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CHAPTER 1

Health: An Introduction

CHAPTER OBJECTIVES

- Review key concepts to help understand terminology used in this text.
- Define health in the broader context.
- Explain how our environment influences the health choices we make.
- Describe the meaning of health across the life span.
- Review the theories of health behavior.
- Explore the meaning of race and racism and why they are important health issues.

Health isn't merely the absence of disease—it is much broader than that! You may know what it feels like to be healthy, but can you explain what health is to someone else? In 1948, the World Health Organization (WHO) defined health as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity."[1] This definition hasn't changed over time, although we now know to add environmental factors into the definition.[1] Health is a balance between the individual and his or her environment.[2]

Together, we will learn about many aspects of health—both personal health and population health—from the choices you can make on a personal level to the state of health of the world around you. We will take a look at your personal health, and we will also help you understand health from a family, community, and global perspective. You will learn about how to make healthy choices and, hopefully, will choose those over less healthy ones. Perhaps you will be inspired to help others make healthy choices and to help the world become a healthier place in which to live.

Most health issues affect all of us, whether we are directly affected (having a disease or health disorder) or indirectly affected (smoking by others in public places or laws requiring helmet use for motorcycle riders). Because we are not alone in our struggle for good health, scientists and researchers look at our health issues collectively, using the term **population health**. Throughout this book, we will show you how your health and your choices impact, and are impacted by, the health and choices of those around you—both physically nearby and through the interconnectivity of the global population.

population health The health outcomes of a group of individuals, including the distribution of such outcomes within the group. This field of study includes health outcomes, patterns of health determinants, and policies and the interventions that link them. It is an approach that aims to improve the health of an entire human population.

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POPULATION HEALTH VERSUS PUBLIC HEALTH

Population health—the health of a population over the life course.
Public health—the health of a whole society; a discipline focused on the development and application of preventive strategies and interventions to achieve a state of population health.

The distinction between population health and public health is that population health describes the situation, whereas public health includes the plans, strategies, and actions required to achieve the population's health.

Body, mind, and spirit.

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Personal Health Choices in a Societal Context

Most of us think about the health choices we make every day: what to eat, whether and how much to exercise, how much sleep to get, whether to smoke. We all know that making health choices is not always easy! Look at the data in the By the Numbers box.

When viewing health statistics, the questions often raised are: Why do people make unhealthy choices, and whose fault is it when they do? For the answer, we usually point to personal responsibility; after all, we each choose how much

BY THE NUMBERS

Healthy or Unhealthy Choices?

The most recent National Health Report from the Centers for Disease Control and Prevention (CDC) found that approximately 25% of adults smoke, although among youth, it declined between 2005 and 2013 to a record low of 15.7%. Approximately 35% of adults and 17% of youth suffer from obesity. Only 21% of adults met the recommended levels of physical activity. On the flip side, during the 2012–2013 influenza season, vaccination rates reached highs among children and adults, including among pregnant women.[3]

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FIGURE 1-1 Fruit versus chocolate: Which would you choose?

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we eat or exercise. Yet, research shows that the environment in which we live strongly affects how easy or hard it is to make healthy decisions. *Environment*, in this context, can refer to your city, neighborhood, school, or home—any place where you spend your time.[4] Think about your own environment. How easy or difficult is it for you to find healthy, fresh food? Are you close to a gym or park where you can exercise? How is the air quality where you live? An important population health goal is to design environments that encourage people to make healthy choices.

Research shows that while people understand the importance of eating healthy foods, they often opt for less healthy choices. One study found that participants were "dynamically inconsistent" in their choice between healthy and unhealthy snacks. When asked what they would choose 1 week in the future, 74% picked a healthy choice (fruit). When the following week arrived, 70% chose chocolate over fruit (**FIGURE 1-1**). Current hunger level contributed to participants' future choices. That is, participants who were hungry, even when choosing for the future, were more likely to choose chocolate over fruit.[5]

Another study explored how bite size influences overall food consumption. Researchers collected data in a restaurant and manipulated bite size by providing diners with small or large forks. They found that people consumed more when using smaller rather than larger forks. They hypothesized that in a restaurant setting, factors that relate to the experience of eating impact diners' choices. In a controlled lab study, when those factors are absent, the pattern of results is reversed.[6] Another series of studies showed how plate size affects the amount of food we consume.[7] Researchers found that people with larger bowls served themselves approximately 30% more cereal than did people given smaller bowls. They also found that people tend to eat the same percentage of food regardless of plate size. How much a person ate depended on the plate size—the bigger the plate, the more food eaten. In American culture, plate size has increased over time. As illustrated in **FIGURE 1-2**, plate size, and thus how many calories a diner will consume, varies with plate size, which depends where the person is eating. These studies demonstrate the importance of the structure of our options in affecting the choices we make.

If we want everyone (all adults) to eat healthy diets, we need to begin early and we need to make healthy choices affordable to those with less money. Two issues affecting healthy diets are cost and quality. A 2013 study reviewed data from 10 countries and found that eating healthy was more expensive.

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FIGURE 1-2 Plate size varies depending on where you are eating.

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BY THE NUMBERS

Organ Donation

Are you an organ donor? In the United States, an average of 22 people die each day waiting for an organ transplant. People of every age, from infants to seniors, give and receive organ donations. In 2014 alone, 29,532 people received an organ transplant. Yet the gap between the number of people donating organs and those who need them is widening.[8] Although a 2012 national survey showed that 94.9% of U.S. adults support or strongly support donation, only 60.1% had granted permission on a driver's license.[9] In countries where the default is opt out (actively choose to not donate organs) rather than opt in (actively choose to donate organs), the rate of organ donation is much higher because people tend to go with the default option.[10] **FIGURE 1-3** shows how much a difference this opt-out factor can make.

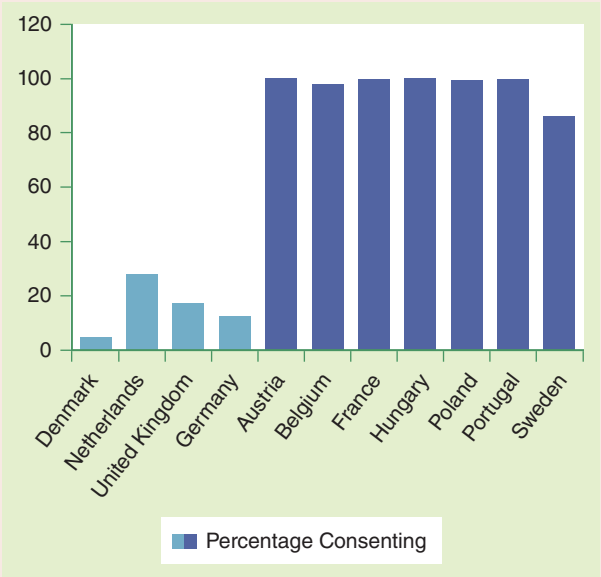

FIGURE 1-3 Opting in versus opting out of organ donation.

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The healthiest diets cost $1.50 more per person, per day. The largest difference in price was found for healthy versus less healthy meat/protein. The researchers also found smaller but statistically significant differences in prices for snacks/sweets, grains, fats/oils, and dairy.[11] With the idea of helping kids eat healthier, in 2012 school lunches in the United States were redesigned to make healthy choices more accessible. A study that evaluated students' responses to the healthier lunch options found that most students liked the choices.[12] Another study that reviewed how food options changed between 2006–2007 and 2013–2014 found that the percentage of schools that regularly offered healthful items, such as vegetables (other than potatoes), fresh fruit, salad bars, whole grains, and more healthful pizzas, increased significantly. In addition, the number of schools offering less-healthy foods, such as fried potatoes, regular pizza, and high-fat milks, decreased significantly. While these changes are good news, they are not uniform. Schools in the West were significantly more likely to offer salad bars than were schools elsewhere. Majority-Black or majority-Latino schools were significantly less likely to offer fresh fruit than were predominantly White schools. Schools with low socioeconomic status were significantly less likely to offer salads regularly than were schools with middle or high socioeconomic status.[13] This disparity is one of the population health inequities that must be addressed.

TRY IT!

Create a Budget

Give yourself a "healthy diet" budget. What food choices would you make if you had $3.00 per day to spend? What about $6.00 per day? Or $10.00 per day? Try to come up with a grocery list for a week's worth of groceries based on those numbers. [Hint: Look on the Internet to come up with suggestions if you need to. This is an exercise many have tried!]

The importance of environment to our health also applies to physical activity. As schools became more accountable for student success, recess was frequently viewed as expendable. Yet, the American Academy of Pediatrics views recess as a necessary break from the rigors of concentrated, academic challenges in the classroom. Additionally, it offers cognitive, social, emotional, and physical benefits.[14] The physical, health, and emotional benefits of exercise continue into adulthood, but communities, workplaces, and governments need to support citizens to make healthy choices. Examples of programs that have worked are community programs that encourage citizens to walk more, point-of-decision signs that are designed to help people choose stairs over the elevator, worksite wellness programs that support physical activity, and cities that build bicycle lanes and walking paths. Having access to places and opportunities for physical activity and the knowledge that these opportunities exist are crucial.[15]

TRY IT!

How to Encourage Physical Activity?

What programs are in place in your environment to encourage physical activity? If you had the resources to do so, what changes would you make in your community to increase participation in physical activity?

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Theories of Health

So far, we have examined how the environment can influence the choices we make. Did you ever think about how you make the choices you do? Researchers want to understand health behavior as well as how to develop interventions to improve the health of individuals and communities. There are many theories that address changing a specific behavior, such as promoting safe sex or discouraging excess alcohol consumption. Let's look at the most important theories of health behavior and health behavior change. For each theory, we will examine a study from the medical literature to illustrate how researchers have used that theory to study health behavior change.

Social-Ecological Model

The social-ecological model (or socioecological model) is a theory-based framework (an idea that explains what is observed) for understanding how multiple levels of personal and environmental factors influence behaviors. In 1988, Dr. Kenneth McLeroy proposed this model for health promotion. It focuses on both individual and social environmental factors as targets for health promotion interventions. The model assumes that a change in the social environment will cause a change at the personal level.[16]

The social-ecological model describes the interaction between the individual, the group/community, and the physical, social, and political environments,[17–19] and it explains how each of those factors impacts health (**FIGURE 1-4**). Because of its broad applicability, the social-ecological model has been used to address areas of public health, including nutrition and physical activity,[20] **cancer**,[21] violence prevention,[22] diabetes,[23] and cardiovascular disease.[24]

cancer A malignant growth or tumor resulting from the abnormal division of cells.

The social-ecological model has five levels: individual, interpersonal, community, organizational, and policy/enabling environment. **TABLE 1-1** provides a brief description of each level. Individual behaviors both shape and are shaped by the social environment. The most effective approach to population health prevention and control uses a combination of interventions at all levels of the model.

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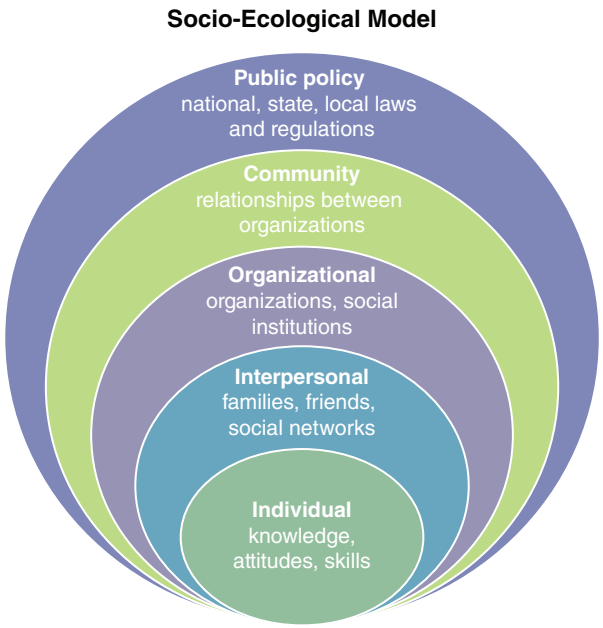

FIGURE 1-4 Social-Ecological Model.

Reproduced from Violence Prevention : The Social-Ecological Model: A Framework for Prevention, Centers for Disease Control and Prevention (CDC). Retrieved from http://www.cdc.gov /ViolencePrevention/overview/social-ecologicalmodel.html

TABLE 1-1 A Description of the Social-Ecological Model

Social-Ecological Model Level	Description
Individual	Characteristics of an individual that influence behavior change, including knowledge, attitudes, behavior, self-efficacy, developmental history, gender, age, religious identity, racial/ethnic identity, sexual orientation, economic status, financial resources, values, goals, expectations, literacy, stigma, and others
Interpersonal	Both formal and informal social networks and social support systems that can influence individual behaviors, including family, friends, peers, coworkers, religious networks, customs, or traditions
Organizational	Organizations or social institutions with rules and regulations for operations that affect how, or how well, services are provided to an individual or group
Community	Relationships among organizations, institutions, and informational networks within defined boundaries, including the built environment (e.g., parks), local associations, community leaders, businesses, and transportation
Policy/Enabling Environment	Local, state, national, and global laws and policies, including policies regarding the allocation of resources for health and access to healthcare services, restrictive policies (e.g., high fees or taxes for health services), or lack of policies, that affect an individual

A research team utilized the social-ecological model to examine urban social stress and exposure to violence as predictors of poor quality of life for adolescent and young mothers during pregnancy and postpartum. The team found that higher social stress predicted lower mental and physical quality of life during pregnancy. The associations were significantly stronger for mothers exposed to violence. Population health interventions within each of the social-ecological model levels need to work to improve the young women's lives,

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including stress reduction and teaching pregnancy and parenting programs to tailor their work to address violence.[25]

The Health Belief Model

The Health Belief Model, the most common model used to explain health behavior,[26] attempts to explain and predict health behaviors by focusing on the attitudes and beliefs of individuals. Psychologists from the U.S. Public Health Service developed the model to understand the failure of a tuberculosis screening program.[27]

The basis for the Health Belief Model is the idea that people's behavior is due to four perceptions: how serious they believe a disease to be, whether they believe themselves to be susceptible to a disease, the value of a new behavior in decreasing the risk of developing a disease, and an individual's belief in his or her ability to adopt a new behavior. There are also cues to action, which are events, people, or things that motivate people to change their behavior, such as an advertisement warning pregnant women not to drink alcohol.

The last part of the Health Belief Model is self-efficacy, a person's belief in his or her ability to do something. A picture of the Health Belief Model is presented in **FIGURE 1-5**, and an example of the Health Belief Model is presented in **TABLE 1-2**.

A 2015 study used the Health Belief Model to study minority adolescents' use of testing for HIV (human immunodeficiency virus; the virus that causes AIDS). The researchers used a survey followed by focus groups to assess perceptions about HIV testing. Only 15% of participants thought that it was *somewhat likely* or *very likely* they would get HIV (perceived susceptibility), although 73% of participants thought HIV was a very serious problem for someone their age. Rather than being a motivating factor to get tested, the seriousness of HIV made many adolescents afraid to get tested and find out if they were HIV positive (perceived severity). Participants in both the survey and the focus groups acknowledged the importance of getting tested to avoid spreading the disease to others (perceived benefit). Adolescents reported barriers to getting tested, including privacy concerns, waiting for results, and stigma associated with getting an HIV test (perceived barriers). The students acknowledged few cues to action for getting tested. The researchers concluded

Don't drink alcohol when you are pregnant.

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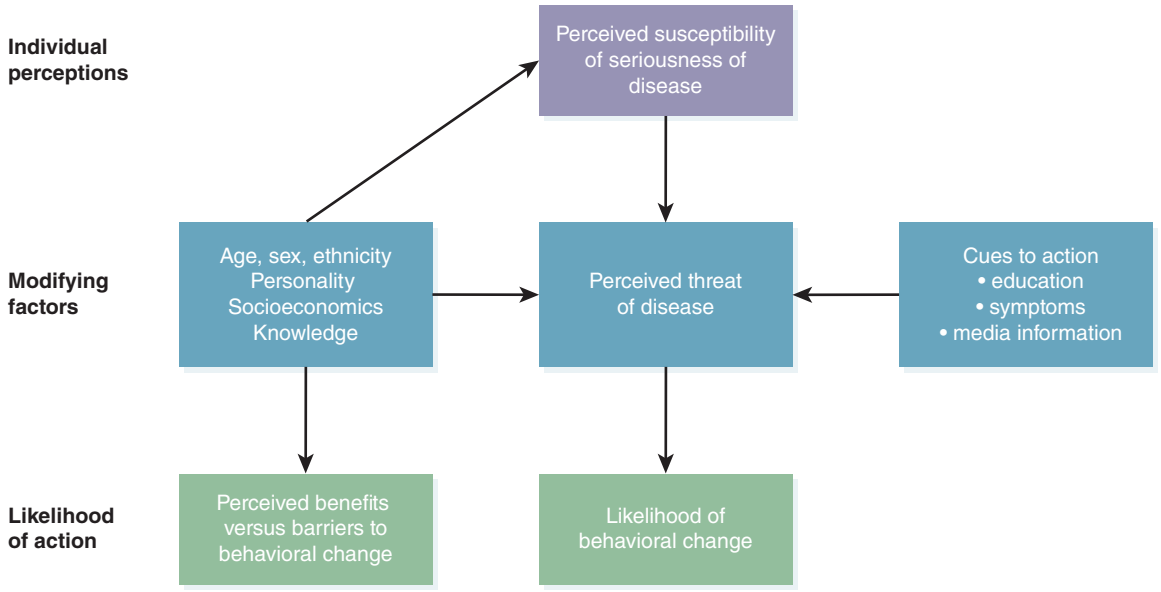

FIGURE 1-5 Health Belief Model.

Data from Glanz, K., Rimer, B.K. & Lewis, F.M. (2002). Health Behavior and Health Education. Theory, Research and Practice. 52. San Fransisco: Wiley & Sons.

TABLE 1-2 An Example of the Health Belief Model

Concept	Behavior: Using a Designated Driver
1. Perceived susceptibility	Individual believes she will get caught if she drinks and drives.
2. Perceived severity	Individual believes that the consequences of drinking and driving, such as getting caught or having a crash, are serious enough to try to avoid.
3. Perceived benefits	Individual believes that when it is not her turn to be the designated driver, she can enjoy herself without worry.
4. Perceived barriers	Individual's personal barriers to using a designated driver may include lack of independence or privacy.
5. Cues to action	Signs posted for DUI (driving under the influence) enforcement areas.
6. Self-efficacy	Individual is confident that someone will be willing to be the designated driver.

Don't drink and drive.

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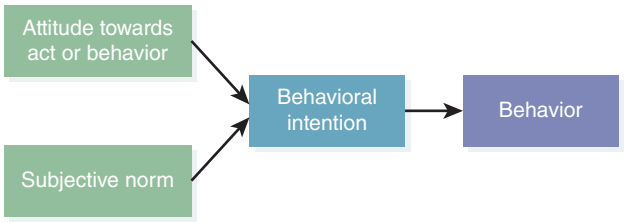

FIGURE 1-6 Theory of Reasoned Action.

that there was a need to design interventions to address adolescents' perceived barriers to HIV testing and to increase access to and knowledge about HIV testing.[28]

Theory of Reasoned Action

The Theory of Reasoned Action describes how people decide to act in a certain way (**FIGURE 1-6**). According to the theory, people consider their actions before they decide on their behavior. This theory assumes that individuals will usually act upon their intentions. The two major attributes are an individual's attitude toward a behavior (i.e., whether it is right or wrong) and an individual's beliefs concerning social pressures to either engage or not engage in the behavior.[29,30]

A study tested the applicability of the Theory of Reasoned Action in predicting whether college students would act as whistle-blowers within the setting of fraternity or sorority hazing. Researchers gave the participants a survey with three scenarios, varying in level of severity (*not severe*, *moderately severe, most severe*), describing a hypothetical hazing situation. Results showed that the Theory of Reasoned Action provided a sound basis for predicting whistle-blowing intentions. The level of severity moderated students' intentions. For both the *moderately severe* and the *most severe* scenarios, the perceived severity of hazing really did affect a participant's intention to report hazing. Student participants were less likely to report *not severe* hazing. Although this model is not usually used in ethical decision-making contexts, the results indicated the Theory of Reasoned Action could be used to explain the students' intentions.[31]

Theory of Planned Behavior

Professor Icek Azjen extended the Theory of Reasoned Action to the Theory of Planned Behavior,[32] which links beliefs with behavior. The intention to perform in a certain way can be predicted by a person's attitudes toward the behavior. This theory comprises three ideas: (1) A person's attitude toward a behavior will influence his or her behavior; (2) the *normative component*—that is, what other people we value would expect us to do—will influence the individual; and (3) *perceived behavior control*, which is the degree to which a person feels able to control the behavior, will affect behavior (**FIGURE 1-7**). Essentially, the more you like something, the more socially acceptable it is, and the more control you have over the behavior, the more likely you are to do it. If you are at a football or basketball game, for example, you will likely cheer for your team even if you are not really a big sports fan, but you are less likely to do so in a library.

A study from California examined the Theory of Planned Behavior and texting while driving in college students. The students who participated were of all races and ethnicities, were age 18 years or older, owned a cell phone, and drove a car. Over 70% of the sample reported that within the past week they

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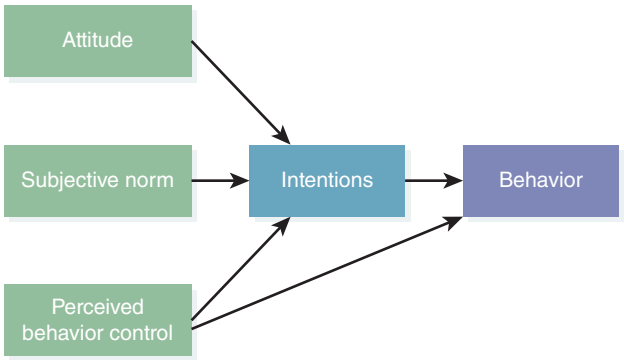

FIGURE 1-7 Theory of Planned Behavior.

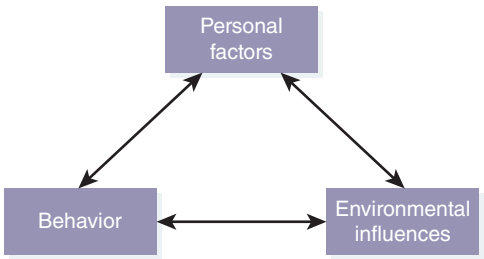

FIGURE 1-8 Social Cognitive Theory.

had talked on their cell phone and had sent and received text messages "at least a few times" while driving. Only 27% reported being stopped by police. Twenty-six percent reported reading or sending texts and having to slam the brakes to avoid hitting another car or a pedestrian(s) as a result within the past month. Attitude was the strongest factor that predicted intention. Intention changed the relationship of willingness to text while driving on students' perceived belief that they could control their behavior. That is, the more the student intended not to text while driving, the greater their belief that they could change their behavior increased. These findings highlight the usefulness of the Theory of Behavior Change to understand where to focus change interventions to stop texting while driving.[33]

Social Cognitive Theory

Social cognitive theory is a model of behavior from the work of Albert Bandura.[34,35] Basically, learning occurs in a social context, and much of what people learn comes from watching others. Social cognitive theory has been used for organizational behavior, athletics, and mental and physical health (**FIGURE 1-8**).

A study from North Carolina wanted to develop short educational videos to motivate teens with asthma to be more involved during their doctor visits. The researchers used social cognitive theory to develop the videos. To do this, they conducted **focus groups**. Four groups consisted of teens with asthma, four groups of parents of teens, and seven groups of physicians. The subject matter for the videos came from themes proposed in the focus groups. Based on the results, teen newscasters narrated six short videos with different themes: (1) how to get mom off your back, (2) asthma triggers, (3) staying active with asthma, (4) tracking asthma symptoms, (5) how to talk to your doctor, and (6) having confidence with asthma.[36] The researchers concluded that the teens, parents, and providers gave them insight into developing the videos to increase the teens' involvement during their medical visits.

focus groups Small number of people brought together with a moderator to discuss a specific topic. They aim at generating discussion instead of on individual responses to formal questions, and produce preferences and beliefs that may be expected from a larger population. The group may be deliberately selected.

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The Transtheoretical Model

The Transtheoretical Model conceptualizes the process of intentional behavior change.[37,38] It includes ideas from other theories.

The stages of change are the core principles of the Transtheoretical Model. When people modify their behavior, they go through a series of steps. Each step is required before moving on to the next stage. Often, individuals repeat the stages or regress to an earlier stage from later ones. The stages are precontemplation (person is not yet ready for change), contemplation (person is getting ready for change), preparation (person is ready for change), action (person makes the change), and maintenance (person maintains the change) (**FIGURE 1-9** and **TABLE 1-3**).

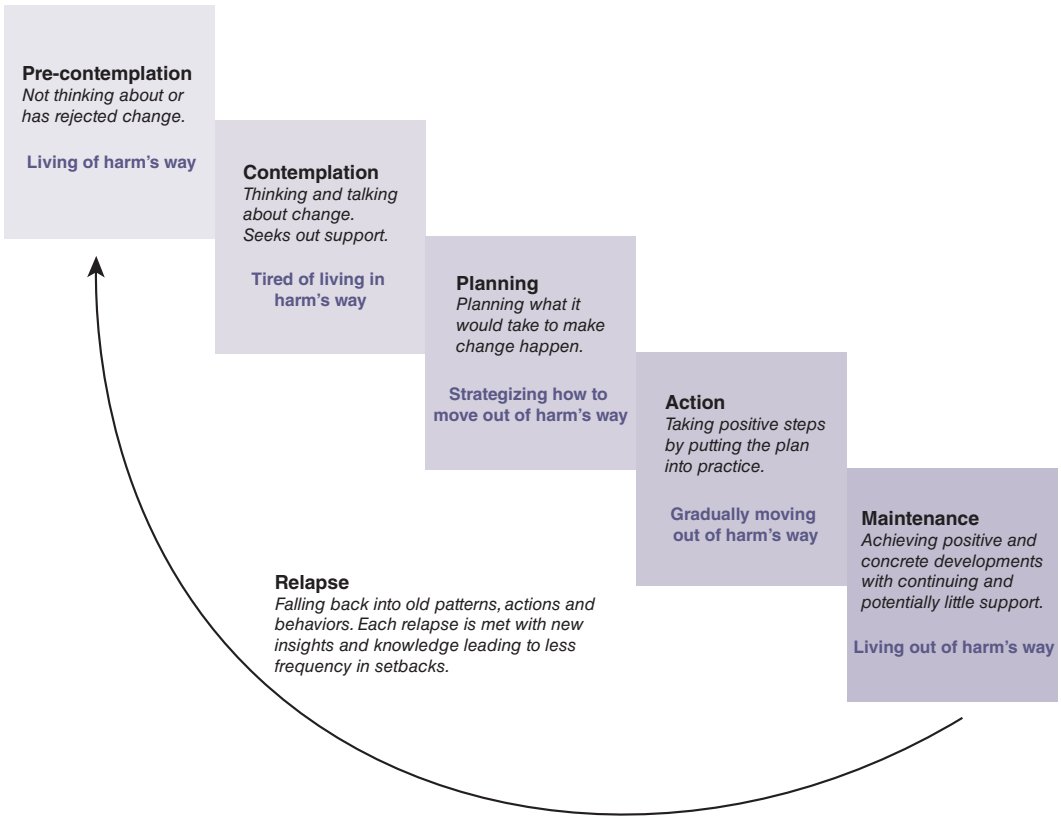

FIGURE 1-9 The Transtheoretical Model.

TABLE 1-3 A Description of the Transtheoretical Model

Transtheoretical Stage of Change	Description	Example
Precontemplation (not ready)	People in the precontemplation stage do not intend to take action in the near future. Being uninformed or less than adequately informed about the consequences of one's behavior may result in a person being in the precontemplation stage.	If someone is trying to change a behavior, such as stopping cigarette smoking, multiple attempts to quit can demoralize a person about his ability to change.

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Contemplation (getting ready)	Contemplation is the second stage, where a person intends to change his or her behavior within the next 6 months. The person is more aware of the pros and cons of changing.	Our person who wants to quit smoking knows the benefits but understands how hard it is and many of the downsides. This weighing between the costs and benefits of changing can cause ambivalence so that the person remains at this stage for a long period.
Preparation (ready)	Preparation is the stage in which people plan to take action in the immediate future, usually within the next month. These people may have a plan.	Our person trying to quit smoking may take a health education class, talk to his physician about a prescription for medicine to help quit, or encourage friends to support him in his efforts.
Action	Action is the stage in which people have modified their behavior, usually within the past 6 months.	In our example, reduction in the number of cigarettes or switching to e-cigarettes, low-tar, and low-nicotine cigarettes do *not* count as *actions*. Only totally not smoking counts as the desired action.
Maintenance	Maintenance is the stage where people have modified their behavior and are working actively to prevent relapse.	Our now ex-smoker is not tempted to have a cigarette and increasingly feels confident that he will not return to smoking.

Two other parts of the Transtheoretical Model are decision making and self-efficacy.[39] Irving Janis and Leon Mann conceptualized decision making as a balance of potential gains and losses. Self-efficacy is also addressed in social cognitive theory.[34,35] It reflects people's belief that they can maintain their behavior change.

Weiss and colleagues[40] applied the Transtheoretical Model to bicycle helmet use among middle school, high school, and college students in Phoenix, Arizona. Forty-three percent of the students were in precontemplation, 17% were in either contemplation or preparation, 16% were in either action or maintenance, and 24% had used a bicycle helmet in the past but had relapsed to an earlier stage. Compared with students in precontemplation, students in the contemplation stage were disproportionately younger. The researchers concluded that the Transtheoretical Model was a useful framework for designing interventions aimed at increasing bicycle helmet use in children and adolescents.

Health Across the Life Span

Health begins at conception and continues through birth, childhood, adulthood, and old age. In utero, health depends on genetic makeup, a mother's health before she gets pregnant, and her behavior and choices while she is pregnant. In childhood, our health depends on love and support from parents; good nutrition, including access to clean water; enough physical activity; and quality health care and immunizations. As we grow into the teen and early adult years, beyond the basic physical health considerations of these groups, choices regarding tobacco, sexual activity, drinking, and illegal substance use will affect our health. When we move into parenthood (or not), we have to make choices about contraceptive practices, prenatal care, breastfeeding, and preventive services. Finally, as we get older, our health needs change further. Nutrition and exercise remain important; we also have concerns about chronic diseases. Screening and knowledge about chronic diseases like cardiovascular disease, diabetes, and cancer as well as other conditions are important. For some people, mental

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health care is an issue that needs to be addressed. Depending on the particular diagnosis, mental health services may or may not be needed. Access to high-quality health care for both preventive care and treatment is important.

When we think about health across the life span, there is an almost unlimited number of topics to cover. Because many of these issues are covered in the following chapters, we will describe only a few here, touching on issues across the life span.

Children

BY THE NUMBERS

Under Age 5 Mortality

Globally in 2016, there were 5.6 million deaths among children under 5 years of age.[41] As many as that may seem, we have come a long way. In 1955, just over 60 years earlier, there were 20.6 million deaths among children under age 5 years.[42]

In the United States, many people take for granted the factors that influence child survival, such as access to clean water, food that is clean and nutritious, and access to good primary health care. Think about your own childhood and whether you had access to clean water, healthy food, and primary health care. Were these readily available or were they a struggle for your family? As the WHO says, biology and environment determine a child's fate. A child's risk of dying "is influenced biologically by its gender, its natural defenses and its nutrition; and by its physical, microbial, social and cultural environments. The living conditions of families, the **prevalence** and modes of transmission of infectious disease agents and the nutritional status of the child are among the strongest immediate determinants that set the different levels of under-five mortality rates around the world."[42]

prevalence The total number of cases of a health condition, exposure, or other variable related to health, known to have existed over a period of time.

The leading causes of death among children under 5 years of age in the United States are **congenital anomalies**, prematurity, unintentional injuries, **sudden infant death syndrome (SIDS)**, and pregnancy complications.[43] In low- and middle-income countries, children under 5 years of age die from preterm birth complications, pneumonia, birth asphyxia, diarrhea, and malaria. About 45% of the deaths in developing countries are linked to malnutrition.[44]

congenital anomalies A structural or functional anomaly (e.g., metabolic disorders) that occurs during intrauterine life and can be identified prenatally, at birth, or later in life. Also known as a birth defect, congenital disorder, or congenital malformation.

sudden infant death syndrome (SIDS) The sudden unexplained death of an infant younger than 1 year old. The cause remains unexplained after a complete investigation.

Teen Pregnancy

The most recent report from the CDC shows that teen pregnancy rates are declining.

There is a strong association between age of having a baby and the mother's socioeconomic well-being. Simply put, the younger a woman is when she delivers her first child, the worse her economic future is. Pregnancy and delivery increase the likelihood of female students dropping out of high school. Only half of teen mothers graduate high school by age 22 years, compared to 90% of girls who do not become adolescent mothers. Adolescent mothers are less likely to marry, and when they do work, they earn less money.[46] There are costs to the children of teenagers as well. Children of teenage mothers are at higher risk of dropping out of high school, having more health problems, becoming a teenage parent, and being unemployed as a young adult.

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BY THE NUMBERS

Teen Births

In the United States in 2015, there were 229,715 babies born to teenagers 15 to 19 years of age. This means that there were 22.3 births for every 1,000 women age 15 to 19 years. Three-quarters of teen pregnancies are unplanned. The U.S. teen pregnancy rate is higher than that in other Western industrialized countries.

The overall rate of decline was 8% from 2014 to 2015. Declines were seen for all races and for Hispanics.[45] Among 15- to 19-year-olds, teen birth rates decreased as follows:

- 10% for Asian/Pacific Islanders
- 9% for non-Hispanic Blacks
- 8% for Hispanics
- 8% for non-Hispanic Whites
- 6% for American Indian/Alaska Natives

Adults

In the United States, for those 45 years old or older, the two leading causes of death are **heart disease** and cancer.[43] (See the chapter "A Growing Challenge: Chronic Diseases" for a more comprehensive discussion of each of these.)

heart disease A broad category of conditions relating to disease of the cardiovascular system, including vessels and heart structures. Coronary artery disease is the most common type, and it is the leading cause of death for both men and women in the United States—and across the world.

Heart Disease

Coronary artery disease, the most common type of heart disease, is the *number one* killer of both men and women in the United States—and across the world.[43,47]

Coronary artery disease develops when the major blood vessels that carry oxygen-rich blood to the heart become damaged. This happens because plaque builds up in the arteries, decreasing blood flow to the arteries. Eventually, the decreased blood flow may cause chest pain (angina), shortness of breath, or other symptoms. If the artery becomes blocked, a heart attack results (**FIGURE 1-10**).

Coronary artery disease usually develops over decades. People may be unaware that they have a problem until there are symptoms or a heart attack occurs. However there are actions that people can take to minimize their risk of heart disease. As we will discuss here, it is amazing how important our lifestyle choices are for remaining healthy. Important lifestyle choices include[48]:

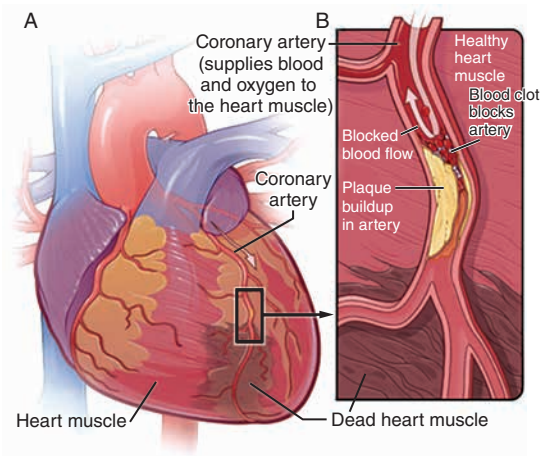

FIGURE 1-10 Heart showing muscle damage and a blocked artery.

Reproduced from Heart Disease: Symptoms, Diagnosis, Treatment, NIH MedLine Plus. Retrieved from https://medlineplus.gov/magazine/issues/winter09/articles/winter09pg25-27.html.

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1. Quit smoking! Smoking can raise your risk for coronary artery disease and heart attack and worsen other coronary artery disease risk factors.
2. Eat a heart-healthy diet. Eat five servings a day of fruits and vegetables. Eat fish high in omega-3 fatty acids (i.e., salmon, tuna, and trout) twice a week. Choose fat-free or low-fat dairy products, legumes (e.g., kidney beans, lentils, chickpeas), and whole grains. Minimize saturated fat, trans-fat, and sugary foods and beverages.
3. Maintain a healthy weight. The ideal body mass index is between 18.5 and 24.9.
4. Manage stress. A common trigger for a heart attack is an emotionally upsetting event. Cope with stress in a healthy way, such as meditation or a physical activity. Try a stress management program or relaxation therapy. Talking about things with friends and family is often helpful.
5. Exercise regularly. Any exercise is better than no exercise, but everyone should aim for 2.5 hours of moderate-intensity aerobic exercise or 1.25 hours of vigorous aerobic exercise per week. The more active you are, the more you'll benefit![48]

Cancer

Cancer is a collection of related diseases that can occur anywhere in the body. In cancer, the orderly process by which cells grow and die goes awry. Either the cells grow and divide when they should not or they do not die when they should.[49] Many cancers form solid tumors. Cancers of the blood, such as leukemias, usually do not form solid tumors. Cancerous tumors are malignant, meaning they spread into nearby tissues. Additionally, as the tumors grow, cancerous cells sometimes break off and move to other parts the body.[49]

incidence The number of new cases of a disease over a specified period of time.

There are more than 100 types of cancer. Cancer types are typically designated according to the organ or system affected.[49] The **incidence** of cancer is 454.8 cases per 100,000 men and women per year, and the mortality rate is 171.2 per 100,000 men and women per year. Mortality is highest among African American men (261.5/100,000) and lowest among Asian/Pacific Islander women (91.2/100,000). (Rates cited here are based on 2008–2012 cases and deaths.)[50]

The overall death rate for cancer has declined since the early 1990s, as physicians and scientists now understand more about how to lower risks for cancer as well as treat cancers when they occur. From 2004 to 2013, cancer death rates have decreased by 1.8% per year among men and 1.4% per year among women.[50]

When you see your healthcare professional, he or she will likely tell you all of the following ways to lower your risk for cancer. You will also read more

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about these recommendations later. Your chances of developing cancer are affected by the lifestyle choices you make. Following these tips will help you to be healthy beyond helping you to lower your cancer risk[51]:

1. Don't use tobacco of *any* kind. Smoking raises your risk for cancer of the lung, mouth, throat, larynx, pancreas, bladder, cervix, and kidney. Chewing tobacco raises your risk for oral cancers and pancreatic cancer. Exposure to secondhand smoke increases your risk of lung cancer.
2. Eat a healthy diet, including lots of fruits and vegetables as well as whole grains and beans. Drink alcohol in moderation, if you drink at all. According to the National Institute on Alcohol Abuse and Alcoholism, *moderate* means drinking no more than two drinks per day for men and one drink per day for women.[52] One drink is defined as 12 ounces of beer, 5 ounces of wine, or 1½ ounces of distilled liquor.[53] Limit the amount of processed meat you eat.
3. Maintain a healthy weight and exercise regularly.
4. Protect yourself from the sun. Avoid the midday sun, seek shade, and use sunscreen. Avoid tanning beds and sun lamps.
5. Get immunized against hepatitis B and human papillomavirus (HPV).
6. Avoid risky behaviors. Practice safe sex and don't share needles.
7. Get regular medical care. Take your healthcare provider's recommendations for screening tests seriously.[51]

Social Determinants of Health and Health Inequities

Although it is important to follow the recommendations in the preceding lists, our health begins with our families. It continues with our homes, neighborhoods, schools, and communities. As you will read here, taking care of ourselves by eating a nutritious diet, being physically active, not smoking, wearing seat belts, getting immunizations and recommended **screening tests**, and seeing a healthcare professional when we are sick all influence our health. But less obvious factors, such as our access to high-quality schools and to social and economic opportunities, also determine our health. The cleanliness of the water we drink, the food we eat, and the air we breathe are all important, as are our neighborhood and the **built environment** in which we live. Our social

screening tests A simple test usually performed to identify those in a population who have or are likely to develop a specified disease.

built environment The physical environments where communities live and interact, including parks, sidewalks, green space, and housing.

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FIGURE 1-11 Social determinants of health.

Reproduced from Social Determinants of Health , HealthyPeople.gov. Retrieved from https://www.healthypeople.gov/2020/topics-objectives/topic/social-determinants-of-health.

interactions when we are out in the world and our relationships with other people all play an important part in our mental and physical health. All of these factors help explain why some people are healthier than others (**FIGURE 1-11**).

social determinants of health The circumstances in which people are born, grow, live, work, and age. They are shaped by the distribution of money, power, and resources at global, national, and local levels.

There is a wider set of forces and systems that shape daily life for people in this country and around the world. Part of the **social determinants of health** is the economic policies and government structure in the country in which we live, as well as the social norms of our society.[54] Although there are individual choices we make about our own health, there are also important material, social, political, and cultural conditions that determine our lifestyles and behaviors. As a society, we must reduce socioeconomic and racial inequities for everyone to enjoy good health.[55]

Health and Wealth

The poorer health experienced by those with lower incomes is not merely a problem of access. If that were true, the passage of the Affordable Care Act would eliminate disparities moving forward. But evidence from many other countries that have universal health care, including Canada, the United Kingdom, and virtually all of Europe and many other nations around the world, tells us that offering health insurance to all members of a society does not guarantee equalities in health. When comparing the well-off to the very rich, there are disparities between these two groups as well, with the very rich being healthier.[56]

The situation is not simply the poor versus everyone else. Data from the Gallup-Sharecare Well-Being Index demonstrates that while those with low income have worse health outcomes than the wealthier, those with high incomes are consistently healthier than middle-class families (**TABLE 1-4**).[57] In addition to specific diagnoses, the overall well-being increases as income rises.[57]

Race

race A sociocultural concept, not a biological one, that has emerged as a way to categorize and rank groups.

People make many assumptions, good or bad, attributed to race. But, contrary to what people may think, **race** is a sociocultural concept, not a biological one. A person's racial group cannot be identified by blood type,[58,59] skin color,[60,61] ancestry,[62] or genes.[63,64]

Because skin is one of our most visible features, we use it to divide people into racial categories.[61] As noted, skin color is not just *a* trait by which people define population differences; it is *the* trait.[60] The idea of race was invented as a

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TABLE 1-4 Physical Health Indicators by Income Group

Health Condition	Low Income	Middle Class	High Income
Obesity	32.0%	27.9%	21.7%
Diabetes	16.1%	10.1%	6.7%
High blood pressure	36.4%	29.0%	23.6%
High cholesterol	29.3%	26.4%	25.3%
Heart attack	7.2%	3.5%	2.2%
Asthma	15.9%	10.5%	9.2%
Cancer	7.7%	6.9%	6.0%
Diagnosis of depression	29.0%	15.2%	10.2%

Data from Mendes, E. (2010, October 18). In U.S., health disparities across incomes are wide-ranging. Gallup-Healthways Well-Being Index. Well-Being. Retrieved from http://www.gallup.com/poll/143696/Health-Disparities-Across-Incomes-Wide-Ranging.aspx

way to categorize and rank groups.[65] It is a concept that has molded our economy, laws, and social institutions.[65]

It is difficult to talk about race. We have, through our history and culture, made race the determinant of devastating consequences. As you will discover, in this book, we mention race frequently. We do so because of the devastating consequences that categorizing people based on race has inflicted on our population and on the population's health. The idea of race is only a few hundred years old.[65] In 1619, Jamestown colonist John Rolfe traveled to the Court of London with his new wife Pocahontas. Because Pocahontas was a princess, this marriage caused a scandal. Seventeenth-century England was a very feudal society and people's status was fixed at birth. Maintaining social order was so important that they had laws regulating the clothing people could wear, defining their class. No one was upset that Rolfe had married an Indian. His marriage to Pocahontas was unthinkable because people of that time could not accept that a person of royalty would marry a commoner.[66]

Just because someone is *Black*, does not automatically make the person African American. He or she could be African, Afro-Caribbean, or Afro-European, for example. Likewise, someone who was born in the United States but whose parents were born and raised in Africa would correctly be called African American, even if that person is White.

TRY IT!

Where Is Your Family From?

Do you know your ancestry? Companies like Ancestry DNA, Family Tree DNA, and 23andMe will provide you with DNA results to help track your ancestry (for a fee). To view recent videos that show how some people get some surprising results from DNA analysis, search for the following on YouTube:

"Momondo: The DNA Journey"

"An open world begins with an open mind"

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Courtesy of Anna Nzuzki Kiely; Photographer: Jean Pierre Vertil.

Skin color is an adaptation to geography. The closer people's ancestors were to the equator, the darker their skin. Variation in human skin color is an adaptive trait that correlates closely with geography and the sun's ultraviolet radiation. The amount of melanin in a person's skin determines how brown he or she is. Melanin is a natural sunscreen. It protects people from the harmful effects of ultraviolet radiation. As people migrated away from the tropics to colder areas with less sunlight, they developed lighter-colored skin. Lighter skin allowed ultraviolet rays to penetrate and produce vitamin D.[67] Based on our current understanding of genetics, inheritance of skin color is controlled by multiple genes working in combination. As a result, skin tones range from very pale to rich dark browns.

Another factor that has historically influenced skin color is diet. The native people of Alaska and Canada retain their darker skin even though they live in areas with low ultraviolet rays. Their diet, rich in vitamin D from seafood, provides an alternate source of vitamin D.[67]

As we talk about the consequences of how racial designations affect health, in general, we use the term African American to denote people whose skin is brown and whose ancestors came from Africa, although we understand that this designation is imprecise. Indeed, other designations will also be used. When we reference data with more precise designations, we use those terms, and when we refer to comparisons from published works, we use the terms the authors used.

Race and Income

There is massive financial and economic disparity across the races at every income level (**FIGURE 1-12**). According to a Pew Research Center report, from 2010 to 2013, White households' median wealth rose 2.4%, to $141,900. (*Median* refers to the midpoint; in this instance half the families are above this point and half are below. It indicates how the "typical" family is doing.) Over that same period, the median wealth in Black households declined to $11,000 and in Hispanic households declined to $13,700. That is a 13-fold wealth gap, the widest it has been since 1989.[68]

The other factor that helps explain the widening gap is where people invest their money. Real estate makes up a large portion of the wealth of Blacks and Hispanics. After the last recession, financial markets rebounded more than housing did. Because Whites are more likely to own stocks than are people of color, this added to the wealth gap. Additionally, the median income of minority households fell 9% between 2010 and 2013. During that same period, the median income of Whites fell by 1%.[68]

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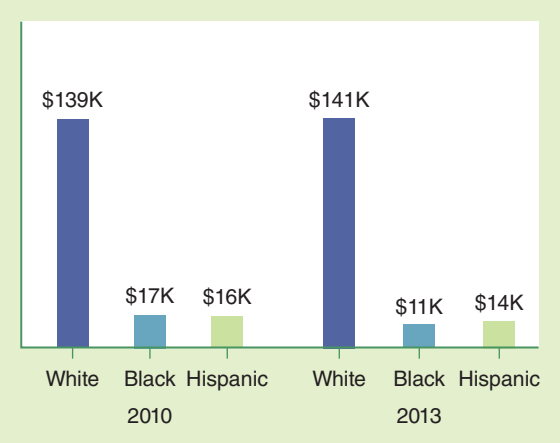

FIGURE 1-12 Race and ethnicity strongly predict wealth.

Data from https://www.washingtonpost.com/news/get-there/wp/2014/12/12/white-people-have-13-dollars-for-every-dollar-held-by-black-americans/?tid=a_inl

GOING UPSTREAM

We Are the 99 Percent

The disparity between the richest and poorest Americans has been increasing over time. "We Are the 99 Percent" is a website about income inequality, wealth concentration, and the economic system. As a measure of the inequality that exists in this country, think about the following:

- *Inequality impact*. Due in part to economic factors, students from low-income families with high test scores are no more likely to complete college than students from high-income families with low test scores.[69]
- *Inequality impact*. Extreme inequality causes many other social problems, like decreases in life expectancy, math proficiency, literacy, social mobility, and education and increases in infant mortality, homicides, imprisonment, teenage births, social distrust, obesity, mental illness, drug addiction, and debt.[70]
- *Wealth concentration*. Over one-third of Americans who are born to parents at the bottom of the income ladder remain very poor for their entire lives.[71]
- *Wealth concentration*. In America today, the number one factor predicting how wealthy you will be is not whether or not you went to college, but whether or not your parents are wealthy.[71]
- *Income inequality*. In 2009, the richest 74 Americans earned as much as the 19 million lowest paid Americans combined.[72]
- *Income inequality*. In 2010, the wealthiest 1 percent of Americans took home 24 percent of all U.S. income.[73]
- When politicians say that helping the rich will help everyone below them, they are not telling the truth.

BY THE NUMBERS

Wealth

Wealth is the value of all a person's assets of worth, which can be determined by taking the total market value of all physical and intangible assets owned, then subtracting all debts. The wealth gap is determined by dividing the median wealth of the wealthier group by the median wealth of the poorer group. In our example, the gap between the median White household wealth compared to that of the median Black household is $141,900 / $11,000 = 12.9.

Black Lives Matter: A Public Health Issue?

Racism has not disappeared from the United States. The fact that the country elected an African American president not once but twice does not mean racism has gone away. People of color face **discrimination** every day in many different ways, from profiling by stores to unarmed individuals being killed by police despite presenting no real threat. The news is filled with stories of

racism Prejudice, discrimination, or antagonism directed against someone of a different race based on the belief that one's own race is superior.

discrimination Unfair treatment of a person based on the person's race, ethnicity, gender, religious beliefs, sexual orientation, or other personal characteristics.

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BY THE NUMBERS

Fatal Encounters With Police

The Root used data reported by the *Washington Post*, Fatal Encounters, *The Guardian's* The Counted project, and the Cato Institute's National Police Misconduct Reporting Project from 2007 to 2017.[74]

If you think the playing field is level for all people in the United States, think again. Even when police officers are charged with a crime, they are rarely convicted by judges and juries.

- They found only three cases of a White police officer serving time for killing an African American (in one case, three officers were charged with killing a 92-year-old grandmother).
- Between 2005 and 2017, there were 49 people killed by police who were indicted for their crimes, of whom 33 were Black. Only five of the police officers were convicted, giving a 12% homicide conviction rate for Black victims.
- Since June 2007, there have been approximately 10,000 police shootings, yet only five White police officers have been imprisoned for killing a Black person.
- In 2015, police killed 1,146 victims. Of those, 307, or 7.69/1,000,000 people, were Black. Not a single police officer was convicted for an on-duty killing.

violence against communities of color; yet all too often, charges brought against the perpetrators of these violent acts are dismissed if the perpetrator is White.

In 1998, the American Public Health Association released a policy statement on the impact of police violence on public health. They noted then, and it is still true today, that "police brutality and excessive use of force are widely reported and have a disproportionate impact on people of color [and that there is] significant morbidity and mortality associated with these events."[75]

As discussed in the previous section, there is a strong relationship between race and income. We also know that people who are poor and less privileged have worse health and die much younger than people who are rich and more privileged. As noted, the socioeconomic inequalities in health and mortality are very large. These inequalities have existed for a long time, even though we

Former President Barack Obama and family.

Official White House Photo by Pete Souza.

The American Public Health Association is an organization for public health professionals. The organization speaks out for public health issues and policies backed by science. Their mission is to "improve the health of the public and achieve equity in health status."

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have addressed many of the causes, such as overcrowding and poor sanitation.[76] Rates of poor pregnancy outcome, cancer, and cardiovascular disease are significantly different by socioeconomic status and by race.

As discussed, race is a social construct that holds devastating repercussions for communities of color, and this makes racism a social determinant of health. If we understand that racism is a system that unfairly disadvantages some individuals and communities, and advantages others,[77] then the consequences of living in a racially stratified society are evident when health outcomes demonstrate disparities along racial lines. There are many examples of these disparate outcomes, including higher rates of infant mortality among Blacks, higher rates of deaths caused by heart disease and stroke, and a shorter life expectancy for Blacks in comparison with Whites.[78] These disparities are a consequence of racism.

GOING UPSTREAM

Experiences of Racism

Consider a study from California, where researchers conducted focus groups to study women's experiences of racism. Researchers found that women experienced racism throughout their lives. The racism they experienced as children was particularly salient and enduring. They continued to experience the effects as adults, directly and vicariously, in seeing their children suffer. The women experienced interpersonal, institutional, and internalized forms of racism. They had behavioral, emotional, cognitive, and bodily responses to the racism. Finally, the women acknowledged being vigilant in anticipation of future racism toward themselves and toward their children. The stress these women and other women of color experience contributes to poor birth outcomes.[79]

Racism is institutionalized, racism is interpersonal, and racism is internalized. Institutional racism comes in the form of structural barriers that make society unequal. Institutions include governments, organizations, schools, banks, and courts of law, any of which may treat certain groups of people negatively because of their race. When schools in poor communities, filled predominantly with students of color, are not as good as schools in affluent neighborhoods, that is institutionalized racism. When the societal norm is that people who are White can get better jobs than people of color, that is institutionalized racism. When people are privileged simply because their skin is a lighter color, that is institutionalized racism.

Interpersonal racism is what happens between people. When an individual is not welcome into a home because of his or her color, that is interpersonal racism. When someone makes an assumption about another based on his or her race, that is interpersonal racism. Interpersonal racism can be intentional or unintentional, but even if it is unintentional, it is still racism. When individuals internalize the messages that they are less than equal or somehow unworthy simply because of the color of their skin, that is internalized racism.[80]

There is a large body of medical literature verifying that discrimination impacts people's health.[81–91] Exposure to discrimination is a risk factor for poor health, even among children.[81] Skin color is a dominant factor that impacts self-reported health,[85] and the darker a person's skin, the more discrimination he or she experiences.[84]

"The most certain test by which we judge whether a country is really free is the amount of security enjoyed by minorities."
—**John E. E. Dalberg**, Lord Acton, *The History of Freedom in Antiquity*, 1899.[92]

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Social Justice

The definition of social justice is "promoting a just society by challenging injustice and valuing diversity."[93] A just society will exist when all people have a right to equitable treatment, support for their human rights, and a fair allocation of community resources. Applied to health, this means that everyone deserves equal rights and opportunities, including the right to good health.[93]

We live in a society where many of the diseases that threaten our health and well-being are preventable. Unfortunately, there is an unequal distribution of money, power, and resources that helps maintain a divided society. Some inequities affect health, for better or for worse, depending on what side of the divide a person lives on. The division includes access to safe housing, jobs with living wages, quality education, nutritious and affordable food, a safe place to be physically active, and access to high-quality, respectful, and affordable health care.

GOING UPSTREAM

Is It a Level Playing Field?

If schools were a level playing field, discipline would be administered evenly across all students and discipline rates would show no difference based on race or ethnicity. However, discipline rates do show differences and it matters because this starts early and continues through life. Unfortunately, as school administrators and teachers have reported, most discipline policies do not lead to improvements in behavior.

What is striking is not that there is a racial divide in discipline, but how early it starts, how pervasive it is, and how it continues.

An article from the *Seattle Times* found that short-term suspension rates for Black elementary students were four times that for White students.[94] Or, consider a story from Georgia where two 12-year-old girls, one Black, and one White, got into trouble for writing graffiti on the walls of the gym bathroom. Both girls were suspended for a few days and requested to pay a $100 fine. The White girl's family paid the fine, but the Black girl's family could not. A few weeks after the disciplinary hearing, the Black girl was charged in juvenile court with a trespassing misdemeanor and potentially a felony. In a plea bargain, she admitted to criminal trespassing, spent her summer on probation, with a 7:00 p.m. curfew, and completed 16 hours of community service.[95]

The Center for the Study of Race and Equity in Education at the University of Pennsylvania found that in 13 Southern states, Blacks made up only 24% of students enrolled in public school, but 48% of the students who were suspended and 49% of the students' expelled.[96] In 84 of the school districts across the Southern states, 100% of the suspended students were Black. As you can see from **TABLE 1-5**, the proportion of Black students suspended greatly exceeded the

TABLE 1-5 Percentage of Black Students Enrolled and Suspended in Southern States[96]

State	Blacks as a % of Students Enrolled	Blacks as a % of Students Suspended	Differential (% Suspended/% Enrolled)
Alabama	34%	64%	1.9
Arkansas	21%	50%	2.4
Florida	23%	39%	1.7
Georgia	37%	67%	1.8
Kentucky	11%	26%	2.4

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Louisiana	45%	67%	1.5
Mississippi	50%	74%	1.5
North Carolina	26%	51%	2.0
South Carolina	36%	60%	1.7
Tennessee	23%	58%	2.5
Texas	13%	31%	2.4
Virginia	24%	51%	2.1
West Virginia	5%	11%	2.2

Data from Penn Graduate School of Education. Center for the Study of Race & Equity in Education. Disproportionately Disciplined: Black Student Suspension Rates in the American South. 2018. Retrieved from: https://equity.gse.upenn.edu/sites/default/files/GSE_HarprSspnsnInfo_R5.pdf

proportion such students represent in a school. The consistency of the findings across all these states suggests that for Black students the playing field is definitely not level.[96]

Students who are disciplined unfairly are more likely to fall behind in their schoolwork, more likely to drop out of school, and more likely to end up in jail or prison. A study from the Bureau of Justice found that Black males received harsher sentences than White males after accounting for the facts of the case. The study also found that disparities increased between 2005 and 2012 (the years of the study).[97]

Think about how such disparities make individuals feel. Has this ever happened to you? Have you seen it happen to a peer? The stress of being made to feel less than worthy contributes to poor health outcomes.

In his book, *A Theory of Justice*, author John Rawls describes how it is unlikely that society will achieve equal outcomes for all members. Rawls maintains that this reality is acceptable if every person has a reasonable opportunity to achieve optimal outcomes. As this argument applies to health, if all members of society have safe housing, jobs that pay a living wage, equal access to education, nutritious food, physical activity, and high-quality health care, it is still unlikely that everyone will be equally healthy; however, that scenario is acceptable because everyone has an equal opportunity for health.[98]

If we consider the past and much of the present, we realize that the differences we see in health are due to racism and discrimination that make the opportunity for equity currently impossible.

Why Is Change Important?

Imagine a world where we don't judge others—a place where all races, genders, and people who look different than ourselves are judged by who they are as people rather than how they look. We need to remove the perception of "normal" and "acceptable." Imagine a world where there is no hate or discrimination. Imagine a world where instead of spending time and energy on fearing or ridiculing others, people simply accept others and move on to far more important things. There will always be people different than you, but it is important to embrace diversity. To witness one man's journey from racism to understanding, search for "James Rainey Reformed Racist on Oprah" on YouTube.

Although we have focused mainly on race, discrimination can be based on many factors. Many people face discrimination on a regular basis, including

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women, LGBTQ (lesbian, gay, bisexual, transgender, queer and/or questioning) individuals, religious minorities, and individuals with disabilities.

Being LGBTQ often means facing discrimination, which may manifest as verbal abuse, being ignored while waiting for service at a restaurant or store, or an outright refusal of service from a public entity. For example, a local bakery that refuses to make a wedding cake for a same-sex couple. Although partially repealed a year later, the North Carolina legislature on March 23, 2016, passed a law (HB2) that prevented transgender people from using bathrooms that correspond with their gender identity.[99]

GOING UPSTREAM

Experiencing Discrimination

"We have an insanely long way to go [for equality]. I am happy enough to be a white, cisgender, gay male; as such, I face much less prejudice than many members of the LGBTQIA+ community. That said, I experience it on almost a daily basis and I look like a somewhat affluent member of the white middle class. Can you imagine how much worse it would be if I were a person of color?"

—**Derrick De Lise**, author, activist, chef, and Culinary Institute of America alumnus[100]

Individuals with a disability face discrimination every day. Some examples include the assumption that if you have a physical disability, you are not intelligent; lack of physical access to buildings; wheelchair quotas for concert venues, airplanes, city buses, and amusement park rides; nondisabled people

Dylan Foyster

Courtesy of Traci and Dylan Foyster.

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parking in handicapped parking spots; and people acting like the disabled person is invisible.[101] People shout at the blind as if they were deaf. Many people assume that someone with intellectual impairments will not understand negative comments about them or stares from curious people. It is important to remember that everyone has feelings and wants acceptance.

Discrimination has a significant negative effect on health. Many groups in society are the targets of frequent discrimination, both overt and subtle. Mental health outcomes include stress, depression, and anxiety. Physical health outcomes of discrimination include hypertension, obesity, high blood pressure, substance use, and self-reported poor health. Repeated exposure to discrimination is a chronic stressor that erodes a person's protective mechanisms and increases the likelihood of physical illness. The more severe and the more frequent the discrimination, the more negative the mental and physical health outcomes.[102]

Location, Location, Location: The Importance of Where We Live

How many times have you moved? We are a mobile society. The average American moves every 7 years. This means that 40 to 50 million people move each year. Of these people, 15 to 20 million individuals are making *big* moves—to a new city, county, or state. This is important, because where you live increasingly shapes your life and your opportunities.[103] Think about how many moves you have made in your life. Are you above or below the average?

Where you live matters, especially if you are poor. As the *New York Times* puts it, the rich live longer everywhere; for the poor, geography matters. In some areas, the poor live as long as their middle-class neighbors. In other areas, those with the lowest incomes die young.[104] (See the interactive map available at this reference.) Between 2001 and 2014, the gap between the life spans of the rich and the poor grew wider. Life expectancy increased continuously with income. American men earning in the top 1% of income lived 15 years longer than men in the bottom 1%. Among women, the gap was 10 years. Additionally, the inequality in life expectancy has increased over time. While individuals in the top 5% of income gained approximately 3 years of life expectancy, those in the bottom 5% experienced no gains.[105] The authors identified five factors associated with substantial upward mobility, many related to policies at the local level. These factors include (1) less segregation by income and race, (2) lower levels of income inequality, (3) better schools, (4) lower violent crime rates, and (5) a higher proportion of two-parent households. The location in which a person lives was more important for boys than for girls and for lower-income children than for rich children.[106]

Noise Pollution

How loud is it where you live? We regard noise as unwanted or disturbing sound. It can interfere with sleeping or conversation and can impact a person's health. Housing close to sources of noise (e.g., highways, trains, airports, sirens, factories) is obviously less desirable, and therefore, less costly. Thus, if you can afford to live where it is quiet, it is likely that is what you will choose.

Approximately 22 million workers in the United States are exposed to hazardous work-related noise.[107] Research has shown noise exposure to be related to type 2 diabetes mellitus,[108] hearing loss,[107] decreased sleep, and decreased performance of manual activities.[109]

When looking for a place to live, of all the factors you might consider, the noise level of an apartment can be difficult to anticipate. However, a website called howloud.com provides a "soundscore" based on traffic activity, airport

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activity, and local noise sources (e.g., restaurants, schools, stores) to inform you about whether the neighborhood is calm, active, or busy.[110] Note that some variables cannot be included in this assessment, including how noisy or quiet other tenants are or whether the apartment faces the street or the back of a building. The score rates an address from 0 to 100, with a higher score reflecting less noise.

TRY IT!

Noise

How noisy is where you live? Search for how loud and compare your perceptions with your addresses' score.

Move to Opportunity Experiment

What about where you grew up? A study by the Equality of Opportunity Project found that there is a wide variation in the ability of an individual to improve his or her economic status across different places in the United States. The researchers in this study mapped the ability to change economic status by county all across the United States. Children from lower-income families who live in the southeastern United States, on average, stayed in that income bracket. Across much of the Great Plains, with the exception of some large Native American reservations, children had a better than average chance of moving to higher income brackets.[111]

The researchers also studied how the neighborhood where one lives affects a person's ability to improve his or her income. The project found that every year of exposure to a better environment improved a child's chance of success. The researchers also reanalyzed data from a study called the Moving to Opportunity experiment, designed by the U.S. Department of Housing and Urban Development. Between 1994 and 1998, approximately 4,600 families living in high-poverty public housing projects in five large U.S. cities were randomly assigned to one of three groups. One group received a subsidized housing voucher that required moving to an area with less than 10% poverty. The second group received standard housing vouchers with no requirements. The third group retained their access to public housing but did not receive a voucher.[112] Adults in the first group had greatly improved mental and physical health.[113] As shown in **FIGURE 1-13**, the children who were younger than

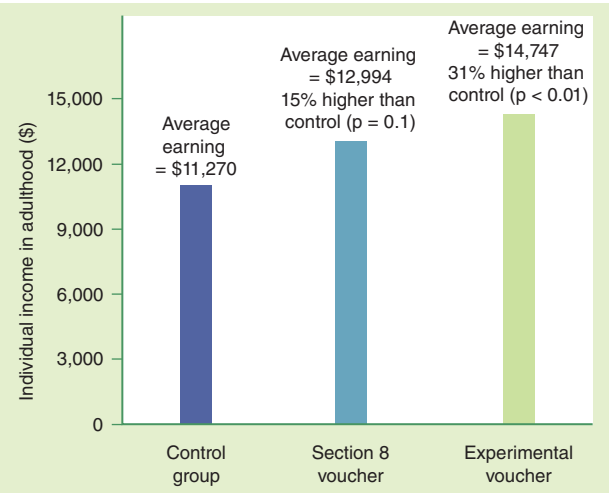

FIGURE 1-13 Cost-effective policy: The Move to Opportunity study increased the earnings of children.

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13 years when they moved had higher incomes in adulthood. Children who were age 13 to 18 years when they moved to a lower-poverty neighborhood had an insignificant or slightly worse outcome in terms of income. The economic gains from moving declined steadily as children got older at the time of the move.[112] The gains from moving at a young age were robust regardless of gender or city of residence or race/ethnicity. The researchers estimated that moving a family to a low-poverty area when a child is young translates into a total lifetime increase in earnings of $302,000. Importantly, the findings suggest that integrating disadvantaged families into mixed-income communities may reduce poverty for the children and grandchildren of those disadvantaged families.[112]

What Is Happiness?

You probably know when you're happy and when you're not. But look around your classroom and ask your classmates what makes them happy. You will likely get many different answers because defining happiness is not easy. There are thousands of articles in the medical literature about being happy. The Declaration of Independence (1776) describes it as a fundamental and inalienable right. Yet the pursuit of happiness is elusive.

So what makes us happy? What have researchers discovered?

It's Partly Your Genes

Although not entirely, to some extent genes do control your happiness.[114–116] Researchers estimate that genes might be responsible for between one-third and one-half of a person's happiness.[114,117] Bartels and colleagues estimate that the amount of happiness inherited genetically is almost twice as high for females (41%) as for males (22%).[115] Gatt, Burton, Schofield, Bryant, and Williams suggest there are common genetic factors that contribute to a sense of well-being and satisfaction with life.[118]

While some people are born with sunnier personalities, even sunny people are not happy all of the time. Additionally, people who are not genetically predisposed to happiness can learn to be happier.

Do you believe you know what does or will make you happy?

Being Rich

There is no doubt that having money makes life easier, but does money actually make you happy? Surprisingly, not so much! A study from Princeton University found that the income required to improve one's chances of happiness is about $75,000 a year. The lower a person's annual income is below that number, the unhappier the person is. But no matter how much more a person makes than the $75,000, it does not make him or her happier.[119] Being rich is not like what you see on TV. In real life, most people who are rich work for their money, and many work all the time. And while money can buy quality health care, it cannot buy health.[120]

Spending Time With Good Friends

Spending quality time with good friends is an important part of a happy life.[121] Taking time off to relax will also keep your stress levels low. It is important to prioritize the time you spend with friends and not wait for special occasions to get together—call up your friends today and make a plan!

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FIGURE 1-14 Before and after decluttering.

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Getting Your Room/Apartment Organized

It may not be your favorite way to spend the day, but organizing certainly is gratifying. Cleaning out the clutter and creating a usable space will give you a sense of achievement that is guaranteed to boost your well-being (**FIGURE 1-14**). Perhaps the junk we live with clutters our minds as well.[122]

Losing Weight

There is no doubt that if you are overweight, weight loss is good for you. But it does not seem to make people happy; nor should it. If weight loss is not making people happy, that could explain, at least in part, why many people struggle to keep weight off. As Roberto and colleagues suggest, when you are trying to lose weight, changes in brain chemistry, metabolism, and hunger make it difficult to definitively lose weight.[123]

Being healthy and exercising, even without losing weight, will make you healthier than the person who does not exercise.[124] The goal is for your blood pressure, cholesterol, blood sugar, and other indicators to fall within a healthy range. A person who feels healthy is more likely to be happy.[125]

Smile!

As simple as this suggestion seems, smiling has been scientifically proven to make you feel happy. It is something like the saying, when you smile, the world smiles with you.[126]

Happiness and a Meaningful Life

Martin Seligman is the founder of Positive Psychology and promotes the idea that a happy life is one that is pleasurable, engaging, and meaningful. Seligman found that the most satisfied, upbeat people are those who had discovered and exploited their unique combination of strengths. People who use their energies to lead engaging and meaningful lives are more likely to be happy than individuals who focus on immediate pleasure.[127]

What does this mean for you? Do what you love. An activity that makes you happy and helps you ignore outside stressors is good. Activities that provide something of a challenge, such as playing a musical instrument, bring reward. Participation in social activities can both bring happiness and increase your well-being.

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Being satisfied with your life is important as you get older. In a 9-year study, older individuals rated questions about their life satisfaction over time. The participants responded annually over the course of the study, also answering questions about age, gender, education, health conditions, smoking status, physical activity, and depressive symptoms. As participants' life satisfaction increased, the risk of mortality decreased. Some people's satisfaction with their life varied over the course of the study. People whose satisfaction was low had increased mortality risk, while people who were satisfied with their life had lower mortality risk. Individuals in the group with both low satisfaction and high variability in satisfaction were at greatest risk of mortality over the course of the study.[128]

Key Health Concepts

It is a good idea to understand how researchers and other experts in the field define and discuss health. Once you understand the concepts that underlie the subject of health, reading and digesting the facts and figures presented here will be much easier. Each of these concepts is introduced briefly.

Rates Versus Numbers

The concept of rates is important when discussing health. Rates are different than numbers because rates consider the size of the population, which allows us to make comparisons. We can use rates to measure time as well as numbers. Rates are statements of frequency (e.g., disease frequency) that allow comparisons between groups of people. For example, let's consider the number of cases of a fictional illness called "madpox disease." In City A there are 100 cases, and in City B there are only 40 cases (**TABLE 1-6**). This suggests to us that madpox disease is a greater problem in City A than in City B, right?

To make a meaningful comparison, however, we must determine the prevalence of the disease in each city, which means that we need to know each city's population. We discover that City A has a population of 40,000 residents, while City B has 8,000 residents. That changes the picture a bit. To arrive at the disease prevalence, we must divide the number of cases in each city by the population (**TABLE 1-7**).

When we compare the prevalence in the two cities, it is clear that madpox disease is actually a much greater problem in City B, due to its smaller population, than in City A, even though the total number of cases is greater in City A.

TABLE 1-6 Existing Cases of Madpox Disease in Cities A and B

	Existing Cases
City A	100
City B	40

TABLE 1-7 Prevalence of Madpox Disease in Cities A and B

	Existing Cases	Population	Prevalence
City A	100	40,000	.0025
City B	40	8,000	.0050

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TABLE 1-8 Existing Cases of Madpox Disease and Population in Cities A and B With Prevalence as a Rate

	Existing Cases	Population	Prevalence (as a decimal fraction)	Prevalence (per 1,000 population)
City A	100	40,000	.0025	2.5/1,000
City B	40	8,000	.0050	5.0/1,000

epidemiologists Individuals who study the causes and distributions of disease among local and global populations. They not only focus on preventing and controlling the spread of communicable diseases, but also on understanding how to prevent chronic diseases.

Because we are talking about people, a number as small as 0.005 is not particularly useful on its own. Such small numbers are common when interpreting the prevalence of rare diseases. To raise numbers to a more useful value, **epidemiologists** multiply the prevalence rate by 1,000, which for most diseases yields a number larger than 1 (**TABLE 1-8**). The prevalence can now be described as being "per 1,000." There are diseases that are so rare that the multiplier used is 1,000,000 and prevalence is discussed as "per 1,000,000."

Neither city has exactly 1,000 residents, but by using the "per 1,000" convention, we now have a clearer picture of the prevalence of madpox among residents in each city. You can see how presenting the information as a rate is much more informative than simply stating a total,[129] and how it changes our original view that madpox was a greater problem in City A than in City B. It also allows you to determine whether the comparison you are making is truly comparable.

Incidence Versus Prevalence

Researchers often refer to disease frequency in population health. They talk about disease frequency in terms of incidence and prevalence. Incidence is the number of *new* cases of a disease over a specified period (e.g., 100 cases over 2 years). However, it is difficult to measure incidence because the exact time of the beginning of an illness is hard to pinpoint. As we have already noted, prevalence is the total number of cases, per population size, known to have existed over a period.[129] For example, a 2008 study found that among college students, 306/1,000 had smoked a water pipe in the past year.[130] We will primarily discuss prevalence as we look at population health.

FIGURE 1-15 illustrates the relationship between incidence and prevalence. As incidence (new cases) increases, so does prevalence. If we are discussing an infectious disease, such as malaria or the flu, when people get the condition again, prevalence increases. If people die of the condition, the prevalence decreases.

randomized controlled trials A study design that randomly assigns participants to either an intervention group or a control group. The control may be a standard practice, a placebo ("sugar pill"), or no intervention at all. As the study is conducted, the only expected difference between the control and experimental groups is the outcome variable being studied.

Randomized Controlled Trials

When researchers want to know if a treatment (or intervention) will improve disease outcomes in individuals or communities, they employ an intervention study. Investigators make comparisons between a group receiving a new, innovative intervention (the intervention group) and a group receiving an older intervention (the control group) or no intervention (also called a control group).

Many people regard **randomized controlled trials** as the absolute best, or "gold standard," for judging the benefits of interventions (treatment).[131] A randomized controlled trial is a kind of study that randomly assigns participants into one of two groups, either an intervention group or a control group.

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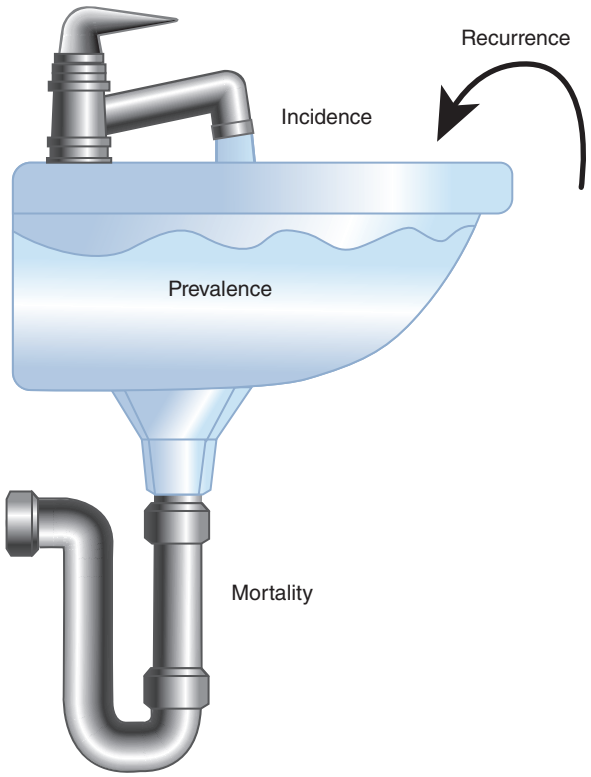

FIGURE 1-15 The relationship between incidence and prevalence.

The control group may receive the standard practice, such as the usual medical care; a placebo, which is a treatment that is deliberately ineffective, such as giving someone a "sugar pill"; or no intervention at all. When correctly done, after randomization (i.e., the process of dividing the participants so that each person has an equal chance of being assigned to either group) but before the intervention, the characteristics of the two groups should be similar. Relevant characteristics depend on the purpose of the trial and may include, for example, age, gender, education, employment, usual exercise routine, diet, or prior medical history.

Statistical Significance

As you're reading this book, you will come across statements such as "This rate is significantly different than that rate." This refers to *statistical significance*, which means that differences found among groups are not likely to have occurred by chance. For example, consider a board game that uses two dice to determine how many spaces a player moves. Everyone rolls two sixes once in a while, but if on *every* turn one player rolls a double six, you will suspect the person's consistency is not just a matter of chance; you will look for a logical explanation—namely, that the person is cheating. So when we say that the difference between two things is statistically significant, we mean that we believe the difference cannot be attributed to chance—that there is a logical explanation for the difference.

Screening

Another concept important in population health is screening. Screening is a simple test usually performed to identify those in a population who have or are likely to develop a specified disease. For instance, newborn screening is

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TABLE 1-9 Validity of Disease Screening

	Person Has Disease	Person Does Not Have Disease
Screening results are positive	True positive	False positive
Screening results are negative	False negative	True negative

Data from Penn Graduate School of Education. Center for the Study of Race & Equity in Education. Disproportionately Disciplined: Black Student Suspension Rates in the American South. 2018. Retrieved from: https://equity.gse.upenn.edu/sites/default/files/GSE_HarprSspnsnInfo_R5.pdf

the practice of testing every newborn for specific harmful or potentially fatal diseases that are not otherwise apparent at birth. When you are young and healthy, fewer screening tests are needed. As you age, however, screening tests are used more frequently. Common examples of screening tests are blood pressure measurements, cholesterol checks through blood analysis, diabetes screening, mammograms to screen for breast cancer, and Pap tests to screen for cervical cancer.

Sometimes, results of a screening can tell the healthcare professional if you are at low, medium, or high risk of developing a disease, but the results of other screening tests can be only positive or negative. An ideal screening test will identify everyone correctly. That is, people who have the disease will test positively on the screening test, and those who do not have the disease will test negatively on the screening test. In reality, though, the tests are not always 100% correct. Many factors affect whether a screening test is positive or negative, including the stage of the disease, the care with which the test was conducted, and medications a person is taking.

Screening is necessary for serious diseases like cervical cancer. Treatment often is both more effective and less invasive when disease identification occurs early. A good screening test is inexpensive, easy to administer, produces minimal discomfort for the patient, is reliable (provides consistent results), and is valid (distinguishes between people with a disease and those who are disease-free) (**TABLE 1-9**).

If you have a screening test that was positive, then your healthcare provider will perform a diagnostic test to determine if you have the disease. If it is a serious disease such as cancer, the **cutoff value** for a positive test is set low, because it is better to declare a test positive when the person does not have cancer than to declare a test negative when he or she does.

cutoff value The level at which the result of a diagnostic test is determined to be positive or negative.

Inequities

Inequity can generally be defined as a lack of fairness. The inequalities that we will discuss have much to do with existing sociocultural inequities, and you will see how they have an enormous impact on the population's health.

Everyone wants to be healthy. People who are poor may take good care of themselves but live in an environment that is bad for them. The environment in which people live can have an enormous impact on their health. Exposure to mold, pests such as rats and cockroaches, and poor air quality can raise the risk for diseases. Chronic stress and discrimination also affect a person's health. It is neither a coincidence nor surprising that people living in such environments and under such conditions have more health issues than do those who live in better conditions.

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South Bronx, New York City.

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According to the U.S. Census Bureau data, the 50 largest cities have significant income gaps between the rich and the poor. In 2015, the poorest cities in the United States were Louisville, Boston, Indianapolis, El Paso, Fresno, Baltimore, Tucson, Philadelphia, Memphis, Detroit, and Milwaukee. The causes for the poverty include high unemployment rate, lack of economic diversity, a relatively uneducated population, and poor-paying jobs (i.e., most available jobs pay minimum wages).[132] The poor neighborhoods in these and many other cities tend to be high in crime and air pollution and low in quality, affordable housing and services. They are the places in which people live when they cannot afford to live in healthier places. People end up in these neighborhoods when the resources and political power to make things better are absent. In disadvantaged neighborhoods, many residents have no choice but to be more concerned about everyday survival than what a nearby industry is doing. One of the results of these inequities is poor health. The disparities in health are due directly and indirectly to social, economic, cultural, and political inequities.[133]

In Summary

Every day you make choices that impact your health. Those choices are not made in a vacuum; they are influenced by the environment around you. Researchers have proposed theories of health behavior that attempt to explain how people make decisions about their health behaviors. These theories are helpful because public health practitioners want to understand how to help people make healthier choices.

This chapter introduces key concepts and terms fundamental to understanding health. The concept of health across the life span helps you understand that the choices you make, as well as the external environment around you, affect your health. The concept of race is a social, not biological, construct. The consequences of racism on health are devastating.

We also consider health determinants that are not always obvious. Where you live is important. It influences your sense of well-being, your health, your happiness, and other choices about your life. Furthermore, understanding what will make you happy is critical to living a healthy life.

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Key Terms

built environment
cancer
congenital anomalies
cutoff value
discrimination
epidemiologists
focus groups
heart disease
incidence
population health
prevalence
race
racism
screening tests
randomized controlled trials
social determinants of health
sudden infant death syndrome (SIDS)

Student Discussion Questions and Activities

1. How would you define health? Why do you define it that way? How is your definition similar to, or different from, the definition given by the World Health Organization?
2. Consider the social-ecological model and how it explains the different factors that affect the choices a person makes. Give one example for each model level of an influence over your personal health decisions.
3. Compare the recommendations to protect yourself against heart disease and cancer. Many of these recommendations apply to your health in general. Which ones do you follow?
4. Think about where you grew up. It could be in a city, suburb, or town, or out in the country. (If you grew up out in the country, think about the nearest town.) Describe the neighborhoods—rich, poor, and in between—and how they differ.
5. Think about the Moving to Opportunity experiment. Do we as a society have an obligation to help others? Do you think the Moving to Opportunity plan should be implemented throughout the country?
6. Consider what makes you happy. Do you think being rich would make you happy?

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