

CONCEPT CHECK: SOLUTIONS

CHAPTER 1

Concept Check 1.1

1. What are the factors that influence our food choices?

Hunger and appetite influence our food choices. Factors such as flavor, appearance, and texture; early influences, routines, and habits; advertising and restaurant menus; economics and convenience; seeking emotional comfort; social changes; and hopefully, nutrition and health concerns, also greatly influence our food choices. North Americans probably respond more to external, appetite related forces than to hunger-related ones in choosing when and what to eat.

2. How do hunger and appetite differ in the way they influence our desire to eat?

Hunger is the primarily physical or internal desire to find and eat food. Fulfilling it creates satiety—no further desire to eat exists. Food intake is also affected by appetite-related (external) forces like social customs, time of day, and being with others.

3. What factors influence satiety?

Satiety is influenced by hunger-related (internal) signals from the brain and other organs, as well as the content of the foods in the meal.

Concept Check 1.2

1. How do we define nutrition?

Nutrition is the study of food and nutrients—their digestion, absorption, and metabolism, and their effect on health and disease.

2. What are the three leading causes of death for which diet plays a part?

Cardiovascular (heart) disease, including hypertension and stroke; some forms of cancer; and diabetes are life-threatening chronic diseases for which a poor diet is known to be a risk factor and which account for two-thirds of all deaths in North America.

Concept Check 1.3

1. What are the six classes of nutrients?

Food contains the vital nutrients essential for good health: carbohydrates, lipids (fats and oils), proteins, vitamins, minerals, and water.

2. What are the three general functions of nutrients in the body?

Nutrients have three general functions in the body: (1) to provide materials for building and maintaining the body; (2) to act as regulators for key metabolic reactions; and (3) to participate in metabolic reactions that provide the energy necessary to sustain life.

Concept Check 1.4

1. What are the energy (calorie) values for each of the “energy nutrients”?

A common unit of measurement for energy is the kilocalorie (kcal). On average, carbohydrates and protein provide 4 kcal per gram of energy to the body, while lipids provide 9 kcal per gram. Although not considered a nutrient, alcohol provides about 7 kcal per gram. The other classes of nutrients (vitamins, minerals, and water) do not supply calories but are essential for proper body functioning.

Concept Check 1.5

1. What are the six steps used in the scientific method?

Step 1 of the scientific method is the observation of a natural phenomenon and asking questions about it. In Step 2, scientists generate hypotheses which are possible explanations about the cause of the phenomenon. *Proving* the hypothesis, however, requires controlled experiments, so in Step 3, research experiments are conducted. In Step 4, findings are evaluated by other scientists and published. In Step 5, follow-up experiments are conducted to confirm or extend the findings. Step 6 is to accept or reject hypothesis.

Concept Check 1.6

1. Surveys indicate that we could improve our diets by focusing on which type of food sources?

Surveys in the United States and Canada show that we generally have a variety of foods available to us. However, some of us could improve our diets by focusing on food sources rich in various vitamins, minerals, and fiber, such as fruits, vegetables, and whole grains.

2. The consumption of which types of foods should be reduced to attain and maintain good health?

Many of us should reduce our consumption of calories, added sugar, protein, solid fat, cholesterol, salt, and alcoholic beverages. These recommendations are consistent with an overall goal to attain and maintain good health.

Concept Check 1.7

1. What are some diet, physical activity and lifestyle recommendations for health promotion and disease prevention?

Diet

Consuming enough essential nutrients, including fiber, while moderating energy, solid fat, cholesterol, added sugar, and alcohol intake can result in:

- Increased bone mass during childhood and adolescence

- Prevention of some adult bone loss and osteoporosis, especially in older adults
- Fewer dental caries
- Prevention of digestive problems, such as constipation
- Decreased susceptibility to some cancers
- Decreased degradation of the retina (especially through intake of green and orange vegetables)
- Lower risk of obesity and related diseases, such as type 2 diabetes and cardiovascular disease
- Reduced risk for deficiency diseases, such as anemia (through adequate intake; and of iron, folate, other nutrients)

Physical Activity

Adequate, regular physical activity (at least 30 minutes on most or all days) helps reduce the risk of:

- Obesity
- Type 2 diabetes
- Cardiovascular disease
- Some adult bone loss and loss of muscle tone
- Premature aging
- Certain cancers

Lifestyle

Minimizing alcohol intake (no more than two drinks per day for men and one drink for women and all adults age 65 years and older) helps prevent:

- Liver disease
- Accidents

Not smoking cigarettes or cigars helps prevent:

- Lung cancer, other

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ANSWERS TO STUDY QUESTIONS

For many of the Study Questions, individual answers will vary. Examples of appropriate answers to these subjective questions are shown.

CHAPTER 1

1. *Describe the process that controls hunger and satiety in the body. List other factors that influence our food choices. (LO 1.1)*

Hunger is a physiological drive to eat, and is controlled by internal body mechanisms. As nutrients are processed by the stomach and small intestine, these organs communicate with the liver and brain, reducing further food intake. The liver also uses its direct nerve pathways to the brain to signal hunger and fullness. The hypothalamus, a portion of the brain, helps to regulate hunger and satiety. The feeding center of the hypothalamus signals the body to eat, whereas the satiety center signals the body to stop eating. Besides hunger – the internal, physiological drive to find and eat food – many external factors contribute to food choices. Some of these factors include flavor, texture, and appearance of foods; early life experiences; routines or habits; advertising; social changes; economics; and nutrition knowledge.

2. *Describe how your food preferences have been shaped by the following factors:*

- a. *Exposure to foods at an early age***
- b. *Advertising (what is the newest food you have tried?)***
- c. *Eating out***
- d. *Peer pressure***
- e. *Economic factors (LO 1.1)***

Food choices are influenced by many factors:

- a. Being raised by a vegetarian mother, I was exposed to a wide variety of fruits and vegetables from a young age and never went through a picky stage or refused to eat vegetables.
- b. At the grocery store, there were coupons and free samples of a new type of cereal bar. I tried it, liked it, and purchased it for breakfast this week.
- c. Because we were in a hurry and stopped at a fast food restaurant, my food choices at lunch today were excessive in calories, fat, and sodium.

- d. At Thanksgiving dinner, my grandmother offered me a second helping of mashed potatoes and gravy. I didn't want to hurt her feelings, so I ate the extra portion.
- e. Expenses play a major role in my diet patterns. As a college student, funds are limited, so I really try to eat inexpensive food items or those that are on sale. For example, I purchased canned peaches instead of fresh peaches.

3. What products in your supermarket reflect the consumer demand for healthier foods? For convenience? (LO 1.1)

Many grocery stores now offer an organic aisle or health food aisle, which reflects a changing trend in consumer demands. In terms of convenience, the frozen food section has become larger than ever and many supermarkets now offer prepared meals, such as sandwiches and roasted chicken.

4. Name one chronic disease associated with poor nutrition habits. Now list a few corresponding risk factors. (LO 1.2)

Cardiovascular disease is a chronic disease associated with poor nutritional habits. A few corresponding risk factors are high blood cholesterol, high blood pressure, inadequate physical activity, diabetes, and smoking.

5. Describe two sources of fat and explain why the differences are important in terms of overall health. (LO 1.3)

There are two basic types of fat, unsaturated fat and saturated fat. Plant oils tend to contain many unsaturated fatty acids, which make them liquid at room temperature. Certain unsaturated fatty acids are essential nutrients, and some may also lower blood cholesterol. Animal fats are often rich in saturated fatty acids, which make them solid at room temperature. Saturated fatty acids tend to raise blood cholesterol.

6. Identify three ways that water is used in the body. (LO 1.3)

Individual answers will vary. *Example:* To name just a few functions, water acts as a solvent and lubricant, provides a medium for transport of nutrients and wastes, and helps to regulate body temperature.

7. Explain the concept of calories as it relates to foods. What are the values used to calculate kcal from grams of carbohydrate, fat, protein, and alcohol? (LO 1.4)

A calorie is a measure of heat energy: the amount of heat it takes to raise the temperature of 1 gram of water 1°C. Energy is stored in the chemical bonds in the carbohydrates, fat, and protein in the foods we eat. We can use this chemical energy to perform body functions, from pumping ions across cell membranes to moving skeletal muscles. Foods generally provide calories from

more than one source. The fuel value for a gram of carbohydrate is 4 kcal, a gram of fat is 9 kcal, a gram of protein is 4 kcal, and a gram of alcohol is 7 kcal.

- 8. A bowl of Panera's broccoli cheddar soup contains 21 grams carbohydrate, 13 grams fat, and 12 grams protein. Calculate the percentage of calories derived from fat. (LO 1.4)**

21 grams x 4 calories/gram of carbohydrate = 84 calories from carbohydrate

13 grams fat x 9 calories/gram of fat = 117 calories from fat

12 grams protein x 4 calories/gram of protein = 48 calories from protein

84 + 117 + 48 = 213 total calories

117 calories from fat/213 total calories = 0.55 x 100 = 55% calories from fat

- 9. According to national nutrition surveys, which nutrients tend to be underconsumed by many North Americans? Why do you think this is the case? (LO 1.5)**

Some North Americans have inadequate intakes of iron, calcium, vitamin A, various B vitamins, vitamin C, vitamin D, vitamin E, potassium, zinc, and fiber. This is primarily because of an inadequate fruit, vegetable, and whole grain intake, as well as over-consumption of sugared soft drinks and snacks.

- 10. List four Healthy People 2020 objectives for the United States. How would you rate yourself in each area? Why? (LO 1.5 & 1.6)**

Four Healthy People 2020 objectives for the United States are as follows:

- Increase the proportion of adults who are at a healthy weight. At 5'7" and 140 pounds, I am at a healthy weight.
- Increase the variety and contribution of vegetables to the diets of the population ages 2 years and older. I usually consume one or two servings of vegetables per day. I should increase my consumption of vegetables.
- Reduce consumption of saturated fat in the population ages 2 years and older. I usually select poultry and fish instead of red meat, so these choices are lower in saturated fat. However, I should cut down on the amount of cheese I eat, as this is a source of saturated fat.
- Reduce consumption of sodium in the population ages 2 years and older. I prepare most of my foods at home rather than relying on fast food or frozen meals. This helps me to keep my sodium intake within a healthy range.

- 11. List five strategies to avoid weight gain during college. (LO 1.7)**

Five strategies to avoid weight gain during college are:

- a. Eat breakfast.
- b. Plan ahead to eat a balanced meal or snack every 3–4 hours.
- c. Limit liquid calories by drinking water instead of high-calorie soft drinks, fruit juice, alcohol, or coffee.
- d. Keep a stash low-calorie, nutritious snacks, such as pretzels, light microwave popcorn, and fruit (fresh, canned, or dried).
- e. Exercise at least 30 minutes at least 5 days a week.

CHAPTER 2

1. How would you explain the concepts of nutrient density and energy density to a fourth-grade class (LO 2.1)?

Calories give us energy. We need just enough calories to help us stay healthy, learn, and play. If we have too many calories, though, we might gain too much weight and feel tired and sick. We need to choose foods that have a lot of nutrition – vitamins and minerals to help us grow – but not too many calories. Nutrient-dense foods are good foods to eat. They give us a lot of healthy vitamins and minerals, but they do not give us too many calories. We should choose more foods that are nutrient dense, such as fruits, vegetables, eggs, and oatmeal. Energy density is another way to describe foods to help us make healthy choices. An energy-dense food has a lot of calories in a small amount of food. Some examples of energy-dense foods are cookies, chips, and peanut butter. Having a small amount of some energy-dense foods is fine, but we need to make sure we are getting good nutrition along with our calories. We should choose energy-dense foods like cookies and chips less often or in smaller amounts. Instead, choose nutrient-dense foods like apples and carrots to help us grow, learn, and play.

2. Describe the intent of the Dietary Guidelines for Americans. Based on the discussion of the Dietary Guidelines for Americans, suggest two key dietary changes the typical North American adult should consider making. (LO 2.2).

Dietary Guidelines have been issued to help improve the health of all Americans, ages 2 and older. The guidelines emphasize balancing food intake with physical activity to manage body weight; increasing consumption of fruits, vegetables, whole grains, and low-fat dairy foods; and decreasing consumption of dietary some components such as solid fats and added sugars, and sodium. A major criticism is that these guidelines are very general. For example, cholesterol and salt consumption affect people in different ways.

3. What dietary changes would you need to make to comply with the healthy eating guidelines exemplified by MyPlate on a regular basis (LO 2.3)?

A general change will be to avoid oversized portions. Specific changes would include increasing fruit and vegetable consumption at each meal so that fruits and vegetables cover half of the plate at each meal. Grains should be decreased to occupy only slightly more than one-fourth of the plate at each meal. However, at least half of my grains should be whole grains. I will fill the remaining space on each plate with sources of protein and change these to be more lean meats and poultry and plant sources of protein. I will include fish as a protein source twice a week. In addition I will have 2 to 3 cups of low-fat or fat-free dairy products each day or other rich sources of calcium. I will also choose foods such as soup, bread, and frozen meals that have the lower sodium numbers and drink water instead of sugary drinks.

4. Describe what would happen to the status of a nutrient in the body for a person who transitions from an overnourished to an undernourished state (LO 2.4).

The status of a nutrient in an overnourished person may be potentially toxic, causing damage to the body. As the person decreases the intake of this nutrient, the status of the nutrient will drop down to adequate level of storage and blood levels of the nutrient. If the intake of the nutrient drops below the required amount, the status of the nutrient will drop resulting in a decline in body functions associated with the nutrient. This decline in nutrient status will lead to clinical symptoms related to the decline in body function.

5. What steps would you follow to evaluate the nutritional state of an undernourished person? (LO 2.5)?

Nutritional assessment would start with carefully recording and analyzing the person's family health history. Next the person's medical history would be evaluated, especially for any disease states or treatments that could decrease nutrient absorption or ultimate use. A list of medications taken and the person's social history (e.g., marital status, living conditions) would also be analyzed. Most importantly, the five nutritional-assessment categories (ABCDEs) would be completed. These include anthropometric assessment of height, weight (and weight changes), skinfold thicknesses, and body circumferences. In addition a biochemical assessment of the concentrations of nutrients and nutrient byproducts in the blood, urine, and feces, and the activities of specific blood enzymes would be completed. A clinical assessment would follow, during which a health professional would search for any physical evidence of diet-related diseases or deficiencies. Then a dietary assessment of at least the previous few days' food intake would be done to determine any possible problem areas. Finally, an environmental assessment would provide further details about the living conditions, education level, and ability to purchase and prepare foods needed to maintain health.

6. How do RDAs and AIs differ from Daily Values in intention and application (LO 2.6)?

Recommended Dietary Allowances (RDAs) are set for many nutrients. RDAs indicate the amount of a nutrient that is sufficient to meet the needs of 97% to 98% of individuals within a population group. Adequate Intakes (AIs) are the standard used when not enough information is available to set an RDA. AIs indicate the intake level of a nutrient that appears to maintain health. Whereas the RDAs and AIs are specific to certain population groups, such as children or pregnant women, the DVs are generic because it is not feasible to list nutrient recommendations for every population group on the food label. The DVs are usually based on the highest RDA or AI for vitamins and minerals. For nutrients such as fat and cholesterol, the DVs represent a maximum intake level based on

a 2000-kcal diet.

7. What would you list as the top five sources of reliable nutrition information? What makes these sources reliable (LO 2.7)?

Five reliable sources of nutrition information:

- a. Registered dietitians are reliable sources of nutrition information. They have completed rigorous classroom and field training and are required to earn continuing education credits to maintain their credentials. RDs are trained to translate complex scientific knowledge into practical nutrition advice for the public.
- b. Peer-reviewed scientific publications are a source of information on nutrition research. These journals publish studies that are well-designed and reviewed by experts in the field. It is important to remember, however, that nutrition recommendations are not based on the results of one study; multiple lines of evidence are required to support nutrition recommendations.
- c. Professional nutrition organizations, such as the Academy of Nutrition and Dietetics, are reliable sources of nutrition information. The Academy develops clinical practice guidelines, maintains an Evidence Analysis Library, and provides answers to frequently asked questions to help both professionals and the public identify sound nutrition information.
- d. Universities and medical centers are reliable sources of nutrition information. These institutions provide practical information for health professionals and patients. Many such websites, such as www.mayoclinic.com, display the Health on the Net symbol, which indicates the publishers of the site are committed to disseminating ethical and high-quality health information.
- e. Government organizations that conduct nutrition research and develop nutrition guidelines are other sources of reliable nutrition information. The Food and Drug Administration, the U.S. Department of Agriculture, Health Canada, the Centers for Disease Control and Prevention, the National Institutes of Health, and the Food and Nutrition Board of the Institute of Medicine are examples of such organizations. Experts in the field conduct research, analyze the findings, and work together to formulate nutrition recommendations, such as the DRIs.

8. Dietitians encourage all people to read labels on food packages to learn more about what they eat. What four nutrients could easily be tracked in your diet if you read the Nutrition Facts panels regularly on food products (LO 2.8)?

Four nutrients that can easily be tracked using food labels are vitamin A, vitamin C, calcium, and iron. These are the four nutrients that are commonly lacking in diets of some North Americans, and are essential for good health.

9. Define the USDA definition for the term “organic” (LO 2.8).

Federal standards for organic foods require that at least 95% of ingredients (by

weight) must have been produced without the use of chemical fertilizers or pesticides, genetic engineering, sewage sludge, antibiotics, or irradiation to be labeled “organic” on the front of the package. If the front label instead says “made with organic ingredients,” only 70% of the ingredients must be organic. For animal products, the animals must graze outdoors, be fed organic feed, and cannot be exposed to large amounts of antibiotics or growth hormones.

10. List some specific health claims can be made on food labels (LO 2.8).

- A diet with enough calcium and vitamin D and a reduced risk of osteoporosis
- A diet low in total fat and a reduced risk of some cancers
- A diet low in saturated fat and cholesterol and a reduced risk of cardiovascular disease (typically referred to as heart disease on the label)
- A diet rich in fiber—containing grain products, fruits, and vegetables—and a reduced risk of some cancers
- A diet low in sodium and high in potassium and a reduced risk of hypertension and stroke
- A diet rich in fruits and vegetables and a reduced risk of some cancers
- A diet adequate in the synthetic form of the vitamin folate (called folic acid) and a reduced risk of neural tube defects (a type of birth defect)
- A diet rich in fruits, vegetables, and grain products that contain fiber and a reduced risk of cardiovascular disease.
- Oats (oatmeal, oat bran, and oat flour) and psyllium are two fiber-rich ingredients that can be singled out in reducing the risk of cardiovascular disease, as long as the statement also says the diet should also be low in saturated fat and cholesterol
- A diet rich in whole-grain foods and other plant foods, as well as low in total fat, saturated fat, and cholesterol, and a reduced risk of cardiovascular disease and certain cancers
- Fatty acids from oils present in fish and a reduced risk of cardiovascular disease
- Margarines containing plant stanols and sterols and a reduced risk of cardiovascular disease

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