Human Nutrition Science for Healthy Living 1st edition Stephenson Solutions Manual

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Chapter 2
Evaluating Nutrition Information

Chapter 2 Learning Outcomes

2.1 The Importance of Nutrition
2.1.1 Explain how Joseph Goldberger developed a hypothesis for the cause of pellagra.
2.1.2 Explain why it can be difficult for a novel hypothesis to be accepted by the scientific community.

2.2 Understanding the Scientific Method
2.2.1 Describe the typical steps that scientists generally use to investigate whether a disease has a nutrition-related cause.
2.2.2 Explain the importance of having controls when performing experiments.
2.2.3 Describe and provide examples of a case-control study and a cohort study.

2.3 Nutrition Information: Fact or Fiction
2.3.1 List features of unreliable sources of nutrition information.
2.3.2 List characteristics of reliable sources of nutrition information.
2.3.3 Describe how the Internet can be used to access reliable nutrition information.

2.4 Nutrition Experts: Registered Dietitians
2.4.1 Describe the roles that registered dietitians play as members of the health care team.
2.4.2 Discuss steps a person must take to become a registered dietitian nutritionist.

Overview

In Chapter 2, students will learn how scientists generally rely on the scientific method for nutrition research. The major types of studies are introduced, including experimental studies and epidemiological studies. The importance of peer review is also discussed. Furthermore, students will learn how to discern fact from fiction when considering nutrition information. Features of unreliable sources of nutrition information and characteristics of reliable sources of nutrition information are listed. In the final section of this chapter, students are introduced to nutrition experts, registered dietitians, or registered dietitian nutritionists. The educational requirements and professional credentialing of a registered dietitian nutritionist (RDN) is discussed.

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Teaching Strategies/Classroom Ideas/Activities

1. Have students read the *Case Study* in the opening of the chapter and answer the questions that follow. After they have read the chapter, students should answer the questions again and compare their answers to the responses provided at the end of the chapter.
2. Have students answer the *Quiz Yourself* questions. Students should save their responses and answer the questions again, after they have read the chapter.
3. Assign ***Connect®*** and ***LearnSmart®*** activities for Chapter 2.
4. Have students search the Internet for a website that promotes dietary supplements or a nutrition-related device. The site should include nutrition information. Students can use the information in the "Fresh Tips" feature of Section 2.3 to judge the reliability of each claim or statement. In a paper or class presentation, students should explain why the site is or is not a reliable source of nutrition information.
5. Ask students to select a nutrition topic that is of interest to them, such as obesity, diabetes, or taking vitamin C to prevent the common cold. Students should use the National Library of Medicine's *PubMed* website (http://www.ncbi.nlm.nih.gov/pubmed/) to search for articles that relate to their topic. Students should note the number of articles that are available concerning the topic, and read one article from a peer-reviewed journal that was published within the past five years. Students should make a copy of the article and analyze its information. Is it a review article or a report of a study? If the article is about a study, did the research involve animals or humans? How many? Did the investigators follow the steps of the scientific method? Were there controls? What were the credentials and professional affiliations of the author(s)? Does the article reveal the source(s) of financial support for the research?
6. Have students form groups of 5 to 7 people. Have each group develop a hypothesis that relates to human nutrition, such as "eating sugar makes people obese," "eating grapefruit facilitates weight loss," "taking vitamin B-6 supplements reduces the signs and symptoms of PMS," or "taking thiamin supplements protects against mosquito bites. " Ask the students to use the scientific method shown in Figure 2.1 to design an experimental or observational study involving human subjects that investigates their hypothesis. The study designs should include a review of literature, number of subjects, time frame, controls (if experimental), etc.
7. Have students search the Internet to find a website that offers nutrition information. Students should read the information at the site and identify any "red flags" for misinformation (see the list of characteristics in the passage called "Look for Red Flags" in Section 2.3). Students should evaluate the quality of the information presented on the website. In their report to the class, students should identify the URL of the site and its sponsorship; summarize the information, including health-related claims; evaluate the site for bias; and search the site for any disclaimers. Students are to determine whether the site is a reliable source of nutrition information, and explain why it is or is not.

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8. Have students contact a local health care facility to determine whether registered dietitians or registered dietitian nutritionists (RDNs) are on the staff. After locating dietitians, individual students or groups of students arrange to interview an RDN concerning his or her job. Students should ask the RDN why he or she decided to major in dietetics and what he or she likes and dislikes about the profession. Instructors can also invite a registered dietitian or RDN to visit the class and answer questions from students about his or her educational background and the profession of dietetics.
9. Have students read Section 2.1, "Dr. Goldberger's Discovery." Ask students to determine whether Dr. Joseph Goldberger applied the scientific method in his research. What steps did he include? Why did the scientific community largely ignore his findings when he reported them?
10. Assign the *Critical Thinking* questions and *Practice Test* at the end of the chapter.

Extended Chapter Outline

I. Dr. Goldberger's Discovery

A. In the early 1900s, pellagra was widespread in the United States. Individuals with the disease had various signs and symptoms such as scaly skin sores (rash) and some became so ill, they died.

B. Goldberger developed the *hypothesis* that pellagra resulted from the lack of something in the affected people's diet.

1. To test his hypothesis, Goldberger gave certain foods to people with pellagra and they were cured of the disease, but the medical establishment generally rejected his findings that a poor diet was the cause of the disease.

a. In 1916, Dr. Goldberger experimented on himself and some volunteers during a "filth party." Although none of the party's participants contracted the disease, a few physicians continued to resist the idea that pellagra was associated with poor diet.

C. A few years later, Dr. Conrad Elvehjem at the University of Wisconsin isolated a form of the vitamin *niacin* from liver extracts. Niacin cured "black tongue," a condition affecting dogs that was similar to pellagra.

1. Niacin was determined to be effective in treating pellagra, and the medical establishment finally accepted the fact that the disease was the result of a dietary deficiency.

II. Understanding the Scientific Method

A. In the past, nutrition facts and dietary practices were often based on intuition, common sense, conventional wisdom, and anecdotes. Today, nutrition experts base dietary recommendations on the results of scientific research.

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1. Figure 2.1 presents the general steps nutrition researchers usually take when conducting scientific investigations.

B. Animal Research: Laboratory Experiments

1. An experiment is a systematic way of testing a hypothesis.
    a. Nutrition scientists often conduct experiments on small mammals before performing similar research on humans.
        i. Researchers must follow government guidelines concerning the ethical care and treatment of laboratory animals.
        ii. An ***in vivo*** experiment describes experiments that use whole living organisms. An ***in vitro*** experiment describes testing on cells or other components derived from living organisms.

2. To test their hypothesis using an animal model, scientists divide genetically similar groups of animals into a treatment group and control group. In a controlled study, the treatment group receives a treatment and the control group does not receive a treatment. Refer students to Figure 2.2.
    a. Having a control group enables scientists to compare results between the two study groups to determine whether the treatment has any effect.
        i. Variables can influence the outcome of an experimental study.
        ii. Medical researchers must be careful when applying the results of *in vivo* animal studies to people.
        iii. Scientists are often able to determine the safety and effectiveness of treatments by conducting research on laboratory animals before testing on humans.

C. Human Research: Experimental (Intervention) Studies

1. Most nutrition-related experimental research involving human subjects incorporates the basic steps of the scientific method.

2. Sometimes it is not practical to conduct research on humans in laboratory settings, so scientists enroll "free-living" subjects.
    a. Researchers randomly divide a large group of people into treatment and control groups. Random assignment helps ensure the members of the treatment and control groups have similar variables.
        i. All study participants are provided with the same instructions and a form of intervention, but only members of the treatment group receive the treatment.
        ii. Subjects in the control group are given a placebo, which enables scientists to compare the extent of the treatment's response with that of the placebo (no treatment).
    b. Double-Blind Studies

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i. Human experimental studies are usually double-blind. Codes are used to identify each subject's group membership, which is not revealed until the end of the study.

ii. It is important to conceal group membership because researchers and subjects may try to predict group assignments based on their expectations. Such predictions could influence participants' responses and scientists' findings.

c. The placebo effect occurs when subjects report positive or negative reactions to a treatment even though they received the placebo.

i. People who use unconventional medical therapies often report that the products and treatments are effective, despite the lack of scientific evidence. Such personal reports may be examples of the placebo effect.

D. Human Research: Epidemiological Studies

1. Medical researchers have noted differences in rates of chronic diseases and causes of death among various human populations. Epidemiology is the study of the occurrence, distribution, and causes of health problems in populations.

2. To obtain health data, epidemiologists use physical examinations of people and information collected in surveys. Surveys rely on people remembering details about their medical histories and lifestyle practices, which may be incomplete or inaccurate.

3. The National Health and Nutrition Examination Survey (NHANES) provides information about the health and nutritional status of adults and children in the United States. This information is used for developing educational programs and establishing national health-related standards.

4. Most nutritional research involving human subjects is observational and involves case-control or cohort study designs.

a. In a case-control study, individuals with a health condition are matched to persons with similar characteristics who do not have the condition. By analyzing the results of case-control studies, researchers can identify factors that may have been responsible for the illness.

b. In a cohort study, epidemiologists collect and analyze various kinds of information about a large group of people over time.

i. In a retrospective cohort study, researchers collect information about a group's past exposures and identify current health outcomes.

ii. In a prospective cohort study, a group of initially healthy people are followed over a time period, and any diseases that eventually develop are recorded.

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5. When analyzing data collected during their research, nutrition scientists look for correlations between variables and health outcomes. A correlation occurs when two variables change over the same period.

a A direct or positive correlation describes the relationship that occurs when two variables increase or decrease in the same direction.

b. An inverse or negative correlation describes the relationship that occurs when one variable increases and the other one decreases.

c. Epidemiological studies cannot establish causation.

E. Reporting Findings

1. When an experiment or study is completed and the results are analyzed, researchers summarize the findings and seem to publish articles with information about their investigation in scientific journals. Before articles are accepted for publication, they undergo peer review.

2. Scientists expect researchers to avoid replying on personal attitudes and biases.

a. Researchers should evaluate and report their results objectively and honestly. Some funding sources can have expectations or biases about research outcomes.

b. Peer-reviewed journals require authors of articles to disclose their affiliations and sources of financial support.

F. The results of one study are rarely enough to gain widespread acceptance for new or unusual findings or to provide a basis for nutritional recommendations. If the results of several scientific investigations conducted under similar conditions confirm the original researchers' conclusions, the findings are more likely to be accepted.

1. After the results of a study are published or reported to health professionals, the media may receive notice of the findings. If the information is simplistic and sensational, it is more likely to be reported in the popular press.

2. Consumers need to realize that conflicting findings result from differences in the ways various studies are designed.

3. Science involves asking questions, developing and testing hypotheses, gathering and analyzing data, drawing conclusions from data, and accepting change.

III. Nutrition Information: Fact or Fiction

A. People should not assume that all nutrition information presented in the popular media is reliable.

B. The U.S. Food and Drug Administration can regulate nutrition- and health-related claims on product labels, but the agency cannot prevent the spread of health and nutrition

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misinformation that is published in books or pamphlets, and presented in television and radio programs.

1. The First Amendment to the U.S. Constitution guarantees freedom of the press and freedom of speech, so people can provide nutrition information that is misleading. This amendment does not protect consumers with freedom from nutrition misinformation or false nutrition claims.

a. Consumers are responsible for questioning and researching the accuracy of nutrition information and credentials of the people making nutrition-related claims.

b. Consumers need to be aware that promoters of worthless nutrition-related products often use sophisticated marketing methods to lure consumers.

c. Consumers also need to know that few dietary supplements have been thoroughly evaluated by reputable scientists.

C. Consumers should ask questions to evaluate various sources of nutrition information and look for "red flags" that are signs of misinformation, such as promises of quick and easy remedies and claims that are too good to be true.

D. Using the Internet Wisely

1. Consumers must be careful and question the sources before accepting the information as being reliable. Be wary of websites that are authored or sponsored by one person and/or promote or sell products for profit.

2. Generally reliable sources of nutrition information include websites sponsored by nationally recognized nutrition and/or health associations such as the Academy of Nutrition and Dietetics; nationally respected nonprofit health organizations, such as the National Osteoporosis Foundation; government agencies, including Centers for Disease Control and Prevention, and the Food and Drug Administration.

3. To conduct an online review of scientific literature, visit the U.S. National Library of Medicine and National Institutes of Health "PubMed." This site provides abstracts of and links to full-text articles about various medical conditions. However, some journals have been established and supported by groups with biases. Such journals provide a way of publishing articles that would otherwise be rejected by editors of reliable peer-reviewed journals. It is important to search for information in more than one journal and compare research designs and results.

E. Directing Questions at Reliable Experts

1. People cannot always rely on someone who refers to himself or herself as a "nutrition expert" or "nutritionist" for reliable nutrition information. There are no standard legal definitions for these descriptors. Many states have licensure laws

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for someone using the title "nutritionist," but in other states, people can refer to themselves as "nutritionists" regardless of their education and training.

a. Be wary if the nutrition expert has "credentials" that lack credibility among members of the scientific community.

2. Universities and colleges that have nutrition or dietetics departments are likely to employ nutrition experts, such as instructors and/or researchers with advanced degrees in foods, nutrition, or dietetics.

a. A registered dietitian (RD) or registered dietitian nutritionist (RDN) is a college-trained health care professional who has extensive knowledge of foods, nutrition, and dietetics.

b. People can locate registered dietitians by consulting online directories, contacting local dietetic associations or dietary departments of local hospitals, visiting the Academy of Nutrition and Dietetics' website (www.eatright.org) or the Dietitians of Canada's website (www.dietitians.ca).

IV. Nutrition Experts: Registered Dietitians

A. A registered dietitian (RD) or registered dietitian nutritionist (RDN) is a health care professional who is "a food and nutrition expert."

1. *Clinical* dietitians can work as members of medical teams that include other health professionals. A clinical dietitian helps evaluate the health status of patients and plan dietary treatments.

2. Dietitians can also work as community nutritionists in public health settings, directors of food service systems, educators, researchers, or dietary counselors in private practice.

B. To become an RD or RDN, a person needs to meet specific educational and certification requirements approved by the Accreditation Council for Education in Nutrition and Dietetics, which is the accreditation agency for the Academy of Nutrition and Dietetics.

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