CHAPTER 1

Nutrition and Health
New Challenges for Nutrition Professionals

The Obesity Epidemic

- Global increasing prevalence of obesity
- 74% of men and 64% of women are overweight or obese
- 32% of children ages 2+ are overweight or at risk for overweight
- Increase in type 2 diabetes is parallel to the increase in obesity
- “Obesogenic” environment: food availability and portion sizes, decreased activity
New Challenges for Nutrition Professionals (Cont.)

Shifts in Population

- Increased numbers of older adults
  - Increased life expectancy
  - Increasing numbers of older adults greatly increase health care costs

- Increased ethnic and racial diversity
  - Most rapid increases in Hispanic American, Asian American, and Pacific Islander American populations
  - U.S. food patterns increase health risks
New Challenges for Nutrition Professionals (Cont.)

New Products in the Marketplace
- Functional foods
- Phytochemicals
- Processed foods that promise health benefits

Genes in Nutrition and Health
- Learning how diet and environment influence genes and how genetic code affects nutrient needs and disease susceptibility
- Nutrigenics and individualized advice
New Challenges for Nutrition Professionals (Cont.)

Nutrition Misinformation

• Expansion of the Internet and other technology-based information sources
• Food companies provide helpful nutrient content information
• Sale-related information can be misleading
• Reliable sources include government agencies, universities, state extension services, and medical facilities
Definitions

Nutrition
- Means “to nourish”; involves how food enriches life physically, socially, and personally

Nutrition Science
- Nutrient requirements for body maintenance, growth, activity, and reproduction
Definitions (Cont.)

Dietetics

- The health profession with primary responsibility for the practical application of nutrition science throughout the life cycle in health and disease

Registered Dietitian (RD)

- The nutrition expert on the health care team with major responsibility for patients’ nutritional care
Public Health Nutritionist

- Focuses on disease prevention and oversees the care of high-risk groups in the community, such as pregnant teenagers and older adults, assessing needs and developing intervention programs
Food and Nutrients

Nutrients

- Specific chemical compounds and elements in foods
- No one particular food or food combination is required for health
- Approximately 50 nutrients have been found to be essential to human life and health
Food and Nutrients (Cont.)

**Essential Nutrients**
- Macronutrients—carbohydrates, fats, proteins, and water
- Micronutrients—vitamins and minerals

**Metabolism**
- The sum of all chemical reactions that use nutrients
Food and Nutrients (Cont.)

- Nutrients have three general functions in the body:
  1. They provide energy
  2. They build and repair body tissues and structures
  3. They regulate all the metabolic processes that maintain homeostasis and support life
Energy Sources: Carbohydrates

● Body’s primary source of fuel for heat and energy
  ➢ Glycogen is a storage form of carbohydrate used for quick energy
  ➢ Each gram of carbohydrate yields 4 kcal when metabolized in the body—“fuel factor”
Energy Sources: Carbohydrates (Cont.)

- Body’s primary source of fuel for heat and energy (Cont.)
  - 45% to 65% of total kcalories should be supplied by carbohydrates
  - More kcalories should come from complex carbohydrates (starch) and less from simple carbohydrates (sugars)

- Calories versus kilocalories
Energy Sources: Fats

- From animal and plant sources
- Body’s alternate or storage form of energy
- Yields 9 kcal/g
- Should supply no more than 20% to 35% of total kcalories
- Majority should be unsaturated; saturated fats are less healthy
Energy Sources: Proteins

- Primary function is tissue building
- Can be used for energy if needed
- Yields 4 kcal/g
- Should provide 10% to 35% of total kcalories
Tissue Building and Repair: Proteins

- Protein foods are broken down into amino acids, the building units necessary for making and repairing tissues
- Body tissues are constantly broken down and rebuilt
- Proteins form vital regulatory substances, such as enzymes and hormones
Tissue Building and Repair: Minerals

Minerals

- Help build tissues with very specific functions
  - Calcium and phosphorus give strength to bones and teeth
  - Iron is a component of hemoglobin and binds oxygen for transport to cells
Tissue Building and Repair: Vitamins

Vitamins

- Complex molecules needed in very minute amounts, but essential in certain tissues
  - Vitamin C helps produce the intercellular ground substance that cements tissues together and prevents tissue bleeding
  - Vitamin A in the rods and cones of the eye is needed for vision in dim light
Metabolic Regulation

Minerals
● Serve as cofactors in controlling cell metabolism

Vitamins
● Components of cell enzyme systems
● Govern reactions that produce energy and synthesize important molecules
Metabolic Regulation (Cont.)

Water

- Forms the blood, lymph, and intercellular fluids that transport nutrients to cells and remove waste
- Regulatory agents that provide the fluid environment for metabolic reactions
Nutrient Interrelationships

Nutrient Interaction

- Concept made up of the following two parts:
  1. Individual nutrients participate in many different metabolic functions; in some functions a nutrient has a primary role, and in others it has a supporting role
  2. No nutrient ever works alone
Nutritional Status

- Referred to as the *nutritional health* of an individual
- Influenced by one’s living situation, social and economic factors, available food, food choices, and state of health
Nutritional Status (Cont.)

- Evaluation of nutritional status requires:
  - Dietary records including food and supplements
    - Help to differentiate primary versus secondary deficiencies
  - Biochemical measurements such as blood nutrient levels, which can help identify specific deficiencies
  - Anthropometric measurements such as body weight for height, which provide an estimate of body fat and muscle mass
  - Clinical assessments looking at skin, hair, eyes, etc.
Optimal Nutrition

- Neither deficiency nor excess of nutrients
- Nutrient reserves are at the upper end of the normal range; appropriate weight for height
- More likely to be alert, both mentally and physically
- Meet day-to-day nutrient needs and maintain appropriate nutrient stores
Undernutrition

- Various forms ranging from marginal nutritional status to the famine victim with kwashiorkor or marasmus
Undernutrition (Cont.)

Marginal Nutritional Status

- Person is not deficient but lacks the nutrient reserves to cope with any added physiologic or metabolic demand arising from injury or illness, the need to sustain a healthy pregnancy, or a childhood growth spurt

- Caused by poor eating habits, stressed environments, or insufficient resources to obtain appropriate types or amounts of food
Undernutrition (Cont.)

Marginal Nutritional Status (Cont.)

- U.S. diets tend to be energy rich and nutrient poor
- Increased risk of physical illness
Overt Malnutrition

- When nutrient intake is not sufficient to meet day-to-day needs and nutrient reserves are depleted
- Approximately 14.9% of U.S. households report some form of food insecurity
Overt Malnutrition (Cont.)

- Energy needs may be met, but micronutrients likely are lacking
- Single-parent and low-income families are at risk for malnutrition
- Infants, children, pregnant women, and older adults are most vulnerable
- Malnutrition can also be found among hospital patients and long-term care facility residents
Overnutrition

- Excessive energy intake and low physical activity leads to unwanted weight gain and elevated health risks
- Also occurs with excessive intakes of micronutrients from supplements
- Risks of certain herbal preparations
Nutrient Density

- Relative nutrient content of a food in relation to its energy content
- Nutrient-dense foods contribute vitamins, minerals, essential fatty acids, and/or protein as well as kcals
- “Empty calorie” foods contribute kcals but no essential nutrients
Diet, Health, and Public Policy

- All government laws and programs that pertain to or regulate food and nutrition
- Nutrition policies are concerned with food guidance for the public, nutrition standards for government food programs, and health and well-being of the population
- Recent focus on reducing obesity and chronic disease
- Food safety laws and nutrition labeling
Development of Nutrition Policy

- Until about 1950 policies and programs were intended to eradicate hunger, malnutrition, and deficiency diseases
- Laws passed in the 1930s mandated the addition of vitamin D to milk
- Enrichment of grains with several of the B vitamins and iron began sometime later
- The School Nutrition Program was created with policies for free or reduced-cost lunches
Development of Nutrition Policy (Cont.)

- By 1980s, focus had shifted to overnutrition
- The first major nutrition policy report was the *Surgeon General’s Report on Nutrition and Health* released in 1988
- In 1990 the U.S. Department of Health and Human Services (USDHHS) developed a public health initiative addressing diet, physical activity, and other health-related lifestyle factors (*Healthy People 2000*)—it is updated every 10 years
Health Promotion

- *Healthy People 2020*, National Institutes of Health, and nonprofit health groups
- Use of media and community programs
- Effective community programs reach a broad base of consumers to reinforce messages in various ways
- Health promotion must be ongoing and consistent and have specific goals
Nutrition Guides for Food Selection

- Nutrition standards
- Dietary guidelines
- Food guides
Dietary Reference Intakes (DRIs)

Categories

- Recommended Dietary Allowance (RDA) serves as an intake goal for all healthy people.
- Adequate Intake (AI) sets a dietary goal when new research suggests a health benefit but not enough information is available to develop an RDA.
Dietary Reference Intakes (Cont.)

Categories (Cont.)

- Tolerable Upper Intake Level (UL) is an important guide for practitioners advising individuals on the use of dietary supplements
- Estimated Average Requirement (EAR) is used to evaluate the nutrient intakes of population groups
Dietary Reference Intakes (Cont.)

Categories (Cont.)

- Acceptable Macronutrient Distribution Range (AMDR) guides the division of kcalories among carbohydrate, fat, and protein in ranges supportive of health
Dietary Guidelines

- Intended for use by government agencies, health care providers, and professional groups
- Basis for nutrition messages and consumer materials developed by health professionals
- Direct government programs involving food and nutrition
- Updated every 5 years
- Changes are based on new nutrition science or population needs
Dietary Guidelines for Americans 2010

- Directed toward an unhealthy American public
- Evidence based, built on scientific and medical research
- Special attention to total diet and individual needs and preferences
- Cooperation among parents, teachers, health care professionals, government officials, and food producers to provide healthy choices
Dietary Guidelines for Americans 2010: Recommendations

- Encourage greater use of lower calorie, nutrient-dense foods
- Greater emphasis on plant-based foods
- More use of lower fat or fat-free milk and dairy products
- Reduce sodium intake to less than 1500 mg (the AI)
- Encourage two servings of seafood weekly for n-3 fatty acids
Dietary Guidelines for Americans 2010: Recommendations (Cont.)

- Need for regular physical activity
- Reduce overweight or obesity
- Heart health and prevention of chronic disease
- Seven short messages that summarize important concepts
Food Guides

MyPlate Food Guidance System

- Uses a place setting as a familiar mealtime visual
- Several food groups were renamed to reflect foods with similar nutrient content
- Goal to choose smaller portions and nutrient-dense foods lower in kcalories
Food Guides

MyPlate Food Guidance System (Cont.)

- Interactive website, ChoseMyPlate.gov, gives access to SuperTracker personalized food plans, sample menus, recipes, and tips
- Food plans define empty calories: solid fats, added sugars, or alcohol (SoFAS)
- Need to understand serving sizes and physical activity
The Exchange Lists for Meal Planning

- First introduced in 1950 as a meal-planning tool for persons with diabetes
- Useful for planning any diet in which control of carbohydrate, fat, protein, and total kcalories is the goal
The Exchange Lists for Meal Planning (Cont.)

- Foods are arranged into the following three groups:
  1. **Carbohydrates:** This group includes starches (grains, starchy vegetables, crackers, snacks, and legumes), fruits, milk, sweets, and nonstarchy vegetables
The Exchange Lists for Meal Planning (Cont.)

- Foods are arranged into the following three groups: (Cont.)
  2. **Meat and meat substitutes**: Includes animal protein foods arranged by fat content (lean, medium-fat, and high-fat) and plant-based proteins
  3. **Fats**: Includes both animal and plant fats arranged by degree of saturation—monounsaturated, polyunsaturated, and saturated
A Safe and Healthy Food Supply

- Prevalence and causes of food-borne illness
  - Contamination can occur at any point in the food supply
  - Underreporting of food-borne illness
  - Vulnerable groups include older adults, children, pregnant women, and those with compromised immune function

- Prevention
  - Careful washing of fresh produce
  - Thorough cooking of poultry, meat, and eggs
  - Hand washing
Personal Perceptions of Food

- Based on:
  - Ethnic background
  - Cultural or religious beliefs
  - Family habits
  - Socioeconomic status
  - Health status
  - Geographic location
  - Personal likes and dislikes

- Effects of increasing ethnic and cultural diversity
Assessing Food Patterns

- Keeping a record of everything you eat and drink—noting the time, place, and activity, as well as persons with you—gives important insight into your true relationship with food.
- Using the MyPlate plan will provide a rapid dietary estimate.
- More comprehensive nutritional analysis uses a computer-assisted nutrient analysis program and compares intakes with the DRIs.