" (62")	191	196	202	207	213	218	224	229	235	240	246	251	256	262	267	273	278
5'3" (63")	197	203	208	214	220	225	231	237	242	248	254	259	265	270	278	282	287
5'4" (64")	204	209	215	221	227	232	238	244	250	256	262	267	273	279	285	291	296
5'5" (65")	210	216	222	228	234	240	246	252	258	264	270	276	282	288	294	300	306
5'6" (66")	216	223	229	235	241	247	253	260	266	272	278	284	291	297	303	309	315
5'7" (67")	223	230	236	242	249	255	261	268	274	280	287	293	299	306	312	319	325
5'8" (68")	230	236	243	249	256	262	269	276	282	289	295	302	308	315	322	328	335
5'9" (69")	236	243	250	257	263	270	277	284	291	297	304	311	318	324	331	338	345
5'10" (70")	243	250	257	264	271	278	285	292	299	306	313	320	327	334	341	348	355
5'11" (71")	250	257	265	272	279	286	293	301	308	315	322	329	338	343	351	358	365
6' (72")	258	265	272	279	287	294	302	309	316	324	331	338	346	353	361	368	375
6'1" (73")	265	272	280	288	295	302	310	318	325	333	340	348	355	363	371	378	386
6'2" (74")	272	280	287	295	303	311	319	326	334	342	350	358	365	373	381	389	396
6'3" (75")	279	287	295	303	311	319	327	335	343	351	359	367	375	383	391	399	407
6'4" (76")	287	295	304	312	320	328	336	344	353	361	369	377	385	394	402	410	418

BMI Ranges for Pregnant Women Certified for WIC

For WIC nutrition risk determination, pregnant women certified in the WIC program have their prepregnancy weight for height status assessed using the ranges listed below. These ranges are somewhat different from the ranges used for the general adult population. The reason for this difference is that pregnancy outcome studies done in the past were based on the ranges listed below.

- Underweight: BMI less than 19.8**
- Normal Weight: BMI 19.8 to 26.0**
- Overweight: BMI 26.1 to 29.0**
- Obese: BMI greater than or equal to 29.1**



Chapter 4. Physical Activity

Key Recommendations

- Engage in regular physical activity and reduce sedentary activities to promote health, psychological well-being, and a healthy body weight.
- To reduce the risk of chronic disease in adulthood: Engage in at least 30 minutes of moderate-intensity physical activity, above usual activity, at work or home on most days of the week.
- For most people, greater health benefits can be obtained by engaging in physical activity of more vigorous intensity or longer duration.
- To help manage body weight and prevent gradual, unhealthy body weight gain in adulthood: Engage in approximately 60 minutes of moderate-intensity to vigorous-intensity activity on most days of the week while not exceeding calorie intake requirements.
- To sustain weight loss in adulthood: Participate in at least 60 to 90 minutes of daily moderate-intensity physical activity while not exceeding calorie intake requirements. Some people may need to consult with a health care provider before participating in this level of activity.
- Achieve physical fitness through various types of physical activities including cardiovascular conditioning, stretching exercises for flexibility, and resistance exercises or calisthenics for muscle strength and endurance.

Key Recommendations for Specific Population Groups

- **Children and adolescents.** Engage in at least 60 minutes of physical activity on most, preferably all, days of the week.
- **Pregnant women.** In the absence of medical or obstetric complications, incorporate 30 minutes or more of moderate-intensity physical activity on most, if not all, days of the week. Avoid activities with a high risk of falling or abdominal trauma.
- **Breastfeeding women.** Be aware that participation in physical activity does not affect the mother's ability to successfully breastfeed.
- **Older adults.** Participate in regular physical activity to reduce functional declines associated with aging and to achieve the other benefits of physical activity identified for all adults.

Regular physical activity has been shown to reduce the risk of certain chronic diseases, including high blood pressure, stroke, coronary artery disease, type 2 diabetes, colon cancer, and osteoporosis. Therefore, to reduce the risk of chronic disease, it is recommended that adults engage in at least 30 minutes of moderate-intensity physical activity on most, preferably all, days of the week. For most people, greater health benefits can be obtained by engaging in physical activity of more vigorous intensity or of longer duration. In addition, physical activity appears to promote psychological well-being and reduce feelings of mild to moderate depression and anxiety.

Regular physical activity is also a key factor in achieving and maintaining a healthy body weight for adults and children. To prevent the gradual accumulation of excess weight in adulthood, up to 30 additional minutes per day may be required over the 30 minutes for reduction of chronic disease risk and other health benefits. That is, approximately 60 minutes of moderate-intensity to vigorous-intensity physical activity on most days of the week may be needed to prevent unhealthy weight gain. See Figure 14 on page 74 of this module for some examples of moderate-intensity and vigorous-intensity physical activities.

While moderate-intensity physical activity can achieve the desired goal, vigorous-intensity physical activity generally provides more benefits than moderate-intensity physical activity. Control of caloric intake is also advisable. However, to sustain weight loss for previously overweight/obese people, about 60 to 90 minutes of moderate-intensity physical activity per day is recommended.

Figure 14. Calories/Hour Expended in Common Physical Activities

Some examples of physical activities commonly engaged in and the average amount of calories a 154-pound individual will expend by engaging in each activity for 1 hour. The expenditure value encompasses both resting metabolic rate calories and activity expenditure. Some of the activities can constitute either moderate-intensity or vigorous-intensity physical activity depending on the rate at which they are carried out (for walking and bicycling). Note: Calories burned per hour will be higher for persons who weigh more than 154 lbs. (70 kg.) and lower for persons who weigh less.

Moderate Physical Activity	Approximate Calories/Hour
Hiking	370
Light gardening/yard work	330
Dancing	330
Golf (walking and carrying clubs)	330
Bicycling (less than 10 miles per hour)	290
Walking (3.5 miles per hour)	280
Weight lifting (general light workout)	220
Stretching	180
Vigorous Physical Activity	
Running/jogging (5 miles per hour)	590
Bicycling (greater than 10 miles per hour)	590
Swimming (slow freestyle laps)	510
Aerobics	480
Walking (4.5 miles per hour)	460
Heavy yard work (chopping wood)	440
Weight lifting (vigorous effort)	440
Basketball (vigorous)	440

Source: *Dietary Guidelines for Americans*, 2005, Table 4, page 16.

Most adults do not need to see their health care provider before starting a moderate-intensity physical activity program. However, men older than 40 years and women older than 50 years who plan a vigorous program or who have either chronic disease or risk factors for chronic disease should consult their health care provider to design a safe, effective program. It is also important during leisure time to limit sedentary behaviors, such as television watching and video viewing, and replace them with activities requiring more movement. Reducing these sedentary activities appears to be helpful in treating and preventing overweight among children and adolescents.

Different intensities and types of exercise provide different benefits. Vigorous physical activity (e.g., jogging or other aerobic exercise) provides greater benefits for physical fitness than does moderate physical activity and burns more calories per unit of time. Resistance exercise (such as weight training, using weight machines, and resistance band workouts) increases muscular strength and endurance and maintains or increases

muscle mass. These benefits are seen in adolescents, adults, and older adults who perform resistance exercises on 2 or more days per week. Also, weight-bearing exercise has the potential to reduce the risk of osteoporosis by increasing peak bone mass during growth, maintaining peak bone mass during adulthood, and reducing the rate of bone loss during aging. In addition, regular exercise can help prevent falls, which is of particular importance for older adults.

The barrier often given for a failure to be physically active is lack of time. Setting aside 30 to 60 consecutive minutes each day for planned exercise is one way to obtain physical activity, but it is not the only way. Physical activity may include short bouts (e.g., 10-minute bouts) of moderate-intensity activity. The accumulated total is what is important—both for health and for burning calories. Physical activity can be accumulated through three to six 10-minute bouts over the course of a day.

Elevating the level of daily physical activity may also provide indirect nutritional benefits. A sedentary lifestyle limits the number of calories that can be consumed without gaining weight. The higher a person's physical activity level, the higher his or her energy requirement and the easier it is to plan a daily food intake pattern that meets recommended nutrient requirements.

Proper hydration is important when participating in physical activity. Two steps that help avoid dehydration during prolonged physical activity or when it is hot include: (1) consuming fluid regularly during the activity and (2) drinking several glasses of water or other fluid after the physical activity is completed.

Chapter 5. Food Groups to Encourage

Key Recommendations

- Consume a sufficient amount of fruits and vegetables while staying within energy or calorie needs. Two cups of fruit and 2½ cups of vegetables per day are recommended for a reference 2,000-calorie intake, with higher or lower amounts depending on the calorie level.
- Choose a variety of fruits and vegetables each day. In particular, select from all five vegetable subgroups (dark green, orange, legumes, starchy vegetables, and other vegetables) several times a week.
- Consume 3 or more ounce-equivalents of whole-grain products per day, with the rest of the recommended grains coming from enriched or whole-grain products. In general, at least half the grains should come from whole grains.
- Consume 3 cups per day of fat free or lowfat milk or equivalent milk products.

Key Recommendations for Specific Population Groups

- *Children and adolescents.* Consume whole-grain products often; at least half the grains should be whole grains. Children 2 to 8 years should consume 2 cups per day of fat free or lowfat milk or equivalent milk products. Children 9 years of age and older should consume 3 cups per day of fat free or lowfat milk or equivalent milk products.

Overview

Fruits, vegetables, whole grains, and milk products are all important to a healthful diet and can be good sources of the nutrients of concern. When increasing intake of fruits, vegetables, whole grains, and fat free or lowfat milk and milk products, it is important to decrease one's intake of less-nutrient-dense foods to control calorie intake. The 2,000-calorie level used in the discussion is a reference level only; it is not a recommended calorie intake because many Americans should be consuming fewer calories to maintain a healthy weight.

Fruits and Vegetables

Four and one-half cups of fruits and vegetables are recommended daily for the reference 2,000-calorie level, with higher or lower amounts depending on the caloric level. This results in a range of 2½ to 6½ cups of fruits and vegetables each day for the 1,200-calorie level to 3,200-calorie level. Fruits and vegetables provide a variety of micronutrients and fiber. Figure 15 provides a list of fruits and vegetables that are good sources of vitamins A (as carotenoids) and C, folate, and potassium. In the fruit group,



consumption of whole fruits (fresh, frozen, canned, dried) rather than fruit juice for the majority of the total daily amount is suggested to ensure adequate fiber intake. Different vegetables are rich in different nutrients. In the vegetable group, weekly intake of specific amounts from each of five vegetable subgroups (dark green, orange, legumes [dry beans], starchy, and other vegetables) is recommended for adequate nutrient intake. Each subgroup provides a somewhat different array of nutrients. In the MyPyramid food guidance system, at the reference 2,000-calorie level, the following weekly amounts are recommended:

Dark green vegetables	3 cups/week
Orange vegetables	2 cups/week
Legumes (dry beans)	3 cups/week
Starchy vegetables	3 cups/week
Other vegetables	6 ¹ / ₂ cups/week

Most current consumption patterns do not achieve the recommended intakes of many of these vegetables.

Figure 15. Fruits, Vegetables, and Legumes (Dry Beans) that contain Vitamin A (Carotenoids), Vitamin C, Folate, and Potassium

Many of the fruits, vegetables, and legumes (beans) are considered to be important sources of vitamin A (as carotenoids), vitamin C, and potassium in the adult population. Intakes of these nutrients, based on dietary intake data or evidence of public health problems, may be of concern. Also listed are sources of naturally occurring folate, a nutrient considered to be of concern for women of childbearing age and those in the first trimester of pregnancy. Folic acid-fortified grain products, not listed in this table, are also good sources.

Sources of vitamin A (carotenoids)

- Bright orange vegetables like carrots, sweet potatoes, and pumpkin
- Tomatoes and tomato products, red sweet pepper
- Leafy greens such as spinach, collards, turnip greens, kale, beet and mustard greens, green leaf lettuce, and romaine
- Orange fruits like mango, cantaloupe, apricots, and red or pink grapefruit



Sources of vitamin C

- Citrus fruits and juices, kiwi fruit, strawberries, guava, papaya, and cantaloupe
- Broccoli, peppers, tomatoes, cabbage (especially Chinese cabbage), brussels sprouts, and potatoes
- Leafy greens such as romaine, turnip greens, and spinach



Sources of folate

- Cooked dry beans and peas
- Oranges and orange juice
- Deep green leaves like spinach and mustard greens



Sources of potassium

- Baked white or sweet potatoes, cooked greens (such as spinach), winter (orange) squash
- Bananas, plantains, many dried fruits, oranges and orange juice, cantaloupe, and honeydew melons
- Cooked dry beans
- Soybeans (green and mature)
- Tomato products (sauce, paste, puree)
- Beet greens



Source: *Dietary Guidelines for Americans*, 2005, Table 5, page 26.

Whole Grains

In addition to fruits and vegetables, whole grains are an important source of fiber and other nutrients. Whole grains, as well as foods made from them, consist of the entire grain seed, usually called the kernel. The kernel is made of three components—the bran, the germ, and the endosperm. If the kernel has been cracked, crushed, or flaked and it has nearly the same relative proportions of bran, germ, and endosperm as the original grain, then it can be called whole grain. In the grain-refining process, most of the bran and some of the germ is removed, resulting in the loss of dietary fiber, vitamins, minerals, lignans, phytoestrogens, phenolic compounds, and phytic acid. Some manufacturers add bran to grain products to increase the dietary fiber content. Refined grains are the resulting product of the grain-refining processing. Most refined grains are enriched before being further processed into foods. Enriched refined grain products that conform to standards of identity are required by law to be fortified with folic acid, as well as thiamin, riboflavin, niacin, and iron. Food manufacturers may fortify whole-grain foods where regulations permit the addition of folic acid. Currently, a number of whole-grain, ready-to-eat breakfast cereals are fortified with folic acid. As illustrated by the comparison of whole-wheat and enriched white flours in Figure 16 below, many nutrients occur at higher or similar levels in whole grains when compared to enriched grains, but whole grains have less folate unless they have been fortified with folic acid.

Figure 16. **Comparison of 100 Grams of Whole-Grain Wheat Flour and Enriched, Bleached, All-Purpose White Flour**

	100 Percent Whole-Grain Wheat Flour	Enriched, Bleached, All-Purpose White Flour
Calories, kcal	339.0	364.0
Dietary fiber, g	12.2	2.7
Calcium, mg	34.0	15.0
Magnesium, mg	138.0	22.0
Potassium, mg	405.0	107.0
Folate, DFE, μ g	44.0	291.0
Thiamin, mg	0.5	0.8
Riboflavin, mg	0.2	0.5
Niacin, mg	6.4	5.9
Iron, mg	3.9	4.6

Source: *Dietary Guidelines for Americans*, 2005, Table 6, page 27.

Consuming at least 3 or more ounce-equivalents of whole grains per day can reduce the risk of several chronic diseases and may help with weight maintenance. Thus, daily intake of at least 3 ounce-equivalents of whole grains per day is recommended by substituting whole grains for refined grains. However, because three servings may be difficult for younger children to achieve, it is recommended that they increase whole grains into their diets as they grow. At all calorie levels, all age groups should consume at least half of their grains as whole grains to achieve the fiber recommendation. All grains can be whole-grain; however, it is advisable to include some folate-fortified products, such as folate-fortified whole-grain cereals, in these whole-grain choices.



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Chapter 6. Fats

Key Recommendations

- Consume less than 10 percent of calories from saturated fatty acids and less than 300 mg/day of cholesterol, and keep *trans* fatty acid consumption as low as possible.
- Keep total fat intake between 20 to 35 percent of total daily calories, with most fats coming from sources of polyunsaturated and monounsaturated fatty acids, such as fish, nuts, and vegetable oils.
- When selecting and preparing meat, poultry, dry beans, and milk or milk products, make choices that are lean, lowfat, or fat free.
- Limit intake of fats and oils high in saturated and/or *trans* fatty acids, and choose products low in such fats and oils.

Key Recommendations for Specific Population Groups

- *Children and adolescents.* Keep total fat intake between 30 to 35 percent of calories for children 2 to 3 years of age and between 25 to 35 percent of calories for children and adolescents 4 to 18 years of age, with most fats coming from sources of polyunsaturated and monounsaturated fatty acids, such as fish, nuts, and vegetable oils.

Fats supply energy and essential fatty acids and serve as a carrier for the absorption of the fat-soluble vitamins A, D, E, and K and carotenoids. Fats serve as building blocks of membranes and play a key regulatory role in numerous biological functions. Dietary fat is found in foods derived from both plants and animals. The recommended total fat intake is between 20 and 35 percent of calories for adults. A fat intake of 30 to 35 percent of calories is recommended for children 2 to 3 years of age and 25 to 35 percent of calories for children and adolescents 4 to 18 years of age. Few Americans consume less than 20 percent of calories from fat. Fat intakes that exceed 35 percent of calories are associated with both total increased saturated fat and calorie intakes.

To decrease their risk of elevated low-density lipoprotein (LDL) cholesterol in the blood, most Americans need to decrease their intakes of saturated fat and *trans* fats, and many

need to decrease their dietary intake of cholesterol. Because men tend to have higher intakes of dietary cholesterol, it is especially important for them to meet this recommendation. Population-based studies of American diets show that intake of saturated fat is more excessive than intake of *trans* fats and cholesterol. Therefore, it is most important for Americans to decrease their intake of saturated fat. However, intake of all three should be decreased to meet recommendations. Figure 17 below shows, for selected calorie levels, the maximum gram amounts of saturated fat to consume to keep saturated fat intake below 10 percent of total calorie intake. Figure 18 below shows the major dietary sources of saturated fats in the United States diet. Figure 19 on the following page, gives a few practical examples of the differences in the saturated fat content of different forms of commonly consumed foods.

Figure 17. Daily Amounts of Saturated Fat and Total Fat To Keep Saturated Fat below 10% and Total Fat between 20 to 35% of Total Daily Calorie Intake

Total Daily Calories	Saturated Fat Intake	Total Fat Intake
1,600	18 grams or less	36 to 42 grams
2,000	20 grams or less	45 to 78 grams
2,200	24 grams or less	49 to 86 grams
2,500	25 grams or less	56 to 97 grams
2,800	31 grams or less	62 to 109 grams

Source: Adapted from *Dietary Guidelines for Americans*, 2005, Table 8, page 31. (Total fat intake information was added for this module.)

Figure 18. Contribution of Various Foods to Saturated Fat Intake in the American Diet (Average daily intake of saturated fat = 25.5 grams)

Food	Contribution (percent of total saturated fat consumed)
Cheese	13.1
Beef	11.7
Milk (includes all milk, including whole, lowfat and fat free)	7.8
Oils	4.9
Ice cream/sherbet/frozen yogurt	4.7
Cakes/cookies/quick breads/doughnuts	4.7
Butter	4.6
Other fats (shortening and animal fats)	4.4
Salad dressings/mayonnaise	3.7
Poultry	3.6
Margarine	3.2
Sausage	3.1
Potato chips/corn chips/popcorn	2.9
Yeast bread	2.6
Eggs	2.3

Source: *Dietary Guidelines for Americans*, 2005, Table 10, page 33.

Figure 19. **Differences in Saturated Fat and Calorie Content of Commonly Consumed Foods**

Food Category	Portion	Saturated Fat Content (grams)	Calories
Cheese			
Regular cheddar cheese	1 oz	6.0	114
Lowfat cheddar cheese	1 oz	1.2	49
Ground beef			
Regular ground beef (25% fat)	3 oz (cooked)	6.1	236
Extra lean ground beef (5% fat)	3 oz (cooked)	2.6	148
Milk			
Whole milk (3.24%)	1 cup	4.6	146
Lowfat (1%) milk	1 cup	1.5	102
Breads			
Croissant	1 medium	6.6	231
Bagel, oat bran (4")	1 medium	0.2	227
Frozen desserts			
Regular ice cream	1/2 cup	4.9	145
Frozen yogurt, lowfat	1/2 cup	2.0	110
Table spreads			
Butter	1 teaspoon	2.4	34
Soft margarine with zero <i>trans</i> fat	1 teaspoon	0.7	25
Chicken			
Fried chicken (leg with skin)	3 oz (cooked)	3.3	212
Roasted chicken (breast, no skin)	3 oz (cooked)	0.9	140
Fish			
Fried fish	3 oz	2.8	195
Baked fish	3 oz	1.5	129

Source: *Dietary Guidelines for Americans*, 2005, Table 9, page 32.

Based on 1994 to 1996 data, the estimated average daily intake of *trans* fats in the United States was about 2.6 percent of total energy or calorie intake. Processed foods and oils provide approximately 80 percent of *trans* fats in the diet, compared to 20 percent that occur naturally in food from animal sources. Figure 20 below shows the major dietary sources of *trans* fats listed in decreasing order. *Trans* fat content of certain processed foods has changed and is likely to continue to change as the industry reformulates products. Because the *trans* fatty acids produced in the partial hydrogenation of vegetable oils account for more than 80 percent of total intake, the food industry has an important role in decreasing *trans* fatty acid content of the food supply. Limited consumption of foods made with processed sources of *trans* fats provides the most effective means of reducing intake of *trans* fats. By looking at the food label, consumers can select products that are lowest in saturated fat, *trans* fats, and cholesterol.

Figure 20. Contribution of Various Foods to *Trans* Fat Intake in the American Diet (Average Daily Intake of *trans* fat = 5.84 grams)

Food Group	Contribution (percent of total <i>trans</i> fats consumed)
Cakes, cookies, crackers, pies, bread, etc.	40
Animal products	21
Margarine	17
Fried potatoes	8
Potato chips, corn chips, popcorn	5
Household shortening	4
Other including breakfast cereal and candy	5

Source: *Dietary Guidelines for Americans*, 2005, Table 11, page 34.

To meet the total fat recommendation of 20 to 35 percent of calories, most dietary fats should come from sources of polyunsaturated and monounsaturated fatty acids. Sources of omega-6 polyunsaturated fatty acids are liquid vegetable oils, including soybean oil, corn oil, and safflower oil. Plant sources of omega-3 polyunsaturated fatty acids (alpha-linolenic acid) include soybean oil, canola oil, walnuts, and flaxseed. Eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) are omega-3 fatty acids that are contained in fish and shellfish. Fish that naturally contain more oil (e.g., salmon, trout, herring) are higher in EPA and DHA than are lean fish (e.g., cod, haddock, catfish). Limited evidence suggests an association between consumption of fatty acids in fish and reduced risks of mortality from cardiovascular disease for the general population. Other sources of EPA and DHA may provide similar benefits; however, more research is needed. Plant sources that are rich in monounsaturated fatty acids include vegetable oils (e.g., canola, olive, high oleic safflower, and sunflower oils) that are liquid at room temperature and nuts.

Chapter 7. Carbohydrates

Key Recommendations

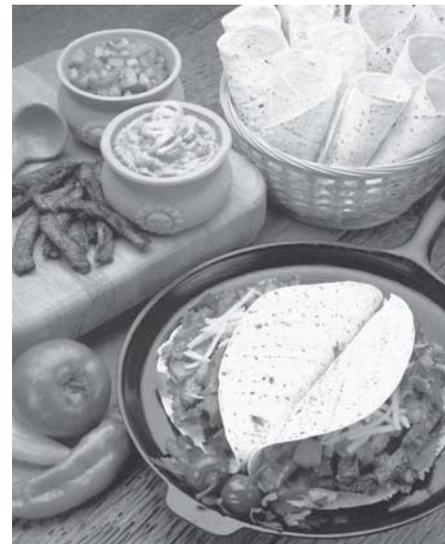
- Choose fiber-rich fruits, vegetables, and whole grains often.
- Choose and prepare foods and beverages with little added sugars or caloric sweeteners, such as amounts suggested by the MyPyramid food guidance system.
- Reduce the incidence of dental caries by practicing good oral hygiene and consuming sugar- and starch-containing foods and beverages less frequently.

The recommended dietary fiber intake is 14 grams per 1,000 calories consumed. Initially, some Americans will find it challenging to achieve this level of intake. However, making fiber-rich food choices more often will move people toward this goal and is likely to confer significant health benefits.

The majority of food consumed from the fruit group should come from whole fruit (fresh, frozen, canned, dried) rather than juice. Increasing the proportion of fruit that is eaten in the form of whole fruit rather than juice is desirable to increase fiber intake. However, inclusion of some juice, such as orange juice, can help meet recommended levels of potassium intake.

Legumes—such as dry beans and peas—are especially rich in fiber and should be consumed several times per week. They are considered part of both the vegetable group and the meat and beans group as they contain nutrients found in each of these food groups.

Consuming at least half the recommended grain servings as whole grains is important, for all ages, at each calorie level, to meet the fiber recommendation. Consuming at least 3 ounce-equivalents of whole grains per day can reduce the risk of coronary heart disease, may help with weight maintenance, and may lower risk for other chronic diseases. Thus, at lower calorie levels, adults should consume more than half (specifically, at least 3 ounce-equivalents) of whole grains per day, by substituting whole grains for refined grains.



Individuals who consume food or beverages high in added sugars tend to consume more calories than those who consume food or beverages low in added sugars; they also tend to consume lower amounts of micronutrients. Although more research is needed, available prospective studies show a positive association between the consumption of calorically

sweetened beverages and weight gain. For this reason, decreased intake of such foods, especially beverages with caloric sweeteners, is recommended to reduce calorie intake and help achieve recommended nutrient intakes and weight control.



Total discretionary calories should not exceed the allowance for any given calorie level, as shown in the MyPyramid food guidance system. The discretionary

calorie allowance covers all calories from added sugars, alcohol, and the additional fat found in even moderate fat choices from the milk and meat group. For example, the 2,000-calorie pattern includes only about 265 discretionary calories. At 29 percent of calories from total fat (including 18 grams of solid fat), if no alcohol is consumed, then only 8 teaspoons (32 grams) of added sugars can be afforded. This is less than the amount in a typical 12-ounce calorically sweetened soft drink. If fat is decreased to 22 percent of calories, then 18 teaspoons (72 grams) of added sugars is allowed. If fat is increased to 35 percent of calories, then no allowance remains for added sugars, even if alcohol is not consumed.

In some cases, small amounts of sugars added to nutrient-dense foods, such as breakfast cereals and lowfat milk products, may increase a person's intake of such foods by enhancing the palatability of these products, thus improving nutrient intake without contributing excessive calories. The major sources of added sugars are listed in Figure 21 that is shown below.

Figure 21. Major Sources of Added Sugars (Caloric Sweeteners) in the American Diet

Food groups that contribute more than 5 percent of the added sugars to the American diet in decreasing order.

Food Categories	Contribution to Added Sugars Intake (percent of total added sugars consumed)
Regular soft drinks	33.0
Sugars and candy	16.1
Cakes, cookies, pies	12.9
Fruit drinks (fruitades and fruit punch)	9.7
Dairy desserts and milk products (ice cream, sweetened yogurt, and sweetened milk)	8.6
Other grains (cinnamon toast and honey-nut waffles)	5.8

Source: *Dietary Guidelines for Americans*, 2005, Table 13, page 38.

The Nutrition Facts panel on the food label provides the amount of total sugars but does not list added sugars separately. People should examine the ingredient list to find out whether a food contains added sugars. The ingredient list is usually located under the Nutrition Facts panel or on the side of a food label. Ingredients are listed in order of predominance, by weight; that is, the ingredient with the greatest contribution to the product weight is listed first and the ingredient contributing the least amount is listed last. Some of the names for added sugars that may be in processed foods and listed on the label ingredients list include the following: brown sugar, invert sugar, corn sweetener, lactose, corn syrup, maltose, dextrose, malt syrup, fructose, molasses, fruit juice concentrates, raw sugar, glucose, sucrose, high-fructose corn syrup, sugar, honey, and syrup.

Sugars and starches contribute to dental caries. The frequency and duration of consumption of starches and sugars can be important factors because they increase exposure to cavity-causing substances. Drinking fluoridated water and/or using fluoride-containing dental hygiene products help reduce the risk of dental caries. Most bottled water is not fluoridated. With the increase in consumption of bottled water, there is concern that Americans may not be getting enough fluoride for maintenance of oral health. A combined approach of reducing the frequency and duration of exposure to fermentable carbohydrate intake and optimizing oral hygiene practices, such as drinking fluoridated water and brushing and flossing teeth, is the most effective way to reduce incidence of dental caries.

Considerations for Specific Population Groups

Older Adults

Dietary fiber is important for laxation. Since constipation may affect up to 20 percent of people over 65 years of age, older adults should choose to consume foods rich in dietary fiber. Other causes of constipation among this age group may include drug interactions with laxation and lack of appropriate hydration and decreased activity levels.

Children

Carbohydrate intakes of children need special considerations with regard to obtaining sufficient amounts of fiber, avoiding excessive amounts of calories from added sugars, and preventing dental caries. Several cross-sectional surveys on children and adolescents in the United States have found inadequate dietary fiber intakes, which could be improved by increasing consumption of whole fruits, vegetables, and whole-grain products. Sugars can improve the palatability of foods and beverages that otherwise might not be consumed. This may explain why the consumption of sweetened dairy foods and beverages and presweetened cereals is positively associated with childrens' and adolescents' nutrient intake. However, beverages with caloric sweeteners, sugars and sweets, and other sweetened foods that provide little or no nutrients are negatively associated with diet quality and can contribute to excessive energy intakes. This reinforces the importance of reducing added sugar intake substantially from current levels. Most of the studies of preschool children suggest an association between sucrose consumption and dental caries, though other factors (particularly infrequent brushing or not using fluoridated toothpaste) are more strongly associated with development of dental caries.



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Chapter 8. Sodium and Potassium

Key Recommendations

- Consume less than 2,300 mg of sodium (approximately 1 teaspoon of salt) per day.
- Choose and prepare foods with little salt. At the same time, consume potassium-rich foods, such as fruits and vegetables.

Key Recommendations for Specific Population Groups

- *Individuals with hypertension, blacks, and middle-aged and older adults.* Aim to consume no more than 1,500 mg of sodium per day, and meet the potassium recommendation (4,700 mg/day) with food.

Salt is sodium chloride. Food labels list sodium content rather than salt content. When reading a Nutrition Facts panel on a food product, look for the sodium content. Foods that are low in sodium (less than 140 mg or 5 percent of the Daily Value [DV]) are low in salt.

On average, the natural salt content of food accounts for only about 10 percent of total intake, while salt added at the table or while cooking provides another 5 to 10 percent of total intake. Approximately 75 percent is derived from salt added by manufacturers. In addition, foods served by food establishments may be high in sodium. It is important to read the food label and determine the sodium content of food, which can vary by several hundreds of milligrams in similar foods. For example, the sodium content in regular tomato soup may be 700 mg per cup in one brand and 1,100 mg per cup in another brand. Reading labels, comparing sodium contents of foods, and purchasing the lower sodium brand may be one strategy to lower total sodium intake (see Figure 22 on the following page for examples of these foods).



Figure 22. Range of Sodium Content for Selected Foods

Serving sizes were standardized to be comparable among brands within a food. Pizza and bread slices vary in size and weight across brands. None of the examples provided were labeled low-sodium products.

Food Group	Serving Size	Range (mg)
Breads, all types	1 oz	95-210
Frozen pizza, plain, cheese	4 oz	450-1200
Frozen vegetables, all types	1/2 c	2-160
Salad dressing, regular fat, all types	2 Tbsp	110-505
Salsa	2 Tbsp	150-240
Soup (tomato), reconstituted	8 fluid oz	700-1260
Tomato juice	8 fluid oz	340-1040
Potato chips*	1 oz	120-180
Tortilla chips*	1 oz	105-160
Pretzels*	1 oz	290-560

*All snack foods are regular flavor, salted.

Source: *Dietary Guidelines for Americans*, 2005, Table 15, page 42.

An individual's preference for salt is not fixed. After consuming foods lower in salt for a period of time, taste for salt tends to decrease. Use of other flavorings may satisfy an individual's taste. While salt substitutes containing potassium chloride may be useful for some individuals, they can be harmful to people with certain medical conditions. These individuals should consult a health care provider before trying salt substitutes.

Discretionary salt use is fairly stable, even when foods offered are lower in sodium than typical foods consumed. When consumers are offered a lower sodium product, they typically do not add table salt to compensate for the lower sodium content, even when available. Therefore, any program for reducing the salt consumption of a population should concentrate primarily on reducing the salt used during food processing and on changes in food selection (e.g., more fresh, less-processed items, less sodium-dense foods) and preparation.



Reducing salt intake is one of several ways that people may lower their blood pressure. On average, the higher a person's salt intake, the higher the blood pressure. Reducing blood pressure, ideally to the normal range, reduces the risk of stroke, heart disease, heart failure, and kidney disease.

Another dietary measure to lower blood pressure is to consume a diet rich in potassium. A potassium-rich diet also blunts the effects of salt on blood pressure, may reduce the risk of developing kidney stones, and possibly decrease bone loss with age. The recommended intake of potassium for adolescents and adults is 4,700 mg/day. Recommended intakes for potassium for children 1 to 3 years of age is 3,000 mg/day, 4 to 8 years of age is 3,800 mg/day, and 9 to 13 years of age is 4,500 mg/day. Potassium should come from food sources. Potassium-rich fruits and vegetables include leafy green

vegetables, fruit from vines, and root vegetables. Although meat, milk, and cereal products also contain potassium, the form of potassium in these foods is not as readily available for absorption. Dietary sources of potassium are listed in Figure 23 below.

Figure 23. Food Sources of Potassium

Food, Standard Amount	Potassium (mg)	Calories
Sweet potato, baked, 1 potato	694	131
Tomato paste, 1/4 cup	664	54
Beet greens, cooked, 1/2 cup	655	19
Potato, baked, flesh, 1 potato	610	145
White beans, canned, 1/2 cup	595	153
Yogurt, plain, non-fat, 8 oz	579	127
Tomato puree, 1/2 cup	549	48
Clams, canned, 3 oz	534	126
Yogurt, plain, lowfat, 8 oz	531	143
Prune juice, 3/4 cup	530	136
Carrot juice, 3/4 cup	517	71
Blackstrap molasses, 1 Tbsp	498	47
Halibut, cooked, 3 oz	490	119
Soybeans, green, cooked, 1/2 cup	485	127
Tuna, yellowfin, cooked, 3 oz	484	118
Lima beans, cooked, 1/2 cup	484	104
Winter squash, cooked, 1/2 cup	448	40
Soybeans, mature, cooked, 1/2 cup	443	149
Rockfish, Pacific, cooked, 3 oz	442	103
Cod, Pacific, cooked, 3 oz	439	89
Bananas, 1 medium	422	105
Spinach, cooked, 1/2 cup	419	21
Tomato juice, 3/4 cup	417	31
Tomato sauce, 1/2 cup	405	39
Peaches, dried, uncooked, 1/4 cup	398	96
Prunes, stewed, 1/2 cup	398	133
Milk, non-fat, 1 cup	382	83
Pork chop, center loin, cooked, 3 oz	382	197
Apricots, dried, uncooked, 1/4 cup	378	78
Rainbow trout, farmed, cooked, 3 oz	375	144
Pork loin, center rib (roasts), lean, roasted, 3 oz	371	190
Buttermilk, cultured, lowfat, 1 cup	370	98
Cantaloupe, 1/4 medium	368	47
1%-2% milk, 1 cup	366	102-122
Honeydew melon, 1/8 medium	365	58
Lentils, cooked, 1/2 cup	365	115
Plantains, cooked, 1/2 cup	358	90
Kidney beans, cooked, 1/2 cup	358	112
Orange juice, 3/4 cup	355	85
Split peas, cooked, 1/2 cup	355	116
Yogurt, plain, whole milk, 8 oz	352	138

Source: *Dietary Guidelines for Americans*, 2005, Appendix B-1, page 56.

Considerations for Specific Population Groups

Individuals With Hypertension, Blacks, and Middle-Aged and Older Adults. Some individuals tend to be more salt sensitive than others, including people with hypertension, blacks, and middle-aged and older adults. Because blacks commonly have a relatively low intake of potassium and a high prevalence of elevated blood pressure and salt sensitivity, this population subgroup may especially benefit from an increased dietary intake of potassium. Dietary potassium can lower blood pressure and blunt the effects of salt on blood pressure in some individuals. While salt substitutes containing potassium chloride may be useful for some individuals, they can be harmful to people with certain medical conditions. These individuals should consult a health care provider before using salt substitutes.

Chapter 9. Alcoholic Beverages

Key Recommendations

- Those who choose to drink alcoholic beverages should do so sensibly and in moderation—defined as the consumption of up to one drink per day for women and up to two drinks per day for men.
- Alcoholic beverages should not be consumed by some individuals, including those who cannot restrict their alcohol intake, women of childbearing age who may become pregnant, pregnant and lactating women, children and adolescents, individuals taking medications that can interact with alcohol, and those with specific medical conditions.
- Alcoholic beverages should be avoided by individuals engaging in activities that require attention, skill, or coordination, such as driving or operating machinery.

Alcoholic beverages supply calories but few essential nutrients (see Figure 24 on page 92). As a result, excessive alcohol consumption makes it difficult to ingest sufficient nutrients within an individual's daily calorie allotment and to maintain a healthy weight. Although the consumption of one to two alcoholic beverages per day is not associated with macronutrient or micronutrient deficiencies or with overall dietary quality, heavy drinkers may be at risk of malnutrition if the calories derived from alcohol are substituted for those in nutritious foods.

Figure 24. **Calories in Selected Alcoholic Beverages**

Beverage	Approximate Calories Per 1 Fluid Oz¹	Example Serving Volume	Approximate Total Calories²
Beer (regular)	12	12 oz	144
Beer (light)	9	12 oz	108
White wine	20	5 oz	100
Red wine	21	5 oz	105
Sweet dessert wine	47	3 oz	141
80 proof distilled spirits (gin, rum, vodka, whiskey)	64	1.5 oz	96

1. Calories are calculated to the nearest whole number per 1 fluid oz.
2. The total calories and alcohol content vary depending on the brand. Also, adding mixers to an alcoholic beverage can contribute calories in addition to the calories from the alcohol itself.

Source: *Dietary Guidelines for Americans*, 2005, Table 16, page 46.



Wine

The majority of American adults consume alcohol. Those who do so should drink alcoholic beverages in moderation. Moderation is defined as the consumption of up to one drink per day for women and up to two drinks per day for men. Twelve fluid ounces of regular beer, 5 fluid ounces of wine, or 1.5 fluid ounces of 80-proof distilled spirits count as one drink for purposes of explaining moderation. This definition of moderation is not intended as an average over several days but rather as the amount consumed on any single day.



Beer

The effect of alcohol consumption varies depending on the amount consumed and an individual's characteristics and circumstances. Alcoholic beverages are harmful when consumed in excess. Excess alcohol consumption alters judgment and can lead to dependency or addiction and other serious health problems such as cirrhosis of the liver, inflammation of the pancreas, and damage to the heart and brain. Even less than heavy consumption of alcohol is associated with significant risks. Consuming more than one drink per day for women and two drinks per day for men increases the risk for motor vehicle accidents, other injuries, high blood pressure, stroke, violence, some types of cancer, and suicide. Compared with women who do not drink, women who consume one drink per day appear to have a slightly higher risk of breast cancer.



Cocktail

Studies suggest adverse effects even at moderate alcohol consumption levels in specific situations and individuals. Individuals in some situations should avoid alcohol—those who plan to drive, operate machinery, or take part in other activities that require attention, skill, or coordination. Some people, including children and adolescents, women of childbearing age who may become pregnant, pregnant and lactating women, individuals who cannot restrict alcohol intake, individuals taking medications that can interact with alcohol, and individuals with specific medical conditions should not drink at all. Even moderate drinking during pregnancy may have behavioral or developmental consequences for the baby. Heavy drinking during pregnancy can produce a range of behavioral and psychosocial problems, malformation, and mental retardation in the baby.

Moderate alcohol consumption may have beneficial health effects in some individuals. In middle-aged and older adults, a daily intake of one to two alcoholic beverages per day is associated with the lowest all-cause mortality (death). More specifically, compared to non-drinkers, adults who consume one to two alcoholic beverages a day appear to have a lower risk of coronary heart disease. In contrast, among younger adults alcohol consumption appears to provide little, if any, health benefit, and alcohol use among young adults is associated with a higher risk of traumatic injury and death. As noted previously, a number of strategies reduce the risk of chronic disease, including a healthful diet, physical activity, avoidance of smoking, and maintenance of a healthy weight. Furthermore, it is not recommended that anyone begin drinking or drink more frequently on the basis of health considerations.



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Chapter 10. Food Safety

Avoiding foods that are contaminated with harmful bacteria, viruses, parasites, toxins, and chemical and physical contaminants are vital for healthful eating. The signs and symptoms of foodborne illness range from gastrointestinal symptoms, such as upset stomach, diarrhea, fever, vomiting, abdominal cramps, and dehydration, to more severe systemic illness, such as paralysis and meningitis. It is estimated that every year about 76 million people in the United States become ill from pathogens in food; of these, about 5,000 die. Consumers can take simple measures to reduce their risk of foodborne illness, especially in the home.

Key Recommendations

To avoid microbial foodborne illness:

- Clean hands, food contact surfaces, and fruits and vegetables. Meat and poultry should *not* be washed or rinsed.
- Separate raw, cooked, and ready-to-eat foods while shopping, preparing, or storing foods.
- Cook foods to a safe temperature to kill microorganisms.
- Chill (refrigerate) perishable food promptly and defrost foods properly.
- Avoid raw (unpasteurized) milk or any products made from unpasteurized milk, raw or partially cooked eggs or foods containing raw eggs, raw or undercooked meat and poultry, unpasteurized juices, and raw sprouts.



Key Recommendations for Specific Population Groups

- ***Infants and young children, pregnant women, older adults, and those who are immunocompromised.*** Do not eat or drink raw (unpasteurized) milk or any products made from unpasteurized milk, raw or partially cooked eggs or foods containing raw eggs, raw or undercooked meat and poultry, raw or undercooked fish or shellfish, unpasteurized juices, and raw sprouts.
- ***Pregnant women, older adults, and those who are immunocompromised:*** Only eat deli meats and frankfurters that have been reheated to steaming hot.

The most important food safety problem is microbial foodborne illness. All those who handle food, including farmers, food producers, individuals who work in markets and food service establishments, and other food preparers, have a responsibility to keep food as safe as possible. To keep food safe, people who prepare food should clean hands, food contact surfaces, and fruits and vegetables; separate raw, cooked, and ready-

to-eat foods; cook foods to a safe internal temperature; chill perishable food promptly; and defrost food properly. For more important information on cooking, cleaning, separating, and chilling, see www.fightbac.org.

When preparing and consuming food, it is essential to wash hands often, particularly before and after preparing food, especially after handling raw meat, poultry, eggs, or seafood. A good hand washing protocol includes wetting hands; applying soap; rubbing hands vigorously together for 20 seconds; rinsing hands thoroughly under clean, running warm water; and drying hands completely using a clean disposable or cloth towel.

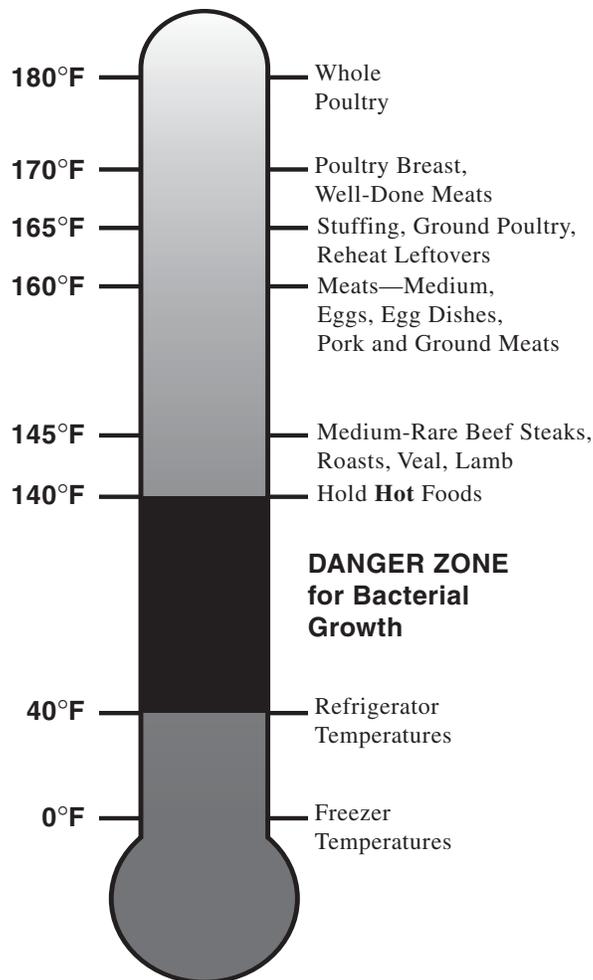
Washing may be the only method that consumers have to reduce the number of pathogens on fresh produce that will not be either peeled or subsequently cooked. A good protocol for washing fresh fruits and vegetables includes removing and discarding outer leaves, washing produce just before cooking or eating, washing under running tap water, scrubbing with a clean brush or with hands, and drying the fruits or vegetables using a clean disposable or cloth towel. Moisture on produce may promote survival and growth of harmful pathogens.

Therefore, drying the food is critical if the item will not be eaten or cooked right away.

People should read the labels of bagged produce to determine if it is ready-to-eat. Ready-to-eat, prewashed bagged produce can be used without further washing if kept refrigerated and used by the “use-by” date. If desired, prewashed, ready-to-eat produce can be washed again.

Raw meat and poultry should not be washed because this creates the danger of cross-contamination and is not necessary. Washing these foods can allow most bacteria that are present on the surface of the meat or poultry to spread to ready-to-eat foods, kitchen utensils, and counter surfaces.

Figure 25. **Recommended Safe Cooking Temperatures**



These food temperatures are for home use. They are not intended for processing, institution, or foodservice preparation.

It is important to separate raw, cooked, and ready-to-eat foods while shopping, preparing, or storing. This prevents cross-contamination from one food to another. In addition, refrigerator surfaces can become contaminated from high-risk foods such as raw meats, poultry, fish, uncooked hot dogs, certain deli meats, or raw vegetables. If not cleaned, contaminated refrigerator surfaces can, in turn, serve as a vehicle for contaminating other foods.

Uncooked and undercooked meat, poultry, eggs, and egg products are potentially unsafe. Raw meat, poultry, and eggs should always be cooked to a safe internal temperature. The best way to tell if meat, poultry and egg dishes are cooked safely is to use a food thermometer. Leftover refrigerator foods should also be reheated to the proper internal temperature. Bacteria grow most rapidly in the range of 40°F and 140°F. To keep food out of this danger zone, keep cold food cold (below 40°F) and hot food hot (above 140°F). Figure 25 shown on page 95 of this module provides information for temperature rules for proper cooking and food handling. Proper cooking makes most uncooked foods safe.

The refrigerator should be set at no higher than 40°F and the freezer at 0°F, and these temperatures should be checked with an appliance thermometer. Refrigerated leftovers may become unsafe within 3 to 4 days. Despite the appearance of a food, it may not be safe to eat. Not all bacterial growth causes a food's surface to discolor or smell bad. It may be unsafe to taste fresh or leftover food items when there is any doubt about their safety. Safe disposal of the food is indicated if there is a question about whether or not a food is safe to eat. "If in doubt—throw it out."

Considerations for Specific Population Groups

Some people may be at high risk for developing foodborne illness. These include pregnant women and their fetuses, young children, older adults, people with weakened immune systems, and individuals with certain chronic illnesses. These people should pay extra attention to food safety advice. For example, these individuals are at risk of developing listeriosis, a potentially life-threatening illness caused by the bacteria *Listeria monocytogenes*. Deli meats and frankfurters that have not been reheated to steaming hot and some ready-to-eat foods are associated with listeriosis and pose a high-risk to these individuals. All these foods should be heated to a safe internal temperature. In addition, these individuals should take special care not to eat or drink raw (unpasteurized) milk or any products made from unpasteurized milk, raw or partially cooked eggs or foods containing raw eggs, raw or undercooked meat and poultry, unpasteurized juices, and raw sprouts. They should also avoid raw or undercooked fish or shellfish.

New information on food safety is constantly emerging. Recommendations and precautions for people at high risk are updated as scientists learn more about preventing foodborne illness. Individuals in high-risk categories should seek guidance from a health care provider.

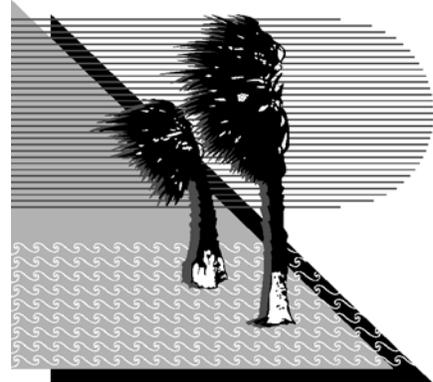
Keeping Food Safe During an Emergency

Did you know that a flood, fire, natural disaster, or the loss of power from high winds could jeopardize the safety of your food? Knowing how to determine if food is safe and how to keep food safe will help minimize the potential loss of food and reduce the risk of foodborne illness.

Always keep meat, poultry, fish, and eggs refrigerated at or below 40°F and frozen food at or below 0°F. This may be difficult when the power is out. Keep the refrigerator and freezer doors closed as much as possible to maintain the cold temperature. The refrigerator will keep food safely cold for about 4 hours if it is unopened. A full freezer will hold the temperature for approximately 48 hours (24 hours if it is half full) if the door remains closed. Obtain dry or block ice to keep your refrigerator as cold as possible if the power is going to be out for a prolonged period of time. Fifty pounds of dry ice should hold an 18-cubic foot full freezer for 2 days. Plan ahead and know where dry ice and block ice can be purchased.

Be prepared for an emergency by having items on hand that don't require refrigeration and can be eaten cold or heated on the outdoor grill. Shelf-stable food, boxed or canned milk, water, and canned goods should be part of a planned emergency food supply. Make sure you have ready-to-feed baby formula for infants and also food for your pets. Remember to use these items and replace them from time to time. Be sure to keep a hand-held can opener for an emergency. Consider what you can do ahead of time to store your food safely in an emergency. If you live in a location that could be affected by a flood, plan your food storage on shelves that will be safely out of the way of contaminated water. Coolers are a great help for keeping food cold if the power will be out for more than 4 hours—have a couple on hand along with frozen freezer packs. When your freezer is not full, keep items close together—this helps the food stay cold longer. Digital, dial, or instant-read food thermometers and appliance thermometers will help you know if the food is at safe temperatures. Keep appliance thermometers in the refrigerator and freezer at all times. When the power is out, an appliance thermometer will always indicate the temperature in the refrigerator and freezer no matter how long the power has been out. The refrigerator temperature should be 40°F or below; the freezer, 0°F or lower. If you're not sure a particular food is cold enough, take its temperature with a food thermometer.

For more information about food safety you can go to the following government websites: www.FloridaWIC.org to view and print the WIC Disaster Preparedness Newsletter. You can also go to the following federal government websites: www.FoodSafety.gov or www.fsis.usda.gov/Fact_Sheets/index.asp.





Self-
Check



Basic Nutrition
Module

 **GO TO** the Workbook for the Basic Nutrition Module and complete Self-Check Questions 90–96 right now. Then, immediately check your answers against the Answer Key to the Self-Check Questions (contained in your workbook) before proceeding to the next section of the module.

Part 3. MyPyramid

Overview of MyPyramid

In April 2005, the U.S. Department of Agriculture released the MyPyramid food guidance system. MyPyramid, which replaces the Food Guide Pyramid introduced in 1992, is part of an overall food guidance system that emphasizes the need for a more individualized approach to improving diet and lifestyle.

MyPyramid incorporates recommendations from the 2005 Dietary Guidelines for Americans. MyPyramid was developed to carry the messages of the dietary guidelines and to make Americans aware of the vital health benefits of simple and modest improvements in nutrition, physical activity, and lifestyle behavior.

The MyPyramid symbol, which is deliberately simple, is meant to encourage consumers to make healthier food choices and to be active every day. The MyPyramid symbol represents the recommended proportion of foods from each food group and focuses on the importance of making smart food choices in every food group, every day. Physical activity is also part of the symbol.



MyPyramid illustrates:

- Personalization, demonstrated by the MyPyramid website. To find a personalized recommendation of the kinds and amounts of food to eat each day, go to MyPyramid.gov.
- Gradual improvement, encouraged by the slogan, “Steps to a Healthier You.” It suggests that individuals can benefit from taking small steps to improve their diet and lifestyle each day.
- Physical activity, represented by the steps and the person climbing them, as a reminder of the importance of daily physical activity.
- Variety, symbolized by the six color bands representing the five food groups of MyPyramid and oils. Foods from all groups are needed each day for good health.
- Moderation, represented by the narrowing of each food group from bottom to top. The wider base stands for foods with little or no solid fats, added sugars, or caloric sweeteners. These should be selected more often to get the most nutrition from calories consumed.
- Proportionality, shown by the different widths of the food group bands. The widths suggest how much food a person should choose from each group. The widths are just a general guide, not exact proportions. Go to MyPyramid.gov for the amount that is right for you.

The MyPyramid food guidance system utilizes interactive technology found on MyPyramid.gov. MyPyramid contains interactive activities that make it easy for individuals to key in their age, height, weight, gender, and physical activity level so that they can get a more personalized recommendation on their daily calorie level. It also allows individuals to find general food guidance and suggestions for making smart choices from each food group.

MyPyramid: Getting Started

Below is information that can help you navigate through the MyPyramid system to educate consumers.

MyPyramid Symbol - You can explain the messages in the MyPyramid symbol to consumers. These messages are physical activity, variety, proportionality, moderation, gradual improvement, and finally personalization. More information on these messages can be found on the “Anatomy of MyPyramid” handout at www.mypyramid.gov/downloads/MyPyramid_Anatomy.pdf.

MyPyramid’s Basic Messages - You can explain MyPyramid’s basic messages about healthy eating and physical activity. These can be found on the miniposter and the website. They mirror the messages from the 2005 Dietary Guidelines for Americans consumer brochure. For example:

- Eat at least 3 ounces of whole-grain cereals, rice, or pasta every day;
- Go lowfat or fat free when you choose milk, yogurt, and other milk products; and
- Choose food and beverages low in added sugars.

MyPyramid Plan - At MyPyramid Plan, consumers can find the kinds and amounts of foods they should eat each day. When consumers enter their age, gender, and activity level, they get their own plan at an appropriate calorie level. The food plan includes specific daily amounts from each food group and a limit for discretionary calories (fats, added sugars, alcohol). Consumers can print out a personalized miniposter of their plan, and a worksheet to help them track their progress and choose goals for tomorrow and the future.

Inside the Pyramid - You can point consumers to the in-depth information about each food group, discretionary calories, and physical activity on the website at “Inside the Pyramid.” In this area, there are tips and resources to help consumers implement their food plan.

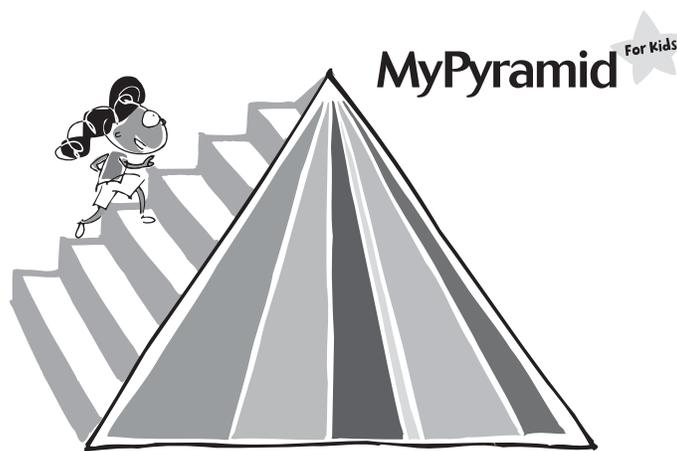
MyPyramid Tracker - For consumers who want a detailed assessment and analysis of their current eating and physical activity habits, have them try MyPyramid Tracker at www.mypyramidtracker.gov. This dietary and physical activity assessment tool asks for entry of all foods eaten each day and all physical activities performed. From this, a wealth of output shows an individual’s current status in comparison to the 2005 Dietary

Guidelines recommendations, nutrient intake, and energy balance. A history function allows consumers to track their progress over time, up to one year.

Additional information can be found at “Tips and Resources” and “For Professionals,” such as a 7-day menu plan at 2,000 calories and tips for eating out. This is available at: www.mypyramid.gov/tips_resources/index.html and www.mypyramid.gov/professionals/index.html.

MyPyramid for Kids

At the MyPyramid.gov website, a child-friendly version of MyPyramid is available for educators and for children ages 6 to 11 years.



The “MyPyramid for Kids” section of the website includes the following:

MyPyramid Blast Off Game. This is an interactive computer game where children can reach “Planet Power” by fueling their rocket with food and physical activity. “Fuel” tanks for each food group help students keep track of how their choices fit into MyPyramid.

MyPyramid for Kids Poster. This is a two-sided poster. One side is for younger children which

highlights a simplified “MyPyramid for Kids” graphic. The other side, for advanced elementary students, features both the “MyPyramid for Kids” graphic and healthy eating and physical activity messages.

Tips for Families. This is a 2-sided mini-poster with the “MyPyramid for Kids” graphic on one side and eating and physical activity tips on the other side.

A Close Look at MyPyramid for Kids. This is a step-by-step explanation of the key concepts of the MyPyramid for Kids symbol.

MyPyramid for Kids Coloring Page. This is a black and white line art of the “MyPyramid for Kids” symbol for children to color.

MyPyramid for Kids Worksheet. This is a worksheet to help children track how their food choices match up to the recommendations of MyPyramid.

Classroom Materials. This contains a link to materials that are on the Team Nutrition website at www.fns.usda.gov/tn/.

MyPyramid Food Groups

Grains - Make half your grains whole.

Any food made from wheat, rice, oats, cornmeal, barley or another cereal grain is a grain product. Bread, pasta, oatmeal, breakfast cereals, tortillas, and grits are examples of grain products.

In general, 1 slice of bread, 1 cup of ready-to-eat cereal, or $\frac{1}{2}$ cup of cooked rice, cooked pasta, or cooked cereal are considered to be equal to 1 ounce from the grains group.



Here are some tips for the grains group:

- Eat at least 3 ounces of **whole-grain** cereals, breads, crackers, rice, or pasta everyday.
- 1 ounce is approximately 1 slice of bread, 1 cup of ready-to-eat breakfast cereal, or $\frac{1}{2}$ cup of cooked rice, cereal, or pasta.

Vegetables - Vary your veggies.

Vegetables may be raw or cooked; fresh, frozen, canned, or dried/dehydrated; may be whole, cut-up, or mashed; or may be in the form of vegetable juice.

In general, 1 cup of raw or cooked vegetables or vegetable juice, or 2 cups of raw leafy greens are considered to be equal to 1 cup from the vegetable group.

Here are some tips for the vegetable group:

- Eat more dark-green vegetables like broccoli, spinach, and other dark leafy greens.
- Eat more orange vegetables like carrots and sweet potatoes.
- Eat more dry beans and peas like pinto beans, kidney beans, and lentils.



Fruits - Focus on fruits.

Fruits may be fresh, canned, frozen, or dried, and may be whole, cut-up, pureed, or may be in the form of fruit juice.

In general, 1 cup of fruit or 100 percent fruit juice, or $\frac{1}{2}$ cup of dried fruit are considered to be equal to 1 cup from the fruit group.

Here are some tips for the fruit group:

- Eat a variety of fruit.
- Choose fresh, frozen, canned, or dried fruit.
- Go easy on fruit juices.



Milk - Get your calcium-rich foods



All fluid milk products and many foods made from milk are considered part of this food group. Foods made from milk that retain their calcium content are part of the group, while foods made from milk that have little to no calcium, such as cream cheese, cream, and butter, are not. Most milk group choices should be fat free or lowfat.

In general, 1 cup of milk or yogurt, 1½ ounces of natural cheese, or 2 ounces of processed cheese are considered to be equal to 1 cup from the milk group.

Here are some tips for the milk group:

- Go lowfat or fat free when you choose milk, yogurt, and other milk products.
- If you don't or can't consume milk, choose lactose-free milk products or other calcium sources such as fortified foods and beverages.

Meat & Beans - Go lean with protein.

All foods made from meat, poultry, fish, dry beans or peas, eggs, nuts, and seeds are considered part of this group. Dry beans and peas are part of this group as well as the vegetable group. Most meat and poultry choices should be lean or lowfat. Fish, nuts, and seeds contain healthy oils, so choose these foods frequently instead of meat or poultry.

In general, 1 ounce of meat, poultry or fish; ¼ cup cooked dry beans; 1 egg; 1 tablespoon of peanut butter; or ½ ounce of nuts or seeds are considered to be equal to 1 ounce from the meat & beans group.

Here are some tips for the meat & beans group:

- Choose lowfat or lean meats and poultry.
- Bake it, broil it, or grill it.
- Vary your protein routine by choosing fish, beans, peas, nuts, and seeds more often.



Figure 26 on page 104 is a Daily Food Guide which shows the food groups and amounts recommended based on a variety of age ranges and genders. The calorie levels shown in this table are averages for the group. Calorie needs will vary for individuals depending on age, gender, height, weight, and activity level. Figure 27 on page 105 shows photos of a variety of food portions and how these can be estimated using common objects. This information was originally presented in the “Be Wise About Your Portion Size” campaign materials. Copies of the Daily Food Guide are available from the Tallahassee Distribution Center in English and Spanish (DH 150-314, Stock Number 5730-314-0150-1).

Figure 26. Daily Food Guide¹

How much do you need each day from each food group?

	Grains	Vegetables	Fruits	Milk	Meat & Beans	Oils
Children 2 to 3 years (1,200 calories)	4 ounces	1½ cups	1 cup	2 cups	3 ounces	3 teaspoons
Children 4 to 8 years (1,600 calories)	5 ounces	2 cups	1½ cups	2 to 3 cups	5 ounces	4 teaspoons
Teen girls, children 9 to 13 years, & adult women* (2,000 calories)	6 ounces	2½ cups	2 cups	3 cups	5½ ounces	6 teaspoons
Teen boys & adult men (2,600 calories)	9 ounces	3½ cups	2 cups	3 cups	6½ ounces	8 teaspoons

*Pregnant and breastfeeding women should consult with their health care providers or a licensed dietitian/nutritionist for information about their daily food intake.

Here are the foods and amounts you can choose from each food group when following the daily food guide chart shown above.

Grains

1 ounce equals:

- 1 slice of bread
- 1 cup ready-to-eat cereal
- ½ cup cooked rice, pasta, or cereal
- 1 small bran muffin
- ½ of an English muffin
- ½ of a 3-inch bagel
- ½ of a hamburger roll
- ½ of an 8-inch tortilla
- 5-6 whole grain crackers
- 3 cups popped popcorn

Vegetables

1 cup equals:

- 1 cup raw or cooked vegetables
- 1 cup vegetable juice
- 2 cups leafy salad greens

Fruits

1 cup equals:

- 1 cup chopped fruit
- 1 cup fruit juice
- ½ cup dried fruit

Milk

1 cup milk equals:

- 1 cup (8 fluid ounces) milk
- 1 cup yogurt
- 1½ ounces natural cheese
- 2 ounces processed cheese

½ cup milk equals:

- ½ cup pudding (made with milk)
- ½ cup frozen yogurt

Meat & Beans

1 ounce equals:

- 1 ounce cooked meat, fish, or poultry
- 1 egg
- ¼ cup cooked dry beans or tofu
- 1 tablespoon peanut butter
- ½ ounce nuts or seeds

Oils

1 teaspoon (5 grams) equals:

- 1 teaspoon liquid vegetable oil
- 1 teaspoon margarine with zero trans fat
- 1 tablespoon lowfat mayonnaise
- 2 tablespoons light salad dressing

1. Food groups and amounts are based on the U.S. Department of Agriculture MyPyramid food guidance system.

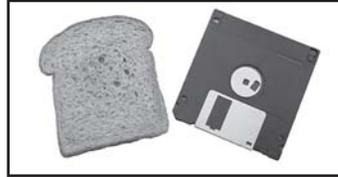


Figure 27. Use Common Objects to Picture the Size of Food Portions

For more information about the “Be Wise About Your Portion Size” campaign, go to www.FloridaWIC.org.



1 cup cereal (1 ounce from Grains Group) = size of a baseball



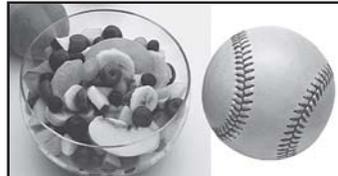
1 slice bread = size of a computer disk



$\frac{1}{2}$ cup cooked pasta = size of a small computer mouse



1 cup chopped vegetables = size of a baseball



1 cup chopped fruit = size of a baseball



1 teaspoon margarine = size of one die



$1\frac{1}{2}$ ounces of natural cheese = size of four dice



1 cup milk = size of a small carton of milk



2 tablespoons light salad dressing = size of a golf ball



3 ounces of lean meat, fish, or poultry = size of a deck of cards



$\frac{1}{2}$ cup cooked dry beans = size of a small computer mouse



2 tablespoons peanut butter = size of a golf ball

Prevent Choking

Do not give children under 4 years of age the following foods: popcorn, nuts, seeds, dried fruits, large chunks of meat or cheese, hard pieces of vegetables or fruits, hard candies, marshmallows, chips, whole grapes, and fish or meat with bones. Do not give children under 2 years of age peanut butter. Peanut butter should only be given to children over 2 years of age when spread thinly on crackers or toast.

What is the difference between portion size and serving size?

Portion size is the amount of a single food item served in a single eating occasion, such as a meal or a snack. Many people confuse portion size with serving size, which is a standardized unit of measuring foods—for example, a cup or ounce—used in dietary guidance, such as in the MyPyramid food guidance system. Portion size is the amount offered to a person in a restaurant, the amount offered in the packaging of prepared foods, or the amount a person chooses to put on his or her plate. For example, bagels or muffins are often sold in sizes that constitute at least 2 servings, but consumers often eat the whole thing, thinking that they have eaten 1 serving. They do not realize that they have selected a portion size that was more than 1 serving.

Oils

In addition to the five food groups, oils are also included in the MyPyramid plan.

Oils are fats that are liquid at room temperature, like the vegetable oils used in cooking. Oils come from many different plants and from fish. Some common oils are: canola oil, corn oil, cottonseed oil, olive oil, safflower oil, soybean oil, and sunflower oil. Some oils are used mainly as flavorings, such as walnut oil and sesame oil. A number of foods are naturally high in oils, like: nuts, olives, some fish, and avocados. Foods that are mainly oil include mayonnaise, certain salad dressings, and soft (tub or squeeze) margarine with no *trans* fats. Check the Nutrition Facts panel to find margarines with 0 grams of *trans* fat.



All fats and oils are a mixture of saturated fatty acids and unsaturated fatty acids. Solid fats (such as butter and shortening that are solid at room temperature) contain more **saturated fats** and/or ***trans* fats** than oils. Oils contain more monounsaturated (MUFA) and polyunsaturated (PUFA) fats. Saturated fats, *trans* fats, and cholesterol tend to raise “bad” (LDL) cholesterol levels in the blood, which in turn increases the risk for heart disease. To lower risk for heart disease, cut back on foods containing saturated fats, *trans* fats, and cholesterol.

Most oils are high in monounsaturated or polyunsaturated fats, and low in saturated fats. Oils from plant sources (vegetable and nut oils) do not contain any cholesterol. In fact, no foods from plants sources contain cholesterol. A few plant oils, however, including coconut oil and palm kernel oil, are high in saturated fats and for nutritional purposes should be considered to be solid fats.

Why is it important to consume oils?

Most of the fats consumed should be polyunsaturated (PUFA) or monounsaturated (MUFA) fats. Oils are the major source of MUFAs and PUFAs in the diet. PUFAs contain some fatty acids that are necessary for health—called “essential fatty acids.”

Because oils contain these essential fatty acids, there is an allowance for oils in the food guide separate from the discretionary calorie allowance. The MUFAs and PUFAs found in fish, nuts, and vegetable oils do not raise LDL (“bad”) cholesterol levels in the blood. In addition to the essential fatty acids they contain, oils are the major source of vitamin E in typical American diets.

While consuming some oil is needed for health, oils still contain calories. In fact, oils and solid fats both contain about 120 calories per tablespoon. Therefore, the amount of oil consumed needs to be limited to balance total calorie intake. The Nutrition Facts panel provides information to help you make smart choices. Figure 28 below shows the amount of oil in some common foods.

Figure 28. Amount of Oil in Some Common Foods

	Amount of Food	Amount of Oil	Calories from Fat	Total Calories
Oils:				
Vegetable oils (such as canola, corn, cottonseed, olive, peanut, safflower, soybean, and sunflower oil)	1 tablespoon	3 teaspoons	120	120
Foods rich in oils:				
Margarine, soft (<i>trans</i> fat free)	1 tablespoon	2½ teaspoons	100	100
Mayonnaise	1 tablespoon	2½ teaspoons	100	100
Mayonnaise-type salad dressing	1 tablespoon	1 teaspoon	45	55
Italian dressing	2 tablespoons	2 teaspoons	75	85
Thousand Island dressing	2 tablespoons	2½ teaspoons	100	120
Olives, ripe, canned	4 large	½ teaspoon	15	20
Avocado*	½ medium	3 teaspoons	130	160
Peanut butter**	2 tablespoons	4 teaspoons	140	190
Peanuts, dry roasted**	1 ounce	3 teaspoons	120	165
Mixed nuts, dry roasted**	1 ounce	3 teaspoons	130	170
Cashews, dry roasted**	1 ounce	3 teaspoons	115	165
Almonds, dry roasted**	1 ounce	3 teaspoons	130	170
Hazelnuts**	1 ounce	4 teaspoons	160	185
Sunflower seeds**	1 ounce	3 teaspoons	120	165

*Avocados are part of the fruits group.

**Peanut butter, nuts, and seeds are part of the meat & beans group.

Note: 1 tablespoon = 3 teaspoons; 1 teaspoon oil = approximately 5 grams of oil.

Source: Adapted from MyPyramid.gov website, 2006.

How much oil should be consumed daily?

Most Americans consume enough oil in the foods they eat, such as nuts, fish, cooking oil, and salad dressings. A person's allowance for oil depends on age, sex, and level of physical activity. Daily allowances are shown in Figure 29 below.

Figure 29. Daily Allowances for Oil

Note: These amounts are appropriate for individuals who get less than 30 minutes per day of moderate physical activity. Those who are more physically active may be able to consume more while staying within calorie needs.

Children	2-3 years old	3 teaspoons
	4-8 years old	4 teaspoons
Girls	9-13 years old	5 teaspoons
	14-18 years old	5 teaspoons
Boys	9-13 years old	5 teaspoons
	14-18 years old	6 teaspoons
Women	19-30 years old	6 teaspoons
	31-50 years old	5 teaspoons
	51+ years old	5 teaspoons
Men	19-30 years old	7 teaspoons
	31-50 years old	6 teaspoons
	51+ years old	6 teaspoons

Source: Adapted from MyPyramid.gov website, 2006.

Discretionary Calories

In addition to the five food groups and oils, discretionary calories are also included in the MyPyramid plan.

You need a certain number of calories to keep your body functioning and provide energy for physical activities. Think of the calories you need for energy like money you have to spend. Each person has a total calorie "budget." This budget can be divided into "essentials" and "extras."

With a financial budget, the essentials are items like rent and food. The extras are things like movies and vacations. In a calorie budget, the "essentials" are the minimum calories required to meet your nutrient needs. By selecting the lowest fat and no-sugar-added forms of foods in each food group you would make the best nutrient "buys." Depending on the foods you choose, you may be able to spend more calories than the amount required to meet your nutrient needs. These calories are the "extras" that can be used on luxuries like solid fats, added sugars, and alcohol, or on more food from any food group. They are your "discretionary calories."

In the MyPyramid food guidance system, each person has an allowance for some discretionary calories. But, many people have used up this allowance before lunch time! Most discretionary calorie allowances are very small, between 100 and 300 calories, especially for those who are not physically active. For many people, the discretionary calorie allowance is totally used by the foods they choose in each food group, such as higher fat meats, cheeses, whole milk, or sweetened bakery products.

Individuals can use their discretionary calorie allowance to:

- Eat more foods from any food group than the food guide recommends.
- Eat higher calorie forms of foods—those that contain solid fats or added sugars. Examples are whole milk, cheese, sausage, biscuits, sweetened cereal, and sweetened yogurt.
- Add fats or sweeteners to foods. Examples are sauces, salad dressings, sugar, syrup, and butter.
- Eat or drink items that are mostly fats, caloric sweeteners, and/or alcohol, such as candy, soda, wine, and beer.

For example, assume your calorie budget is 2,000 calories per day. Of these calories, you need to spend (i.e., eat or drink) at least 1,735 calories for essential nutrients, if you choose foods without added fat and sugar. Then you have 265 discretionary calories left. You may use these on “luxury” versions of the foods in each group, such as higher fat meat or sweetened cereal. Or, you can spend them on sweets, sauces, or beverages. Many people overspend their discretionary calorie allowance, choosing more added fats, sugars, and alcohol than their budget allows.

Physical Activity

In addition to food intake, physical activity is also an important component of the MyPyramid plan.

What is physical activity?

Physical activity simply means movement of the body that uses energy. Walking, gardening, briskly pushing a baby stroller, climbing the stairs, playing soccer, or dancing are all good examples of being active. For health benefits, physical activity should be **moderate** or **vigorous** and add up to at least 30 minutes a day.

Moderate physical activities include:

- Walking briskly (about 3¹/₂ miles per hour)
- Hiking
- Gardening/yard work
- Dancing
- Golf (walking and carrying clubs)
- Bicycling (less than 10 miles per hour)
- Weight training (general light workout)

Vigorous physical activities include:

- Running/jogging (5 miles per hour)
- Bicycling (more than 10 miles per hour)
- Swimming (freestyle laps)
- Aerobics
- Walking very fast (4¹/₂ miles per hour)
- Heavy yard work, such as chopping wood
- Weight lifting (vigorous effort)
- Basketball (competitive)

Some physical activities are not intense enough to help meet the recommendations. Although individuals are moving, these activities do not increase heart rate, so they should not count these towards the 30 or more minutes a day that should be strived for. These include walking at a casual pace, such as while grocery shopping, and doing light household chores.

Why is physical activity important?

Being physically active is a key element in living a longer, healthier, happier life. It can help relieve stress and can provide an overall feeling of well-being. Physical activity can also help individuals achieve and maintain a healthy weight and lower risk for chronic disease. The benefits of physical activity may include:

- Improves self-esteem and feelings of well-being
- Increases fitness level
- Helps build and maintain bones, muscles, and joints
- Builds endurance and muscle strength
- Enhances flexibility and posture
- Helps manage weight
- Lowers risk of heart disease, colon cancer, and type 2 diabetes
- Helps control blood pressure
- Reduces feelings of depression and anxiety

Physical activity and nutrition work together for better health. Being active increases the amount of calories burned. As people age their metabolism slows, so maintaining energy balance requires moving more and eating less.

Some types of physical activity are especially beneficial:

- **Aerobic activities** – speeds heart rate and breathing and improves heart and lung fitness. Examples are brisk walking, jogging, and swimming.
- **Resistance, strength building, and weight-bearing activities** – helps build and maintain bones and muscles by working them against gravity. Examples are carrying a child, lifting weights, and walking. They help to build and maintain muscles and bones.

- **Balance and stretching activities** – enhances physical stability and flexibility, which reduces risk of injuries. Examples are gentle stretching, dancing, yoga, martial arts, and tai chi.

How much physical activity is needed?

At a minimum, individuals should do **moderate** intensity activity for 30 minutes most days, or preferably every day. This is in addition to usual daily activities. Increasing the intensity or the amount of time of activity can have additional health benefits and may be needed to control body weight.

About 60 minutes a day of moderate physical activity may be needed to prevent weight gain. For those who have lost weight, at least 60 to 90 minutes a day may be needed to maintain the weight loss. At the same time, calorie needs should not be exceeded. Children and teenagers should be physically active for at least 60 minutes every day, or most days.

While 30 minutes a day of moderate intensity physical activities provide health benefits, being active for longer or doing more vigorous activities can provide even greater health benefits. They also use up more calories per hour. No matter what activity you choose, it can be done all at once, or divided into two or three parts during the day. Even 10-minute bouts of activity count toward your total.

Most adults do not need to see their health care provider before starting to exercise at a moderate level. However, men over the age of 40 and women over the age of 50 planning to start vigorous physical activity should consult a health care provider. Individuals with one of the conditions below should also consult a health care provider for help in designing a safe program of physical activity.

- A chronic health problem such as heart disease, high blood pressure, diabetes, osteoporosis, asthma, or obesity.
- High risk for heart disease, such as a family history of heart disease or stroke, eating a diet high in saturated fat, *trans* fat and cholesterol, smoking, or having a sedentary lifestyle.

Tips for increasing physical activity

Make physical activity a regular part of the day. Choose activities that you enjoy and can do regularly. Fitting activity into a daily routine can be easy—such as taking a brisk 10-minute walk to and from the parking lot, bus stop, or subway station. Or, join an exercise class. Keep it interesting by trying something different on alternate days. What’s important is to be active most days of the week and make it part of daily routine. For example, to reach a 30-minute goal for the day, walk the dog for 10 minutes before and after work, and add a 10-minute walk at lunchtime. Or, swim 3 times a week and take a yoga class on the other days. Make sure to do at least 10 minutes of the activity at a time, shorter bursts of activity will not have the same health benefits. To be ready anytime, keep some comfortable clothes and a pair of walking or running shoes in the car and at the office.

More ways to increase physical activity

At home:

- Join a walking group in the neighborhood or at the local shopping mall. Recruit a partner for support and encouragement.
- Push the baby in a stroller.
- Get the whole family involved—enjoy an afternoon bike ride with your kids.
- Walk up and down the soccer or softball field sidelines while watching the kids play.
- Walk the dog—don't just watch the dog walk.
- Clean the house or wash the car.
- Walk, skate, or cycle more, and drive less.
- Do stretches, exercises, or pedal a stationary bike while watching television.
- Mow the lawn with a push mower.
- Plant and care for a vegetable or flower garden
- Play with the kids—tumble in the leaves, build a snowman, splash in a puddle, or dance to favorite music.

At work:

- Get off the bus or subway one stop early and walk or skate the rest of the way.
- Replace a coffee break with a brisk 10-minute walk. Ask a friend to go with you.
- Take part in an exercise program at work or a nearby gym.
- Join the office softball or bowling team.

At play:

- Walk, jog, skate, or cycle.
- Swim or do water aerobics.
- Take a class in martial arts, dance, or yoga.
- Golf (pull cart or carry clubs).
- Canoe, row, or kayak.
- Play racket ball, tennis, or squash.
- Water skiing, cross-country skiing, or downhill skiing.
- Play basketball, softball, or soccer.
- Hand cycle or play wheelchair sports.
- Take a nature walk.
- Most important – have fun while being active!



Self-
Check



Basic Nutrition
Module

GO TO the Workbook for the Basic Nutrition Module and complete Self-Check Questions 97–103 right now. Then, immediately check your answers against the Answer Key to the Self-Check Questions (contained in your workbook) before proceeding to the next section of the module.

Part 4: Beyond the Basics

Food Labels

Food labels contain a great deal of information. Individuals should take the time to read them. The information can help them plan a healthful diet that meets the recommendations of the Dietary Guidelines. Food labels have several parts, including the front panel or the principle display panel, Nutrition Facts panel, and ingredient list. The front panel often tells if nutrients have been added—for example, “iodized salt” lets you know that iodine has been added, and “enriched pasta” (or “enriched” grain of any type) means that thiamin, riboflavin, niacin, iron, and folic acid have been added.

Principle Display Panel

The principal display panel (PDP) is the part of the label consumers see first when they purchase a product. In most cases, it is on the front of the package. It must contain the name of the product and the net quantity of contents statement.

Food Name

The name of a food is called a “statement of identity.” It is one of the principle features of the PDP. It must be in English and its common or usual name must also be given. A brand name can serve as the statement of identity if the name is commonly used and understood by the public to refer to a specific food.

Net Quantity

The net quantity of contents statement aids consumers by letting the consumers know how much food is in a container and it aids in price comparison. It includes only the quantity of food usually eaten in a package or container. It does not include the weight of the container or wrapper. The net quantity of contents must be stated in both ounce or pound units and metric units.

Label Descriptors

Label descriptors such as “free,” “low,” or “reduced” on the front of the package can signal that a food is low in a certain dietary component, such as calories, fat, saturated fat, or sodium. Eating those foods can then help individual’s moderate their intake of these and other nutrients. Here are some of the terms, along with their definitions.

- **Low Fat:** 3 grams or less of fat per serving.
- **Fat Free:** Less than 0.5 grams of fat per serving.
- **Low Sodium:** 140 milligrams or less per serving.
- **Low Cholesterol:** 20 milligrams or less and 2 grams or less of saturated fat per serving.
- **Low Calorie:** 40 calories or less per serving.

- **High:** This term can be used if the food contains 20% or more of the Daily Value of a particular nutrient per serving.
- **Sugar Free:** Less than 0.5 grams per serving.
- **Reduced:** This term means the product has been altered and contains 25% less of a nutrient or of calories than the regular reference product.

Descriptors such as “good source” and “high” can help identify foods that contain significant amounts of dietary fiber, vitamins, and minerals. Claims about the relationship between a nutrient or a food and the risk of a disease or health-related condition also may show up on the front of the food package. These are called health claims. They can help individuals identify foods with certain nutritional qualities.

Information Panel

The information panel is designated for the nutrition information; ingredient list; and the name and address of the manufacturer, packer, or distributor.

Ingredient List

The ingredient list helps consumers identify foods that have substances that they are allergic to or want to avoid or include. All packaged foods composed of two or more ingredients are required to list ingredients. Ingredients must be listed in order of descending weight. This informs the consumer of the proportion of each ingredient contained in a food.



Company Name

The firm responsible for the product must be identified on the food label. It may be the manufacturer, packer, or distributor. The firm’s city, state, and zip code must be included. A telephone number is not mandatory. This required information is available for consumers to address problems, questions, or concerns.

Product Dates

Dates appearing on food products can be used in several forms:

- **Pull Date** is the last day that the manufacturer recommends that the product remain for sale. This date allows for storage time after purchase, so if a food is bought on the pull date, it can be eaten at a later date.
- **Quality Assurance or Freshness Date** shows how long the manufacturer thinks a food will be of optimal quality. For example it may read “Best if used by October 2007.”

- **Pack Date** is the date the food was packaged or processed. This date will inform consumers of the age of the product. Many times the package will have a code date in which the consumer may not be able to determine the date the food was packed.
- **Expiration Date** is the last date on which a product should be eaten. State government regulate these dates for perishable items such as milk and eggs. The U.S. Food and Drug Administration (FDA) regulates only the expiration of infant formulas.

Nutrition Facts Panel

Information about the food's nutritional content will be found under the Nutrition Facts panel. **The panel's format includes:** serving size; servings per container; amount per serving; calories and calories from fat; total fat along with saturated fat and *trans* fat; cholesterol; sodium; total carbohydrates along with dietary fiber and sugars; protein; vitamin A; vitamin C; calcium; and iron.

Figure 30 on page 117 explains how you can use the information on the Nutrition Facts panel. The Nutrition Facts panel can be used to see if a food is a good source of a nutrient or to compare similar foods—for example, to find which brand of frozen dinner is lower in saturated fat, or which kind of breakfast cereal contains more folic acid. The **% Daily Value** shows the consumer how much of the recommended amounts for the day that the food provides in one serving. Look at the % Daily Value (% DV) column to see whether a food is high or low in nutrients. To limit a nutrient (such as fat, saturated fat, cholesterol, sodium), try to choose foods with a lower % DV. To consume more of a nutrient (such as calcium, other vitamins and minerals, fiber), try to choose foods with a higher % DV. As a guide, foods with 5% DV or less contribute a small amount of that nutrient to an individual's eating pattern, while those with 20% or more contribute a large amount.

Serving sizes shown in Nutrition Facts panel may differ from those used in the MyPyramid food guidance system. The Nutrition Facts serving size is generally the size of an average serving eaten. For example, 2 ounces of dry macaroni would be stated as one serving on the food package. This serving size will yield about 1 cup of cooked macaroni, or 2 ounces from the Grains Group. Also, because serving sizes are generally uniform across product lines, comparing the nutritional content of foods is easier. However, the amount of food **consumed** may be different from the stated serving size. For example, the serving size for ice cream is a half cup, so if an individual eats one cup of ice cream, he/she would have to double the number of calories and the percentages of the Daily Values listed to learn the nutrient content of the portion he/she ate.

Figuring Fat. The Dietary Guidelines suggest individuals eat a diet providing 20 to 35 percent or less of calories from fat and less than 10 percent of calories from saturated fat. Thus, the recommended upper limit on grams of fat and saturated fat in an individual's diet depends on the calories needed per day. Percent DVs for fat and saturated fat are based on a 2,000-calorie diet, which is about right for moderately active women, teenage girls, and sedentary men.

Some people occasionally keep a running total of the amount of fat and saturated fat they eat in a day and compare this to their target level. Someone who eats about 2,000 calories a day can simply monitor the percent DV information from the foods eaten so

that the total amount of fat intake is close to or less than 100 percent over the day. However, not all foods people eat will have DV values, for example, a main dish prepared at home.

Alternatively, an individual who eats fewer than or more than 2,000 calories a day can keep a total of the actual amount of fat and saturated fat contained in the foods consumed. This information



is listed immediately after the nutrient name, for example, *Total Fat 13g*.

Daily values based on an intake of 2,500 calories a day are listed in a footnote on the Nutrition Facts panel, at least on larger packages. These values can be used as a target level for many men, teenage boys, and active women.

Figure 17 on page 82 of this module shows recommended upper limits of fat and saturated fat intakes for a variety of calorie levels. Many older adults, children, and sedentary women need fewer than 2,000 calories a day and may want to select target levels based on 1,600 calories a day. Some active men and teenage boys and very active women may want to select target levels based on 2,800 calories per day.

Food Labeling Rule Requiring *Trans* Fat in Nutrition Facts Panel. As of January 1, 2006, manufacturers of conventional foods and some dietary supplements are required to list *trans* fat on a separate line, immediately under saturated fat on the nutrition label. (See Figure 30 on page 117.) However, *trans* fat does not have to be listed if the **total** fat in a food is less than 0.5 gram (or $\frac{1}{2}$ gram) per serving and no claims are made about fat, fatty acids, or cholesterol content. If it is not listed, a footnote will be added stating that the food is “not a significant source of *trans* fat.”

Although the updated Nutrition Facts panel will now list the amount of *trans* fat in a product, be aware that it does not have a % Daily Value (% DV) for *trans* fat. While scientific reports have confirmed the relationship between *trans* fat and an increased risk of CHD, none has recommended an amount of *trans* fat that FDA could use to establish a Daily Value (DV). Without a DV, a % DV cannot be calculated. As a result, *trans* fat will be listed with only a gram amount.

But saturated fats do have a % DV. To choose foods low in saturated fat and cholesterol, use the Quick Guide to % DV - **5% DV or less is low and 20% DV or more is high**. You can also use the % DV to make dietary trade-offs with other foods throughout the day. You don't have to give up a favorite food to eat a healthy diet. When a food you like is high in any of these cholesterol-raising components, balance it with foods that are low in them at other times of the day.

Figure 30. Nutrition Facts Panel¹

Nutrition Facts	
Serving Size 1 cup (228g)	
Servings Per Container 2	
Amount Per Serving	
Calories 250	Calories from Fat 110
% Daily Value*	
Total Fat 12g	18%
Saturated Fat 3g	15%
<i>Trans</i> Fat 1.5g	
Cholesterol 30mg	10%
Sodium 470mg	20%
Total Carbohydrate 31g	10%
Dietary Fiber 0g	0%
Sugars 5g	
Protein 5g	
Vitamin A	4%
Vitamin C	2%
Calcium	20%
Iron	4%
* Percent Daily Values are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs:	
	Calories: 2,000 2,500
Total Fat	Less than 65g 80g
Sat Fat	Less than 20g 25g
Cholesterol	Less than 300mg 300mg
Sodium	Less than 2,400mg 2,400mg
Total Carbohydrate	300g 375g
Dietary Fiber	25g 30g

Check for:

- Serving size
- Number of servings

Here, the label gives the amounts for the different nutrients in one serving.

- Calories
- Total Fat in grams
- Saturated Fat in grams
- *Trans* Fat in grams
- Cholesterol in milligrams
- Sodium in milligrams
- Total Carbohydrate in grams
- Dietary Fiber in grams
- Sugars in grams
- Protein in grams

The "% Daily Value" shows you how much of the recommended amounts the food provides in one serving, if **2,000** calories a day are consumed. For example, one serving of this food gives 18 percent of the total fat recommendation. The % Daily Value is also shown for selected vitamins and minerals that are listed below the thick black bar.

Here is shown the recommended daily amount for each nutrient for two calorie levels. If 2,000 calories are consumed each day, the individual should be eating less than 65 grams of fat and less than 20 grams of saturated fat. If 2,500 calories are consumed each day, the individual should eat less than 80 grams of fat and 25 grams of saturated fat. *Daily amounts may be higher or lower, depending on the calories consumed.*

1. This figure was adapted from page 47 of *The Practical Guide: Identification, Evaluation, and Treatment of Overweight and Obesity in Adults* published by the National Heart, Lung, and Blood Institute, National Institutes of Health, US Department of Health and Human Services, NIH Publication No. 00-4084, October 2000. This Nutrition Facts panel graphic was updated to include *trans* fat.

Sodium, Cholesterol, and Sugars. The percent DV column also can be used to help individuals moderate their intake of sodium and cholesterol. The Daily Values for sodium and cholesterol are the same for everyone, regardless of total calories consumed, so you do not have to make adjustments based on your caloric needs.

Food labels also can be helpful for keeping a moderate sugar intake. The Nutrition Facts panel lists the amount of sugars in grams (4 grams is equivalent to 1 teaspoon of sugar) in a serving of the food.

Note that this amount includes sugars that are present naturally in the food (such as lactose in milk and fructose in fruit), as well as sugars added to the food during processing. If you're interested in finding out whether a sweetener has been added to a food, check the ingredient listing. The following terms are used to describe sugar and sweeteners that are added to foods: brown sugar, corn sweetener, corn syrup, dextrose, fructose, fruit juice concentrate, glucose, high fructose corn syrup, honey, invert sugar, lactose, maltose, malt syrup, molasses, raw sugar, sucrose, sugar, and syrup.

If one of these terms appears first or second in the list of ingredients, or if several of them appear, the food is likely to be high in added sugars. A percent DV is not given for sugars because there is no target quantity of sugars to aim for each day.

Alcohol

Labeling of the alcohol content of beverages is regulated by the U.S. Bureau of Alcohol, Tobacco, and Firearms. Alcohol content (in percentage by volume) appears on the front panel of some alcoholic beverage labels. Alcohol content of foods and beverages is not required to be listed on the nutrition panel. However, some alcoholic beverages, such as light beers and wine coolers, provide information about the amount of calories, carbohydrate, protein, and fat they contain. This information may be useful for those who are counting calories. Alcoholic beverages are generally high in calories and low in nutrients.

Using Food Labels in Nutrition Education

While food labels are designed to inform consumers about the nutrient content of a product, they can serve as wonderful nutrition education tools. Staff members can reinforce practically any nutrition message by having clients read and compare food labels. Whether discussing vitamins or minerals, protein or fat, heart health or dental health, try enhancing that information with a label reading activity. Of course, it is always important to first make sure the client understands how to read a label, which is a teaching opportunity in and of itself!

The Food Allergen Labeling and Consumer Protection Act¹

The Food Allergen Labeling and Consumer Protection Act (FALCPA) of 2004 requires that the label of a food that contains an ingredient that is or contains protein from a “major food allergen” declare the presence of the allergen.

Congress passed this Act to make it easier for food allergic consumers and their caregivers to identify and avoid foods that contain major food allergens. In fact, in a review of the foods of randomly selected manufacturers of baked goods, ice cream, and candy in Minnesota and Wisconsin in 1999, FDA found that 25 percent of sampled foods failed to list peanuts or eggs as ingredients on the food labels although the foods contained these allergens.

FALCPA applies to food products that are labeled on or after January 1, 2006. The Act identifies eight foods or food groups as the major food allergens. They are milk, eggs, fish (e.g., bass, flounder, cod), Crustacean shellfish (e.g., crab, lobster, shrimp), tree nuts (e.g., almonds, walnuts, pecans), peanuts, wheat, and soybeans. More than 160 foods have been identified to cause food allergies in sensitive individuals. However, the eight major food allergens identified by the Act account for over 90 percent of all documented food allergies in the United States and represent the foods most likely to result in severe or life-threatening reactions. It is estimated that 2 percent of adults and about 5 percent of infants and young children in the United States suffer from food allergies. Approximately 30,000 consumers require emergency room treatment and 150 Americans die each year because of allergic reactions to food.

FALCPA requires food manufacturers to label food products that contain an ingredient that is or contains protein from a major food allergen in one of two ways.

The first option for food manufacturers is to include the name of the food source in parenthesis following the common or usual name of the major food allergen in the list of ingredients in instances when the name of the food source of the major allergen does not appear elsewhere in the ingredient statement. For example:

Ingredients: *Enriched flour (wheat flour; malted barley, niacin, reduced iron, thiamin mononitrate, riboflavin, folic acid), sugar, partially hydrogenated soybean oil, and/or cottonseed oil, high fructose corn syrup, whey (milk), eggs, vanilla, natural and artificial flavoring) salt, leavening (sodium acid pyrophosphate, monocalcium phosphate), lecithin (soy), mono-and diglycerides (emulsifier)*

The second option is to place the word “Contains” followed by the name of the food source from which the major food allergen is derived, immediately after or adjacent to the list of ingredients, in type size that is no smaller than the type size used for the list of ingredients. For example: *Contains Wheat, Milk, Egg, and Soy.*

1. This section was adapted from: U.S. Food and Drug Administration, Center for Food Safety and Applied Nutrition. *Information for Consumers: Food Allergen Labeling And Consumer Protection Act of 2004 Questions and Answers*. Updated July 18, 2006. To obtain a consumer handout on this topic go to: www.cfsan.fda.gov/~dms/ffalrgn.html.



Self-Check



Basic Nutrition Module

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Individual Dietary Preferences and Concerns

It is important to consider the underlying factors that are involved when an individual makes food choices. These factors which have a definite influence over one's eating behavior and food choices include: **cultural, personal, social, economic, medical, and educational factors.**

Cultural Factors

A strong influence on food choice is family tradition, which is largely determined by country of origin (ethnicity) and religious or traditional beliefs. Preferred foods are usually those that are familiar and were introduced early in life. For example, rice is preferred over bread by Chinese; tortillas are preferred over bread by Mexicans; grits are preferred over hash fried potatoes for breakfast by Southerners.



- Certain foods are “taboo” for certain cultures. For example, Americans don't eat dogs or cats, whereas some cultures do.
- Different cultures believe that particular foods are appropriate or inappropriate for certain meals. For example, oatmeal for breakfast is considered appropriate in the United States.
- Religious beliefs may prohibit certain foods. For example, Orthodox Jews and Muslims do not eat pork.

Personal Factors

- Taste satisfaction is a dominating factor in food selection; people eat what tastes good to them.
- Even more significant is the deep emotional attachment to food that begins to develop the moment a baby receives food from a loving caregiver. Thus, a positive response elicited by a certain food in adulthood is often due to a positive remembrance of it from childhood.
- Ethical and/or philosophical beliefs may influence food choices. For example, some vegetarians choose not to eat meat for ethical reasons.



- Some food habits or activities nurture a sense of creativity and personal accomplishment; for example, *baking* bread at home rather than purchasing commercially-baked bread can provide some people with that sense of accomplishment, not to mention the home-baked bread!

Social Factors

- Lack of skills in food preparation or lack of time to cook may determine the menu.
- Merchandising, advertising, and food displays are used extensively by the food industry and local retailers to influence food selection.
- Parental eating practices and preferences may be imitated by their children.
- Peer group pressures may have a big impact on food choices. For example, teenagers may frequently eat hamburgers, french fries, and soft drinks.
- Family events, holidays, and festive occasions sometimes feature certain foods. For example, turkey is served for Thanksgiving and cake and ice cream is usually served for birthdays.
- Food fads and superstitions are likely to influence food selection and food avoidance. For example, some “health food” advocates may reject all canned and bottled foods because they are perceived as “unnatural.”

Economic Factors

- Poverty may restrict actual food choices, as well as limit trips to the grocery store due to lack of transportation.

- In rural areas, a community may have only one food store; thus, purchases are limited to only those items that are readily available.
- Lack of adequate refrigeration or food storage may limit purchases to those items that can be used in one day or will keep without refrigeration. Also, lack of cooking equipment may limit choices.
- Geography and climate can influence the availability of food throughout the year. Southern states and countries with tropical climates may enjoy a bigger variety of fresh fruits and vegetables year round.

Medical Factors

There are some medical conditions such as **hypertension** (high blood pressure), **heart disease**, **diabetes**, and **iron-deficiency anemia** that may require modifications in the daily diet. A health professional should provide medical care and assure that dietary counseling is provided to individuals with such conditions. For example, someone who is anemic should be encouraged to consume foods high in vitamin C, which helps iron absorption in the body.

Substance abuse (of alcohol, drugs, tobacco, etc.) has a definite impact on one’s food choices. Often food either loses its importance to the substance “abuser,” or the abuser doesn’t have enough money to buy food.

Educational Factors

Lack of education has been related to poor diets in low-income populations. Women who have not received a formal education are less likely to be informed about health issues, including nutrition-related issues. Lack of education may also contribute to unemployment, which can cause financial restrictions on food purchasing.

On the other hand, there are many individuals with advanced education and high financial status who have daily diets inadequate in nutrients and calories. A possible reason for this may be that the changing lifestyle of the American family has resulted in changing eating patterns which include an increased consumption of “convenience” and snack foods that tend to be less healthy choices.


Self-
Check

Basic Nutrition
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 **GO TO** the Workbook for the Basic Nutrition Module and complete Self-Check Question 111 right now. Then, immediately check your answers against the Answer Key to the Self-Check Questions (contained in your workbook) before proceeding to the next section of the module.

Vegetarian Diets¹

The meals of a vegetarian undoubtedly feature a number of foods from plant sources. However, depending on the specific type of vegetarian diet that is followed, a vegetarian may also eat eggs and various dairy products. Here are the main types of vegetarians:



- A **vegan** or **pure vegetarian** consumes only plant foods; no animal products whatsoever.
- A **lacto-vegetarian** consumes food of plant origin, plus milk and milk products.
- A **lacto-ovo-vegetarian** consumes foods of plant origin, as well as milk, milk products and eggs (“lacto” refers to milk and “ovo” refers to egg).
- A **semi-vegetarian** consumes plant foods, as well as eggs, milk and milk products, plus small amounts of fish or poultry on occasion. Although some people may not think of semi-vegetarians as “true vegetarians,” their diet can be very similar to a lacto-ovo-vegetarian if they eat fish and poultry on an infrequent basis.
- There are some uncommon vegetarian diets that have developed over the years. These include macrobiotic, fruitarian, and Rastafarian dietary patterns. These diets can be very restrictive. Many of these diets may not be nutritionally adequate, particularly for infants and young children.

It is very important to ensure that adults, adolescents, infants, and children following vegetarian diets receive adequate nutrition. Periods of rapid growth during infancy and childhood are of special concern for infants and children following vegan diets or the uncommon vegetarian diets mentioned above. The parents or caregivers of these infants and children sometimes feed their infants and children inappropriately, particularly during the weaning period which usually occurs between 6 and 18 months of age. Clients who are following vegetarian diets should be referred to the nutritionist for assessment and counseling.

Potential Benefits of Vegetarian Diets

From a nutritional standpoint, plant-based diets have some wonderful advantages. Vegetarians generally eat plenty of fruits, vegetables, grains and legumes, so they get lots of fiber, magnesium, and vitamins A, C, and E. Also, plant-based diets generally have less saturated fat and cholesterol than diets based on meat. In fact, vegetarian diets are in agreement with most of the current recommendations outlined in the Dietary Guidelines for Americans. It’s no surprise that vegetarian diets are linked to a lower risk of many chronic disease including colorectal cancer, coronary heart disease, diabetes, diverticular disease, hypertension, obesity, and renal disease.

1. This section was adapted from Texas Department of Health, *Basic Nutrition Module*, 2001.

Potential Risks of Vegetarian Diets

On the other hand, there are certain nutritional risks associated with some types of vegetarian diets. The more restrictive the diet, the riskier it is, so people following vegan diets or other restrictive vegetarian diets run the greatest risk of not getting all the nutrients they need. Still, well-planned vegetarian diets can provide adequate nutrition during all stages of the life cycle, including adulthood, infancy, childhood, pregnancy, and lactation.

Key Nutrients Needed by Vegetarians

The bottom line is that vegetarians, especially vegans, need to make careful food choices, paying special attention to their intake of energy, protein, calcium, vitamin D, vitamin B₁₂, iron, and zinc. Each of these is discussed in the following sections.

Energy

Most plant-based foods are high in fiber and low in fat, so they're lower in calories than most meat-based foods. For example, an ounce of pinto beans has only 25 calories while an ounce of lean ground beef has about 80 calories. So in general, vegetarian meals provide fewer calories than meat-based meals. For adults looking to lose weight, this is a benefit, and indeed, it's one of the reasons some people adopt a vegetarian diet. But it's a different story for infants, children, adolescents, and pregnant women who consume vegetarian diets. These individuals need adequate calories for growth and development. In addition, fat should not be restricted in infants and children younger than 2 years of age. To counter these risks, vegetarians can increase their caloric intake by eating more whole grain breads and cereals, legumes, nuts, and seeds. Also, depending on a person's vegetarian style, eggs and dairy products can contribute calories and nutrients to the diet. Young children following a vegetarian diet need to eat nutrient-dense snacks and meals.

Protein

The requirement for protein is really a requirement for the 9 essential amino acids. As discussed earlier in this module, animal proteins provide all 9 essential amino acids in sufficient amounts to meet a person's needs, so they are known as **complete proteins**. Foods of plant origin, however, usually lack adequate amounts of certain essential amino acids, so they are known as **incomplete proteins**.

While vegans don't consume animal products, they can still meet their protein needs fairly easily. Since some plant foods provide the essential amino acids that other plant foods lack (and vice versa), vegans need to eat a variety of plant foods over the course of the day to obtain adequate amounts of all 9 essential amino acids. However, infants and preschoolers need a greater proportion of essential amino acids, so if they aren't being breastfed or being given infant formula or another source of complete protein, children should eat complementary proteins within a few hour time period.

A vegetarian's daily intake should include a variety of legumes and whole grains along with seeds or nuts. Several protein sources to be aware of are soybeans, amaranth, and quinoa, all of which have amino acid patterns similar to that of cow's milk. Soy protein, in particular, has become a popular meat alternative since it offers high quality protein without the

cholesterol and saturated fat found in animal products. Also, researchers are studying other potential health benefits of soy, including its cholesterol-lowering abilities, its potential role in bone health, and possible anti-cancer properties. Vegetarians can choose from numerous products made from soy including tofu, soy milk, and soy burgers.

Calcium

Since milk provides a large portion of the required calcium for most people, vegetarians who don't consume milk or milk products may not get enough calcium. The most reliable and practical source of calcium for vegans is calcium-fortified soy milk. Also, firm tofu (set with calcium sulfate) is a significant source, as are some of the calcium-fortified products that can fit into a vegetarian diet, such as calcium-fortified orange juice, grapefruit juice, bread, and cereal. Other sources that offer moderate to small amounts of calcium include soy cheese, blackstrap molasses, sesame seeds, tahini (sesame butter), almonds and almond butter, tempeh, and certain vegetables (collards, kale, mustard greens, turnip greens, broccoli, okra, rutabaga). Calcium supplements may be necessary if dietary intake is insufficient. For more information about calcium and the calcium content of various foods, refer to the Calcium section beginning on page 52 of this module.

Vitamin D

In addition to calcium, vitamin D is needed for healthy bones. Vitamin D may be a concern for vegans since they don't eat eggs or drink cow's milk, two important food sources of vitamin D in the typical American diet. And while it's true that the body makes vitamin D through exposure of the skin to sunlight (20 to 30 minutes two or three times a week), vegetarians shouldn't rely only on this as a source, especially considering current recommendations to limit time spent in the sun to prevent skin cancer (melanoma). In addition, sunscreen lotions, smog, and winter temperatures all cut down on the amount of sun exposure. Also, people with darker skin need even longer exposure to the sun (30 minutes to 3 hours per day) to improve the vitamin D use by the body.



Vegan adults and especially caregivers of vegan children and adolescents, need to ensure that they or their children are getting the vitamin D they need. Some brands of soy milk, breakfast cereals, and margarine are fortified with vitamin D. It's important for clients to check the Nutrition Facts panels to be sure they are obtaining enough vitamin D. For information about vitamin D intake for infants, refer to the Infant Nutrition Module.

Vitamin B₁₂

Vitamin B₁₂, also known as cobalamin, is essential for growth, red blood cell formation, and central nervous system functioning. Vitamin B₁₂ is primarily found in animal products, including eggs and dairy products. While some foods of plant origin contain B₁₂, plant foods are not a reliable source. For example, seaweed, miso, tempeh, tamari, sauerkraut, spirulina, and algae are often cited as good sources of vitamin B₁₂, but they

generally contain an inactive form of the vitamin that the body can't use. So vegans need other sources of cobalamin. The most reliable sources are foods fortified with B₁₂ such as breakfast cereals, soy products, or vegetarian burger products. Formula fed infants should be given soy formula, which is fortified with vitamin B₁₂. For information about vitamin B₁₂ intake for exclusively breastfed infants, refer to the Breastfeeding Module.

Iron

Getting enough iron is hard enough for people who eat a mixed diet, so it can be especially challenging for vegetarians. As discussed earlier, plant products contain non-heme iron, which has a lower absorption rate (2 to 20 percent) than the absorption rate of heme iron found in meat, fish, and poultry (15 to 35 percent). Milk contains only negligible levels of iron and the small amount of iron in eggs is poorly absorbed by the body. Therefore, all vegetarians need to optimize their iron intake and absorption. Vegetarians should try to consume high iron foods on a daily basis. Fortified breakfast cereals, blackstrap molasses, legumes, tofu, dried fruits, and enriched pasta and bread all contribute iron to the diet. Eating foods high in vitamin C, and limiting or avoiding food or supplements that limit the absorption of iron is recommended. Tea, coffee, bran, antacids, and large amounts of calcium in food or dietary supplements can limit iron absorption by the body. For more information about iron absorption, see the Minerals section of this module. For information about iron for infants and children, refer to the Infant Nutrition Module and Preschool Nutrition Module, respectively.

Zinc

Zinc is essential for growth and development. This mineral is widely available in animal products, including milk and eggs, and to a lesser extent, in foods of plant origin. Although most vegetarians get adequate levels of zinc, it's still a nutrient to be aware of, especially because substances in plants such as fiber and phytates can reduce the bioavailability of zinc, i.e., the absorption of zinc by the body.

Plant sources of zinc include legumes, tofu, miso, tempeh, nuts, seeds, wheat germ, and whole grains. Zinc is lost in the processing of refined flour. To increase absorption and ensure adequate zinc intake, vegetarians should avoid raw wheat bran and limit consumption of unleavened bread. Also it helps to soak legumes 1 to 2 hours before cooking and then discard the water before cooking. Calcium interferes with zinc absorption, so people should avoid taking calcium supplements with sources of zinc. As for infants, both breastmilk and soy formula provide adequate amounts of zinc.

Meal Planning for Vegetarians

As with any type of meal plan, it is important to assess a vegetarian's diet before making recommendations. Not only are there different types of vegetarians, but the intake of individual vegetarians can vary quite a bit. Still, there are some general guidelines to suggest when discussing vegetarian diets.

- **Choose a variety of foods**, including whole grains, vegetables, fruits, legumes, nuts, seeds, and if desired, dairy products and eggs. Many people, both vegetarians and non-vegetarians, tend to get stuck in a dietary rut, making the same meals over and over, with the same vegetable choices, same breads, etc. Variety is a key to healthy eating.
- **Limit heavily refined foods that are high in fat and sugar.** Instead, opt for whole, unrefined foods that offer plenty of vitamins, minerals, and complex carbohydrates. This is another universal guideline that applies to vegetarians and non-vegetarians alike.
- For vegetarians who choose to include dairy products and/or eggs, **go easy on the eggs, cheese, and other dairy foods which are high in saturated fat.** Also, choose fat free (skim), and/or low fat dairy products. And don't rely solely on eggs and dairy products for protein. For variety and nutrition, it's important to consume protein from plant foods as well.
- **Vegans need a routine source of vitamin B₁₂** from fortified foods and/or supplements. Also if they don't get much sun, they need a source of **vitamin D**.
- **Don't restrict dietary fat in children younger than 2 years of age. For older children, offer nutrient dense foods** to help them meet their calorie needs. Include foods higher in unsaturated fats such as nuts, seeds, seed butters, avocados, and vegetable oils.
- **Special care must be taken to ensure that infants and young children receive a nutritionally adequate diet. For infants, some particular nutrients to be aware of are iron, vitamin D, and vitamin B₁₂.** For detailed information on these issues for infants and children, refer to the Breastfeeding Module, Infant Nutrition Module, and Preschool Child Nutrition Module.



Food Allergy, Intolerance, and Aversion

Food Allergy

A *food allergy* is an immune system response to a particular component of food or food additive. A food allergy can also be referred to as a *food hypersensitivity*. Many people believe that food allergies are common, however, statistics show that food allergies occur in only about 2 percent of adults and in about 5 percent of infants and children. When an allergenic food is consumed, the allergen (the specific substance in the food, usually a protein) reaches the bloodstream and triggers body responses that always produce antibodies and may or may not produce allergic symptoms. Allergies must be diagnosed by testing for antibodies—they cannot be diagnosed from symptoms alone. A skin prick test and a double-blind food challenge can confirm a true food allergy. Since these tests can be time-consuming and expensive, many people who have symptoms are not tested and just avoid the specific food or food they think is causing a problem. They do not know for sure if they have a true food allergy.

Symptoms of food allergy can include the following: hives; eczema; skin rashes; nausea; vomiting; diarrhea; cramps; wheezing; runny nose; coughing; swelling of the face or throat; and in severe forms it can cause death if not treated immediately. Symptoms of an allergic reaction usually appear within seconds or up to 2 hours after eating the food. Reactions may be delayed up to 2 days later. *Anaphylactic shock* is a life-threatening, whole-body allergic reaction to a food or substance.

The foods which most often cause allergic reactions are milk, eggs, and peanuts. These three foods cause about 75 percent of the allergic reactions to foods. The other 25 percent of food allergies are caused by a variety of other foods such as wheat, soybeans, tree nuts, fish or shellfish, citrus fruits, strawberries, chocolate, tomatoes, and yeast.

Food Intolerance

A *food intolerance* is the body's abnormal response to a food or food additive which does not involve an immune mechanism. A common food intolerance is lactose intolerance.

Lactose Intolerance

People who are lactose intolerant have difficulty digesting *lactose*, the sugar that is naturally present in milk. People with lactose intolerance do not have enough *lactase*, the enzyme that breaks down lactose in the small intestine. Therefore, the consumption of milk and foods that contain milk causes these people to experience symptoms such as bloating, cramping, gas, discomfort, and/or diarrhea.

Babies are born with the enzyme necessary to digest lactose, but some people lose the ability to digest lactose as they get older. Lactose intolerance is an inherited condition, and certain groups have higher rates of lactose intolerance, including Native Americans, Asians, African Americans, Middle Easterners, and people of Mediterranean descent.

Lactose intolerance affects people to differing degrees. Many people with lactose intolerance can tolerate as much as a cup of milk or eat products such as yogurt, pudding, and cheese without problems. Also, products that have been treated with lactase are available, such as Lactaid® or Dairy Ease®. Many people mistakenly refer to lactose intolerance as a milk allergy. There is such a thing as milk allergy, but it is quite different. With milk allergy, a person's immune system reacts in response to the protein in milk.

Here are some tips that can be used by a person with lactose intolerance:

- Drink milk with a snack or a meal instead of on an empty stomach. Solid foods slow down digestion, which helps the body handle the lactose more easily.
- Consume small, frequent portions of milk and milk products throughout the day. This allows whatever lactase is present to do its job of digesting the lactose before it starts causing problems.
- Drink lactose-reduced or lactose-free milk, or use lactase enzyme drops. When these drops are added to milk, they break down the lactose so it is easier to digest.
- Aged hard cheeses such as Cheddar, Colby, Swiss, and Parmesan are particularly low in lactose and easier to digest.
- Select cultured milk products such as yogurt, which contains “friendly” bacteria that help the body digest lactose.

For additional information on food allergies and intolerances in children, refer to the Food-Induced Reactions section of the Preschool Child Nutrition Module.

Food Aversion

A food aversion is an intense dislike of a food that results from an illness or other negative experience associated with that particular food. This may be nature's way of protecting a person or child from an allergic food reaction or other adverse food reactions to food.

 **Self-Check**  **Basic Nutrition Module**

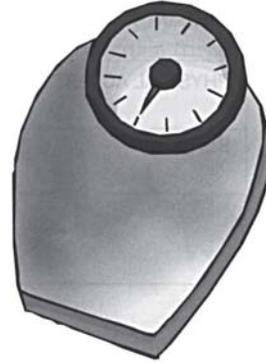
 **GO TO** the Workbook for the Basic Nutrition Module and complete Self-Check Questions 112–119 right now. Then, immediately check your answers against the Answer Key to the Self-Check Questions (contained in your workbook) before proceeding to the next section of the module.

Treatment of Overweight and Obesity in Adults¹

Note: The purpose of this section is for you to be familiar with the variety of weight management techniques described here. Any weight management advice or counseling should be provided by a licensed dietitian/nutritionist that is working in consultation with the client's health care provider.

Overview of Weight Management Techniques

Effective weight loss involves many techniques and strategies including diet therapy, physical activity, behavior therapy, pharmacotherapy (the use of medications), and surgery; as well as combinations of these strategies. Weight management techniques need to take into account the health and needs of the individual. They should be culturally sensitive and incorporate the individual's perspectives and characteristics.



Exclusion From Weight Loss Therapy

The weight management techniques provided in this section are provided for adults. Adults for whom weight loss therapy is not appropriate are most pregnant and breastfeeding women, those with a serious uncontrolled psychiatric illness such as a major depression, and those who have a variety of serious illnesses and for whom caloric restriction might exacerbate the illness. Clients with active substance abuse and those with a history of anorexia nervosa or bulimia should be referred to their health care provider for specialized care.

Diet Therapy

In the majority of overweight and obese individuals, adjustment of the daily food intake will be required to reduce caloric intake. The health care provider in consultation with the nutritionist will determine the appropriate daily caloric level for the individual. A meal plan that is individually planned to help create a deficit of 500 to 1,000 calories per day should be an integral part of any weight loss plan that is aimed at achieving a weight loss of 1 to 2 pounds per week. The use of this moderate reduction in caloric intake is designed to achieve a slow, but progressive, weight loss.

Very low calorie diets (VLCDs) of less than 800 calories per day are to be avoided. VLCDs are used only in very limited circumstances by specialized health care providers experienced in their use. Moreover, research has shown that the 1,000 to 1,600 calorie meal plans are as effective as these VLCDs in producing weight loss after 1 year.

1. The text and some of the graphics in this section and in Figures 31 to 39 were adapted from *The Practical Guide: Identification, Evaluation, and Treatment of Overweight and Obesity in Adults* published by the National Heart, Lung, and Blood Institute, National Institutes of Health, US Department of Health and Human Services, NIH Publication No. 00-4084, October 2000.

In general, **low calorie diet (LCD)** meal plans of 1,000 to 1,200 calories per day are prescribed for most women; and meal plans between 1,200 and 1,600 calories per day are prescribed for men and may also be appropriate for women who weigh 165 pounds or more, or who are physically active. If an individual can maintain the 1,600 calorie per day intake but does not lose weight, they may then be prescribed a lower calorie meal plan of 1,200 calories per day. If an individual on either meal plan is hungry, calories may be increased by 100 to 200 calories per day. A variety of meal plans for 1,200 and 1,600 calories are shown in Figures 32 to 37 on pages 136 to 141.

Successful weight loss is more likely to occur when consideration is given to an individual's food preferences. Each of the menus provided are designed for a variety of ethnic groups, regional food preferences, or dietary preferences such as the lacto-ovo vegetarianism. Care should be taken to ensure that all of the recommended dietary allowances are met; this may require the use of a dietary or vitamin/mineral supplement as recommended by the health care provider in consultation with the nutritionist. Some of the menus in Figures 32 to 37 do not contain 100 percent of the recommended dietary allowances, therefore, the need for vitamin/mineral supplementation should be evaluated.

Education and counseling is necessary for an individual to adjust to a reduced calorie meal plan. Educational efforts should pay particular attention to the following topics:

- Energy value of different foods.
- Food composition—fats, carbohydrates (including dietary fiber), and proteins.
- Evaluation of nutrition labels to determine caloric content and food composition.
- New habits of food purchasing.
- Food preparation—avoid adding high-calorie ingredients during cooking (e.g., fats and oils).
- Avoiding overconsumption of high-calorie foods (both high-fat and high-carbohydrate foods).
- Adequate water intake.
- Reduction of portion sizes.
- Limiting alcohol consumption.

Physical Activity

Physical activity has both direct and indirect benefits. Increased physical activity is important to efforts to lose weight because it increases energy expenditure and plays an integral role in weight maintenance. Physical activity also reduces the risk of heart disease more than that achieved by weight loss alone. In addition, increased physical activity may help reduce body fat and prevent the decrease in muscle mass often found during weight loss.

Physical activity should be an integral part of weight loss therapy and weight maintenance. Initially, moderate levels of physical activity for 30 to 45 minutes, 3 to 5 days per week, should be encouraged. Many people live sedentary lives, have little training or skills in physical activity, and are difficult to motivate toward increasing their activity. For these

reasons, starting a physical activity regimen may require supervision for some people. The need to avoid injury during physical activity is a high priority. Extremely obese persons may need to start with simple exercises that can be intensified gradually. The health care provider must decide whether exercise testing for cardiopulmonary disease is needed before an individual begins a new physical activity regimen. This decision should be based on the individual's age, symptoms, and other risk factors.

For most obese individuals, physical activity should be initiated slowly, and the intensity should be increased gradually. Initial activities may be increasing small tasks of daily living such as taking the stairs or walking or swimming at a slow pace. With time, depending on progress, the amount of weight lost, and other capabilities, the client may engage in more strenuous activities. Some of these include fitness walking, cycling, rowing, cross-country skiing, aerobic dancing, and jumping rope. Jogging provides a high-intensity aerobic exercise, but it can lead to orthopedic injury. If jogging is desired, the person's ability to do this must first be assessed and the availability of a safe environment is also a necessity. Competitive sports, such as tennis and volleyball, can provide an enjoyable form of physical activity for many, but again, care must be taken to avoid injury, especially in older people.

A regimen of daily walking is an attractive form of physical activity for many people, particularly those who are overweight or obese. The individual can start by walking 10 minutes, 3 days a week, and can build to 30 to 45 minutes of more intense walking at least 3 days a week and increase to most, if not all days. With this regimen, an additional 100 to 200 kcal per day of physical activity can be expended. Caloric expenditure will vary depending on the individual's body weight and the intensity of the activity.

Reducing sedentary time, i.e., time spent watching television or playing video and computer games, is another approach to increasing activity. Individuals should be encouraged to build physical activities into each day. Examples include leaving public transportation one stop before the usual one, parking farther than usual from work or shopping, and walking upstairs instead of taking the elevators or escalators. New forms of physical activity should be suggested (e.g., gardening, walking a dog daily, or new athletic activities). Engaging in physical activity can be facilitated by identifying a safe area to perform the activity (e.g., community parks, gyms, pools, and health clubs.) However, when these sites are not available, an area of the home can be identified and perhaps outfitted with equipment such as a stationary bicycle or a treadmill. Health care professionals should encourage their clients to plan and schedule physical activity one week in advance, budget the time necessary to do it, and document their physical activity by keeping a diary and recording the duration and intensity of exercise.

Behavior Therapy

Behavior therapy provides methods for overcoming barriers to compliance with diet therapy and/or increased physical activity. These methods are important components of weight loss treatment. Individualizing behavioral strategies to the needs of the client must be emphasized. The health care provider must assess the client's readiness to implement the treatment plan. Then the provider can take appropriate steps to motivate

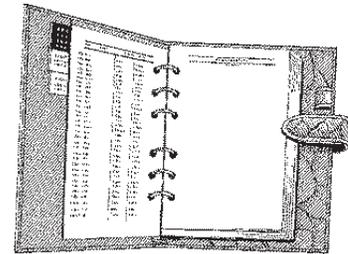
the client to begin treatment. The health care provider must be careful to communicate a nonjudgmental attitude that distinguishes between the weight problem and the individual with the problem. The health care provider needs to objectively examine his/her own attitudes about obesity and obese people by remembering that obesity is a chronic disease, like diabetes or hypertension. In a sense, clients are struggling against their own body's coordinated effort to stop them from losing weight. Compliance with most long-term treatment regimens that require behavior change is poor. The provider needs to keep his/her expectations realistic regarding the ease, amount, speed, and permanence of weight change. The client must be an active partner in the consultation and must participate in setting goals concerning weight loss and how to achieve it. These goals may be different from those the provider would select.

After considering the recommended dietary and physical activity guidelines, the client should be encouraged to select two or three goals that he/she is willing and able to take on. Effective goals are specific, realistic, and forgiving. Monitoring progress is a continuous process of motivational importance to the client and provider. Simple, clear records of body weight, relevant risk factors, other health parameters, and goal attainment should be kept.

Behavior Modification Techniques

Proven behavior modification techniques can be used to assist clients in weight control. Goals may include the use of one or more of these techniques:

- **Self-monitoring** refers to observing and recording some aspect of behavior, such as caloric intake, exercise sessions, medication usage, etc., or an outcome of these behaviors, such as changes in body weight. Self-monitoring of a behavior usually changes the behavior in the desired direction and can produce real-time records for the health care provider's review.
- **Rewards** can be used to encourage attainment of behavioral goals, especially those that have been difficult to reach. An effective reward is something that is desirable, timely, and contingent on meeting a goal. Client-administered rewards may be tangible (e.g., a movie, music CD, or payment toward buying a more costly item) or intangible (e.g., an afternoon off work or an hour of quiet time away from the family). Numerous small rewards, delivered for meeting smaller goals, are preferable to bigger rewards that require a long, difficult effort.
- **Stimulus control** changes involve learning what social or environmental cues seem to encourage undesired eating and then modifying those cues. For example, a client may learn from reflection or from self-monitoring records that he or she is more likely to overeat while watching television, or whenever treats are on display by the office coffeepot, or when around a certain friend. The resulting strategies may be to break the association of eating from the cue (do not eat while watching television), avoid or eliminate the cue (leave the coffee room immediately after pouring coffee), or change the circumstances surrounding the cue (plan to meet with the friend in a



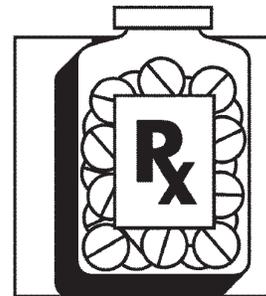
setting where food is not available). In general, visible and accessible food items are often cues for unplanned eating.

- **Dietary behavior** changes can make it easier to eat less without feeling deprived. An important change is to slow the rate of eating to allow satiety signals to begin to develop before the end of the meal. Another tactic is to use smaller plates so that moderate portions do not appear meager. Changing the scheduling of eating can be helpful for clients who skip or delay meals, then overeat later.

See page 145 for the Guide to Behavior Change.

Pharmacotherapy

Weight loss drugs approved by the Food and Drug Administration (FDA) for long-term use may be helpful as an addition to diet and physical activity for clients with a BMI of greater than or equal to 30 and without accompanying obesity-related risk factors or diseases. Drug therapy may also be useful for clients with a BMI greater than or equal to 27 who have accompanying obesity-related risk factors or diseases.



There is a great interest in weight loss drugs among consumers. Because of the possibility of serious adverse effects, health care providers should use drug therapy with caution. Herbal medications are not recommended as part of a weight loss program. These preparations have unpredictable amounts of active ingredients and unpredictable—and potentially harmful—effects.

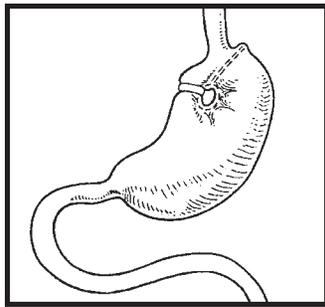
In those clients with a lower risk of obesity, nonpharmacologic therapies are the treatments of choice. When drugs are prescribed by the health care provider, they should be used only as a part of a comprehensive program that includes behavior therapy, diet, and physical activity. It is important that the health care provider monitor the effectiveness and side effects of the drugs currently on the market. Since obesity is a chronic disease, the short-term use of drugs is not helpful. The health care provider should include drugs only as a component of long-term treatment strategy. The risk to benefit ratio cannot be predicted at this time, since not enough long-term data (greater than 1 year) are available on any of the available prescription drugs.

Weight Loss Surgery

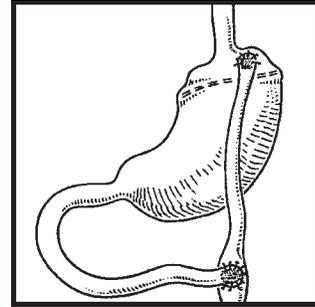
Weight loss surgery is an option for weight reduction in individuals with clinically severe obesity, i.e., a BMI greater than or equal to 40, or a BMI greater than or equal to 35 who have accompanying obesity-related risk factors or diseases. Weight loss surgery is usually reserved for individuals in whom other methods of treatment have failed and who have clinically severe obesity (once commonly referred to as “morbid obesity”). Weight loss surgery provides medically significant sustained weight loss for more than 5 years in most individuals. Two types of operations that have proven to be effective and are currently in use are: those that restrict gastric volume (banded gastroplasty) and those that, in addition to limiting food intake, also alter digestion (Roux-en-Y gastric bypass). Figure 31 below shows a diagram of these surgical procedures.

Figure 31. Surgical Procedures for Weight Loss

Vertical Banded Gastroplasty



Roux-en-Y Gastric Bypass



Lifelong medical monitoring after surgery is a necessity. Surgical complications vary with weight and the overall health of the individual. Young people without other health problems with a BMI less than 50 who have undergone surgery have less than 1 percent rate of death, while massively obese individuals with a BMI greater than 60 and who are also diabetic, hypertensive, and in cardiopulmonary failure may have death rates that range from 2 to 4 percent. Operative complications occur in less than 10 percent of individuals.

An integrated program that provides guidance on diet, physical activity, and psychosocial concerns before and after surgery is necessary. Most individuals fare remarkably well with reversal of diabetes, control of hypertension, marked improvement in mobility, return of fertility, cure of pseudo-tumor cerebri (benign intracranial hypertension), and significant improvement in the individual’s quality of life.

Late complications are uncommon, but some individuals may develop incisional hernias, gallstones, and, less commonly, weight loss failure and dumping syndrome (rapid emptying of the stomach contents which results in sweating and weakness after eating). Problems with the nervous system may occur in unusual cases.

Individuals who do not follow the instructions to maintain an adequate intake of vitamins and minerals may develop deficiencies of vitamin B₁₂ and iron that can result in anemia. Therefore, it is important to ensure that these individuals are adequately nourished.

Figure 32. Traditional American Cuisine—1,200 Calories

(This menu is designed for weight management.)

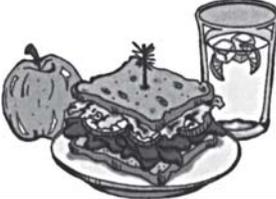
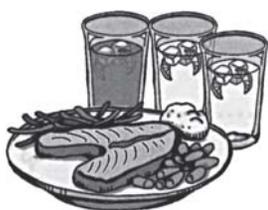
	Calories	Fat (grams)	% Fat
Breakfast			
• Whole wheat bread, 1 medium slice	70	1.2	15
• Jelly, regular, 2 tsp	30	0	0
• Cereal, shredded wheat, 1/2 cup	104	1	4
• Milk, 1% lowfat, 1 cup	102	3	26
• Orange juice, 3/4 cup	78	0	0
• Coffee, regular, 1 cup	5	0	0
Breakfast total	389	5.2	10
			
Lunch			
• Roast beef sandwich:			
Whole wheat bread, 2 medium slices	139	2.4	15
Lean roast beef, 2 oz	60	1.5	23
Lettuce, 1 leaf	1	0	0
Tomato, 3 medium slices	10	0	0
Mayonnaise, low calorie, 1 tsp	15	1.7	96
• Apple, 1 medium	80	0	0
• Water, 1 cup	0	0	0
Lunch total	305	5.6	16
			
Dinner			
• Salmon, 2 ounces	103	5	44
• Vegetable oil, 1 1/2 tsp	60	7	100
• Baked potato, 3/4 medium	100	0	0
• Margarine, 1 tsp	34	4	100
• Green beans, with margarine, 1/2 cup	52	2	4
• Carrots, 1/2 cup	35	0	0
• Milk, 1% lowfat, 1 cup	102	3	26
• Water, 2 cups	0	0	0
Dinner total	486	21	39
			
Snack			
• Popcorn, 2 1/2 cups, fat free	69	0	0
Total for the Day	1,249	32	23
			

Actual Calories	1,249
Total carbohydrate, % kcals	58
Total fat, % kcals	23
*Sodium, mg.	1,043
Saturated fat, % kcals	7
Cholesterol, mg	106
Protein, % kcals	19

Note: Calories have been rounded.
1,200: 100% RDA met for all nutrients except vitamin E 80%, vitamin B₂ 96%, vitamin B₆ 94%, calcium 98%, iron 63%, and zinc 73%.
 * No salt added in recipe preparation or as seasoning. Consume at least 32 ounces of water.

Figure 33. Traditional American Cuisine—1,600 Calories

(This menu is designed for weight management.)

	Calories	Fat (grams)	% Fat
Breakfast			
• Whole wheat bread, 1 medium slice	70	1.2	15
• Jelly, regular, 2 tsp	30	0	0
• Cereal, shredded wheat, 1 cup	207	2	8
• Milk, 1% lowfat, 1 cup	102	3	26
• Orange juice, 3/4 cup	78	0	0
• Coffee, regular, 1 cup	5	0	0
• Milk, 1% lowfat, 1 oz	10	0.3	27
Breakfast total	502	6.5	10
			
Lunch			
• Roast beef sandwich:			
Whole wheat bread, 2 medium slices	139	2.4	15
Lean roast beef, 2 oz	60	1.5	23
American cheese, lowfat and low sodium 1 slice, 3/4 oz	46	1.8	36
Lettuce, 1 leaf	1	0	0
Tomato, 3 medium slices	10	0	0
Mayonnaise, low calorie, 2 tsp	30	3.3	99
• Apple, 1 medium	80	0	0
• Water, 1 cup	0	0	0
Lunch total	366	9	22
			
Dinner			
• Salmon, 3 ounces	155	7	40
• Vegetable oil, 1 1/2 tsp	60	7	100
• Baked potato, 3/4 medium	100	0	0
• Margarine, 1 tsp	34	4	100
• Green beans, seasoned, with margarine, 1/2 cup	52	2	4
• Carrots, with margarine, 1/2 cup	52	2	4
• Dinner roll, 1 medium	80	3	33
• Milk, 1% lowfat, 1 cup	102	3	26
• Water, 2 cups	0	0	0
Dinner total	635	28	38
			
Snack			
• Popcorn, 2 1/2 cups	69	0	0
• Margarine, 1/2 tbsp	58	6.5	100
Total for the Day	1,630	50	28
			

Actual Calories	1,630
Total carbohydrate, % kcals	55
Total fat, % kcals	28
*Sodium, mg.	1,341
Saturated fat, % kcals	8
Cholesterol, mg	142
Protein, % kcals	19

Note: Calories have been rounded.

1,600: 100% RDA met for all nutrients except vitamin E 99%, iron 73%, and zinc 91%.

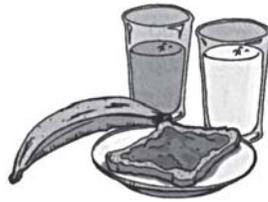
* No salt added in recipe preparation or as seasoning. Consume at least 32 ounces of water.

Figure 34. Asian American Cuisine—Reduced Calorie

(This menu is designed for weight management.)

Breakfast

- Banana
- Whole wheat bread
- Margarine
- Orange juice
- Milk, 1% lowfat



1,600 Calories **1,200 Calories**

1 small	1 small
2 slices	1 slice
1 tsp	1 tsp
3/4 cup	3/4 cup
3/4 cup	3/4 cup

Lunch

- Beef noodle soup, canned, low sodium
- Chinese noodle and beef salad:
 - Roast beef
 - Peanut oil
 - Soy sauce, low sodium
 - Carrots
 - Zucchini
 - Onion
 - Chinese noodles, soft type
- Apple
- Tea, unsweetened



1/2 cup	1/2 cup
3 oz	2 oz
1 1/2 tsp	1 tsp
1 tsp	1 tsp
1/2 cup	1/2 cup
1/2 cup	1/2 cup
1/4 cup	1/4 cup
1/4 cup	1/4 cup
1 medium	1 medium
1 cup	1 cup

Dinner

- Pork stir-fry with vegetables:
 - Pork cutlet
 - Peanut oil
 - Soy sauce, low sodium
 - Broccoli
 - Carrots
 - Mushrooms
- Steamed white rice
- Tea, unsweetened



2 oz	2 oz
1 tsp	1 tsp
1 tsp	1 tsp
1/2 cup	1/2 cup
1 cup	1/2 cup
1/4 cup	1/2 cup
1 cup	1/2 cup
1 cup	1 cup

Snack

- Almond cookies
- Milk, 1% lowfat

2 cookies	—
3/4 cup	3/4 cup



Actual Calories	1,609	Actual Calories	1,220
Total carbohydrate, % kcals	56	Total carbohydrate, % kcals	55
Total fat, % kcals	27	Total fat, % kcals	27
*Sodium, mg	1,296	*Sodium, mg	1,043
Saturated fat, % kcals	8	Saturated fat, % kcals	8
Cholesterol, mg	148	Cholesterol, mg	117
Protein, % kcals	20	Protein, % kcals	21

1,600: 100% RDA met for all nutrients except zinc 95%, iron 87%, and calcium 93%.

1,200: 100% RDA met for all nutrients except vitamin E 75%, calcium 84%, magnesium 98%, iron 66%, and zinc 77%.

* No salt added in recipe preparation or as seasoning. Consume at least 32 ounces of water.

Figure 35. Southern Cuisine—Reduced Calorie

(This menu is designed for weight management.)

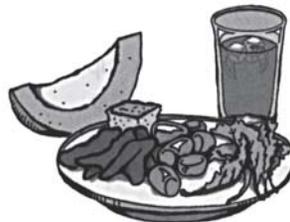
Breakfast	1,600 Calories	1,200 Calories
• Oatmeal, prepared with 1% milk, lowfat	1/2 cup	1/2 cup
• Milk, 1%, lowfat	1/2 cup	1/2 cup
• English muffin	1 medium	—
• Cream cheese, light, 18% fat	1 T	—
• Orange juice	3/4 cup	—
• Coffee	1 cup	1 cup
• Milk, 1% lowfat	1 oz	1 oz



Lunch	1,600 Calories	1,200 Calories
• Baked chicken, without skin	2 oz	2 oz
• Vegetable oil	1 tsp	1/2 tsp
• Salad:		
Lettuce	1/2 cup	1/2 cup
Tomato	1/2 cup	1/2 cup
Cucumber	1/2 cup	1/2 cup
• Oil and vinegar dressing	2 tsp	1 tsp
• White rice	1/2 cup	1/2 cup
• Margarine, diet	1/2 tsp	1/2 tsp
• Baking powder biscuit, prepared with vegetable oil	1 small	1/2 small
• Margarine	1 tsp	1 tsp
• Water	1 cup	1 cup



Dinner	1,600 Calories	1,200 Calories
• Lean roast beef	3 oz	2 oz
• Onion	1/4 cup	1/4 cup
• Beef gravy, water-based	1 T	1 T
• Turnip greens	1/2 cup	1/2 cup
• Margarine, diet	1/2 tsp	1/2 tsp
• Sweet potato, baked	1 small	1 small
• Margarine, diet	1/2 tsp	1/4 tsp
• Ground cinnamon	1 tsp	1 tsp
• Brown sugar	1 tsp	1 tsp
• Corn bread prepared with diet margarine	1/2 medium slice	1/2 medium slice
• Honeydew melon	1/4 medium	1/8 medium
• Iced tea, sweetened with sugar	1 cup	1 cup



Snack	1,600 Calories	1,200 Calories
• Saltine crackers, unsalted tops	4 crackers	4 crackers
• Mozzarella cheese, part skim, low sodium	1 oz	1 oz



Actual Calories	1,653	Actual Calories	1,225
Total carbohydrate, % kcals	53	Total carbohydrate, % kcals	50
Total fat, % kcals	28	Total fat, % kcals	31
*Sodium, mg	1,231	*Sodium, mg	867
Saturated fat, % kcals	8	Saturated fat, % kcals	9
Cholesterol, mg	172	Cholesterol, mg	142
Protein, % kcals	20	Protein, % kcals	21

1,600: 100% RDA met for all nutrients except vitamin E 97%, magnesium 98%, iron 78%, and zinc 90%.

1,200: 100% RDA met for all nutrients except vitamin E 82%, vitamin B₁ & B₂ 95%, vitamin B₃ 99%, vitamin B₆ 88%, magnesium 83%, iron 56%, and zinc 70%.

* No salt added in recipe preparation or as seasoning.

Consume at least 32 ounces of water.

Figure 36. Mexican American Cuisine—Reduced Calorie

(This menu is designed for weight management.)

Breakfast	1,600 Calories	1,200 Calories
• Cantaloupe	1 cup	1/2 cup
• Farina, prepared with 1% lowfat milk	1/2 cup	1/2 cup
• White bread	1 slice	1 slice
• Margarine	1 tsp	1 tsp
• Jelly	1 tsp	1 tsp
• Orange juice	1 1/2 cup	3/4 cup
• Milk, 1% lowfat	1/2 cup	1/2 cup
		
Lunch		
• Beef enchilada:		
Tortilla, corn	2 tortillas	2 tortillas
Lean roast beef	2 1/2 oz	2 oz
Vegetable oil	2/3 tsp	2/3 tsp
Onion	1 T	1 T
Tomato	4 T	4 T
Lettuce	1/2 cup	1/2 cup
Chili peppers	2 tsp	2 tsp
Refried beans, prepared with vegetable oil	1/4 cup	1/4 cup
• Carrots	5 sticks	5 sticks
• Celery	6 sticks	6 sticks
• Milk, 1% lowfat	1/2 cup	—
• Water	—	1 cup
		
Dinner		
• Chicken taco:		
Tortilla, corn	1 tortilla	1 tortilla
Chicken breast, without skin	2 oz	1 oz
Vegetable oil	2/3 tsp	2/3 tsp
Cheddar cheese, lowfat and low sodium	1 oz	1/2 oz
Guacamole	2 T	1 T
Salsa	1 T	1 T
Corn, seasoned with	1/2 cup	1/2 cup
Margarine	1/2 tsp	—
• Spanish rice without meat	1/2 cup	1/2 cup
• Banana	1 large	1/2 large
• Coffee	1 cup	1/2 cup
• Milk, 1% lowfat	1 oz	1 oz
		
Actual Calories	1,638	1,239
Total carbohydrate, % kcals . . .	56	58
Total fat, % kcals	27	26
*Sodium, mg	1,616	1,364
Saturated fat, % kcals	9	8
Cholesterol, mg	143	91
Protein, % kcals	20	19

1,600: 100% RDA met for all nutrients except vitamin E 97% and zinc 84%.

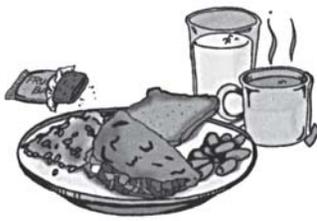
1,200: 100% RDA met for all nutrients except vitamin E 71%, vitamin B₁ & B₃ 91%, vitamin B₂ & iron 90%, and calcium 92%.

* No salt added in recipe preparation or as seasoning.

Consume at least 32 ounces of water.

Figure 37. Lacto-Ovo Vegetarian Cuisine—Reduced Calorie

(This menu is designed for weight management.)

Breakfast	1,600 Calories	1,200 Calories
• Orange	1 medium	1 medium
• Pancakes, made with 1% lowfat milk and eggs whites	3 4" circles	2 4" circles
• Pancake syrup, light	2 T	1 T
• Margarine, diet	1½ tsp	1½ tsp
• Milk, 1% lowfat	1 cup	½ cup
• Coffee	1 cup	1 cup
• Milk, 1% lowfat	1 oz	1 oz
		
Lunch		
• Vegetable soup, canned, low sodium	1 cup	½ cup
• Bagel	1 medium	½ medium
• Processed american cheese, lowfat	¾ oz	--
• Spinach salad:		
Spinach	1 cup	1 cup
Mushrooms	½ cup	½ cup
• Salad dressing, regular calorie	2 tsp	2 tsp
• Apple	1 medium	1 medium
• Iced tea, unsweetened	1 cup	1 cup
		
Dinner		
• Omelette:		
Egg whites	4 large eggs	4 large eggs
Green pepper	2 T	2 T
Onion	2 T	2 T
Mozzarella cheese, made from part skim milk, low sodium	1 oz	½ oz
• Vegetable oil	1 T	½ T
• Brown rice, with	½ cup	½ cup
Margarine, diet	½ tsp	½ tsp
• Carrots, with	½ cup	½ cup
Margarine, diet	½ tsp	½ tsp
• Whole wheat bread	1 slice	1 slice
• Margarine, diet	1 tsp	1 tsp
• Fig bar cookie	1 bar	1 bar
• Tea	1 cup	1 cup
• Honey	1 tsp	1 tsp
• Milk, 1% lowfat	¾ cup	¾ cup
		

Actual Calories 1,650

Total carbohydrate, % kcals . . . 56

Total fat, % kcals 27

*Sodium, mg 1,829

Saturated fat, % kcals 8

Cholesterol, mg 82

Protein, % kcals 19

Actual Calories 1,205

Total carbohydrate, % kcals . . . 60

Total fat, % kcals 25

*Sodium, mg 1,335

Saturated fat, % kcals 7

Cholesterol, mg 44

Protein, % kcals 18

1,600: 100% RDA met for all nutrients except vitamin E 92%, vitamin B₃ 97%, vitamin B₆ 67%, iron 73%, and zinc 68%.

1,200: 100% RDA met for all nutrients except vitamin E 75%, vitamin B₁ 92%, vitamin B₃ 69%, vitamin B₆ 59%, iron 54%, and zinc 46%.

* No salt added in recipe preparation or as seasoning.

Consume at least 32 ounces of water.

Weight Management Chart

You can't drive a car if you can't see where you are going. You can't control your weight if you can't see where it's going. An important behavior change is to keep a visual record of your weight, along with your physical activity habits. Beginning now, weigh yourself every day and record each day's weight and minutes of physical activity using the Weight Management Chart shown in Figure 38 on page 143. An example of a completed chart is shown below. Weigh yourself at the same time under the same conditions every day. The bottom horizontal lines show the days of the month. The vertical lines on the left side will show a range of your weights, while the vertical lines on the right side will show the minutes of physical activity.

Chart Your Weight

Write in your first weight on the third line from the top of the graph on the left side. List successive weights up and down from there, one pound per line. Each day go up the line above that day until you are on the same horizontal line as your weight that day, and mark the spot with a dot. Connect the dots with a solid line.

Chart Your Physical Activity

Do the same for physical activity. Write in 5 minutes of physical activity on the first line from the bottom of the graph on the right side. List additional minutes of activity up from there using 5 minute intervals. Each day go up the line above that day until you are on the same horizontal line as your physical activity for that day, and mark the spot with a dot. Connect the dots with a solid line.

See Your Success

The beginning of a weight loss program is when weight graphing is most fun—a good time to start the habit. Your graph will show ups and downs because of changes in fluid balance and differences in fluid intake from day to day. You will learn to understand these variations and use the overall trend to guide your weight control plan. Post the graph near your scale or on your refrigerator as a reminder of your progress.

Weigh yourself at the same time under the same conditions every day. The bottom horizontal lines show the days of the month. The vertical lines on the left side will show a range of your weights, while the vertical lines on the right side will show the minutes of physical activity.

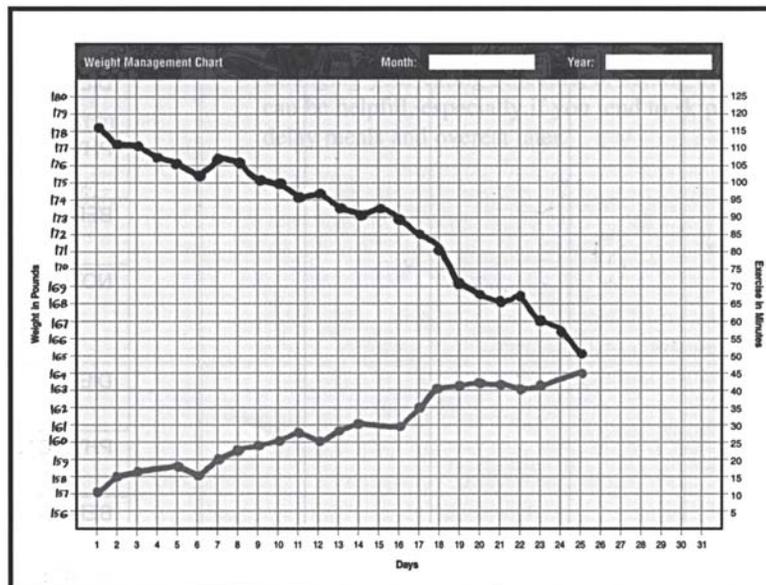


Figure 38. Weight Management Chart

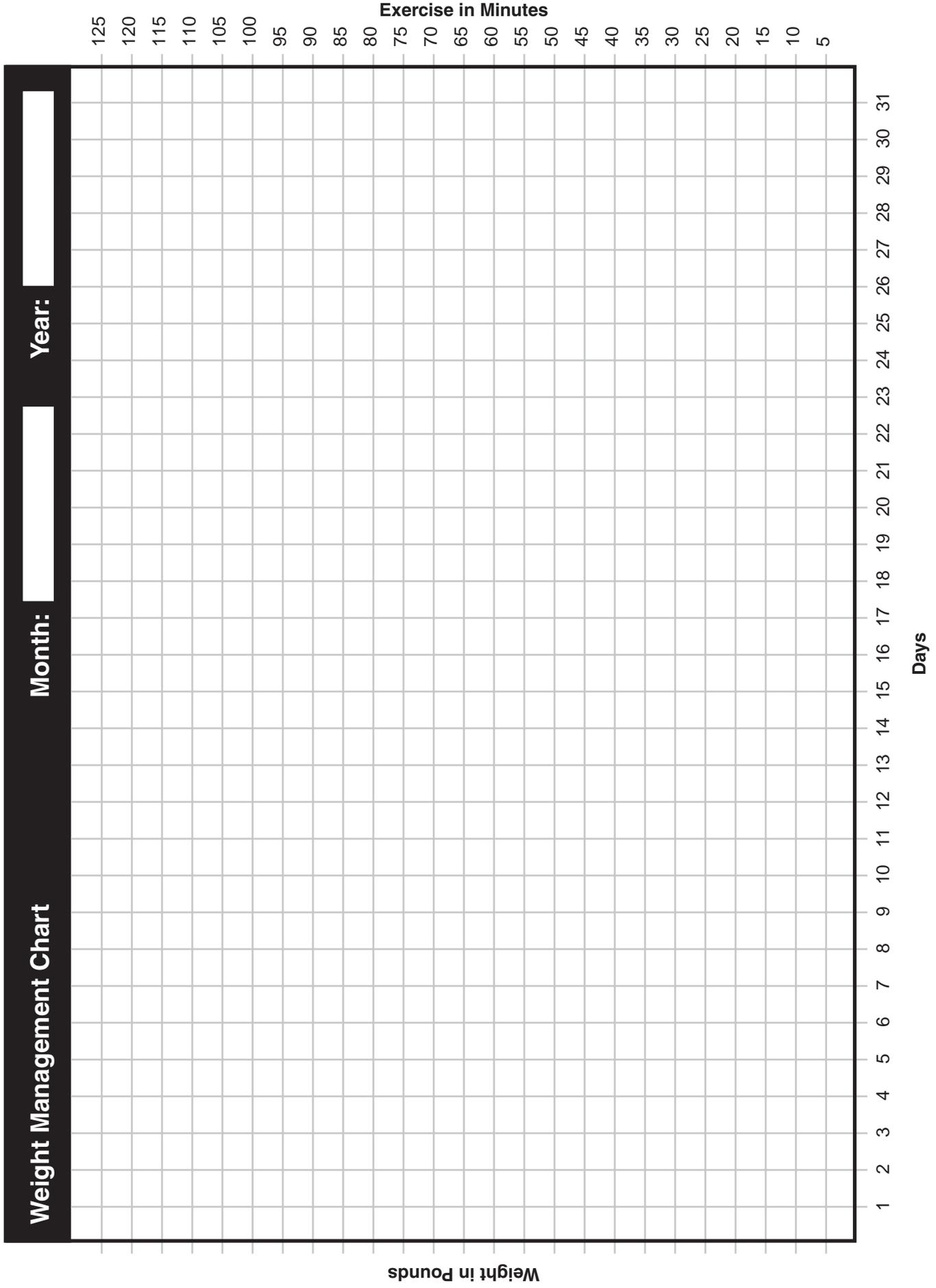


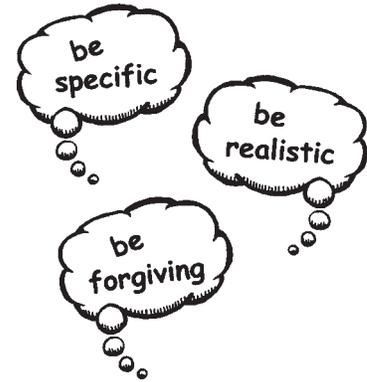
Figure 39. Weekly Food and Activity Diary

Weekly Food and Activity Diary		Week of: <input type="text"/>						
		Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Breakfast								
Lunch								
Snacks								
Dinner								
Activity								

Guide to Behavior Change¹

Set the Right Goals

Setting the right goals is an important first step. If your health care provider suggests an initial weight loss goal that seems too ambitious for you, please understand that your health can be greatly improved by a loss of 5 percent to 10 percent of your starting weight. That doesn't mean you have to stop there, but it does mean that an initial goal of 5 to 10 percent below your starting weight is both realistic and valuable. Most people who are trying to lose weight focus on one thing: weight loss. However, focusing on dietary and exercise changes that will lead to permanent weight loss is much more productive. People who are successful at managing their weight set only two to three goals at a time.



Effective goals are specific, realistic, and forgiving. For example:

“Exercise more” is a fine goal, but it’s not specific enough.

“Walk 5 miles every day” is specific and measurable, but is it achievable if you’re just starting out?

“Walk 30 minutes every day” is more attainable, but what happens if you’re held up at work one day and there’s a thunderstorm during your walking time on another day?

“Walk 30 minutes, 5 days each week” is specific, achievable, and forgiving. A great goal!

Nothing Succeeds Like Success

Shaping is a technique where you set some short-term goals that get you closer and closer to the ultimate goal (e.g., reduce fat from 40 percent of calories to 35 percent of calories, and ultimately to 30 percent). It is based on the concept that “nothing succeeds like success.” Shaping uses two important behavioral principles:

- Continuous goals that move you ahead in small steps to reach a distant point.
- Continuous rewards to keep you motivated to make changes.



1. The text and graphics in this section were adapted from *The Practical Guide: Identification, Evaluation, and Treatment of Overweight and Obesity in Adults* published by the National Heart, Lung, and Blood Institute, National Institutes of Health, US Department of Health and Human Services, NIH Publication No. 00-4084, October 2000.

Reward Success (But Not With Food)

Rewards that you control can encourage achievement of your goals, especially ones that have been hard to reach. An effective reward is something that is desirable, timely, and dependent upon meeting your goal. The rewards you choose may be material (e.g., a movie, music CD, or payment toward buying a larger item) or an act of self-kindness (e.g., an afternoon off from work, a massage, or personal time). Frequent, small rewards earned for meeting smaller goals are more effective than bigger rewards, requiring a long, difficult effort.

Balance Your (Food) Checkbook



Self-monitoring refers to observing and recording some aspect of your behavior, such as calorie intake, servings of fruits and vegetables eaten, and amount of physical activity, etc., or an outcome of these behaviors, such as weight. Self-monitoring of a behavior can be used at times when you're not sure of how you are doing, and at times when you want the behavior to improve. Self-monitoring of a behavior usually moves you closer to the desired behavior. When you

record your behavior, you produce real-time records for you and your health care provider to discuss. For example, keeping a record of your exercise can let you and your health care provider know quickly how you are doing. When your record shows that your exercise is increasing, you'll be encouraged to keep it up. Some individuals find that standard self-monitoring forms make it easier, while others like their own recording system. Use the Weekly Food and Activity Diary form shown in Figure 39 on page 144 to help you keep track of your daily food intake and activity levels.

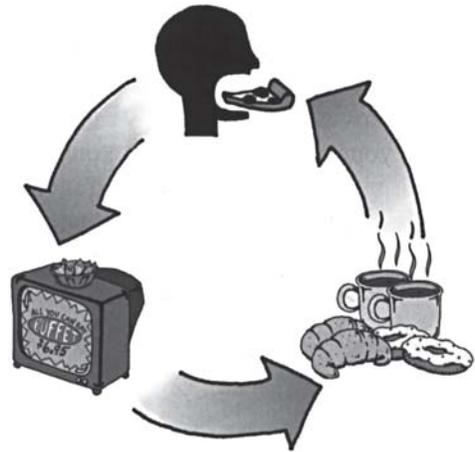
Regular monitoring of your weight is key to keeping it off. Remember these four points if you are keeping a weight chart or graph:

- One day's diet and exercise routine won't necessarily affect your weight the next day. Your weight will change quite a bit over the course of a few days because of fluctuations in water and body fat.
- Try to weigh yourself at a set time of day. This can be when you first wake up and before eating and drinking, after exercise, or right before dinner, etc.
- Whatever time you choose, just make sure it is always the same time and use the same scale to help you keep the most accurate records.
- It may also be helpful to create a graph of your weight as a visual reminder of how you're doing, rather than just listing numbers.



Avoid a Chain Reaction

Stimulus (cue) control involves learning what social or environmental cues encourage undesired eating, and then changing those cues. For example, you may learn from your self-monitoring techniques or from sessions with your health care provider that you're more likely to overeat when watching TV, when treats are on display by the office coffee pot, or when around a certain friend.



Ways to change the situation include:

- Separating the association of eating from the cue (Don't eat while watching television.)
- Avoiding or eliminating the cue (Leave the coffee room immediately after pouring coffee.) (Not purchasing high calorie snacks that are visible when you open a cupboard door or refrigerator.)
- Changing the environment (Plan to meet this friend in a nonfood setting.)

In general, visible and reachable food items often lead to unplanned eating.

Get the (Fullness) Message

Changing the way you eat can help you to eat less and not feel deprived.

- Eating slowly will help you to feel satisfied when you've eaten the right amount of food for you. It takes 15 or more minutes for your brain to get the message you've been fed. Slowing the rate of eating can allow you to feel full sooner and, therefore, help you eat less.
- Eating lots of vegetables and fruits and also starting a meal with a broth-based soup can help you feel fuller.
- Using smaller plates helps to moderate portions so they don't appear too small.
- Drinking at least eight glasses of water each day will help you to feel full, possibly eat less, and benefit you in other ways.
- Changing your eating schedule, or setting one, can be helpful, especially if you tend to skip or delay meals and overeat later.



Eating Healthy Foods Away From Home¹

Nowadays, a large number of meals are eaten away from home. It is important that individuals be careful when selecting foods when away from home—they can eat healthfully, if they know how. The following tips will help individuals move toward healthier eating.

General Tips for Healthy Dining Out

As a customer:

- Ask for what you want. Many restaurants will honor the requests that are made.
- Ask questions. Don't be intimidated by the menu—the server should be able to tell you how foods are prepared or suggest substitutions on the menu.
- If you wish to reduce portion sizes, try ordering appetizers as the main meal or split a large entree with a friend.
- Limiting calories and fat can be easy as long as you know what to order. Ask the restaurant whether they would, on request, do the following:
 - Serve fat free milk rather than whole milk or cream.
 - Tell you the type of cooking oil used.
 - Trim visible fat off poultry or meat.
 - Leave all butter, gravy, or sauces off a side dish or entree.
 - Serve salad dressing on the side.
 - Accommodate special requests.



Above all, customers should not get discouraged. There are usually several healthy choices to choose from at most restaurants.

1. This section was adapted from *The Practical Guide: Identification, Evaluation, and Treatment of Overweight and Obesity in Adults* published by the National Heart, Lung, and Blood Institute, National Institutes of Health, US Department of Health and Human Services, NIH Publication No. 00-4084, October 2000.

Reading the Menu

- Choose lower calorie, low fat cooking methods. Look for terms such as: steamed in its own juice (au jus), garden fresh, broiled, baked, roasted, poached, tomato juice, dry boiled (in wine or lemon juice), or lightly sautéed.
- Be aware of foods high in calories, fat, and saturated fat. Watch out for terms such as butter sauce, fried, crispy, creamed, in cream or cheese sauce, au gratin, escalloped, parmesan, hollandaise, bearnaise, marinated (in oil), stewed, basted, sautéed, stir-fried, casserole, hash, prime, pot pie, and pastry crust.

Specific Tips for Healthy Choices

Breakfast

- Fresh fruit or small glass of fruit juice.
- Whole grain bread, bagel, or English muffin with jelly or honey and little or no butter or margarine.
- Whole grain cereal with lowfat (1%) milk or fat free milk.
- Oatmeal with fat free milk topped with fruit.
- Omelet or scrambled egg made with egg whites or egg substitute, boiled egg.
- Multigrain pancakes or waffles without butter on top.
- Fat free yogurt. (Try adding cereal or fresh fruit.)

Beverages

- Fat free milk.
- 100% fruit juice.
- Water with lemon and ice.
- Flavored sparkling water (non caloric).
- Juice spritzer (half fruit juice and half sparkling water).
- Iced tea without added sugar.
- Tomato juice (reduced sodium).

Bread

Most bread and bread sticks are low in calories and low in fat, unless coated in butter or oil. The calories add up when butter, margarine, or olive oil are added. Also, eating a lot of bread in addition to the meal will add extra unwanted calories and not leave enough room for fruits and vegetables.

Appetizers

- Steamed seafood.
- Shrimp* cocktail. (Limit cocktail sauce—it's high in sodium.)
- Melons or fresh fruit.
- Bean soups.
- Salad with reduced fat dressing. (Or, add lemon juice or vinegar.)

*If on a cholesterol-lowering diet, eat shrimp and other shellfish in moderation.

Entree

- Lean meat, poultry, fish, shellfish, and vegetable dishes that are baked or broiled without added fat.
- Pasta with red sauce or with vegetables (primavera)—not cream or alfredo sauces.
- Look for terms such as: baked, broiled, steamed, poached, lightly sauteed, or stir-fried.
- Ask for sauces and dressings on the side.
- Limit the amount of butter, margarine, and salt you use at the table.

Salads/Salad Bars

- Fresh greens, lettuce, and spinach.
- Fresh vegetables—tomato, mushroom, carrots, cucumber, peppers, onion, radishes, and broccoli.
- Beans, chickpeas, and kidney beans.
- Skip the non-vegetable choices: deli meats, bacon, egg, cheese, croutons.
- Choose lower calorie, reduced fat, or fat free dressing, lemon juice, or vinegar.

Side Dish

- Vegetables and starches (rice, potato, noodles) make good additions to meals and can also be combined for a lower calorie alternative to higher calorie entrees.
- Ask for side dishes without butter or margarine.
- Ask for mustard, salsa, or lowfat yogurt instead of sour cream or butter.

Dessert/Coffee

- Fresh fruit.
- Nonfat frozen yogurt.
- Sherbet or fruit sorbet. (These are usually fat free, but check the calorie content.)
- Ask for lowfat milk for your coffee (instead of cream or half-and-half).

Congratulations! You have just finished your study of the Basic Nutrition Module.





Self-
Check



Basic Nutrition
Module

 **GO TO** the *Workbook for the Basic Nutrition Module* and complete *Self-Check Questions 120–125* right now. Then, immediately check your answers against the *Answer Key to the Self-Check Questions* (contained in your workbook) before proceeding to the next section of the module. **After completing Self-Check Questions 120-125,**

 **GO TO** the “*Practical Activity for the Performance Objectives*,” which is in your *Workbook for the Basic Nutrition Module*. It follows the *Answer Key to the Self-Check Questions*. Do this *Practical Activity* according to the instructions provided.

Appendix A

Dietary Reference Intakes for Vitamins: Recommended Intakes for Individuals

Life Stage Group	Vitamin A (µg/d) ^a	Vitamin C (mg/d)	Vitamin D (µg/d) ^{b,c}	Vitamin E (µg/d) ^d	Vitamin K (µg/d)	Thiamin (mg/d)	Riboflavin (mg/d)
Infants							
0-6 mo	400*	40*	5*	4*	2.0*	0.2*	0.3*
7-12 mo	500*	50*	5*	5*	2.5*	0.3*	0.4*
Children							
1-3 y	300	15	5*	6	30*	0.5	0.5
4-8 y	400	25	5*	7	55*	0.6	0.6
Males							
9-13 y	600	45	5*	11	60*	0.9	0.9
14-18 y	900	75	5*	15	75*	1.2	1.3
19-30 y	900	90	5*	15	120*	1.2	1.3
31-50 y	900	90	5*	15	120*	1.2	1.3
51-70 y	900	90	10*	15	120*	1.2	1.3
> 70 y	900	90	15*	15	120*	1.2	1.3
Females							
9-13 y	600	45	5*	11	60*	0.9	0.9
14-18 y	700	65	5*	15	75*	1.0	1.0
19-30 y	700	75	5*	15	90*	1.1	1.1
31-50 y	700	75	5*	15	90*	1.1	1.1
51-70 y	700	75	10*	15	90*	1.1	1.1
> 70 y	700	75	15*	15	90*	1.1	1.1
Pregnancy							
14-18 y	750	80	5*	15	75*	1.4	1.4
19-30 y	770	85	5*	15	90*	1.4	1.4
31-50 y	770	85	5*	15	90*	1.4	1.4
Lactation							
14-18 y	1,200	115	5*	19	75*	1.4	1.4
19-30 y	1,300	120	5*	19	90*	1.4	1.4
31-50 y	1,300	120	5*	19	90*	1.4	1.4

Note: This table (taken from the DRI reports, see www.nap.edu) presents Recommended Dietary Allowances (RDAs) in **bold type** and Adequate Intakes (AIs) in ordinary type followed by an asterisk (*). An RDA is the average daily dietary intake level sufficient to meet the nutrient requirements of nearly all (97-98 percent) healthy individuals in a group. It is calculated from an Estimated Average Requirement (EAR). If sufficient scientific evidence is not available to establish an EAR, and thus calculate an RDA, an AI is usually developed. For healthy breastfed infants, the AI is the mean intake. The AI for other life stage and gender groups is believed to cover the needs of all healthy individuals in the group, but lack of data or uncertainty in the data prevent being able to specify with confidence the percentage of individuals covered by this intake.

a As retinol activity equivalents (RAEs). 1 RAE = 1 µg retinol, 12 µg β-carotene, 24 µg α-carotene, or 24 µg β-cryptoxanthin in foods. The RAE for dietary provitamin A carotenoids is two-fold greater than retinol equivalents (RE), whereas the RAE for preformed vitamin A is the same as RE.

b As cholecalciferol. 1 µg of cholecalciferol = 40 IU of vitamin D.

c In the absence of adequate exposure to sunlight.

d As α-tocopherol. α-Tocopherol includes *RRR*-α-tocopherol, the only form of α-tocopherol that occurs naturally in foods, and the *2R*-stereoisometric forms of α-tocopherol (*RRR*-, *RSR*-, *RRS*-, and *RSS*-α-tocopherol) that occur in fortified foods and supplements. It does not include the *2S*-stereoisomeric forms of α-tocopherol (*SRR*-, *SSR*-, *SRS*-, and *SSS*-α-tocopherol), also found in fortified foods and supplements.

Appendix A (continued)

Dietary Reference Intakes for Vitamins: Recommended Intakes for Individuals

Life Stage Group	Niacin (mg/d) ^e	Vitamin B ₆ (mg/d)	Folate (μg/d) ^f	Vitamin B ₁₂ (μg/d)	Pantothenic Acid (mg/d)	Biotin (μg/d)	Choline (mg/d) ^g
Infants							
0-6 mo	2*	0.1*	65*	0.4*	1.7*	5*	125*
7-12 mo	4*	0.3*	80*	0.5*	1.8*	6*	150*
Children							
1-3 y	6	0.5	150	0.9	2*	8*	200*
4-8 y	8	0.6	200	1.2	3*	12*	250*
Males							
9-13 y	12	1.0	300	1.8	4*	20*	375*
14-18 y	16	1.3	400	2.4	5*	25*	550*
19-30 y	16	1.3	400	2.4	5*	30*	550*
31-50 y	16	1.3	400	2.4	5*	30*	550*
51-70 y	16	1.7	400	2.4 ^h	5*	30*	550*
> 70 y	16	1.7	400	2.4 ^h	5*	30*	550*
Females							
9-13 y	12	1.0	300	1.8	4*	20*	375*
14-18 y	14	1.2	400 ⁱ	2.4	5*	25*	400*
19-30 y	14	1.3	400 ⁱ	2.4	5*	30*	425*
31-50 y	14	1.3	400 ⁱ	2.4	5*	30*	425*
51-70 y	14	1.5	400	2.4 ^h	5*	30*	425*
> 70 y	14	1.5	400	2.4 ^h	5*	30*	425*
Pregnancy							
14-18 y	18	1.9	600 ^j	2.6	6*	30*	450*
19-30 y	18	1.9	600 ^j	2.6	6*	30*	450*
31-50 y	18	1.9	600 ^j	2.6	6*	30*	450*
Lactation							
14-18 y	17	2.0	500	2.8	7*	35*	550*
19-30 y	17	2.0	500	2.8	7*	35*	550*
31-50 y	17	2.0	500	2.8	7*	35*	550*

e As niacin equivalents (NE). 1 mg of niacin = 60 mg of tryptophan; 0–6 months = preformed niacin (not NE).

f As dietary folate equivalents (DFE). 1 DFE = 1 μg of food folate = 0.6 μg of folic acid from fortified food or as a supplement consumed with food = 0.5 μg of a supplement taken on an empty stomach.

g Although AIs have been set for choline, there are few data to assess whether a dietary supply of choline is needed at all stages of the life cycle, and it may be that the choline requirement can be met by endogenous synthesis at some of these stages.

h Because 10 to 30 percent of older people may malabsorb B₁₂, it is advisable for those older than 50 years to meet their RDA mainly by consuming foods fortified with B₁₂ or a supplement containing B₁₂.

i In view of evidence linking folate intake with neural tube defects in the fetus, it is recommended that all women capable of becoming pregnant consume 400 μg from supplements or fortified foods in addition to intake of food folate from a varied diet.

j It is assumed that women will continue consuming 400 μg from supplements or fortified food until their pregnancy is confirmed and they enter prenatal care, which ordinarily occurs after the end of the periconceptual period—the critical time for formation of the neural tube.

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Appendix B

Dietary Reference Intakes for Minerals: Recommended Intakes for Individuals

Life Stage Group	Calcium (mg/d)	Chromium (µg/d)	Copper (µg/d)	Fluoride (mg/d)	Iodine (µg/d)	Iron (mg/d)	Magnesium (mg/d)
Infants							
0-6 mo	210*	0.2*	200*	0.01*	110*	0.27*	30*
7-12 mo	270*	5.5*	220*	0.5*	130*	11	75*
Children							
1-3 y	500*	11*	340	0.7*	90	7	80
4-8 y	800*	15*	440	1*	90	10	130
Males							
9-13 y	1,300*	25*	700	2*	120	8	240
14-18 y	1,300*	35*	890	3*	150	11	410
19-30 y	1,000*	35*	900	4*	150	8	400
31-50 y	1,000*	35*	900	4*	150	8	420
51-70 y	1,200*	30*	900	4*	150	8	420
> 70 y	1,200*	30*	900	4*	150	8	420
Females							
9-13 y	1,300*	21*	700	2*	120	8	240
14-18 y	1,300*	24*	890	3*	150	15	360
19-30 y	1,000*	25*	900	3*	150	18	310
31-50 y	1,000*	25*	900	3*	150	18	320
51-70 y	1,200*	20*	900	3*	150	8	320
> 70 y	1,200*	20*	900	3*	150	8	320
Pregnancy							
14-18 y	1,300*	29*	1,000	3*	220	27	400
19-30 y	1,000*	30*	1,000	3*	220	27	350
31-50 y	1,000*	30*	1,000	3*	220	27	360
Lactation							
14-18 y	1,300*	44*	1,300	3*	290	10	360
19-30 y	1,000*	45*	1,300	3*	290	9	310
31-50 y	1,000*	45*	1,300	3*	290	9	320

Note: This table presents Recommended Dietary Allowances (RDAs) in **bold type** and Adequate Intakes (AIs) in ordinary type followed by an asterisk (*). RDAs and AIs may both be used as goals for individual intake. RDAs are set to meet the standards of almost all (97 to 98 percent) individuals in a group. For healthy breastfed babies, the AI is the mean intake. The AI for other life stage and gender groups is believed to cover needs of all individuals in the group, but lack of data or uncertainty in the data prevent being able to specify with confidence the percentage of individuals covered by this intake.

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Appendix B (continued)

Dietary Reference Intakes for Minerals: Recommended Intakes for Individuals

Life Stage Group	Manganese (mg/d)	Molybdenum (µg/d)	Phosphorus (mg/d)	Selenium (µg/d)	Zinc (mg/d)	Potassium (mg/d)	Sodium (mg/d)	Chloride (g/d)
Infants								
0-6 mo	0.003*	2*	100*	15*	2*	0.4*	0.12*	0.18*
7-12 mo	0.6*	3*	275*	20*	3	0.7*	0.37*	0.57*
Children								
1-3 y	1.2*	17	460	20	3	3.0*	1.0*	1.5*
4-8 y	1.5*	22	500	30	5	3.8*	1.2*	1.9*
Males								
9-13 y	1.9*	34	1,250	40	8	4.5*	1.5*	2.3*
14-18 y	2.2*	43	1,250	55	11	4.7*	1.5*	2.3*
19-30 y	2.3*	45	700	55	11	4.7*	1.5*	2.3*
31-50 y	2.3*	45	700	55	11	4.7*	1.5*	2.3*
51-70 y	2.3*	45	700	55	11	4.7*	1.3*	2.0*
> 70 y	2.3*	45	700	55	11	4.7*	1.2*	1.8*
Females								
9-13 y	1.6*	34	1,250	40	8	4.5*	1.5*	2.3*
14-18 y	1.6*	43	1,250	55	9	4.7*	1.5*	2.3*
19-30 y	1.8*	45	700	55	8	4.7*	1.5*	2.3*
31-50 y	1.8*	45	700	55	8	4.7*	1.5*	2.3*
51-70 y	1.8*	45	700	55	8	4.7*	1.3*	2.0*
> 70 y	1.8*	45	700	55	8	4.7*	1.2*	1.8*
Pregnancy								
14-18 y	2.0*	50	1,250	60	12	4.7*	1.5*	2.3*
19-30 y	2.0*	50	700	60	11	4.7*	1.5*	2.3*
31-50 y	2.0*	50	700	60	11	4.7*	1.5*	2.3*
Lactation								
14-18 y	2.6*	50	1,250	70	13	5.1*	1.5*	2.3*
19-30 y	2.6*	50	700	70	12	5.1*	1.5*	2.3*
31-50 y	2.6*	50	700	70	12	5.1*	1.5*	2.3*

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Additional Resources

Nutrition.gov provides easy access to the best food and nutrition information from across the federal government. It serves as a gateway to reliable information on nutrition, healthy eating, physical activity, and food safety for consumers, educators and health professionals.

Healthfinder.gov was developed by the U.S. Department of Health & Human Services, healthfinder® links to carefully selected information and websites from over 1,500 health-related organizations.

American Diabetes Association

ATTN: National Call Center
1701 North Beauregard Street
Alexandria, VA 22311
1-800-DIABETES
www.diabetes.org

American Dietetic Association

120 South Riverside Plaza, Suite 2000
Chicago, IL 60606-6995
1-800-877-1600
www.eatright.org

American Obesity Association

1250 24th Street, NW, Suite 300
Washington, DC 20037
202-776-7711
www.obesity.org

U.S. Department of Agriculture Center for Nutrition Policy and Promotion

3101 Park Center Drive, 10th floor
Alexandria, VA 22302-1594
(703) 305-7600
www.cnpp.usda.gov

Food and Nutrition Service

3101 Park Center Drive
Alexandria, VA 22302-1594
www.fns.usda.gov

U.S. Department Health & Human Services Administration on Aging

Washington, DC 21201
(202) 619-0724
www.aoa.gov

U.S. Department Health & Human Services (continued)

Centers for Disease Control & Prevention

1600 Clifton Road
Atlanta, GA 30333
(404) 639-3534
1-800-311-3435
www.cdc.gov

Food & Drug Administration

5600 Fishers Lane
Rockville, MD 20857-0001
1-888-INFO-FDA or 1-888-463-6332
www.fda.gov

National Breastfeeding Helpline

1-800-994-9662
www.womenshealth.gov/breastfeeding

National Cancer Institute

NCI Public Inquiries Office
6116 Executive Blvd., Room 3036A
Bethesda, MD 20892-8322
1-800-4-CANCER or 1-800-422-6237
www.cancer.gov

National Heart, Lung, & Blood Institute Health Information Center

P.O. Box 30105
Bethesda, MD 20824-0105
(301)592-8573
www.nhlbi.nih.gov

National Institute of Diabetes & Digestive & Kidney Diseases

National Institutes of Health
Building 31, Room 9A04
31 Center Drive, MSC 2560
Bethesda, MD 20892-2560
www.niddk.nih.gov/index.htm

National Institute on Alcohol Abuse & Alcoholism

5635 Fishers Lane, MSC9304
Bethesda, MD 20892-9304
www.niaaa.nih.gov

National Women's Health Information Center

1-800-994-9662
www.womenshealth.gov

National Institutes of Health Osteoporosis and Related Bone Diseases National Resource Center

2 AMS Circle, Bethesda, MD 20892-3676
1-800-624-BONE or 202-223-0344



Florida Department of Health
Bureau of WIC and Nutrition Services

