

CHAPTER 1

Community Health: Yesterday, Today, and Tomorrow

CHAPTER SYNOPSIS

In this introductory chapter, we introduce the concepts and principles of community health and explain the differences between community health and personal health and between community health and public health. Next we present a history of community health and public health. Finally we examine six serious health problems facing American communities and offer an outlook for community health in the twenty-first century in the world and United States.

CHAPTER OUTLINE

I. Introduction

A. Definitions

1. Health is a dynamic state or condition of the human organism that is multidimensional (i.e., physical, emotional, social, intellectual, spiritual, and occupational) in nature, a resource for living, and results from a person's interactions with and adaptations to his or her environment.
2. A community is a group of people who have common characteristics; communities can be defined by location, race, ethnicity, age, occupation, interest in particular problems or outcomes, or other common bonds.
3. Community health includes the health status of a defined group of people and the actions and conditions to promote, protect, and preserve their health.
4. Public health comprises the actions that society undertakes collectively to assure the conditions in which people can be healthy.
5. Population health is the health status of people who are not organized and have no identity as a group or locality and the actions and conditions to promote, protect, and preserve their health.

B. Factors that affect the health of a community

1. The physical factors that affect the community's health are geography, environment, community size, and industrial development.
2. The social and cultural factors that influence a community's health are beliefs, traditions, and prejudices; economics; politics; religion; social norms; and socioeconomic status (SES).
3. The quality and effectiveness of community organizing can affect the community's health.
4. Individual behaviors are often overlooked as an important influence on a community's health.

II. A Brief History of Community and Public Health

- A. Evidence of community health practices can be traced to our earliest civilizations.
- B. During the Middle Ages (500 to 1500 A.D.), little progress in public or community health was made and epidemics of communicable diseases were common.
- C. The period of renaissance and exploration (1500 to 1700 A.D.) brought a renewed interest in learning about causes and cures of diseases.
- D. In the eighteenth century, a period characterized by industrial growth and poor sanitary conditions, epidemics of cholera, yellow fever, and smallpox continued to ravage communities in both Europe and America.
- E. The nineteenth century in America was characterized by westward expansion and a *laissez-faire* posture toward health issues by the government.
 1. The beginning of the modern era of public health was marked by Lemuel Shattuck's health report for the Commonwealth of Massachusetts in 1850.
 2. The period of 1875–1900 has become known as the bacteriologic period of public health because during this period scientists discovered and described a great number of bacterial disease agents of communicable diseases.
- F. The twentieth century

1. The health resources development period (1900–1960) was a period in which a number of medical schools, hospitals, and nursing schools were built.
 - a. The reform period (1900–1920) was characterized by social concerns, which led Congress to pass legislation regulating the food and other industries.
 - b. In the 1920s, Prohibition resulted in a decline in alcohol-related health problems.
 - c. The Great Depression resulted in the passage of the Social Security Act of 1935, the first entry of the federal government into the welfare arena, and World War II resulted in a number of medical advances that would eventually be enjoyed by the civilian population.
 - d. During the postwar years, hospital construction resumed and attempts to plan national, state, and community health priorities failed.
2. The period of social engineering (1960–1975) saw the federal government take steps to improve access for the disadvantaged to health care.
 - a. Medicare: Assists in the payment of medical bills for the elderly and people with certain disabilities.
 - b. Medicaid: Assists in the payment of medical bills for the poor.
3. The health promotion period (1974–1990) was an outgrowth of the discovery of the importance of lifestyle choices upon health.
4. Community health in the 1990s and early 2000s faces at least five serious challenges.
 - a. Health care continues to be the single greatest community health challenge in the U.S.
 - b. Environmental problems, including clean air and clean water, continued to be recognized as both economic and health issues.
 - c. Lifestyle diseases remain the leading killers of Americans, particularly smoking, poor diet, and lack of exercise that

have led to epidemics of certain cancers, obesity, and diabetes.

- d. Many communicable diseases, such as AIDS, Lyme disease, tuberculosis, and viral disease, including influenza, still represent a serious community health problem in America.
- e. Alcohol and other drug abuse costs the country thousands of lives and billions of dollars each year.
- f. Disasters (natural and human made) have the potential to cause injury, death, disease and damage to property on a large scale, and require a high level of preparedness, starting with 9/11. Bioterrorism emerged as a national concern.

III. Outlook for Community Health in the Twenty-First Century

- A. World Health Organization's plan titled, "Health for All" is aimed at improving life expectancy through social and economic development, the wider provision of safe water and sanitation facilities, and the expansion of national health services.
- B. The United States' plan for health of Americans, *Healthy People 2010*, contains two overarching goals, namely, to increase the quality and years of healthy life, and to eliminate health disparities, and 467 specific objectives in 28 focus areas.
- C. The Department of Homeland Security (DHS) is a new cabinet level federal department whose mission is to deter terrorist attacks and protect the nation against threats and hazards, including disasters.

Organizations That Help Shape Community Health

CHAPTER 2

I. Introduction

- A. The size and complexity of today's communities hinder their ability to respond effectively to the health needs of their citizens unless they are organized for that purpose.
- B. There are several types of community health organizations: governmental, quasi-governmental, and nongovernmental.

II. Governmental Health Agencies

A. Governmental health agencies are funded by tax dollars, have specific duties mandated by law, and are headed by government officials.

B. International health agencies

1. The primary international health agency is the World Health Organization (WHO), founded in 1948.
2. The WHO headquarters is located in Geneva, Switzerland.
3. The primary operating body of WHO is the World Health Assembly, which comprises delegates from each of the member nations.
4. The purpose of WHO is to assist the peoples of member nations to attain the highest level of health possible.

III. C. National health agencies

1. The nation's principle health agency, the Department of Health and Human Services (HHS), protects the health of Americans and provides essential human services, especially for those who are least able to help themselves.

a. Within HHS, the Public Health Service (PHS) contributes most directly to community health. The PHS comprises the following agencies:

- i. Administration on Aging (AoA)
- ii. Administration for Children and Families (ACF)
- iii. Agency for Healthcare Research and Quality (AHRQ)
- iv. Agency for Toxic Substances and Disease Registry (ATSDR)
- v. Centers for Disease Control and Prevention (CDC)
- vi. Food and Drug Administration (FDA)
- vii. Centers for Medicare and Medicaid (CMS)

- viii. Health Resources and Services Administration (HRSA)
- ix. Indian Health Services (IHS)
- x. National Institutes of Health (NIH)
- xi. Substance Abuse and Mental Health Services Administration (SAMHSA)

2. Other federal agencies also carry out health-related activities.

- a. Department of Agriculture
- b. Department of Transportation
- c. Department of Labor
- d. Department of Interior
- e. Department of Homeland Security

- D. State health departments have three purposes: to promote, protect, and maintain the health and welfare of the citizens of the state. These purposes are represented in the core functions of public health: health assessment, policy development, and health assurance.
- E. Local health departments funded by local tax dollars provide health services to the people in their cities, counties, and parishes. The organization and services provided vary greatly from location to location.
- F. Coordinated School Health Programs that include health education, a healthful school environment, and health services can be considered governmental health agencies.

III. Quasi-governmental Health Organizations

- A. Quasi-governmental health agencies receive funding from both public and private sources, and carry out functions expected of government agencies without government supervision.
- B. The American Red Cross is the best-known example of a quasi-governmental health organization.
- C. There are similar agencies in many foreign countries.

D. Other quasi-government organizations:

1. National Science Foundation
2. National Academy of Sciences

IV. Nongovernmental Health Agencies

- A. Nongovernmental health agencies are funded by private contributions and grants and are not headed by government officials.
- B. Voluntary health agencies are health organizations that were started by concerned citizens who saw a community health need not being met by any government agency.
1. Voluntary health organizations often have national, state, and local offices.
 2. Among the best known are the American Cancer Society, the American Health Association, and the American Lung Association.
 3. Voluntary health agencies usually operate under a voluntary board of directors who hire a paid executive director, who in turn directs a paid staff and a group of volunteers.
 4. The purposes of most voluntary health agencies are to raise money for research, educate the public, and provide services to those in need, and advocate for their cause.
- C. Professional health organizations/associations are funded by membership dues and serve to protect and promote the standards of the profession. Examples include the American Medical Association and the American Nursing Association.
- D. Philanthropic foundations provide money for projects and research to benefit society, much of it directed toward improving health. Examples are the Rockefeller Foundation, the Robert Wood Johnson Foundation, the Sloan-Kettering Foundation, and Bill and Melinda Gates Foundation.
- E. Service organizations, such as the Shriners, Kiwanis, and Lion's clubs, and religious groups often contribute significant health services to the community.

- F. Corporations affect the community's health through health and benefits packages, health and safety education programs, and worksite fitness and recreation programs.

CHAPTER 17

Injuries as a Community Health Problem

CHAPTER OUTLINE

I. Introduction

IV. A. Definitions

1. Injury is physical damage to the body resulting from mechanical, chemical, thermal, or other environmental energy.
2. Unintentional injuries are those judged to have occurred without anyone intending harm to be done.
3. Intentional injuries are injuries that have been purposefully inflicted by oneself or by another.

V. B. Cost of injuries to society

1. Each year more than 150,000 people die from fatal injuries.
2. This includes approximately 112,000 unintentional injury deaths, 30,000 suicides, and 17,000 homicides.
3. There are 156 million medically attended injury-related episodes, including 41 million injury-related emergency department visits and more than 23 million disabling injuries each year in the United States.
4. Injuries cost this country more than \$400 billion of dollars each year because of foregone productivity and the costs of hospitalization and rehabilitation.
5. Injuries are the leading cause of death in the United States before the age of 75 (YPLL-75).
6. Federal funding for injury prevention and control is modest in comparison to that spent for heart disease and cancer research.

7. Injuries put a special burden on emergency departments.

II. Unintentional Injuries

VI. A. General

1. Unintentional injuries, by themselves, are the fifth leading cause of death in the United States.
2. In 2004, fatal and nonfatal unintentional injuries cost Americans approximately \$298 billion in lost wages and productivity, \$99 billion in medical expenses, \$112 billion in insurance administration costs, and \$65 billion in motor vehicle damage.

B. Types of unintentional injuries

1. Motor vehicle crashes: the leading cause of unintentional injury deaths and make up nearly 40% of all unintentional injury deaths.
2. Other types of unintentional injuries
 - a. In 2004, non-motor-vehicle, unintentional injury deaths numbered more than 65,000.
 - b. Examples of other causes of unintentional injuries, in order of number of incidence, are poisonings, falls, fires and burns, drowning and the discharge of firearms.
 - c. Three common sources of nonfatal injuries are stairs, bicycles, and toys.

C. The epidemiology of unintentional injuries can be examined by person, place, and time.

1. Person
 - a. Age: Unintentional injuries are the leading cause of death in each of the following age groups: 1-4, 5-14, 15-24, 24-34, and 35-44 years of age. They are the third leading cause of death in the 45- to 54-year age group (after cancer and heart disease).
 - b. Elders are at greatest risk for injury from falls.

- c. Gender: Males are twice as likely to suffer a fatal unintentional injury as females.
 - d. Minority status: People with minority status bear a heavier burden of unintentional injury deaths than whites. Non-Hispanic, Native Americans have the highest unintentional injury fatality rate, followed by Asian and Hispanics and then blacks.
2. Place
- a. Home: More unintentional injuries (47%) occur in the home than in any other place.
 - b. Highways: Highways rank second in the number of unintentional injuries (13% of total), but rank first in number of fatal injuries.
 - c. Sport facility/recreational area/lake/rivers are the third most important venue where injuries occur.
 - d. Workplace: Workplaces rank fourth as a place for unintentional injuries. (This speaks to the relative safety of the American workplace that more injuries occur at recreational venues than workplaces in America.)
3. Unintentional injury rates vary with time.
- a. The rate of motor-vehicle deaths per million miles driven has declined over that past two decades.
 - b. Deaths from falls and unintentional poisonings have been increasing in recent years.
 - c. 62% of drowning occur from May to August.
 - d. 65% of deaths from fires occur in November through April.
 - e. More motor vehicle deaths occur at night; death rates are more than three times higher at night. More fatal crashes occur on Saturdays.
 - f. Overall, holiday periods are *not* more dangerous than other days, but the proportion of alcohol-related fatal crashes is higher during holiday periods.

4. Alcohol and other drugs as risk factors
 - a. Alcohol is the single most important factor associated with both intentional and unintentional injuries.
 - i. There has been a decline in the percentage of motor vehicle fatalities that are alcohol related. About 39% of fatal motor vehicle crashes in 1996 involved alcohol, down from the 60% reported in 1982.
 - ii. There has been a decline in the percentage of fatal crashes involving a legally intoxicated driver.
 - iii. However alcohol involvement has been determined in a majority of single vehicle, fatal crashes.
 - b. Alcohol is involved in nearly half of adult drowning.
 - c. More than one-third of pedacyclists killed in traffic crashes were killed in an alcohol-related crash.

D. Prevention through epidemiology

1. Early contributors to injury prevention and control
 - a. Hugh De Haven studied victims of falls; his studies have led to vehicle interiors designed for greater safety.
 - b. John E. Gordon proposed using the methods of epidemiology to study the causes of injuries.
 - c. James Gibson proposed the idea that injury was caused by energy exchange.
 - d. William Haddon, Jr., insisted that research on accident prevention be developed into public policy.
2. A model for unintentional injuries incorporates energy as the agent in the standard public health model of agent, host, and environment.
3. Prevention and control tactics based on the public health model stress interrupting transmission of damaging energy to the host.
 - a. Prevent accumulation of energy.

- b. Prevent the inappropriate release of energy.
 - c. Place a barrier between humans and energy.
 - d. Completely exclude humans from proximity to energy source.
4. Other tactics
- a. Strengthen educational programs.
 - b. Strengthen EMS response capabilities.
 - c. Strengthen ordinances against dangerous behaviors.

E. Community-based approaches to the prevention of unintentional injuries

- 1. Education is the process of changing people's health-directed behavior to reduce unintentional injuries.
- 2. Regulation is the enactment and enforcement of laws to control conduct to reduce unintentional injuries.
- 3. Automatic (or passive) protection is the technique of designing a product or the environment to reduce unintentional injuries.
- 4. Litigation is the process of seeking justice for injury through the courts.

III. Intentional Injuries

A. General

- 1. Intentional injuries are the outcome of self-directed or interpersonal violence.
- 2. More than 50,000 people die each year from intentional injuries.
- 3. Millions of others receive nonfatal injuries as a result of interpersonal violence.

B. Types of intentional injuries include assault, abuse, rape, robbery, homicide, and suicide.

1. 21 of every 1,000 people in the United States were victims of violent crimes in 2004.
2. In 2003, homicide ranked as the thirteenth leading cause of death in the United States, accounting for 17,732 deaths.
3. In 2003, suicide was the eleventh leading cause of death, accounting for 31,484 deaths.
4. Suicides are the third leading cause of death among 15-24 year-olds.

Epidemiology of intentional injuries

1. Interpersonal violence disproportionately affects those who are frustrated and homeless, jobless, live in poverty, and have low self-esteem.
2. More violent acts are committed by males than by females; males are also more likely to victims of violence.
3. Firearms are increasingly involved.
4. Perpetrators of violent acts are more likely to have been abused or neglected as children.
5. Victimization rates are highest among minorities.
 - a. Victimization rates are high for black Americans than for other races.
 - b. Persons with low incomes and minorities are more likely to be victims of violent crimes.
6. Suicide and attempted suicide
 - a. More than 30,000 suicides are reported each year, accounting for 20% of all injury-related mortality.
 - b. Suicide rates for males are four times higher than for females.
 - c. Suicide rates among the young have tripled since 1950.
7. Firearm injuries and injury death statistics include both intentional and unintentional injuries.

- a. Firearm injuries are the second leading cause of injury deaths after motor vehicle crashes, but in some states they rank first.
- b. Fifty-four percent of suicides and 67% of homicides involved a firearm.
- c. Teenage boys and young males 15 to 24 years of age are at highest risk for death by firearms.

VII. D. Violence in our society

1. Individuals and violence

- a. Many individuals lack the communication and problem-solving skills to settle disagreements nonviolently.
- b. Firearms are easy to obtain and deadly.
- c. Murder is the number one cause of death for black Americans aged 15 to 24.
- d. Some conflict resolution programs have been developed to teach communication skills.

2. Family violence and abuse

- a. One in six homicides is the result of family violence.
- b. Children who survive family violence (abuse or neglect) are at greater risk for becoming violent as adults.
- c. Child maltreatment includes both child abuse and child neglect.
- d. Child abuse is the intentional inflicting of physical, emotional, verbal, or sexual injury upon a child. In 2004, 872,000 children under the age of 18 years were abused.
- e. Child neglect is more common than child abuse and is the failure to provide necessary subsistence for a child—physical, emotional, or educational.
- f. Between one and two million elders have been abused, neglected, exploited or otherwise mistreated.

- g. Ninety percent of known abusers are family members; two-thirds are adult children or spouses of adult children.
 - h. Intimate partner violence (IPV) is the rape, physical assault, and stalking perpetrated by current and former dates, spouses, and cohabiting partners.
 - i. Nearly two-thirds of women who reported being raped, physically assaulted, or stalked since age 18 were victimized by a current or former husband, partner, or a date.
 - ii. Health care costs for rape, physical assault, and stalking exceed \$5.8 billion each year.
 - iii. One in four women residing in the U.S. has been physically assaulted or raped by an intimate partner.
 - iv. Thirty percent of all women who are murdered are killed by an intimate partner; only 4% of male murder victims are killed by an intimate partner.
 - i. The cycle of violence depicts the progression of steps leading up to an episode of domestic violence.
 - j. Alcohol and other drugs are among the stress factors that increase the risk that violence will occur.
3. Prevention of domestic abuse
4. Violence in schools
- a. In general, schools are safe, but there have been rare but highly publicized acts of violence.
 - b. There has been little funding for school violence initiatives.
 - c. Some behaviors that are related to school violence, such as weapon carrying are decreasing.
 - d. Bullying in schools is increasingly being recognized as associated with school violence-related behavior.
 - e. There is more violence immediately after school than in school.

5. Gangs and violence
 - a. Youth gangs have been around a long time.
 - b. Violence has increased recently because of the availability of drugs, the money to be made selling drugs, and easy access to firearms.
 - c. Gang-related activities have significantly declined since 1996, but are still a concern in many communities.
 - d. Gangs and gang-related violence place enormous demand on law enforcement agencies.
 - e. Gangs deface property, which is costly to repair.
 - f. Community response should be multifaceted and include law enforcement, education, diversion activities, and social services support.

E. Approaches to prevention of intentional injuries

1. Education
 - a. Parenting skills for adults
 - b. Nonviolent problem-solving skills for youth
 - c. Self-esteem raising programs for youths and adults
2. Opportunities for employment and recreation
 - a. Jobs programs
 - b. Recreation programs
3. Regulation and enforcement
 - a. Brady Bill: regulates handgun purchases
 - b. Electronic detection of weapons
 - c. Other types of regulation

4. Counseling and treatment represent secondary and tertiary prevention.
- F. A comprehensive approach includes improved surveillance and training, community empowerment, and evaluation of existing programs.
1. Reduction in injuries resulting from firearm violence
 - a. Education and behavioral changes
 - b. Technological and environmental efforts
 - c. Enhanced enforcement of existing laws
 - d. New legislation and regulation
 2. Reduction in use of alcohol and other drugs
 - a. Decrease chronic use by high-risk individuals—treatment
 - b. Prevent first use by high-risk individuals
 - c. Review current drug laws

CHAPTER 18

Safety and Health in the Workplace

VIII. CHAPTER SYNOPSIS

Safety and health in the workplace is a global concern. After the home, Americans spend the next largest portion of their time at work. In this chapter, we examine work-related injuries and disease. After reviewing the history and scope of occupational safety and health, we briefly outline legislative efforts aimed at protecting workers. We then discuss the epidemiology of occupational injuries and illnesses and review prevention and control efforts. Finally, we outline resources (people and programs) for reducing the number and seriousness of workplace injuries and diseases.

IX. CHAPTER OUTLINE

I. Introduction

- A. An occupational disease is any abnormal condition or disorder, other than one resulting from an occupational injury, caused by factors associated with employment.

- B. An occupational injury is an injury that results from “exposure involving a single incident in the work environment.”
 - C. Scope of the problem
 - 1. About 16 people die of work-related injuries each day in the United States.
 - 2. The annual cost of occupational injuries, illnesses, and deaths was estimated to be \$142 billion in 2004.
 - D. The importance of occupational safety and health to the community can be stated simply: The safety and health of the surrounding community is closely linked to safety and health in the workplace.
- II. History of Occupational Safety and Health Problems
- A. Origins of the occupational safety and health movement
 - 1. The first writing on occupation safety and health of any type occurred in Europe in the sixteenth century.
 - 2. The first general work on the topic was Ramazzini’s *Discourse on the Diseases of Workers*, which appeared in 1700.
 - B. Occupational safety and health in the United States
 - 1. The industrial revolution began in Britain and spread to the European continent and to the United States.
 - 2. Power from burning coal resulted in larger factories with more workers.
 - 3. As factory sizes increased, the number of injuries on the job also increased.
 - 4. The first state legislation in the United States was a child labor law in Massachusetts.
 - 5. Massachusetts also passed the first worker safety law in 1877.
 - 6. The first Worker’s Compensation law was passed in Maryland in 1902.

7. The first federal legislation was the Worker's Compensation law passed in 1908, a law which covered only certain federal employees.
- C. Occupational Safety and Health Act of 1970 (OSHAct)
1. The purpose of the Occupational Safety and Health Act was to assure that employers in the private sector furnished each employee with employment and a work site free from recognized hazards likely to cause death or serious physical harm.
 2. The OSHAct required employers in the private sector to comply with standards promulgated and enforced by the Occupational Safety and Health Administration.
 3. The OSHAct established both the Occupational Safety and Health Administration (OSHA) and the National Institute for Occupational Safety and Health (NIOSH).
 4. NIOSH recommends occupational and safety and health standards.

III. Prevalence of Occupational Injuries, Disease, and Deaths

A. Overview of recent trends in workplace injuries and illness

1. There has been a decline in the number of workplace injuries and illnesses since 1990.
2. The highest rates of workplace injuries and illness are reported by the manufacturing, construction, and agricultural sectors.

B. Unintentional injuries in the workplace

1. Work-related fatalities
 - a. In 2002 there were 5,764 fatal work-related injuries, or 16 a day.
 - b. Highway incidents were the leading cause of fatal workplace injuries.
 - c. Falls were the second leading cause of death in the workplace.

- d. Being struck by an object or equipment was the third leading cause of death, followed by homicides.
- e. Most work-related homicides were robbery motivated.
- f. Agriculture was the industry with the highest rate of fatal occupational injuries.

2. Types of unintentional nonfatal workplace injuries

- a. The most common type of nonfatal workplace injuries requiring a visit to an emergency department were sprains and strains, followed by lacerations, punctures, amputations, and avulsions, contusions, abrasions and hematomas.
- b. The leading body part of injury involving the most days away from work is the back.

3. Characteristics of injured workers

- a. Age
 - i. Younger workers (less than 25 years of age) have significantly higher injury rates than older workers, but account for fewer days away from work.
 - ii. Injury death rates are highest for workers 65 years and older.
 - iii. 100,000 children, many employed illegally, are injured at work each year.
- b. Gender
 - i. Males sustain more injuries than females at every age.
 - ii. Males are more likely to be fatally injured at work; while women make up 46% of the workforce, they account for only 7% of workplace fatalities.
 - iii. Homicides account for almost half of women's work-related deaths.
- c. Frequency of occupational injuries by income and race

- i. Those in lower socioeconomic groups have higher occupational injury death rates.
 - ii. Occupation injury death rates are 12% higher for nonwhites.
 - iii. Native Americans have high occupational injury death rates.
 - iv. Asians have low occupational injury death rates.
- d. Geographic differences in workplace injuries
- i. Occupational injury death rates per 100,000 workers in Alaska, Wyoming, Montana, Mississippi and West Virginia.
 - ii. Death rates from farm machinery injuries are highest in the north central states.
- e. Temporal variations in workplace injuries
- i. Overall injury rates per 100,000 workers have declined during this century, while production has increased.
 - ii. Injuries from work out of doors are highest in the summer.
- f. Workplace injuries by industry and occupation
- i. Fatality rates are highest for agriculture, followed by mining, construction, and transportation and warehousing.
 - ii. The highest job-related death rates are those for fisherman, loggers and pilots.
- g. Agricultural safety and health
- i. Agricultural employees are exposed to injuries, hearing loss, skin, lung disease, chemicals, and sunlight (ultraviolet radiation).

- ii. Many farm workers are unpaid family members; including more than one million youths.
- iii. There are still many tractors in use that are not equipped with rollover protection structures (ROPS), resulting many rollover deaths every year.
- iv. Another group of agricultural workers at risk are migrant workers and their families. Working conditions for migrant workers are hazardous, and living conditions are often unsanitary; infant mortality in migrant workers is seven times the natural average.

C. Prevention and control of unintentional injuries in the workplace

1. Reducing injuries and illnesses in the workplace involves:
 - a. Anticipation of future adverse events
 - b. Recognition including surveillance of conditions, exposures and events
 - c. Evaluation and assessment of surveillance data
 - d. Control by changing workplace processes, environment and personnel practices to make them safer

D. Workplace violence: intentional workplace injuries

1. Homicides are the fourth leading cause of workplace deaths after motor vehicle crashes.
2. Homicide is the second leading cause of workplace injury deaths among female workers.
3. A majority (85%) of workplace homicides are associated with robberies.
4. Hospitals, nursing homes, and social service agencies are worksites particularly prone to nonfatal assaults.
5. Risk factors include working around money and valuables, working alone, and working late at night.

6. Prevention of work-related violence involves changes in environmental design, administration policy, and worker behavior.

IV. Occupational Diseases

- A. Illnesses in the workplace account for less than 6% of the 4.2 million injury and illness cases reported each year.
 1. In 2005, 242,000 cases of occupational diseases are reported in private industry.
 2. Some conditions like cancer are slow to develop and difficult to associate with the workplace; these diseases and conditions are often unreported or underreported.
- B. Chronic musculoskeletal diseases such as repetitive trauma, skin disorders, and respiratory conditions are among the leading types of workplace diseases.
 1. Chronic musculoskeletal conditions arise from continued/repeated trauma, resulting in inflamed, irritated or strained muscles, joints, or tendons.
 - a. Taken together, this is the leading cause of disability in the workplace
 - b. The economic cost of chronic musculoskeletal conditions exceeds the cost of any other disorder.
 - c. Another repeated trauma disorder is hearing loss which accounted for 11% of all reported occupational illnesses in 2005.
 2. Dermatological conditions
 - a. Examples are contact dermatitis, skin cancer, and infections.
 - b. Many toxic chemicals enter the body through the skin.
 3. Occupational lung diseases are caused by inhalation of toxic substances present in the workplace.

- a. Occupational lung diseases typically have a long latent period.
- b. Pneumoconiosis is a fibrotic lung disease caused by the inhalation of dusts. There are four common types.
 - i. Asbestosis, from inhalation of asbestos fibers, is the only form of occupational lung disease for which deaths are increasing; deaths from asbestosis accounted for 59% of all workplace pneumoconiosis deaths in 2002.
 - ii. The incidence of coal workers' pneumoconiosis (black lung disease) has declined after being the leading cause of occupational lung disease for many years; it make up 34% of pneumoconiosis deaths in 2002.
 - iii. Silicosis, from inhaling crystalline silica, is responsible for 6% of all pneumoconiosis deaths.
 - iv. Byssinosis (brown lung disease), caused by inhalation of cotton dust, now results in less than 10 deaths per year.
4. Other work-related disorders involve the nervous, reproductive, and cardiovascular systems
5. Pesticides are an occupational hazard to agricultural workers
6. Bloodborne pathogens and antineoplastic agents are two major occupational disease concerns for health workers

C. Controlling occupational diseases

1. The same principles delineated to reduce the number and seriousness of occupational injuries should be implemented to reduce the incidence of occupational illnesses and disorders.
2. The vigilance of both employer and employee and the assistance of the government is essential.
3. There are specific activities that can be employed to control occupational disease.

4. Occupational disease control programs require professionally trained personnel.

V. Resources for the Prevention of Occupational Injuries and Diseases

- A. Occupational safety and health professionals include safety engineers, health physicists, industrial hygienists, occupational physicians, and occupational health nurses.
 1. Safety engineers and certified safety professionals design safety education programs and detect and correct or remove hazards in the workplace.
 2. Health physicists monitor radiation in the workplace and develop plans for decontamination and coping with radiation accidents.
 3. Industrial hygienists are concerned with environmental factors in the workplace that might cause illness.
 4. Occupational physicians are medical practitioners whose primary concern is preventive medicine in the workplace.
 5. Occupational health nurses are registered nurses who practice in a workplace setting. Duties may range from first aid to health promotion and injury prevention.
- B. Occupational safety and health programs have as their goal the hiring and maintaining of healthy workers.
 1. Pre-placement examinations assure that applicants are physically matched for their jobs.
 2. Occupational disease prevention program and safety programs
 - a. Disease prevention program focus on controlling occupational disease.
 - b. Safety programs are aimed at reducing the number and seriousness of unintentional injuries on the job.
 3. Worksite health promotion (WHP) programs are workplace-based programs aimed at improving the health of employees through changes in lifestyle.

- a. The goals of these programs are reducing absenteeism, lowering health insurance premiums, increasing productivity and improving moral.
 - b. Worksite health promotion programs are one approach to reducing the employer's health care cost burden.
4. Employee assistance programs (EAPs) assist employees experiencing personal problems that interfere with job performance. While EAPs predate the arrival of WHP programs at most worksites, they are now usually considered a facet of the latter.

Chapter 20

Epidemiology

Overview

Epidemiology, the basic science of public health, is the study of the cause and distribution of health states, including diseases, in populations. Through the identification of causative (etiological) agents, sources and routes of transmission of disease, prevention of disease may be accomplished. Types of epidemiological studies are presented as well as a summary of current disease surveillance networks. Emerging diseases and nosocomial infections are also covered.

1. Define epidemiology
2. Define the following:
 - Portal of exit
 - Portal of entry
 - Communicable diseases
 - Non-communicable diseases
3. Define and differentiate between morbidity rate and mortality rate.
4. Define and differentiate between incidence and prevalence.
5. Define
 - Endemic
 - Epidemic
 - Outbreak
 - Pandemic
6. Define reservoir and give examples.
7. Differentiate between symptomatic infection and asymptomatic carriers.
8. Define zoonoses.
9. Differentiate between horizontal and vertical transmission of disease.
10. List specific mechanisms for the transmission of microbial diseases.

11. Define
 - Fomites
 - Droplet nuclei
 - Vectors
12. Differentiate between mechanical and biological vectors.
13. List the major portals of exit and portals of entry.
14. List and describe the major factors that influence the epidemiology of disease.
15. Differentiate among descriptive, analytical and experimental epidemiological studies.
16. Define
 - Risk factor
 - Placebo
 - Double-blind study
17. Describe the following epidemiological approaches
 - Cross-sectional study
 - Retrospective or Case-Control study
 - Prospective study
18. Describe how infectious disease surveillance is carried out.
19. Define or explain the following terms:
 - Centers for Disease Control and Prevention (CDC)
 - Morbidity and Mortality Weekly Report (MMWR)
 - Notifiable diseases
 - World Health Organization (WHO)
20. List and describe some of the factors that contribute to the emergence and reemergence of diseases.
21. Define healthcare-associated (nosocomial) infections and explain why they occur.
22. Describe how healthcare-associated infections can be prevented.

Chapter 30

Microbial Ecology

Overview

Microorganisms are found throughout the biosphere and are essential for life as we know it. They both change the environment in which they are found and adapt to that environment. Those microorganisms that are best adapted tend to dominate in a particular environment. The roles of microorganisms are many and varied, including primary production, decomposition and biogeochemical cycling.

Learning Objectives

After studying the material in this chapter, you should be able to:

23. Define the following terms:
 - Microbial ecology
 - Community
 - Ecosystem

- Biosphere
 - Biodiversity
 - Ecological niche
 - Microenvironment
 - Macroenvironment
 - Biofilm
24. Describe the roles of:
 - Primary producers
 - Consumers
 - Decomposers
 25. Describe how microorganisms grow in low-nutrient environments.
 26. Distinguish between microbial competition and antagonism.
 27. Describe how environmental changes have an effect on microbial communities.
 28. Explain how a microbial mat is stratified based on microbes present.
 29. Describe the roles of the following techniques or procedures in studying microbial ecology
 - Fluorescence *in situ* hybridization (FISH)
 - Polymerase chain reaction (PCR)
 - Denaturing gradient gel electrophoresis (DGGE)
 - Genomics
 30. Distinguish between oligotrophic and eutrophic waters.
 31. Compare marine environments with freshwater environments.
 32. Describe the effects of nutrient-rich runoff on water.
 33. Define the following:
 - Groundwater
 - Salt lakes
 34. List the characteristics of soil
 35. Define soil as a microbial habitat.
 36. Define biogeochemical cycles and list three specific examples.
 37. List three uses of chemical elements in biogeochemical cycles.
 38. Describe what occurs in each of the following cycles.
 - Carbon cycle
 - Nitrogen cycle
 - Sulfur cycle
 - Phosphorus cycle
 39. List two sources of energy for ecosystems.
 40. Define mutualism.
 41. Describe the two major types of mycorrhizal relationships.
 42. Differentiate among nitrification, denitrification and ammonification.
 43. Describe nitrogen fixation and explain its importance.
 44. Describe the relationship between microorganisms and herbivores.

Chapter 31

Environmental Microbiology: Treatment of Water, Wastes and Polluted Habitats

Overview

A healthy environment requires clean water. Water supplies are continually treated and tested to avoid contamination. Modern society produces waste materials at an ever-increasing rate. As waste materials accumulate in the environment of an organism, its health is negatively affected. Waste water and wastewater treatment methods are covered in this chapter, as well as methods for treatment and disposal of solid wastes. The concept of bioremediation is introduced and discussed.

Learning Objectives

After studying the material in this chapter, you should be able to:

45. Define biochemical oxygen demand (BOD) and explain its significance in wastewater treatment.
46. Describe the goals of wastewater treatment.
47. Describe the physical, chemical and biological processes used in wastewater treatment.
48. Compare and contrast primary treatment, secondary treatment, advanced treatment, and anaerobic digestion.
49. Describe or identify the following wastewater treatment methods:
 - Septic tanks
 - Lagoons
 - Trickling filters
 - Artificial wetlands
50. Describe how water is typically treated to make it safe for drinking.
51. List three steps in the treatment of water in order to make it safe for drinking.
52. Explain what is indicated by the presence of coliforms in water.
53. List four procedures used to test for coliforms in water.
54. Compare and contrast sanitary landfills and composting programs.
55. Define bioremediation and describe how it can be accomplished.

Home Water Purification Systems

- I. Home Water Treatment Systems
 - A. Standards and Regulatory Bodies
 1. EPA (Environmental Protection Agency)
 2. NSF (National Sanitation Foundation)
 3. ANSI (American National Standards Institute)
 4. WHO (World Health Organization)
 - B. Definitions

1. POE
2. POU
3. DWTU
- C. Testing Standards
 1. Material Guidelines
 2. Structural Guidelines
 3. NSF/ANSI Standards for POU and POE Treatment Technologies
 - a. Aesthetic Effects
 - b. Cation Exchange Water Softeners
 - c. Health Effects
 - d. UV Microbiological Water Treatment Systems
 - e. Reverse Osmosis (RO) Drinking Water Treatment Systems
 - f. Drinking Water Distillation Systems
- II. Drinking Water Treatment System Selection
- III. Drinking Water Problems
 - A. Chlorine
 - B. Bacteria
 - C. Lead
 - D. Asbestos
 - E. Chemical Pollution
 - F. Cysts
- IV. In Home Treatment Technologies
 - A. Granulated Activated Carbon
 1. Advantages
 2. Disadvantages
 - B. Distillation
 1. Advantages
 2. Disadvantages
 - C. Reverse Osmosis
 1. Advantages
 2. Disadvantages
 - D. Ultraviolet Light
 1. Advantages
 2. Disadvantages
 - E. Solid Block Carbon Filters
 1. Advantages
 2. Disadvantages
 - F. Other Technologies
 1. Bottled Water
 - a. Advantages
 - b. Disadvantages
 2. KFD Resin
- V. Consumer Protection

Chapter 32

Food Microbiology

Overview

Microorganisms play important roles in both the production and spoilage of foods and beverages. Through the process of lactic acid fermentation by bacteria, cheese, yogurt, acidophilus milk, pickled vegetables and fermented meat products such as salami, pepperoni and summer sausage are produced. Alcoholic fermentation by yeasts is used to produce wine, beer, distilled spirits, vinegar and bread. Mold growth is used to produce soy sauce and to give flavor and texture to some cheeses. Microorganisms cause destruction of food both as crops and as stored items. Our knowledge of the processes of spoilage can enable us to inhibit these processes and preserve foods. Microorganisms are responsible for foodborne illness. Foodborne intoxication results from the consumption of toxin produced by a microorganism growing on food as seen in botulism. Foodborne infections require the consumption of living microorganisms. Examples of causative agents include *Salmonella*, *Campylobacter* and *Escherichia coli* O157:H7. This chapter presents the principles of food microbiology.

Learning Objectives

After studying the material in this chapter, you should be able to:

56. List intrinsic and extrinsic factors that influence the growth of microorganisms in foods.
57. List examples of foods or beverages that are produced by microorganisms.
58. Distinguish between fermentation and spoilage.
59. Explain why the fermentation process often prevents foods or beverages from spoiling.
60. List three major ways in which microorganisms produce food and give examples of each.
61. List seven common food spoilage bacteria.
62. List four common food spoilage fungi.
63. List seven common causes of foodborne infections.
64. List two common causes of foodborne intoxications.
65. Describe how foodborne infections and intoxications can be prevented.
66. List nine methods of food preservation and give examples of their uses.