Chapter 1: What Is Nutrition?
Objectives for Chapter 1

- Discuss the factors that influence your food choices.
- Define the term *nutrition*.
- Differentiate between the six categories of essential nutrients found in food and in the body.
- Understand the importance of a well-balanced diet in meeting your daily nutrient needs.
- Discuss the current nutritional state of the American diet.
- Understand the scientific method that is involved in nutrition research and identify reliable sources of nutrition information.
What Drives Our Food Choices?

- We need to eat and drink to obtain:
  - **Nutrients**: chemical compounds in foods to provide fuel for energy, growth, and maintenance, and to regulate body processes
    - Six classes:
      - Carbohydrates, fats, protein: provide energy in the form of kilocalories
      - Vitamins, minerals, water: help regulate many body processes, including metabolism
  - Food also provides nonnutrient compounds that contribute to health and may play a role in fighting chronic diseases
What Drives Our Food Choices?, Continued

• We choose foods for many other reasons beyond the basic need to obtain nutrients:
  • Taste and culture
  • Social reasons and trends
  • Cost, time, and convenience
  • Habits and emotions
Many Factors Influence Your Food Choices

- Nutrition knowledge
- Trends
- Habits
- Taste
- Emotions
- Nutrients
- Time
- Cost
- Convenience
- Culture
- Advertising
- Social reasons

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What Is Nutrition and Why Is Good Nutrition So Important?

• **Nutrition**: the science that studies how nutrients and compounds in foods nourish and affect body functions and health

• Chronic deficiencies, excesses, and imbalances of nutrients can affect health

• Good nutrition plays a role in reducing the risk of many chronic diseases and conditions, including heart disease, cancer, and stroke
# Leading Causes of Death in the United States

<table>
<thead>
<tr>
<th>Disease/Cause of Death</th>
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</thead>
<tbody>
<tr>
<td>Heart Disease</td>
</tr>
<tr>
<td>Cancer</td>
</tr>
<tr>
<td>Respiratory Diseases</td>
</tr>
<tr>
<td>Accidents</td>
</tr>
<tr>
<td>Stroke</td>
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<tr>
<td>Alzheimer’s Disease</td>
</tr>
<tr>
<td>Diabetes</td>
</tr>
<tr>
<td>Influenza/Pneumonia</td>
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<tr>
<td>Kidney Disease</td>
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<tr>
<td>Intentional Self-Harm</td>
</tr>
</tbody>
</table>

What Are the Essential Nutrients and Why Do You Need Them?

• The six classes of nutrients are all essential in the diet to maintain bodily function

• Macronutrients: energy-yielding nutrients needed in higher amounts
  • Carbohydrates, lipids (fats), and proteins

• Micronutrients: needed in smaller amounts
  • Vitamins and minerals

• Water: copious amounts needed daily for hydration
Nutrients in Foods and in the Body

Human body

- Water: 59%
- Carbohydrates: 20%
- Protein: 17%
- Fat: 8%
- Vitamins and Minerals: 5%

Chicken breast

- Water: 74%
- Carbohydrates: 7%
- Protein: 22%
- Fat: 5%
- Vitamins and Minerals: 2%

Broccoli (raw)

- Water: 89%
- Carbohydrates: 9%
- Protein: 2%
- Fat: 1%
- Vitamins and Minerals: 1%

Figure 1.2
Nutrients and Their Functions

<table>
<thead>
<tr>
<th>Carbohydrates</th>
<th>Energy</th>
<th>Growth, maintenance, support, structure, regulate processes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fats</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamins</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minerals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 1.3
What Are the Essential Nutrients and Why Do You Need Them?, Continued

• Carbohydrates, fats, and proteins
  • Provide energy
  • One kilocalorie equals the amount of energy needed to raise the temperature of 1 kilogram of water 1 degree Celsius
    • Carbohydrates and protein provide 4 kcal/gram
    • Fats provide 9 kcal/gram
  • Are organic compounds (contain carbon atoms)
  • Also contain hydrogen and oxygen atoms
  • Proteins also contain nitrogen atoms (unlike carbohydrates and fats)
What Are the Essential Nutrients and Why Do You Need Them?, Continued-1

- Carbohydrates supply glucose, a major energy source
- Fats are another major fuel source and also:
  - Cushion organs
  - Insulate body to maintain body temperature
- Proteins can provide energy but are better suited for:
  - Growth and maintenance of muscle, tissues, organs
  - Making hormones, enzymes, healthy immune system
  - Transporting other nutrients
What Are the Essential Nutrients and Why Do You Need Them?, Continued-2

• To calculate the amount of energy a food provides:
  • Multiply the total grams of a nutrient by the number of calories per gram
    • 1 gram of carbohydrate or protein = 4 calories
    • 1 gram of fat = 9 calories
• Vitamins and minerals are essential for metabolism
  • Many assist enzymes in speeding up chemical reactions in the body
    • Example: B vitamins are coenzymes in carbohydrate and fat metabolism
• Vitamins are organic compounds that usually have to be obtained from food
• Minerals are inorganic substances
  • Key roles in body processes and structures
• Water is vital for many processes in your body
  • Part of fluid medium inside and outside of cells
  • Helps chemical reactions, such as those involved in energy production
  • Helps maintain body temperature
  • Key role in transporting nutrients and oxygen to cells and removing waste products
  • Lubricant for joints, eyes, mouth, intestinal tract
  • Protective cushion for organs
How Should You Get These Important Nutrients?

• The best way to meet your nutrient needs is with a well-balanced diet that includes:
• Essential nutrients from all six classes
• A well balanced diet will also include fiber and phytochemicals, which have been shown to help fight many diseases
  • Whole grains, fruits, and vegetables are rich sources
How Should You Get These Important Nutrients?, Continued

• A supplement can be beneficial:
  • When nutrient needs are higher
    • Example: pregnant women need an iron supplement to meet increased needs
  • When diet restrictions exist
    • Example: lactose-intolerant individuals (difficulty digesting milk products) may choose a calcium supplement to help meet needs
• Well-balanced diet and supplements are not mutually exclusive; they can be partnered for good health
How Does the Average American Diet Stack Up?

- High in:
  - Added sugar, sodium, saturated fat, calories
- Low in:
  - Vitamin D, calcium, potassium, fiber
- Lack of healthy diet may also be due to where we eat – Americans currently spend 40 percent of their food budget consuming food outside the home
How Does the Average American Diet Stack Up?, Continued

- Incidence of overweight and obesity is on the rise
- Adults
  - 65 percent are overweight and of those, approximately 35 percent are obese
- Children
  - 15 percent of children ages 2–19 are overweight
  - 17 percent are considered obese
How Does the Average American Diet Stack Up?, Continued

- High rates of overweight and obesity
- Causes
  - Consume more calories than needed
  - Burn fewer calories due to sedentary lifestyles
- Effects
  - Increased rate of type 2 diabetes (especially children), heart disease, cancer, and stroke
Obesity Trends among U.S. Adults

Figure 1.4

Prevalence of obesity:
- ≥30%
- 25%–29%
- 20%–24%
- 15%–19%
- 10%–14%
- <10%
- No data

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ABC News Video: Menu Calorie Counts

Nightline
January 11, 2013

>> Hello, I'm Terry Moran.
ABC News Video: Menu Calorie Counts, Continued

Discussion Questions

1. Is the new federal law, which requires posting calorie counts for foods, beneficial or detrimental for restaurant goers?
2. In what ways is the calorie count advertised misleading for customers?
3. Caloric needs are based on several factors. Does the average person have the knowledge to accurately assess caloric intake needs? What more can be done to educate the public regarding caloric needs?
4. What practical methods can the consumer employ to decrease calorie intake at restaurants?
Poor, Obese, and Malnourished: A Troubling Paradox

- Americans living near or below the poverty level have much higher rates of obesity than affluent Americans
- Children who are food insecure are more likely to be deficient in iron, have colds and headaches, have delayed cognitive development, and be at risk for behavioral problems
- Some factors that lead to obesity in the food insecure:
  - Inconsistent meal patterns
  - Household stress
  - Limited access to supermarkets
  - Convenience stores and fast-food restaurants
Improving Americans' diets is one goal of *Healthy People 2020*

- Disease prevention and health promotion objectives for Americans to meet in the second decade of twenty-first century
- Focuses on several overarching goals:
  - Eliminate preventable disease, disability, injury, and premature death
  - Achieve health equity, eliminate disparities, and improve the health of all groups
  - Create social and physical environments that promote good health for all
  - Promote quality of life, healthy development, and healthy behaviors across every stage of life
Table 1.2 Healthy People 2020 Nutrition and Weight Status Objectives

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Target for Americans (%)</th>
<th>Status of Americans (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase the proportion of adults who are at a healthy weight</td>
<td>33.9</td>
<td>30.8</td>
</tr>
<tr>
<td>Reduce the proportion of adults who are obese</td>
<td>30.5</td>
<td>33.9</td>
</tr>
<tr>
<td>Reduce the proportion of children and adolescents who are considered obese</td>
<td>14.5</td>
<td>16.1</td>
</tr>
<tr>
<td>Increase the contribution of fruits to diets of the population aged 2 years and older</td>
<td>0.9 cups/1,000 calories</td>
<td>0.5 cups/1,000 calories</td>
</tr>
<tr>
<td>Increase the variety and contribution of vegetables to the diets of the population aged 2 years and older</td>
<td>1.1 cups/1,000 calories</td>
<td>0.8 cups/1,000 calories</td>
</tr>
</tbody>
</table>

What's the Real Deal When It Comes to Nutrition Research and Advice?

- Newspaper headlines and television news items that report results of a single research study can be misleading.
- In contrast, advice from authoritative health and nutrition organizations is based on:
  - **Consensus**: the opinion of group of experts based on collection of information.
How Can I Evaluate Nutrition News?

• Before making dietary and lifestyle changes based on media reports, read with a critical eye and ask:
  • Was the research finding published in a peer-reviewed journal?
  • Was the study done using animals or humans?
  • Do the study participants resemble me?
  • Is this the first time I've heard about this?
• Wait until research findings are confirmed and consensus is reached by reputable health organizations before making changes
Sound Nutrition Research Begins with the Scientific Method

- **Scientific method**: process used by scientists to generate sound research findings
  - Step 1: observe, ask questions, and formulate a **hypothesis** (idea based on observation)
  - Step 2: conduct an experiment to test the hypothesis
  - Step 3: share findings in a **peer-reviewed journal** (research publication for scientists)
Steps of the Scientific Method

1. **Observe and ask a question**
   Why does cod-liver oil cure rickets?

2. **Formulate a hypothesis**
   The vitamin A in cod-liver oil is the curative factor.

3. **Conduct an experiment**
   Feed rats with rickets cod-liver oil that contains no vitamin A.

   - **Hypothesis supported**
     Rats were not cured.

   - **Hypothesis not supported**
     Rats were cured.

4. **Revise or formulate a new hypothesis**
A Hypothesis Can Lead to a Scientific Consensus

1. Hypothesis supported
2. Publish findings
3. Develop theory
4. Establish consensus

Figure 1.6
Research Studies and Experiments Confirm Hypotheses

• **Observational research**: involves looking at factors in two or more groups of subjects to see if there is a relationship to certain health outcomes.

• **Epidemiological research**: study of populations of people.
  - Example: Relationship of sun exposure and incidence of rickets in Norway compared with Australia.
    - May be due to other unidentified diet or lifestyle factors.
• **Experimental research**: involves at least two groups of subjects
  
  • **Experimental group**: given a specific treatment
  
  • **Control group**: given a placebo ("sugar pill")
  
  • Double-blind placebo-controlled experiment is "gold standard"
    
    • Neither scientists nor subjects know which group is receiving which treatment
    
    • All variables held the same and controlled for both groups
Controlled Experiments

1. Select a large number of subjects with rickets.
2. Randomly divide subjects into two groups.
3. To prevent bias, neither the subjects nor scientists know which group receives what treatment.
4. Compare results.

Experimental group
receives vitamin D supplement.

Did the vitamin D cure rickets in the experimental group and did the control group remain unchanged?

Control group
receives placebo.

Yes
Vitamin D cures

No
Revise hypothesis

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What Is Nutritional Genomics?

• Genes determine your inherited, specific traits
  • With the completion of the Human Genome Project, the complete sequencing of deoxyribonucleic acid (DNA) in your cells is now known.
  • Your DNA contains the genetic instructions for making proteins that direct activities in the body
• Nutritional genomics: study of how specific food components affect gene expression in your cells and thereby your health
  • Example: may help determine the specific dietary combination of fats needed to lower your risk of heart disease based on your unique genetic makeup
What is Nutritional Genomics?, Continued

Environmental influences
- Diet
- Physical activity

Gene variants
- Susceptibility genes

Chronic Disease
You Can Trust the Advice of Nutrition Experts

- **Registered dietitian (RD):** completed at least a bachelor's degree at an accredited U.S. college or university and a supervised practice, and passed a national exam administered by the American Dietetic Association
  - They have an understanding of **medical nutrition therapy**, which is an integration of nutrition counseling and dietary changes based on an individual's medical history and current health needs to improve that person's health.
- **Public health nutritionist:** has a degree in nutrition but is not an RD (if s/he didn't complete supervised practice, s/he is not eligible to take the ADA exam)
- **Licensed dietitian nutritionist (LDN):** licensed by state licensing agencies
- Be wary of anyone who calls him/herself a **nutritionist**, as s/he may have taken few or no accredited courses in nutrition
You Can Obtain Accurate Nutrition Information on the Internet

- National Institutes of Health (NIH) 10 questions to consider when viewing a health-related website:
  1. Who runs the site?
  2. Who pays for the site?
  3. What is the purpose of the site?
  4. Where does the information come from?
  5. What is the basis of the information?
You Can Obtain Accurate Nutrition Information on the Internet, Continued

6. Is the information reviewed?
7. How current is the information?
8. How does the site choose links to other sites?
9. How does the site handle personal information?
10. How does the site manage interactions with visitors?
Nutrition in the Real World: Don't Be Scammed!

• Beware of health quackery and fraud
  • To avoid falling for scams, watch for "red flags" that try to convince you that:
    • There is a quick fix for what ails you
    • Their product causes miraculous cures
    • One product does it all
    • You can lose weight in a short amount of time without dieting or exercising
    • Other folks are claiming that the product worked for them
  • The FDA's health fraud website helps consumers identify scams and fraud (www.consumer.ftc.gov/scam-alerts)