

## CHAPTER 2

# Population Health: A Primer

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### LEARNING OBJECTIVES

By the end of this chapter, the reader will be able to:

- Describe how the leading causes of death in the United States have changed over the past century and discuss the corresponding changes in focus on prevention and control of disease.
- Describe what is meant by health outcomes, determinants, and indicators for chronic disease at the community and population levels.
- Explain how a county-level health ranking is created.
- Identify sources of information on population health outcomes and determinants.
- Describe challenges in communicating about chronic disease.
- Identify difficulties and recommendations for communicating about vaccines and emerging infectious diseases.

### ► Introduction

This chapter provides common ground for health communicators in the science of population health. There are challenges inherent in communicating about chronic and infectious diseases today, given our history, our societal and cultural trends, and the evolution of microbes.

### ► Evolution of the Leading Causes of Death

Over the past century in the United States, advances in public health and health care have led to dramatic changes in the **leading causes of death** and have increased **life expectancy** by an average of 30 years. A white man born in 1900 could have expected to live another 47 years, compared to 75 years in the year 2000. A black woman born in 1900 had a life expectancy of 34 years in 1900, compared to 75 years in 2000; a white woman born in 2000 has a life expectancy of 80 years.<sup>1-3</sup>

Racial and other discrepancies persist and are the subject of much of the discussion in this chapter. Nonetheless, all of us can expect much longer lives than our great grandparents could anticipate. Students of demography know life expectancy calculations rely heavily on surviving our first year of life. In 1900, as many as 30% of infants in some U.S. cities died before reaching their first birthday. Today, fewer than 6 infants per 1000 born alive in the United States

die before reaching their first birthday.<sup>4</sup> Most scientists attribute this gain to advances in public health, especially the control of certain infectious diseases.<sup>5</sup> The appendix to this chapter discusses several global infectious disease communication challenges that remain.

What accounts for these large trends in infant or adult death rates? Our understanding evolved over the course of the 20th century. In particular, our views about the factors that affect the public's health can be organized into four distinct historical eras: the era of environmental factors, the era of health care, the era of health behavior, and the era of social and economic factors.

## The Era of Environmental Disease (Circa 1900)

In the early 1900s in the United States, the leading causes of disease and death were primarily associated with the unhealthy environments in which people lived. In 1900, pneumonia, influenza, tuberculosis, diarrhea, enteritis, and ulceration of the intestines were the leading causes of death, accounting for nearly one-third of all deaths.<sup>6</sup> These health problems resulted from poor sanitation (e.g., typhoid), an unhealthy food supply (e.g., pellagra and goiter), poor prenatal and infant care, and unsafe workplaces or hazardous occupations.<sup>7</sup>

In response to these health problems, the federal government, state governments, and local departments of public health developed laws and regulations intended to improve public health in the United States. Occupational safety laws, restaurant and food establishment laws, fluoridation and other drinking water laws, and motor vehicle safety laws and regulations emerged as a result.<sup>7,8</sup> These government policies led to dramatic reductions in communicable diseases and maternal and child mortality. As a result, Americans began to live longer and chronic diseases took over as the primary causes of death and disability.

## The Era of Expanding Health Care (Circa 1950)

By the middle of the 20th century, heart disease and cancer had become the leading causes of death in the United States. In response, the focus of interventions began to shift from public health approaches to increasing healthcare services, including the delivery of **clinical preventive services** such as the detection and treatment of high blood pressure, vaccines for childhood disease, and improved maternal and prenatal care.

Despite this focus on preventive services, most of the attention of the healthcare system focused on the treatment of diseases. As Evans commented, “[B]y midcentury the providers of health care had gained an

extraordinary institutional and even more intellectual dominance, defining both what counted as health and how it was to be pursued.”<sup>9</sup> By the early 1970s, the United States had developed extensive and expensive systems of health care, underpinned by health insurance systems that covered most—but not all—children and adults.<sup>9</sup>

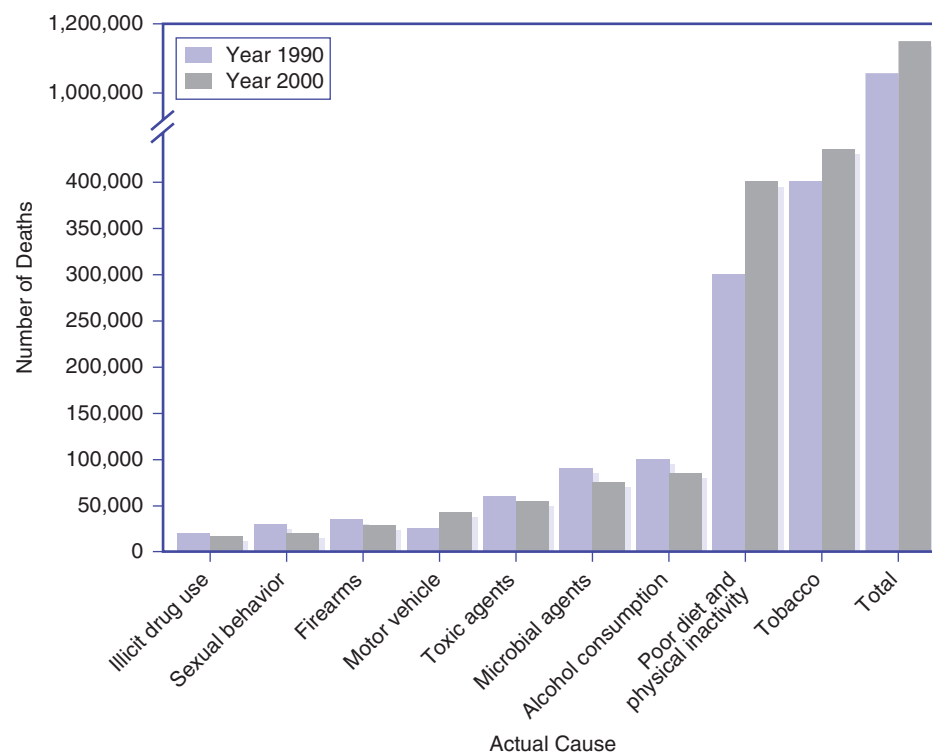
## The Era of Lifestyle and Health Risk Behaviors (Circa 1970)

As heart disease, cancer, stroke, and lung disease became the leading causes of death during the mid-1900s, public health researchers began to focus on identifying their causes. Large-scale studies such as the Framingham Heart Study, the Seven Countries study, and the British Doctors study began to identify the leading causes of chronic diseases. In turn, researchers began to elucidate the important contributions of cigarette smoking, diet, physical inactivity, and high blood pressure to the leading causes of death.

In 1974, the Canadian government published the *Lalonde Report*, which was recognized as the first modern government report to question the direct link between health care and the public's health.<sup>10</sup> It proposed a new framework suggesting that health be considered along four broad dimensions: human biology, environment, lifestyle, and healthcare organization. In addition, the report emphasized the role of individuals in changing their behaviors to improve their health.<sup>11</sup>

In 1993, the publication of the now-acclaimed paper entitled “Actual Causes of Death” by McGinnis and Foege<sup>12</sup> drew attention to the fact that many deaths were due to preventable causes. Later updated (by Mokdad and colleagues at the Centers for Disease Control and Prevention [CDC]<sup>13</sup>), these studies concluded that approximately half of all deaths that occurred in 1990 and 2000 could be attributed to a limited number of preventable factors (**FIGURE 2-1**). Among the highest listed preventable causes of death in order of prevalence are tobacco, poor diet and physical inactivity, and alcohol consumption. These findings, along with escalating healthcare costs and an aging population, argued for the urgent need to establish a more preventive orientation in the U.S. healthcare and public health systems.

Expert opinion at the time suggested that lifestyle factors had the largest and most unambiguously measurable effects on health.<sup>9-15</sup> Behaviors related to diet, exercise, and substance abuse were also factors most readily portrayed as under the control of individuals. The Health Belief Model (HBM, developed by Irwin Rosenstock and colleagues in the Behavioral Sciences Section of the U.S. Public Health Service in



**FIGURE 2-1** Actual causes of death in the United States, 1990 and 2000.

Data from Mokdad AH, Marks JS, Stroup DF, Gerberding JL. Actual Causes of Death in the United States, 2000. *JAMA*. 2004;291(10):1238–1245.

the 1950s) and other psychologically-based models that focused on perceptions of vulnerability, knowledge of an effective course of action, and a sense of behavioral control, became the foundation of public health education. In 1960, Rosenstock briefly suggested that perhaps the pendulum had swung too far toward a belief that health behaviors were the major determinant of health<sup>16</sup> but continued to be a proponent of HBM and went on to found and chair the first Department of Health Behavior and Health Education at the University of Michigan from 1975–1983.

With the recognition that personal behaviors contributed to health, regular collection of such data emerged as a major surveillance and research achievement. In 1984, for example, CDC implemented the first state-wide telephone-based surveillance system for health behaviors.<sup>17</sup> This system, known as the Behavioral Risk Factor Surveillance System (BRFSS),<sup>a</sup> monitors health risk behaviors at the population level and collects information on health risk behaviors, preventive health practices, and healthcare access primarily related to chronic disease and injury. The BRFSS completes more than 400,000 adult interviews each year (more than 506,000 in 2014), making this surveillance system the largest telephone health survey in the world.

## The Era of Social Determinants (Circa 2000)

By the beginning of the 21st century, public health research focused farther “upstream”—on factors that increase not only the risk of diseases, but also their environmental and societal causes. Both the public and policy makers had grasped how the physical environment, medical care, and personal health behaviors could have widespread and indiscriminate effects on health. If you smoked cigarettes or lived in an area with a high air pollution level, whether rich or poor, you could succumb to the effects of these unhealthy contaminants. However, public health leaders were about to suggest a more subtle link between access, affordability, and health.

Sir Michael Marmot performed some of the early studies—the so-called Whitehall Studies—showing the link between socially defined categories of “class” and health in Great Britain. The Whitehall Studies, which are some of the longest epidemiological studies of social and economic factors affecting health in the world, are still ongoing.<sup>b</sup> **BOX 2-1** discusses a major finding from one of Marmot’s early studies.

The first officially stated U.S. government goals to reduce racial, ethnic, and gender-based health disparities appeared in *Healthy People 2010*. Armed with data, CDC Director Dr. David Satcher fought the prevailing political winds to move the United States

a. <http://www.cdc.gov/brfss/>

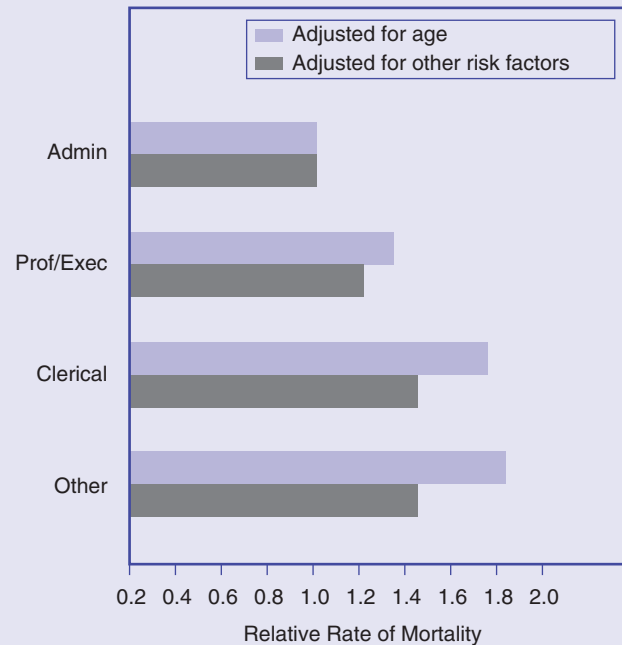
b. <https://www.ucl.ac.uk/whitehallII>

**BOX 2-1** Marmot's Studies of Social Class and Health

One of the most important social epidemiologists of our generation is Sir Michael Marmot, whose studies of British civil servants clearly illustrate the health impact of social class.

The four job categories in **FIGURE 2-2** reflect different education and income profiles among British civil servants. In the figure, we see increased mortality at each occupational level (the social gradient). Taking known modifiable risk factors into account (i.e., statistically controlling for them) explains some, but not all, of this increased risk. The amount of mortality not explained by these risk factors, in a British system where all people have access to medical care, is quite remarkable.

This example highlights individuals' occupational category as a marker of social class and socioeconomic status. Such relationships have also been shown for income, education, and other components of the social determinants of health.



**FIGURE 2-2** Whitehall study.

Data from Sreenivasan G. Justice, Inequality, and Health. IN: The Stanford Encyclopedia of Philosophy (Fall 2014 Edition). Edward N. Zalta (ed.). Available at: <http://plato.stanford.edu/archives/fall2014/entries/justice-inequality-health/>. Assessed July 12, 2015.

in this direction (**BOX 2-2**). For example, one study estimated that eight times more lives would be saved by correcting educational disparities than by medical advances over the same period.<sup>18</sup> Another study estimated a 1% to 3% reduction in mortality rates would occur for each year of additional schooling.<sup>19</sup> **FIGURE 2-3** illustrates the dramatic association of educational attainment with mortality rates for men and women.

In the past 15 years, the role of “social determinants” of health—such as income, education, occupation, and social cohesion—has been more widely acknowledged among public health and healthcare professionals. We have entered the era of making policy based on data derived from leading health indicators.

## ▶ Leading Health Indicators Approach

### Healthy People 2020

*Healthy People 2020*<sup>c</sup> (HP 2020) provides a comprehensive set of 10-year national goals and objectives for improving the health of all Americans. This initiative tracks the nation's health through more than 1200 objectives organized in 42 distinct public health topic areas. Most objectives provide opportunities for public health professionals to set goals and track progress. At the same time, the size and scope of these health objectives create a challenge for health communicators.

c. <http://www.healthypeople.gov>.

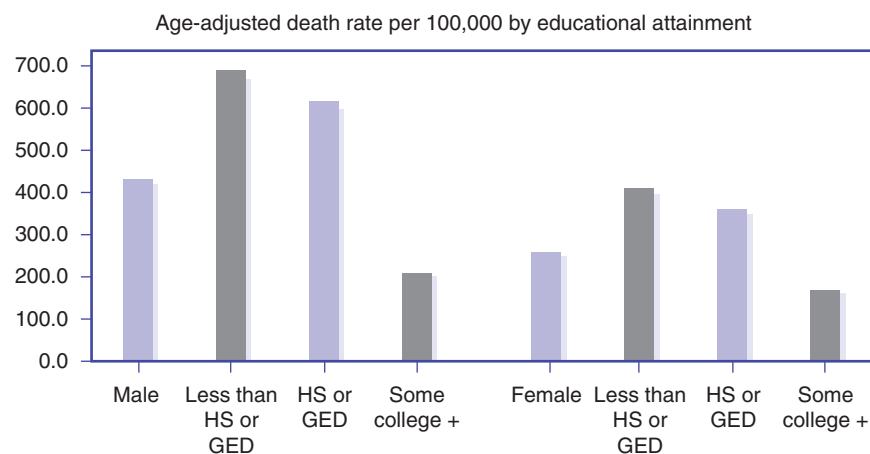
## BOX 2-2 David Satcher and the Health Determinants Approach

According to David Satcher,<sup>1</sup> former CDC Director and U.S. Surgeon General from 1998 to 2002:

Reducing health disparities, primarily those based on race/ethnicity and gender, has long been a public health priority in the United States. . . . Recent developments led by the World Health Organization (WHO), however, have accelerated the thinking about the causes of health inequities—i.e., disparities that are systematic, avoidable, and unjust<sup>2</sup>—and how best to address their reduction.<sup>3,4</sup> The WHO Commission on Social Determinants of Health concluded in 2008 that the social conditions in which people are born, live, and work are the single most important determinant of one's health status.<sup>3</sup> Certainly, individual choices are important, but factors in the social environment are what determine access to health services and influence lifestyle choices in the first place. Social determinants are defined by WHO as follows: "... the circumstances in which people are born, grow up, live, work and age, and the systems put in place to deal with illness. These circumstances are in turn shaped by a wider set of forces: economics, social policies, and politics."<sup>5</sup>

### References

1. Satcher D. Include a social determinants of health approach to reduce health inequities. *Public Health Rep.* 2010;125(suppl 4):6–7.
2. Braveman P, Gruskin S. Defining equity in health. *J Epidemiol Community Health* 2003;57:254–258.
3. World Health Organization. Closing the gap in a generation: health equity through action on the social determinants of health. *Report from the Commission on Social Determinants of Health*. Geneva: WHO; 2008. [http://www.who.int/social\\_determinants/thecommission/finalreport/en](http://www.who.int/social_determinants/thecommission/finalreport/en).
4. World Health Organization. World Health Assembly closes with resolutions on public health. 22 May 2009. [http://www.who.int/mediacentre/news/releases/2009/world\\_health\\_assembly\\_20090522/en/index.html](http://www.who.int/mediacentre/news/releases/2009/world_health_assembly_20090522/en/index.html).
5. World Health Organization. Social determinants of health: key concepts [cited January 18, 2010]. [http://www.who.int/social\\_determinants/thecommission/finalreport/key\\_concepts/en](http://www.who.int/social_determinants/thecommission/finalreport/key_concepts/en).



**FIGURE 2-3** Death rate by educational attainment and sex.

From National Vital Statistics Reports, Vol. 60, No. 3, December 29, 2011. Table 1–8.

The Leading Health Indicators represent a subset of 26 high-priority health issues related to 12 topic areas. The *Healthy People 2020* Federal Inter-agency Workgroup led the process of selecting the Leading Health Indicators, which are summarized in **TABLE 2-1**.

The federal Office of Health Promotion and Disease Prevention monitors progress for each of the

Leading Health Indicators. At last review (2014), it found these results:

- Four leading health indicators (15.4%) met or exceeded targets.
- Ten leading health indicators (38.5%) were improving.
- Eight leading health indicators (30.8%) showed little or no detectable change.

**TABLE 2-1** Leading 2020 Health Indicators in the United States

Category	Example	Baseline Value (Year)	Current Value (Year)	Goal
Access to health services	Adults younger than 65 years with medical insurance (percent)	83.2% (2008)	83.1% (2012)	100%
Clinical preventive services	Children aged 19–35 months receiving recommended doses of DTaP, polio, MMR, Hib, hepatitis B, varicella and PCV vaccines (percent)	44% (2009)	68.5% (2011)	80%
Environmental quality	Children aged 3–11 years exposed to secondhand smoke (percent)	52.2% (2005–2008)	41.3% (2009–2011)	47.0%
Injury and violence	Injury deaths (age-adjusted rate per 100,000 population)	59.7 (2007)	57.1 (2010)	53.7
Maternal, infant, and child health	Infant deaths prior to 12 months of age (rate per 1000 live births)	6.7 (2006)	6.1 (2010)	6.0
Mental health	Suicide (age-adjusted rate per 100,000 population)	11.3 (2007)	12.1 (2010)	10.2
Nutrition, physical activity, and obesity	Obesity among adults aged 20 years or older (age-adjusted percent over a 2-year period)	33.9% (2005–2008)	35.3% (2009–2012)	30.5%
Oral health	Persons who visited the dentist in the past year (age-adjusted percent over a 2-year period)	44.5% (2007)	41.8% (2011)	49.0%
Reproductive and sexual health	Knowledge of serostatus among HIV-positive persons aged 13 years or older (percent)	80.9% (2006)	84.2% (2010)	90.0%
Social determinants	Students awarded a high school diploma 4 years after starting ninth grade (percent)	74.9% (2007–2008)	78.2% (2009–2010)	82.4%
Substance abuse	Binge drinking in past 30 days among adults aged 18 years or older (percent)	27.1% (2008)	27.1% (2008)	24.4%
Tobacco	Cigarette smoking among persons aged 18 years or older (age-adjusted percent)	20.6% (2008)	18.2% (2012)	12.0%

- Three leading health indicators (11.5%) were getting worse.
- One leading health indicator (3.8%) had only baseline data.

## Health Disparities

Over the past three decades, the U.S. government has increased the emphasis on health disparities in the national health goals. In HP 2000, the goal was to *reduce* health disparities among Americans, but HP 2010 seeks to *eliminate* health disparities. The goal in HP 2020 calls on us to *achieve health equity, eliminate disparities, and improve the health of all groups*. To keep on track, HP 2020 reports rates of illness, death, chronic conditions, behaviors, and other types of outcomes in relation to demographic factors that have historically been associated with unequal access and/or illness rates. For example, according to the *Healthy People 2020* data:

- Approximately one-third of the U.S. population identifies themselves as belonging to a racial or ethnic minority population.
- Approximately 12% of the U.S. population not living in nursing homes or other residential care facilities has a disability.
- An estimated 23% of the population lives in rural areas.
- An estimated 4% of the U.S. population aged 18 to 44 years identifies themselves as lesbian, gay, bisexual, or transgender.

In addition, the CDC provides extensive and detailed information about health disparities through reports such as the *CDC Health Disparities and Inequalities Report—United States, 2013*.<sup>d</sup>

Although a vast amount of information about health disparities is available, it is often buried in reports that are read only by public health professionals. Health communicators play a vital role in translating the data into information for the public.

## ► Health Rankings

The idea of ranking states or counties within states using a summary score is based on how the public tends to think about statistics (e.g., sports team

rankings). Such scores enable officials to deliver clear communication messages such as “Our state ranks dead last in the national health ranking” or “Our county is the healthiest place to raise children.” In 1988, the CDC’s *Morbidity and Mortality Weekly Report (MMWR)* ranked state-specific death rates from heart disease.<sup>20</sup> This report led to an Associated Press headline that stated, “Midwest, Northeast City Life Hard on Hearts.”<sup>21</sup> Subsequent media attention led to heated calls to the CDC from outraged health officials and legislators from the states with the highest death rates, insisting that the CDC refrain from publishing rankings in the *MMWR*.<sup>20</sup>

Since 1990, *America’s Health Rankings*<sup>e</sup> has reported on the health of the 50 U.S. states, including measures of health outcomes, health determinants, and programs and policies. This annual report has generated significant interest among the media and among policy makers over the past two decades. Building on this approach, the University of Wisconsin’s Population Health Institute measured and ranked the health of its home state’s 72 counties. This program led to development of a logic model (**FIGURE 2-4**) positing that health rankings would lead to media attention, engage local community leaders, support the development of evidence-based policies and programs, and eventually improve the health of the community.

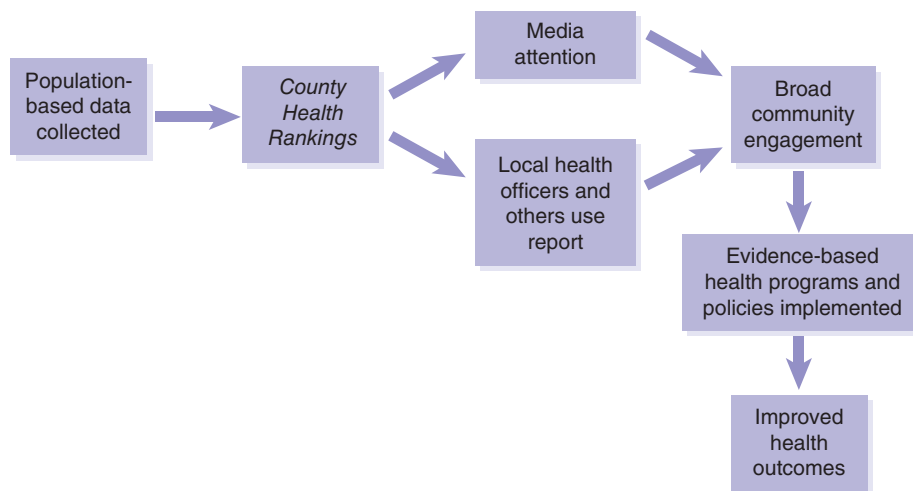
An analysis of media coverage from 2004 to 2008 showed that the number of rankings-related stories increased from 23 in 2006 to 47 in 2008.<sup>22</sup> In addition, several news stories made use of accompanying photographs to highlight the determinants of health (e.g., people running and bicycling on paths or exercising in a school exercise facility).

Each year since 2010, the University of Wisconsin’s Population Health Institute and the Robert Wood Johnson Foundation have produced the *County Health Rankings*,<sup>f</sup> a “population health checkup” for the United States’ more than 3000 counties.<sup>20</sup> The population health of each county is ranked within each state—from the healthiest to the least healthy—using a model that summarizes the overall health outcomes of each county, as well as the factors that contribute to health. Data for each component of the *Rankings* model are selected from a number of national data sources, including the National Center for Health Statistics, BRFSS, and the American Community Survey, among others.

d. <http://www.cdc.gov/minorityhealth/CHDIReport.html>

e. <http://www.americashealthrankings.org/about/annual>

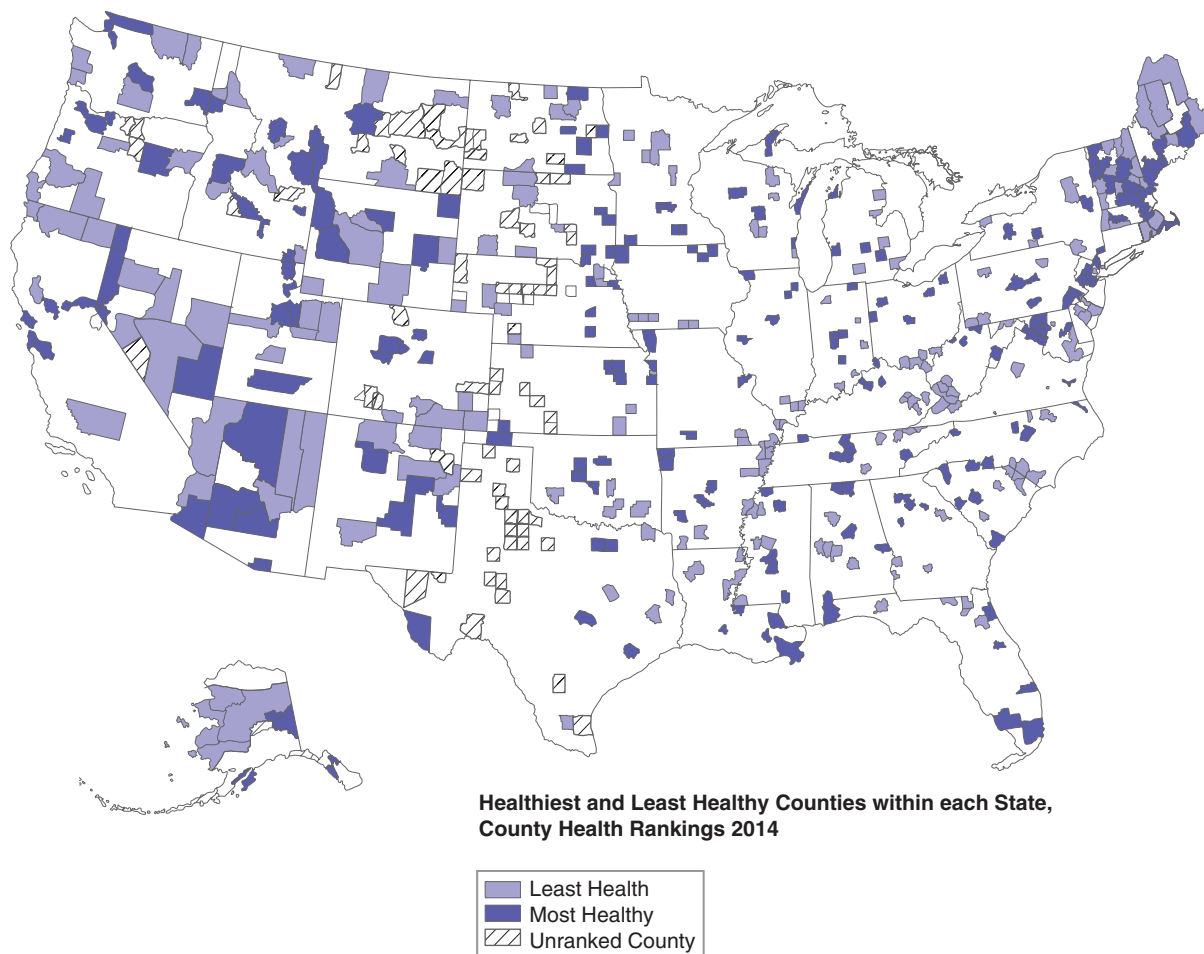
f. <http://www.countyhealthrankings.org>



**FIGURE 2-4** Logic model for the *County Health Rankings*.

**FIGURE 2-5** shows a map of the top five and bottom five counties within each state based on their within-state health outcome ranks. In some states, the healthiest and unhealthiest counties lie far from each other; in other states, the healthiest and unhealthiest counties are adjacent. The five least-healthy counties

in each state have premature death rates that are more than twice the rates of the five healthiest counties. These counties with poorer health outcomes also have the highest rates of smoking, teen births, physical inactivity, preventable hospital stays, and children living in poverty.<sup>20</sup>



**FIGURE 2-5** Healthiest and least healthy counties within each state according to *County Health Rankings*, 2014.

Courtesy of University of Wisconsin Population Health Institute.



The *County Health Rankings* have been successful in increasing community dialogue about the factors that make a community healthy for several reasons. First, the model is clear and easy to understand by both the media and the public. The use of summary measures of the health outcomes and health factors translates complex data into a form that policy makers and the public can easily use. It encourages users to “see the forest rather than the trees”—that is, not to place undue emphasis on individual performance measures. In addition, this model demonstrates that multiple factors determine health, ranging from individual health behaviors to the quality of the healthcare and educational systems to the influences of the built environment. This broad definition of health serves as a call to action to create policies and programs that can be linked to improvements or worsening in health outcomes over time.

## ► Gathering Data to Communicate About Population Health

### Sources of Information

Numerous sources of information align with the population health model described previously, including health outcomes, health determinants, and evidence-based programs and policies.

### Health Outcomes Data

Information about health outcomes (e.g., death and disease) comes from a variety of sources, including vital statistics, healthcare systems, and population-based surveys. Some of the most fundamental information about the health of a community comes from birth and death certificates. These certificates are completed by a physician or medical examiner and reported to the county and state health departments, and ultimately to the CDC’s National Center for Health Statistics, where they are made available to public health practitioners and researchers throughout the United States. The CDC provides access to cleaned data sets through CDC Wonder<sup>g</sup> or through finished analytical reports at the National Vital Statistics website.<sup>h</sup>

Disease incidence and prevalence data may be obtained from a number of sources. Cancer incidence data for a sample of residents of the United States have been available since 1974 through the Surveillance, Epidemiology and End Results (SEER) Program at the

National Cancer Institute (NCI) and more recently from most state health departments. In addition, administrative data from hospitals and other health-care providers may provide information about their rates of care for diseases. In addition, data on birth outcomes (e.g., birth weights, prematurity rates) are reported by hospitals to state health departments.

Some information on overall health-related quality of life (HRQoL) is collected at the state level and reported to the CDC as part of the BRFSS. Other local initiatives to assess HRQoL tend to be disease specific and are driven by healthcare providers and health services researchers interested in health outcomes that result from particular healthcare treatments. Although these quality of life initiatives generally employ quite detailed self-reported assessments of patient conditions, most have been developed relatively independently.

As an example of health outcomes data, **FIGURE 2-6** shows the leading causes of death overall and for each age group, highlighting those deaths due to injuries. For persons of all ages, four chronic diseases account for 60% of all deaths: heart disease, cancer, stroke, and lung disease. Cancer is the leading cause of death among persons ages 45 to 64, and Alzheimer’s disease is now one of the leading causes of death among persons older than age 65. Although unintentional injuries are the fourth-leading cause of death overall, they are the leading cause of death for persons younger than age 45. While some disease rates are increasing, heart disease rates are declining. These rates vary considerably by race, gender, and geographic area.

### Health Determinants Data

**Health Behaviors** CDC’s National Health Interview Survey (NHIS) and National Health and Nutrition Examination Survey (NHANES) are primary sources for national data on adult behaviors; at the state and local levels, CDC’s BRFSS is the primary source of such data. As noted earlier, BRFSS data are collected monthly in all 50 states, as well as in the District of Columbia, Puerto Rico, the Virgin Islands, and Guam. The questionnaire used in these telephone surveys consists of a fixed core (questions asked every year), rotating core (questions asked every other year), optional modules (standardized sets of questions on specific topics), emerging core (questions for newly arising topics), and state-added modules (questions relevant to the individual state). Items in the BRFSS address smoking, alcohol use, diet, exercise, and other health-related behaviors, such as use of clinical preventive services.

g. <http://wonder.cdc.gov>

h. <http://www.cdc.gov/nchs/nvss.htm>

Rank	Age Groups										Total
	<1	1–4	5–9	10–14	15–24	25–34	35–44	45–54	55–64	65+	
1	Congenital Anomalies 4,758	Unintentional Injury 1,316	Unintentional Injury 746	Unintentional Injury 775	Unintentional Injury 11,619	Unintentional Injury 16,209	Unintentional Injury 15,354	Malignant Neoplasms 46,185	Malignant Neoplasms 113,324	Heart Disease 488,156	Heart Disease 611,105
2	Short Gestation 4,202	Congenital Anomalies 476	Malignant Neoplasms 447	Malignant Neoplasms 448	Suicide 4,878	Suicide 6,348	Malignant Neoplasms 11,349	Heart Disease 35,167	Heart Disease 72,568	Malignant Neoplasms 407,558	Malignant Neoplasms 584,881
3	Maternal Pregnancy Comp. 1,595	Homicide 337	Congenital Anomalies 179	Suicide 386	Homicide 4,329	Homicide 4,236	Heart Disease 10,341	Unintentional Injury 20,357	Unintentional Injury 17,057	Chronic Low. Respiratory Disease 127,194	Chronic Low. Respiratory Disease 149,205
4	SIDS 1,563	Malignant Neoplasms 328	Homicide 125	Congenital Anomalies 161	Malignant Neoplasms 1,496	Malignant Neoplasms 3,673	Suicide 6,551	Liver Disease 8,785	Chronic Low. Respiratory Disease 15,942	Cerebro-vascular 109,602	Unintentional Injury 130,557
5	Unintentional Injury 1,156	Heart Disease 169	Chronic Low. Respiratory Disease 75	Homicide 152	Heart Disease 941	Heart Disease 3,258	Homicide 2,581	Suicide 8,621	Diabetes Mellitus 13,061	Alzheimer's Disease 83,786	Cerebro-vascular 128,978
6	Placenta Cord. Membrane 953	Influenza & Pneumonia 102	Heart Disease 73	Heart Disease 100	Congenital Anomalies 362	Diabetes Mellitus 684	Liver Disease 2,491	Diabetes Mellitus 5,899	Liver Disease 11,951	Diabetes Mellitus 53,751	Alzheimer's Disease 84,767
7	Bacterial Sepsis 578	Chronic Low. Respiratory Disease 64	Influenza & Pneumonia 67	Chronic Low. Respiratory Disease 80	Influenza & Pneumonia 197	Liver Disease 676	Diabetes Mellitus 1,952	Cerebro-vascular 5,425	Cerebro-vascular 11,364	Influenza & Pneumonia 48,031	Diabetes Mellitus 75,578
8	Respiratory Distress 522	Septicemia 53	Cerebro-vascular 41	Influenza & Pneumonia 61	Diabetes Mellitus 193	HIV 631	Cerebro-vascular 1,687	Chronic Low. Respiratory Disease 4,619	Suicide 7,135	Unintentional Injury 45,942	Influenza & Pneumonia 56,979
9	Circulatory System Diseases 458	Benign Neoplasms 47	Septicemia 35	Cerebro-vascular 48	Complicated Pregnancy 178	Cerebro-vascular 508	HIV 1,246	Septicemia 2,445	Septicemia 5,345	Nephritis 39,080	Nephritis 47,112
10	Neonatal Hemorrhage 389	Perinatal Period 45	Benign Neoplasms 34	Benign Neoplasms 31	Chronic Low. Respiratory Disease 155	Influenza & Pneumonia 449	Influenza & Pneumonia 881	HIV 2,378	Nephritis 4,947	Septicemia 28,815	Suicide 41,149

**FIGURE 2-6** Leading causes of death by age group, United States, 2013.

Data from National Vital Statistics System, National Center for Health Statistics, CDC. Produced by: National Center for Injury Prevention and Control, CDC using WISQARS™.

**Health Care** Ideally, comprehensive data on healthcare access, utilization, quality, and costs would be available at the national, state, and local levels. No single repository of such information exists, however. Data on the extent of public and private healthcare insurance coverage is available at the national and state levels—for example, from the Current Population Survey, which is jointly conducted by the U.S. Census Bureau and Department of Labor. Data on healthcare utilization and costs are collected for nearly every individual healthcare encounter between birth and death in administrative and clinical databases within healthcare practices and institutions. Similarly, numerous administrative and regulatory requirements lead to the accumulation of data about the providers of these healthcare services.

Nevertheless, the extent to which all of these data are aggregated and accessible for evaluating utilization, quality, and costs varies widely across the United States, depending on both mandated and voluntary initiatives. Data on health care provided through government programs, such as Medicare, Medicaid, and the Veterans Administration, tend to be relatively accessible. Recent private-sector efforts, such as those led by the National Committee for Quality Assurance (NCQA), HealthGrades, and the Leapfrog group, are increasing the amount of publicly available data on healthcare quality. Other key data sources include the Dartmouth Atlas on Health Care (based on Medicare data), the Commonwealth Fund, the Kaiser Family Foundation, and numerous national- and state-level databases compiled by the Agency for Healthcare Research and Quality (AHRQ).

**Social and Economic Factors** Data on social and economic factors are available from a number of sources, such as the decennial Census and the more frequently performed American Community Survey, which now provides inter-Census estimates for counties with a population greater than 20,000. Other sources include education data that states are required to collect as part of the federal No Child Left Behind initiative. District- and school-level statistics regarding graduation rates and student performance in reading and math can be accessed online. As well as being available on a national level from the Bureau of Labor Statistics, unemployment data are generally available at the local and state levels from state governments. Information on both violent and property crime are

available through the Federal Bureau of Investigation (which collects data on crime reports and arrests from local law enforcement agencies and compiles these data on an annual basis) and from the Bureau of Justice. Notable sources for social phenomena and access data include the Pew Research Center<sup>i</sup> (which conducts its own polls and analyzes national and more geographically focused trends by social topic), the Robert Wood Johnson Foundation,<sup>j</sup> the Rand Corporation,<sup>k</sup> and HP 2020.

**Physical Environment** Data on environmental factors are available from a variety of sources, of varying availability and quality, across different potential units of analysis—nation, state, county, city, neighborhood, and so forth. For example, data on public water system violations are available in the U.S. Environmental Protection Agency’s (EPA) Safe Drinking Water Information System, but the quality of these data varies by state. Alternatively, data may be obtained directly from municipal water departments that publish annual reports of water quality. Data on air quality and toxic releases are available from the EPA, and food contamination data are collected on a national scale by the Food and Drug Administration (FDA) and the U.S. Department of Agriculture (USDA). Selected measures about the built environment are also available for some geographic units of analysis (e.g., neighborhood “walkability,” access to healthy foods in a ZIP code) through spatial analytical centers at many universities.

## Comprehensive Population Health Reports

Many sources of information about the health of populations exist at the local, state, and national level. One of the most comprehensive sources of information is published annually by CDC’s National Center for Health Statistics, entitled simply “Health, United States.”<sup>l</sup> The report for 2015 is the 39th report in this series, and includes a comprehensive compilation of health data from a number of sources within the federal government and in the private sector. In addition, each year the report contains a special section focused on a particular aspect of public health, such as the focus on racial and ethnic health disparities in 2015. The 2015 report also features 123 tables that cover a range of topics, including birth rates and reproductive

i. <http://www.pewresearch.org>

j. <http://www.rwjf.org>

k. <http://www.rand.org>

l. <http://www.cdc.gov/nchs/hus.htm>

health, life expectancy and leading causes of death, health risk behaviors, healthcare utilization and insurance coverage, and health expenditures. Highlights from the 2015 report include the following:

- Between 2004 and 2014, the birth rate among teenagers aged 15-19 fell to a historic low of 24.2 per 1,000 females overall.
- In 2014, 17.0% of non-institutionalized adults aged 18 and older were current cigarette smokers, a decline from the rate of 23.2% in 2000.
- Between 2003 and 2013, the age-adjusted heart disease death rate decreased 28%, from 236.3 to 169.8 deaths per 100,000 population.
- Between 2003 and 2013, the age-adjusted drug poisoning death rate involving opioid analgesics increased from 2.9 to 5.1 deaths per 100,000 population.

## Evidence-Based Policies and Programs

William Foege, a former CDC Director, introduced the term “consequential epidemiology”<sup>23</sup> to emphasize that, to be effective, epidemiological research must be effectively translated into public behavior change. Health communication is the leading strategy to this end.

The volume of research published about the effectiveness of individual programs and policies far exceeds the ability of any one person to read, summarize, and synthesize on an ongoing basis. To address this problem, researchers conduct evidence-based **systematic reviews** to consolidate all the information from studies addressing a single clinical or public health question. Systematic reviews use explicit and

comprehensive methods to identify, select, and critically assess all relevant research on the issue under consideration. To avoid bias, the reviews use standard protocols for searching for literature and appraising and combining study data. Over the past two decades, systematic reviews have increasingly relied on meta-analysis to calculate effect sizes based on the findings of individual studies. Among the questions answered by systematic reviews are the following:

- Which interventions have and have not worked?
- In which populations and settings has the intervention worked?
- What might the intervention cost? What should the individual expect for his or her investment?
- Does the intervention lead to any other benefits or harms?
- Which interventions need more research before we can know whether they truly work?

Finding information about effective programs and policies is easier today than ever before thanks to the advent of online resources. For example, the Cochrane Collaboration is one of the most respected sources of systematic reviews of healthcare interventions; reports are available on the Cochrane.org website. The PubMed Systematic Review filter is available through the National Library of Medicine. This resource specializes in PubMed searches to retrieve citations identified as systematic reviews, meta-analyses, reviews of clinical trials, evidence-based medicine, consensus development conferences, and guidelines. Additional resources for evidence-based reviews of programs and policies are shown in **TABLE 2-2**.

**TABLE 2-2** U.S. Sources of Information About Evidence-Based Policies and Programs

The Guide to Community Preventive Services <a href="http://www.thecommunityguide.org/">http://www.thecommunityguide.org/</a>	Contains comprehensive systematic reviews and recommendations on community-based programs and policies.
The Guide to Clinical Preventive Services <a href="http://www.uspreventiveservicestaskforce.org/">http://www.uspreventiveservicestaskforce.org/</a>	Contains comprehensive reviews and recommendations by the U.S. Preventive Services Task Force assessing the merits of clinical preventive measures (e.g., screening tests, counseling, chemopreventive agents).
<i>MMWR</i> Recommendations and Reports <a href="http://www.cdc.gov/mmwr/indrr_2015.html">http://www.cdc.gov/mmwr/indrr_2015.html</a>	Contain in-depth articles that provide program and policy recommendations for prevention and treatment (e.g., recommendations from the Advisory Committee on Immunization Practices).
The National Guideline Clearinghouse <a href="http://www.guideline.gov/">http://www.guideline.gov/</a>	A public resource for evidence-based clinical practice guidelines from many sources. It is an initiative of the Agency for Healthcare Research and Quality, U.S. Department of Health and Human Services, and America's Health Insurance Plans.

### BOX 2-3 What Works for Health?

The University of Wisconsin's Population Health Institute developed *What Works for Health*, which is included in the *County Health Rankings and Roadmaps*.<sup>\*</sup> First developed for the state of Wisconsin, this resource provides a menu of policies and programs for possible implementation in communities corresponding to each of the health determinants in the *Rankings* model for population health. The evidence supporting each intervention is rated based on the quantity, quality, and findings of relevant research. Ratings range from "scientifically supported" to "some evidence," "expert opinion," "insufficient evidence," "mixed evidence," and finally "evidence of ineffectiveness." In addition to determining the effectiveness of the interventions, the Population Health Institute assesses each intervention's likely effect on racial/ethnic, socioeconomic, geographic, or other disparities based on its characteristics (e.g., target audience, mode of delivery) and the best available evidence related to health disparities; the resulting ratings range from "likely to decrease disparities," to "no impact on disparities likely," to "likely to increase disparities."

<sup>\*</sup><http://www.countyhealthrankings.org/roadmaps/what-works-for-health>.

To take one example, the Task Force on Community Preventive Services oversees the Guide to Community Preventive Services. The Guide provides evidence-based reviews and recommendations concerning community prevention interventions, hoping to see greater use of interventions shown to work, less use of interventions shown not to work, and more evaluation research on interventions for which there is inadequate evidence to determine whether they work.<sup>24</sup> **BOX 2-3** provides an example of how this kind of information has been used in Wisconsin.

## ► Communication Challenges

Several challenges arise when sharing information with communities about chiefly chronic illness and its causes. Despite overwhelming evidence about the leading causes of disease, the public still pays the most attention to immediate health risks rather than those that affect population health. The failure to heed warnings about chronic health risks may reflect the reality that messages about the causes of health problems are often complex and difficult to assimilate. In addition,

the health information communication pipelines may become clogged by competing messages from multiple sources (e.g., political figures, news media spokespeople) offering opinions and anecdotes about "causes" and "solutions."

### Confronting Public Perceptions About Risk: Perception Versus Reality

When communicating risk information to the public or policy makers, scientists have discovered that the "actual" health risk may have little or no relationship to people's **risk perception**—that is, what people believe about the level of risk. For example, the health risks from some environmental exposures, such as chemical toxins, pesticides, and electromagnetic fields, are often difficult to detect when those exposures occur at low levels. The public or policy makers might mistake undetectable risks for undisclosed risks, however, and greatly magnify their importance. This path can lead to demands for costly interventions that may have little real impact on population health. Conversely, the public may sometimes greatly underestimate a risk and ignore recommendations that could have a substantial impact on their health. Either extreme may arise given that reactions often have a strong emotional component (especially fear and anger) and that some members of the public may distrust institutions, organizations, or scientists.

The role of media in shaping public understanding of risk is substantial. Hans Rosling highlighted the difference between media interest and actual risk of disease during the 2009 swine flu epidemic. During a 13-day period in 2009, the World Health Organization (WHO) confirmed that 25 countries reported cases of swine flu, and 31 persons died from this cause. During the same period, approximately 60,000 persons died from tuberculosis (TB), according to WHO data. By comparing the number of news reports found through a Google news search, Rosling calculated a *news/death ratio* of 8176 news stories for each death from swine flu but only 0.1 news story per death for TB. He issued an alert for "media hype" on swine flu and a neglect of tuberculosis.<sup>25</sup>

We can see a similar pattern with Ebola and lung cancer deaths. During 2014, there were 8235 deaths from Ebola worldwide,<sup>25</sup> including one death in the United States, and extensive media coverage of this outbreak. A Google search for "Ebola" returned more than 6 million news stories—about

m. <http://www.gapminder.org/videos/swine-flu-alert-news-death-ratio-tuberculosis/>

540 news stories per death from Ebola. By comparison, there were 1.6 million deaths from lung cancer worldwide in 2012,<sup>26</sup> but a Google search returned only 473,000 news stories on this topic, giving a *news/death ratio* of only 0.3. (For more on communicating about infectious disease, see the appendix to this chapter.)

## The Stigma of Chronic Disease: “It’s Your Own Darn Fault”

Communicating information about the causes of disease can be challenging and complex. People can relate to personal stories about suffering from—or better yet, coping with—cancer, heart disease, or the premature death of a loved one. In contrast, stories about the “determinants of health” are a hard sell. Phrases such as “social determinants,” “risk factors,” and “upstream causes” have little salience for the U.S. public, which prizes independence and personal responsibility about all else. The phenomena of “fat shaming,” the stigmas associated with sexually transmitted diseases and mental health, and even reactions to the Patient Protection and Affordable Care Act suggest that U.S. citizens are more likely than not to believe that everyone should enjoy the ability to make their own lifestyle choices.

A study by Robert and Booske examined factors that the public thinks are important determinants of health by conducting a national telephone survey of nearly 3000 U.S. adults.<sup>27</sup> Respondents said that health behaviors and access to health care have very strong effects on health, but were less likely to report a very

strong role for other social and economic factors. Respondents who recognized a stronger role for social determinants of health and who saw social policy as health policy were more likely to be older, female, non-white, and politically liberal and to have less education, income, and quality of health. The conclusion we can draw from this study is that a public education campaign is necessary to broaden the acceptance of a “determinants of health” approach. Widespread embrace of this perspective is not likely to be accomplished by showing great programming<sup>n</sup> on “public” television alone.

## ► Conclusion

Advances in public health have led to changes in the leading health problems—as well as to changes in our understanding of the contributions made by the various factors that influence health. Health communicators can use population health models when designing communication strategies and focus on three major areas along the continuum: health outcomes and the leading causes of death and disability, multiple determinants of health (behaviors, health care, social and economic factors, and the physical environment), and effective programs and policies. For the most part, persuasive behavior-change communication programs have the greatest impact on individual- and community-level actions to improve health, whereas advocacy efforts have the greatest impact on health policy. Threats such as infectious disease require ongoing vigilance and risk communication strategies. The appendix to this chapter describes some of these challenges.

# Wrap-Up

## Chapter Questions

1. Why is it important to have a national health behavior surveillance system, such as the Behavioral Risk Factor Surveillance System?
2. Describe one of the most important determinants of population health according to the *County Health Rankings* model.
3. What are the four criteria making up health determinant rankings within and among populations? How does the health of your county compare with other counties in your state? How can we communicate the findings from *Rankings* to the public?
4. Name several of the key data sources of health factors, including those for health behaviors, social factors, and economic health determinants.
5. How are evidence-based strategies for public health interventions derived?
6. Explain how you would update one of the following databases of evidence-based health

n. [http://www.pbs.org/unnaturalcauses/about\\_the\\_series.htm](http://www.pbs.org/unnaturalcauses/about_the_series.htm)

research: The Community Guide (CDC) or What Works for Health (*County Health Rankings and Roadmaps*).

7. What should be the overarching goals of *Healthy People 2030*?
8. Why is it so difficult to communicate about vaccines?
9. Explain the role of antimicrobial resistance in newly emerging infectious disease. Which kind of health communication program could address this threat?

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# Appendix 2

## Communicating About Infectious Disease

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### ► Introduction

While chronic diseases are leading causes of morbidity and mortality in the United States, infectious diseases remain a significant concern. Despite the tremendous advances in prevention and control, familiar infections such as influenza and pertussis persist. In addition, new and newly identified infectious diseases such as severe acute respiratory syndrome (SARS) and methicillin-resistant *Staphylococcus aureus* (MRSA) emerge periodically. As medical care practices, the environment, infectious agents, and attitudes and beliefs change and adapt, our ability to prevent and treat infections fluctuates.

No one can predict where or when a new infectious disease will emerge or which changes may affect control measures. With increased globalization in business, travel, and food supplies, infectious agents can quickly disperse into diverse populations and threaten large proportions of the globe within days. To respond promptly and effectively to such threats, public health systems must learn from historical events and employ new communication methods to reach at-risk populations.

### ► Vaccines and Vaccine-Preventable Diseases of Childhood

Vaccination is among the most impactful of public health achievements.<sup>1</sup> The world entered the 20th century with infant mortality rates greater than 20%. Of those children who survived infancy, another 20% died before their fifth birthday, largely due to measles, diphtheria, smallpox, pertussis, and other infectious

diseases.<sup>2-5</sup> As the 20th century progressed, new vaccines and more extensive public health programs to distribute and administer them helped eradicate smallpox, eliminate poliomyelitis (caused by wild-type viruses), and make death from infectious disease in childhood a rare event.<sup>6</sup>

While vaccines produce strong biological responses, they also elicit strong social and cultural reactions. Concerns about ethics and vaccine safety surrounded early immunization efforts and persist today.<sup>7</sup> Added to these issues are newer challenges related to the increasing number of vaccines, complexity of the immunization schedule, school and workplace mandates, and increasing costs.<sup>8</sup> In an ironic twist, the most challenging issues actually result from the impressive success of vaccines and immunization programs in the United States and other developed countries. The most recent generations of parents have not seen or experienced what were once common childhood infections. Without direct reinforcement from experience, these parents often question whether the benefits of vaccines outweigh the perceived risks and challenges. However, when parents withhold vaccines from their children, both the individual and community benefits of vaccines are threatened.

### Communicating About Vaccine-Preventable Diseases

Communication about vaccine-preventable diseases can serve to remind the public and healthcare providers about the threats from infections and the potential costs of under-immunization, help parents and guardians as they approach immunization decision points and influence the development of policies and programs that facilitate the desired immunization actions.

## Sources of Data on Vaccine-Preventable Diseases and Vaccination

Communities have counted, monitored, and reported causes of death for centuries. Systematic collection of data regarding infectious conditions in the United States dates back almost 150 years. In 1878, Congress authorized the U.S. Marine Services Hospital to collect and report morbidity reports on contagious conditions including cholera, yellow fever, and smallpox.<sup>9</sup> This collection and reporting of infection data developed into systematic surveillance systems employed by health authorities to enumerate which conditions are present in given populations, locations, and time. A variety of local, state, and national health authorities may request or mandate reporting by hospitals and healthcare providers, laboratories, schools, and others regarding health conditions or symptoms. While each state and locale may have its own set of reportable conditions, they also compile and report a standard set of conditions to the CDC (**TABLE 2A-1**).<sup>10</sup> Transmission of surveillance data among health authorities is facilitated by the National Electronic Disease Surveillance System (NEDSS).<sup>a</sup>

## Examples

**Morbidity and Mortality Weekly Report** *Morbidity and Mortality Weekly Report (MMWR)*, which is published weekly by the CDC, presents a compilation of the surveillance data collected through NEDSS and other surveillance systems. This accurate and timely reporting of diseases assists authorities in determining the magnitude of health problems (incidence and prevalence), identifying individuals and population groups at risk for infection, and alerting healthcare providers to inform evaluation and delivery of care.

**National Immunization Survey** The National Immunization Survey (NIS)<sup>b</sup> first implemented in 1994, is performed annually by NCIRD and the CDC, and monitors immunization coverage for children 35 months to 19 years of age. Through telephone surveys conducted with a sample of U.S. households and questionnaires mailed to healthcare providers, NIS determines immunization rates for diphtheria and tetanus toxoids and acellular pertussis vaccine (DTaP), poliovirus vaccine (polio), measles-containing vaccine (MCV), *Haemophilus influenzae* type b vaccine (Hib),

**TABLE 2A-1** National Notifiable Infectious Conditions, 2015

Anthrax	<i>Haemophilus influenzae</i>	Novel influenza A virus	Syphilis
Arboviral diseases	Hansen's disease	Pertussis	Tetanus
Babesiosis	Hantavirus	Plague	Toxic shock syndrome (non-streptococcal)
Botulism	Hemolytic uremic syndrome	Poliomyelitis	Trichinellosis
Brucellosis	Hepatitis A	Poliovirus infection	Tuberculosis
Campylobacteriosis	Hepatitis B	Psittacosis	Tularemia
Chancroid	Hepatitis C	Q fever	Typhoid fever
<i>Chlamydia trachomatis</i>	Human immunodeficiency virus (HIV) infection	Rabies, animal	Vancomycin-resistant <i>Staphylococcus aureus</i>
Cholera	Influenza-associated pediatric mortality	Rabies, human	Varicella

a. <http://wwwn.cdc.gov/nndss/nedss.html>

b. <http://www.cdc.gov/nchs/nis.htm>

Coccidioidomycosis	Invasive pneumococcal disease	Rubella	Vibriosis
Cryptosporidiosis	Legionellosis	Salmonellosis	Viral hemorrhagic fever
Dengue virus infection	Listeriosis	Severe acute respiratory syndrome (SARS)	Crimean–Congo hemorrhagic fever
Diphtheria	Lyme disease	<i>Escherichia coli</i> (Shiga toxin)	Lassa virus
Ebola virus	Malaria	Shigellosis	Lujo virus
Erlchiosis and anaplasmosis	Measles	Smallpox	Marburg virus
Giardiasis	Meningococcal disease	Spotted fever rickettsiosis	New World arenavirus
Gonorrhea	Mumps	Streptococcal toxic-shock syndrome	Yellow fever

Adapted from 2015 National Notifiable Infectious Diseases, Centers for Disease Control and Prevention website. <http://www.cdc.gov/nndss/conditions/notifiable/2015/infectious-diseases/>. Accessed October 7, 2015.

hepatitis B vaccine (Hep B), varicella zoster vaccine, pneumococcal conjugate vaccine (PCV), hepatitis A vaccine (Hep A), and influenza vaccine (FLU). Data are used to report official vaccination estimates for the United States and its major geopolitical regions. Additional NIS programs include NIS-Teen, NIS-Adult, 2009 H1N1 Flu Survey, and the National Flu Survey.

## Communicating About Vaccine Benefits And Safety

Despite overwhelming evidence pointing to the safety of today's vaccines, negative aspects of vaccination, based largely on erroneous reports of hazards such as autism, often dominate communication about vaccines.<sup>10,11</sup> In a 2008 WHO publication, researchers reported that in the five previous years, Medline recorded five times as many hits for the keyword "vaccine risks" as for the keyword "vaccine benefits."<sup>12</sup> All too often, public health messages about the benefits of protection and scientific support for vaccines must compete with messages of fear. Explaining the risks and benefits of vaccines requires effective communication skills and familiarity with local cultures. Several public health and community-based agencies have developed programs and campaigns to inform the public about the benefits of vaccines and to provide guidance to help overcome hesitancy and fear.

## Example: Vaccine Safety Basics

WHO's Vaccine Safety Basics,<sup>c</sup> an e-learning course, was developed to help health educators and health-care professionals communicate about the safety and benefits of vaccines. The course modules express the need for critical evaluation and assessment of information about vaccines; recognition of target audiences, including their knowledge about vaccines and their perceptions of vaccine risk; outlining fears and concerns of groups to be affected by an immunization program; design of simple, clear, and tailored messages to communicate information about vaccine safety to target audiences; identification of the most suitable means and channels of communication; and alliance with media outlets.

## Communicating Effectively About Vaccines: New Communication Resources for Health Officials

In 2009, in response to requests for assistance with messaging to counter vaccine safety and benefit concerns, the Association of State and Territorial Health Officials (ASTHO) interviewed parents and guardians to gather information and develop effective messages and materials for clear and accurate promotion of the benefits of vaccines and informed decision making.

c. <http://vaccine-safety-training.org/>

The resultant publication, “Communicating Effectively About Vaccines: New Communication Resources for Health Officials,”<sup>d</sup> includes key messages for parents and stakeholders and communication tools designed to help local health officials develop their own vaccine campaigns.

## ► Emerging Infectious Diseases

Approximately 50 years ago, the Nobel laureate Sir MacFarlane Burnett wrote, “One can think of the middle of the twentieth century as the end of one of the most important social revolutions in history, the virtual elimination of the infectious disease as a significant factor in social life.”<sup>13</sup> Obviously, this prediction was not realized. Familiar microbial threats remain, and new challenges continue to emerge. The term “emerging infectious disease” (EID) typically applies to infectious diseases for which the incidence has increased in the past two decades or those for which the incidence threatens to increase in the near future. Diseases in this category include (1) new and newly identified infections, such as severe acute respiratory syndrome (SARS); (2) known infections affecting new regions or population groups, such as hepatitis C in young U.S. adults; and (3) known infections that are newly resistant to treatment or public health actions such as multidrug-resistant tuberculosis (MDR-TB) and methicillin-resistant *Staphylococcus aureus* (MRSA).<sup>14</sup>

EIDs affect all regions of the globe. International concern about the threat posed by EIDs led the Institute of Medicine (IOM) to examine the situation and issue the pivotal 1992 report *Emerging Infections: Microbial Threats to Health in the United States* and the follow-up 2003 report *Microbial Threats to Health*, which identified 13 factors accounting for the emergence of EIDs (**TABLE 2A-2**).<sup>15,16</sup> These factors, acting alone or in concert, affect change in infectious organisms and their environments and human contact with, susceptibility to, or response to them.

## Communicating About Emerging Infectious Diseases

Real and perceived threats from EIDs can elicit fear. Fear, in turn, may lead to exclusion of or discrimination toward infected persons, especially when infections are associated with stigmatizing health behaviors, as in the case of HIV.<sup>17,18</sup> Fear of discrimination may lead

**TABLE 2A-2** Factors Impacting the Development of Emerging Infectious Diseases

- Adaptation and change of microorganisms
- Human susceptibility to infection
- Human demographics and behavior
- Climate and weather
- Changing ecosystems
- Poverty and social inequality
- Economic development and land use
- International travel and commerce
- War and famine
- Lack of political will
- Breakdown of public health measures
- Technology and industry
- Intent to harm

Excerpted from Institute of Medicine. *Microbial Threats to Health: Emergence, Detection and Response*. Washington, DC: The National Academies Press; 2003.

people to reject or delay screening or diagnosis and result in preventable exposures and worsened health outcomes. Communication designed to reduce exposure and foster screening and treatment must instill trust, allay fear and move people to desired action.

## Sources of Data About EID

Collection, verification, and dissemination of data about EIDs are complicated by the factors affecting development and distribution of EIDs noted earlier. Fear of judgment or the stigma associated with health behaviors such as injection drug use or sexual activity may prevent people from seeking care. Additionally, lack of financial and medical resources may limit identification and reporting of infections. Despite these limitations, systems to identify and monitor EIDs operate in the United States and around the globe.

Within its various divisions, CDC operates or authorizes dozens of surveillance systems capturing data about new and potentially EIDs.<sup>e</sup> Among them are the National Malaria Surveillance System (NMS-S, overseen by the Division of Parasitic Diseases and Malaria), the Cholera and Other Vibrio Illness Surveillance System (COVIS, overseen by the Division of Foodborne, Waterborne, and Environmental Diseases), and the Emerging Infections Network (EIN, operated under cooperative agreement by the Infectious Disease Society of America). The sheer number, range, and distribution of oversight of surveillance efforts pose major communication challenges.

d. <http://www.astho.org/WorkArea/DownloadAsset.aspx?id=5464>

## Example

In the 1940s, agents that inhibit the replication of microorganisms were discovered and processed into antibiotic medications. The promise of the antibiotics, along with documented success of vaccines, is what led Sir MacFarlane Burnett and others to predict the elimination of infectious diseases in our lifetime. However, microorganisms can harbor innate resistance to specific antimicrobial agents that limits the therapeutic potential of antibiotics. Since these agents were first introduced, overuse or misuse of antibiotics in humans and animals has contributed to the spread of antimicrobial resistance and added undue burden and cost to the healthcare system.<sup>19</sup> Each year, an estimated 2 million Americans acquire serious infections that are resistant to one or more antibiotics and 23,000 people die as a direct result of these infections.<sup>20</sup>

## National Antimicrobial Resistance Monitoring System for Enteric Bacteria<sup>f</sup>

The National Antimicrobial Resistance Monitoring System (NARMS), established in 1996, is a collaborative effort among state and local public health

departments, the CDC, the Food and Drug Administration, and the U.S. Department of Agriculture. NARMS collects data about susceptibility of certain human infections, livestock infections, and microorganisms present in meats processed for retail sale. The system provides information about emerging bacterial resistance, means by which resistance spreads, and ways in which resistant infections differ from susceptible infections.

## ► Conclusion

Advances in public health led to changes in the leading health problems and to changes in our understanding of the contributions of various factors that influence health. Health communicators can use population health models when designing communication strategies, and can focus on the three major areas of the continuum: health outcomes and the leading causes of death and disability, the multiple determinants of health (behaviors, health care, social and economic factors, and the physical environment), and effective programs and policies.

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f. <http://www.cdc.gov/narms/reports/index.html>

**38**      **Appendix 2**

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