CHAPTER 2

The Social Sources of Illness

Efrem Lukatsky/AP Photo.

In 1964, Dr. Margrethe ("Grethe") Rask left her native Denmark to work in Central Africa. For several years, she worked at a primitive hospital in northern Zaire, where, as her former colleagues described (Shilts, 1987: 4–7), basic supplies were woefully lacking:

> *You just used needles again and again until they wore out; once gloves had worn through, you risked dipping your hands in your patient's blood because that was what needed to be done. The lack of rudimentary supplies meant that a surgeon's work had risks that doctors in the developed world could not imagine.*

In the early 1970s, Rask began working at a major hospital in the capital city of Kinshasa. By Christmas 1976:

> *She was thin, losing weight from a mysterious diarrhea. She had been suffering from the vague yet persistent malaise for two years now, since her time in the impoverished northern villages. In 1975, the problem had receded briefly after drug treatments, but for the past year, nothing had seemed to help. The surgeon's weight dropped further, draining and weakening her with each passing day.*
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> *Even more alarming was the disarray in the forty-six-year-old woman's lymphatic system, the glands that play the central role in the body's never-ending fight to make itself immune from disease. All of Grethe's lymph glands were swollen and had been for nearly two years. Normally, a lymph node might swell here or there to fight this or that infection, revealing a small lump on the neck, under an arm, or perhaps in the groin. There didn't seem to be any reason for her glands to swell; there was no precise infection anywhere, much less anything that would cause such a universal enlargement of the lymph nodes all over her body ....*
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> *Suddenly, she could not breathe. Terrified, Grethe flew to Copenhagen, sustained on the flight by bottled oxygen. [Throughout 1977,] the top medical specialists of Denmark had tested and studied the surgeon. None, however, could fathom why the woman should, for no apparent reason, be dying. There was also the curious array of health problems that suddenly appeared. Her mouth became covered with yeast infections. Staph infections spread in her blood. Serum tests showed that something had gone awry in her immune system; her body lacked T-cells, the quarterbacks in the body's defensive line against disease. But biopsies showed she was not suffering from a lymph cancer that might explain not only the T-cell deficiency but her body's apparent inability to stave off infection. The doctors could only gravely tell her that she was suffering from progressive lung disease of unknown cause. And, yes, in answer to her blunt questions, she would die ....*
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> *On December 12, 1977, Margrethe P. Rask died. She was forty-seven years old.*

A scant few years later, the cause of Grethe Rask's death—AIDS—would make headlines around the world. The news of a new, fatal infectious disease stunned

SOURCES

Efrem Lukatsky/AP Photo.

both doctors and the public. Yet throughout history, new diseases have appeared and old diseases have disappeared. In this chapter, I begin with an overview of some basic concepts used to talk about disease patterns. Then, I provide a brief history of how patterns of disease have shifted over time, from the great epidemics of the past, to the late nineteenth-century decline of infectious diseases, to their modern reemergence. After that, I describe the current evidence regarding the major social sources of premature death in the United States today, including tobacco use, medical errors, and an environment that encourages the use of motor vehicles. The final section focuses on the social and psychological conditions that lead people to adopt healthy or unhealthy behaviors. This section provides a sociological model for understanding these decisions and looks specifically at the impact of one particularly important factor, social stress.

AN INTRODUCTION TO EPIDEMIOLOGY

The first essential concepts that students of health and illness need to understand are disease and illness. To researchers working in health care, **disease** refers to a biological problem within an organism. In contrast, **illness** refers to the social experience and consequences of having a disease. So, for example, an individual who is infected with the poliomyelitis virus has the *disease* we call polio. When we refer, however, to subsequent changes in that individual's sense of self and social relationships, we should properly refer to these changes as consequences of the *illness* known as polio, not the disease. (Chapter 5 will discuss the meaning of illness in more detail.)

The study of the distribution of disease within a population is known as **epidemiology**. This chapter and the next focus more specifically on **social epidemiology**, or the distribution of disease within a population by social factors (such as social class or use of tobacco) rather than biological factors (such as blood pressure or genetics). For example, whereas biologists might investigate whether heart disease is more common among those with high versus low cholesterol levels, social epidemiologists might investigate whether it is more common among those with high versus low incomes.

What do we mean when we say that a certain disease is "more common" among one group than another? One way is to look at how many people in each group have the disease. Relying on raw numbers, however, can distort our picture of a population's health. For example, during 2005/2006, more than 900,000 Brazilians were infected with the virus that causes AIDS, but fewer than half as many persons were infected in Botswana (Population Reference Bureau, 2007). On the surface, these numbers suggest that AIDS is a much greater problem in Brazil. However, Brazil's population is much larger than that of Botswana. To take this difference into account, epidemiologists typically look at the *rate* rather than the number of AIDS cases in a population. **Rate** refers to the *proportion* of a specified population that experiences a given circumstance. We use the following formula to calculate the rate of any event (whether disease, disability, birth, or death):

$$\frac{\text{Number of events in a given period}}{\text{Specified population during that period}} \times 10^n$$

Using this formula, we find that the rate of adults infected with the virus that causes AIDS (calculated as the number of infected persons in a country divided by that country's population) was 500 per 100,000 adults in Brazil compared to 24,000 per 100,000 adults in Botswana (Population Reference Bureau, 2007). This tells us that AIDS affects a greater proportion of the population in Botswana than in Brazil and demonstrates the advantage of using rates rather than raw numbers.

Two particularly useful types of rates are incidence and prevalence rates. **Incidence** refers to the number of *new* occurrences of an event (disease, births, deaths, and so on) within a specified population during a specified period. **Prevalence** refers to the *total* number of cases within a specified population at a specified time—both those newly diagnosed (incidence) and those diagnosed in previous years but still living with the condition under study. So, for example, to calculate the *incidence* rate of lung cancer per 100,000 persons in the United States this year, we would use the formula:

$$\frac{\text{Number of new cases of lung cancer diagnosed this year in U.S.}}{\text{Population of U.S. this year}} \times 100,000$$

To calculate the *prevalence* rate of lung cancer, we would use the formula:

$$\frac{\text{Number of persons living with lung cancer in U.S. this year}}{\text{Population of U.S. this year}} \times 100,000$$

In general, incidence better measures the spread of **acute illnesses**. Acute illnesses, like chicken pox and cholera, strike suddenly and disappear quickly—sometimes killing their victims, sometimes causing only a mild illness. Incidence also better measures rapidly spreading diseases such as AIDS. For example, to see how AIDS has spread, we would compare its incidence in 1981 to its incidence currently. Prevalence, on the other hand, better measures the frequency of **chronic illnesses**. Chronic illnesses are those illnesses that typically last for many years, such as muscular dystrophy, asthma, and diabetes.

Two final terms often used in epidemiology are *morbidity* and *mortality*. **Morbidity** refers to symptoms, illnesses, and impairments; **mortality** refers to deaths. To assess the overall health of a population, epidemiologists typically calculate the rate of serious morbidity in a population (that is, the proportion suffering from serious illness), the rates of infant mortality and maternal mortality (that is, the proportion of infants and childbearing women who die during or soon after childbirth), and **life expectancy** (the average number of years individuals born in a certain year can expect to live).

But what if one population is much older than another? Since younger people have very different health risks than do older people, it would be misleading to compare these populations without taking this into account. For example, Arizona's population is younger on average than is North Dakota's, so we would expect Arizona to have more deaths from drunk driving and fewer from heart disease than would North Dakota. To deal with this issue, epidemiologists use **age-adjusted rates**. These rates are calculated using standard statistical procedures that, as Chapter 1 described, control for the effect of age differences among populations.

The next section uses epidemiological concepts and data to describe how patterns of disease have changed over time.

A BRIEF HISTORY OF DISEASE

THE EUROPEAN BACKGROUND

The modern history of disease begins during the Middle Ages (approximately A.D. 800 to 1300), as commerce, trade, and cities began to swell (Kiple, 1993). These shifts sparked a devastating series of epidemics. The term **epidemic** refers to any significant increase in the numbers affected by a disease *or* to the first appearance of a new disease. In the fledgling European cities, people lived in close and filthy quarters, along with rats, fleas, and lice—perfect conditions for transmitting infectious diseases such as bubonic plague and smallpox. In addition, because city dwellers usually disposed of their sewage and refuse by tossing them out their windows, typhoid, cholera, and other waterborne diseases that live in human waste flourished. Simultaneously, the growth of long-distance trade helped epidemics spread to Europe from the Middle East, where cities had long existed and many diseases were **endemic** (that is, established within a population at a fairly stable prevalence). In addition, religious pilgrimages and crusades to Jerusalem helped spread diseases to Europe.

The resulting epidemics ravaged Europe. Waves of disease, including bubonic plague, leprosy, and smallpox, swept the continent. The worst of these was bubonic plague, popularly known as the "Black Death." Between 1347 and 1351, plague killed at least 25 million people—between 25% and 50% of Europe's population and as much as two-thirds of the population in some areas (Gottfried, 1983; J. Kelly, 2005).

Although the great **pandemics** (worldwide epidemics) began diminishing during the fifteenth and sixteenth centuries, average life expectancy increased only slightly, for malnutrition continued to threaten health (Kiple, 1993). By the early 1700s, however, life expectancy began to increase. This change cannot be attributed to any developments in health care, for folk healers had nothing new to offer, and medical doctors and surgeons (as will be described in more detail in Chapter 11) harmed at least as often as they helped. For example, former president George Washington died after his doctors, following contemporary medical procedures, "treated" his sore throat by cutting into a vein and draining two quarts of his blood (Kaufman, 1971: 3).

If advances in medicine did not cause the eighteenth-century decline in mortality, what did? Historians commonly trace this decline to a combination of social factors (Kiple, 1993). First, changes in warfare moved battles and soldiers away from cities, protecting citizens from both violence and the diseases that followed in soldiers' wakes. Second, the development of new crops and new lands improved the nutritional status of the population and increased its ability to resist disease. Third, women began to have children less often and at later ages, increasing both women's and children's chances of survival. Fourth, women less often engaged in long hours of strenuous fieldwork, increasing their chances of surviving the physical stresses of childbearing. Infants, too, more often survived because mothers could more easily keep their children with them and breastfeed. (This lifestyle, however, would change soon for those women who became factory workers.)

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Disease in the New World

As these changes were occurring in Europe, colonization by Europeans was decimating the native peoples of the New World (Kiple, 1993). The colonizers brought with them about fourteen new diseases—including influenza, measles, smallpox, scarlet fever, yellow fever, cholera, and typhoid—that had evolved in the Old World and for which the Native Americans had no natural immunities. These diseases ravaged the Native American population, in some cases wiping out entire tribes (Crosby, 1986). Conversely, life expectancy *increased* for those who emigrated from Europe to the colonies, for the New World's vast lands and agricultural resources protected them against the malnutrition and overcrowding common in Europe.

The Epidemiological Transition

As industrialization and urbanization increased, mortality rates rose, especially among the urban poor. The main killer was **tuberculosis**, followed by influenza, pneumonia, typhus, and other infectious diseases. By the late nineteenth century, however, deaths from infant mortality, child mortality, and infectious diseases began to decline rapidly. Between 1900 and 1930, life expectancy rose from 47 years to 60 years for whites and rose from 33 years to 48 years for African Americans (U.S. Bureau of the Census, 1975).

As infant mortality declined, families no longer felt obligated to have many children to ensure that one or two would survive long enough to become workers and bring income into the household. At the same time, the national economy continued to shift from agriculture to industry, reducing couples' need to have children to work on the family farm. Similarly, employers increasingly offered pensions and other social benefits, so fewer couples needed children to care for them in their old age. Taken together, these trends produced a sharp decline in family size. Consequently, families could devote more resources to each child, further increasing their children's chances of survival.

As infectious diseases declined in importance, chronic and degenerative diseases, which can affect only those who live long enough for them to develop, gained importance. Cancer, heart disease, and stroke became major causes of mortality, while arthritis and diabetes emerged as major sources of morbidity. Increasingly, too, conditions like heart disease, stroke, and hypertension shifted from being primarily diseases of the affluent to being disproportionately diseases of the poor.

The shift from a society characterized by infectious and parasitic diseases and low life expectancy to one characterized by degenerative and chronic diseases and high life expectancy is referred to as the **epidemiological transition** (Omran, 1971). This transition seems to occur around the world once a nation's mean per capita income reaches a threshold level (in 2007 dollars) of about $8,000 (Wilkinson, 1996). Chapter 4 explores health in countries that have not fully made the epidemiological transition.

Contrary to conventional wisdom, medical interventions such as vaccinations, new drugs, and new surgical techniques played little role in the epidemiological transition, which began more than 200 years ago in Western societies (Leavitt and Numbers, 1985; McKeown, 1979; McKinlay and McKinlay, 1977). In a series of dramatic graphs showing how mortality from several important diseases declined

over time, McKinlay and McKinlay (1977) have demonstrated that most of these declines *preceded* the introduction of effective medical interventions (see Figure 2.1). For example, the death rate for tuberculosis declined steadily from about 3.5 per 1,000 persons in 1860 to 0.34 per 1,000 in 1946. Yet streptomycin, the first effective treatment for tuberculosis, was not introduced until 1947. Only polio and smallpox declined substantially after the introduction of medical interventions. Of these two, only the decline in polio can be confidently attributed to medical intervention, as we cannot separate the possible impact of inoculation on the rate of smallpox from the impact of the myriad other changes that occurred after inoculation was first widely adopted about 200 years ago. Similarly, the introduction of chlorination and filtering to city water systems virtually eliminated waterborne diseases like typhoid fever. Moreover, because clean water reduced the stress on individuals' immune systems, it also dramatically decreased deaths from pneumonia and tuberculosis. Cleaner water systems accounted for almost half of the drop in overall mortality rates and two-thirds of the drop in infant mortality rates between 1900 and 1940 (Cutler and Miller, 2005).

Researchers using generous measures have concluded that medical care explains no more than one-sixth of the overall increase in life expectancy during the twentieth century (Bunker, Frazier, and Mosteller, 1994). Rather, most of this increase resulted from changes in the social environment (McKinlay and McKinlay, 1977).

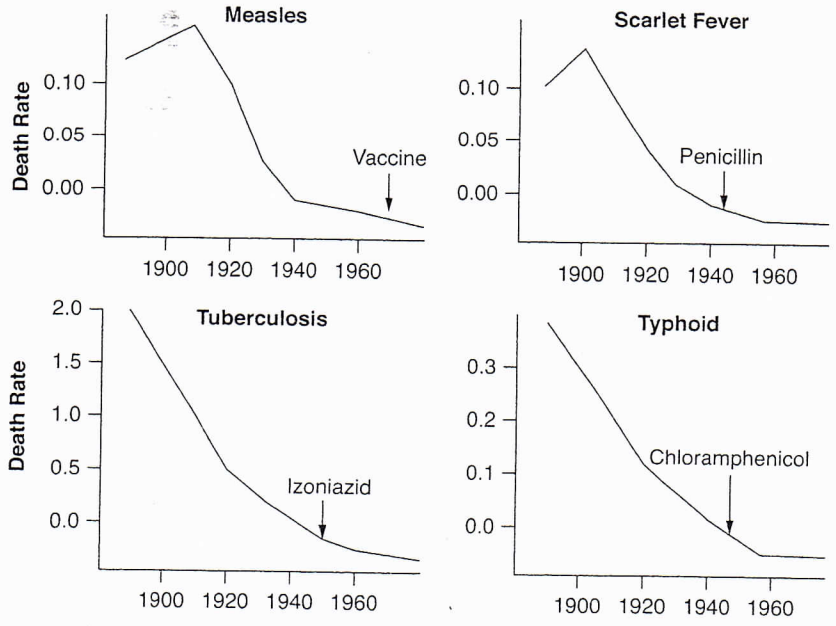

FIGURE 2.1 | THE FALL IN THE STANDARDIZED DEATH RATE (PER 1,000 POPULATION) FOR FOUR COMMON INFECTIOUS DISEASES IN RELATION TO SPECIFIC MEDICAL MEASURES, FOR THE UNITED STATES, 1900–1973

Source: McKinlay and McKinlay (1977). Reprinted by permission of Blackwell Publishers.

As nutrition and living conditions improved, so did individuals' ability to resist infection and to survive if they became infected. In addition, although somewhat less importantly, public health improvements such as the development of clean water supplies and sanitary sewage systems increasingly protected individuals from exposure to disease-causing microbes.

The New Rise in Infectious Disease

By the second half of the twentieth century, Americans—both health care workers and the public—had come to believe infectious diseases were under control (even though they continued to rage in poorer regions of the world). Partly because of this belief, few paid much attention when on June 5, 1981, the federal government's *Morbidity and Mortality Weekly Report* published a brief article describing a curious syndrome of immune-deficiency disorders in five gay men. Within a few years, however, people around the world would learn to their horror that a deadly new infectious disease, AIDS, had taken root. Since then, other new infectious diseases (such as Ebola Hemorrhagic Fever) have been identified, previously known diseases (such as cholera and streptococcus) have become deadlier, and previously harmless microbes (such as the virus that causes Avian Influenza, or "bird flu") have caused important disease outbreaks (Altman, 1994).

The renewed dangers posed by infectious disease partly reflect basic principles of natural selection. Just as natural selection favors animals whose camouflaging coloration hides them from predators so they can survive long enough to reproduce, natural selection favors those germs that can resist drug treatments. As doctors prescribed antibiotics more widely, often under pressure from patients who feel "cheated" if they do not receive a prescription at each visit (Vuckovic and Nichter, 1997), the drugs killed all susceptible variants of disease-causing germs while allowing variants resistant to the drugs to flourish. Similarly, drug-resistant tuberculosis is increasing worldwide, as AIDS and poverty leave individuals both more susceptible to infection and less able to afford consistent, effective treatment. Meanwhile, the growing use of antibiotics in everything from cutting boards to kitty litter, chicken feed, and soaps also encourages the rise of drug-resistant bacteria.

Other forces also promoted the rise in infectious diseases (L. Garrett, 1994). In the same way that population growth and the rise of cities once fostered the spread of infectious diseases in Europe, they now are causing new epidemics in the rapidly growing cities of Africa, Asia, and Latin America. Meanwhile, older cultural traditions often erode among those who move to these cities, making health-endangering activities like tobacco smoking and sexual experimentation more likely. At the same time, as industrial sites and cities replace forests and farmlands and drive out animal populations, some microbes that previously had infected only animals are now infecting humans.

All these factors have been heightened by **globalization**, the process through which ideas, resources, people, and trade increasingly operate in a worldwide rather than local framework. The erosion of cultural traditions in Asia, Africa, and Latin America reflects, among other things, the increasingly global spread of Western ideas by tourists, the mass media, businesspeople, and nongovernmental organizations such as the United Nations and the International Monetary Fund (IMF).

Similarly, environmental changes that encourage disease partly stem from actions taken by Western-based industries and corporations which have found it increasingly easy to operate around the world due to new free trade agreements (such as NAFTA, the North American Free Trade Agreement). Finally, the globalization of business investment and tourism has globalized disease simply by increasing the number of people traveling from one region to another (L. Garrett, 1994). For example, severe acute respiratory syndrome (SARS) was first identified by doctors in China in late 2002. Due to international travel, within less than a year more than 8,000 cases of SARS were reported in 29 countries, including the United States (World Health Organization, 2005a). Finally, globalization can encourage infectious disease through its political effects. Since September 11, 2001, the American public has realized that the U.S. role in world politics can make it a target for terrorists, some of whom may be willing to use infectious diseases as weapons. Box 2.1 discusses this threat.

THE EMERGENCE OF AIDS AIDS provides the premiere example of the new rise in infectious disease. Beginning in 1979, a few doctors in New York, San Francisco, and Los Angeles had noticed small outbreaks in young gay men of rare diseases that typically affect only persons whose immune systems have been damaged by disease or chemotherapy. By 1982, the Centers for Disease Control and Prevention (CDC) had officially coined the term **acquired immunodeficiency syndrome (AIDS)** to describe what we now know is the last, deadly stage of infection with human immunodeficiency virus (HIV). Because most HIV-infected persons do not in fact have AIDS, this textbook uses the term **HIV disease** rather than AIDS except when reporting statistics based solely on AIDS cases.

HIV disease is spread through sexual intercourse, through sharing unclean intravenous needles, through some still-unknown mechanism from mother to fetus, through blood transfusions or blood products, and, rarely, through breastmilk. The last three modes of transmission are now rare in countries where HIV blood tests, breastmilk substitutes, and drugs for reducing the risk of maternal/fetal transmission are affordable. Studies have demonstrated conclusively that AIDS is not spread through insects, spitting, sneezing, hugging, nonsexual touching, or food preparation (Stine, 2005). In 2005, the number of Americans infected with HIV passed 1 million for the first time.

The rapid spread of HIV disease since 1981 reflects public attitudes as much as biological realities. A handful of behavioral changes could have virtually halted its spread: testing the blood supply for infection, using latex condoms and spermicide with sexual partners, and using clean needles when injecting drugs. Unfortunately, early in the epidemic when intervention would have been most effective, the U.S. government (like most other governments) treated HIV disease as a distasteful moral issue rather than as a medical emergency. At critical junctures during the 1980s, federal officials lobbied Congress to restrict funding for HIV research and education (Epstein, 1996). Moreover, the limited funds the government provided early on for HIV education came with many strings attached, such as prohibiting explicit pictures in materials on sexual education, prohibiting language that might offend heterosexuals even in educational materials designed solely for gay men, and—even though substantial proportions of teenagers engage in sexual intercourse—refusing to fund

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BOX 2.1 | THE THREAT OF BIOTERRORISM

by Sarah St. John

The terrorist attacks of September 11, 2001, the spread of anthrax through the mail shortly thereafter, and the numerous terrorist attacks around the world since then have heightened concerns about bioterrorism in the United States. Since World War II, numerous governments (including the United States) have developed stockpiles of dangerous germs—including bubonic plague, typhus, smallpox, and anthrax—as well as technologies for making those germs more toxic and easier to disseminate (T. Brown and Fee, 2001; J. Miller, Engelberg, and Broad, 2001). All of us are endangered by the possibility that a government or terrorist group might use these germs. Such an event could produce massive human casualties, severely reduce food or water supplies if animals or water are infected, and cause great disruption (like the disruption to the postal system after the anthrax mailings).

The United States is particularly vulnerable to bioterrorism for several reasons. First, our status as the world's leading superpower makes us a target for those who envy our economic and political power, fear our cultural influence, or resent our actions. Second, our open society and commitment to individual liberties makes it more difficult to protect against terrorists than would be the case if our country were a dictatorship and we lived under constant governmental surveillance. Third, many Americans lack health insurance, adequate food and housing, and proper immunization against disease, and so are more susceptible to infection and less likely to receive the sort of quick treatment that could stop an epidemic quickly. Fourth, U.S. hospitals lack effective plans for coping with large bioterrorist attacks and lack the vaccinations, treatments, space, equipment, and knowledgeable personnel needed to do so (Daniell, Treser, and Wetter, 2001). Finally, severe cutbacks in the public health system in the quarter century before 9/11 weakened both local health departments and the national CDC, weakening our ability to detect and respond to epidemics (L. Garrett, 2000). Public health funding has improved in the years since the attacks, but remains far below what is needed (Centers for Disease Control and Prevention, 2008a).

In response to these problems, the U.S. government has dramatically increased its antiterrorism funding. Questions have been raised, however, regarding how much of this money should be devoted to fighting bioterrorism (how great is the risk, and how do we calculate it?) and how such money could best be allocated (to military surveillance? epidemiological surveillance? stockpiling medicines?). However these questions are answered, any monies spent alleviating problems associated with poverty, housing, nutrition, access to health care, and the decaying health care infrastructure will bring benefits whether or not we suffer a serious terrorist attack (Cohen, Gould, and Sidel, 2001).

education programs for children and young adults unless the programs taught only abstinence from sex and not how to have sex safely.

Similarly, both federal and local authorities have made it exceedingly difficult for individuals to protect themselves from infection by using intravenous needles safely. By retaining laws making it illegal to purchase or own needles and prosecuting those who distribute needles, the government unwittingly encourages addicts to share needles and thus to spread HIV, hepatitis, and other diseases. At the same time, the government has refused funding to those who would teach drug users how to clean needles. Yet most research suggests that helping drug users to protect

themselves reduces the incidence of HIV infection without increasing the rate of drug use (Holtgrave and Curran, 2006).

The Modern Disease Profile

Despite the recent reemergence of infectious diseases, however, these diseases still play a relatively small role in U.S. mortality rates. Table 2.1 shows the top ten causes of death in the United States in 2006 (the latest data available as of 2008) and illustrates how these causes have changed since 1900.

As the table demonstrates, whereas the top killers in 1900—influenza, pneumonia, and tuberculosis—were infectious diseases, the top killers currently—heart disease and cancer—are chronic diseases primarily associated with middle-aged and older populations. These diseases now far outpace infectious diseases as causes of death.

But infectious diseases have not disappeared from the leading causes of death. Influenza and pneumonia remain significant for the population as a whole, while AIDS remains a leading cause of death among persons ages 25 to 44, especially among African Americans (National Center for Health Statistics, 2008a). The newest drugs for treating HIV disease, the protease inhibitors, do seem to increase life expectancy, but only for those who can tolerate the drugs' side effects, manage the required regimen of as many as twenty pills per day taken at strictly regulated times, and afford the cost of about $15,000 per year.

Finally, Table 2.1 illustrates the role that social factors play in mortality rates. Accidental deaths mostly stem from motor vehicle accidents (many of them linked to alcohol use), while tobacco use is the main cause of chronic respiratory disease and a common contributor to heart disease, cancer, and cerebrovascular disease

Table 2.1 | Main Causes of Deaths, 1900 and 2006

1900	Rate per 100,000	2006	Rate per 100,000
Influenza and pneumonia	194	Heart disease	199
Tuberculosis	181	Cancer	181
Gastritis	143	Cerebrovascular disease	44
Disease of the heart	137	Chronic respiratory disease	41
Cerebrovascular diseases	107	Accidents	39
Chronic kidney disease	81	Diabetes	23
Accidents	72	Alzheimer's disease	23
Cancer	64	Influenza and pneumonia	18
Diseases of early infancy	63	Kidney disease	14
Diptheria	11	Septicemia	11

Source: Greenberg (1987: 5), Heron et al. (2008).