CHAPTER

2

Historical Developments in Public Health and the 21st Century

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LEARNING OBJECTIVES

- To better understand the historical context of public health
- To gain perspective on the role of public health in society
- To grasp the key milestones in the evolution of public health practice and policy
- To understand recent reform and its implications for the future of public health

Chapter Overview

Public health administration and practice comprises organized efforts to improve the health of populations. Public health prevention strategies target populations rather than individuals. Throughout history, public health efforts have focused on the control of communicable diseases, reducing environmental hazards, and providing safe drinking water. Because social, environmental, and biologic factors interact to determine health, public health practice must utilize a broad set of skills and interventions. During the 20th century, the historic emphasis of public health on protecting populations from infectious disease and environmental threats expanded to include the prevention and reduction of chronic disease through behavioral and lifestyle interventions. As we move forward in the 21st century new challenges will emerge and new strategies and initiatives will need to be developed. The role of public health will undoubtedly be central to the wellbeing of the nation and the world.

Early History of Public Health

Little is known about the health of the hunting and gathering people of prehistoric times. Paleopathology has shown that disease not only existed in antiquity, but that it has always occurred in humans in the same basic forms such as infection, inflammation, disturbance of development and metabolism, and tumors.[1] When humans began to aggregate into larger, more permanent settlements with the introduction of agricultural techniques and the domestication of animals, they fundamentally altered the way they lived. With the adoption of an agrarian society, humans began to live in closer contact in communities supported by the production of food. These new types of human settlements reconstructed the ecosystems over which they presided, ushering a fundamental shift in how humans interacted with each other and their environments. These new denser living arrangements afforded innumerable microorganisms a new ecological niche to exploit, paving the way for pestilence, epidemics, and disease.[2,3,4] For example, human settlements offered greater opportunity for constant contact with intestinal parasites carried through human feces, whereas constantly mobile bands of hunters and gatherers were less likely to acquire such infections.[2] Permanent and semipermanent settlements, the domestication of plants and animals, and the urbanization of human society forever altered the disease environment of the human species.[2,3,5] From the most ancient times of recorded history, all human societies have been affected by the contingencies of illness and health.[1,2,6]

Although little is known about the disease regimes of prehistoric societies, it is generally assumed that the early settlements of Mesopotamia, the Indus valley, and the Peruvian coastal region were plagued by tropical diseases such as malaria and schistosomiasis.[2,3] Ancient medical systems relied predominantly on mystical and religious explanations for disease and often stressed the importance of evading illness through ritual and practical methods of prevention grounded in spiritual and temporal purity through various codes of behavior and dietary protocols.[1,2,7] Chinese physicians under the Chou Dynasty (1122–250 BCE) advocated for the preservation of health through a mixture of dietary restrictions, temperance, and physical and spiritual exercises.[2] Similarly, in ancient Egypt the consensus was that illness and disease were a result of an imbalance between temporal and spiritual existence. The ancient Egyptians used techniques such as prayers, magic, ritual, and pharmacopoeia to restore health.[2,8] Regulations governing food preparation, hygiene, and sexual relations were largely ritualistic and widely practiced throughout ancient Egyptian society.[2,9] Furthermore, archaeological excavations in Egypt have provided evidence that several ancient cities from around the 14th century BCE were planned and had relatively sophisticated stone masonry drainage systems.[1] In ancient India, planned cities, in which bathrooms and drains in buildings were commonplace, were also constructed around 4,000 years ago in the Indus valley. These cities also routinely enjoyed broad, paved streets and covered sewers.[1] In Mesopotamia, many societies, including the Babylonians, Assyrians, and Hebrews, embraced regulatory hygiene customs in the form of established codes. The aims of these codes were to encourage spiritual purity; although, the hygiene regulations often latently prevented disease.[9] Furthermore, Hebrew rabbi-physicians formulated elaborate rules for disease prevention based on the belief that some diseases were communicable through foods, bodily discharge, clothing, water, and air.[2] The Hebrews and Babylonians also believed

that plagues spread through contaminated water[2] and connected epidemics with certain animals such as rats, flies, and gnats.[10] Both of these groups isolated individuals during epidemics and fumigated and disinfected their houses and belongings. The Hebrew and Babylonian codes also demanded that no well was to be dug near a cemetery or waste dump; water was to be boiled before drinking; and food had to be clean, fresh, and thoroughly cooked.[2] The association between ritualistic cleanliness and health was not limited to the "old world"; the Incas instituted an annual health ceremony which included the cleaning of all homes.[11] These examples provide evidence of early understanding of the importance of protecting the public from disease.

Hellenistic Health

Between the 7th and 5th centuries BCE new philosophies that separated the temporal and divine causes of disease began to emerge in ancient Greece. However, these philosophies were the exception and their influence was only minuscule; much of the ancient Greek understanding of health was still dominated by mysticism until the emergence of Hippocrates and the **Hippocratic tradition**. Hippocrates was an honored and celebrated physician who probably lived sometime between 460 and 360 BCE. He was one of the authors and namesake of the Hippocratic Corpus, from which the Hippocratic Oath pledged by physicians today was derived. The Corpus is a compilation of works by many authors that presented a radical departure from the religious and mystical traditions of healing. The Corpus and more generally the Hippocratic tradition concentrated on the patient rather than the disease and emphasized prevention.[2] The Hippocratic tradition represented medicine as a professional vocation that used and adapted healing methods and regimes that were based on empirical observation.[2,12] Hippocratic physiology recognized the body as consisting of four fluids or ***humours***: blood, black bile, yellow bile, and phlegm. Health was achieved when all four were in perfect balance or equilibrium. The *humours* reflected the essential elements of the physical universe: fire, earth, air, and water.

Hippocratic tradition recognized that health was affected by seasons and the quality of the environment. *On Airs, Waters, and Places*, a central Hippocratic text, analyzed the environmental determinants of health and divided diseases into ones that were **endemic**, always present, and ones that were **epidemic**, occurring occasionally.[1,2] These terms and concepts are still used today. *On Airs, Waters, and Places* was not limited to a theoretical treatise, but rather it served as a practical guide used in Hellenistic colonial expansion. The text recommended that before a place was colonized and building commenced, a physician should conduct a detailed investigation of the environment's integrity. Building settlements on or near marshes and swamps was discouraged, whereas it was recommended to erect houses on dry, elevated areas warmed by the sun.[1] Another practical application of *On Airs, Waters, and Places* was to assist physicians in setting up practices in unfamiliar towns or areas.

Greek medicine never exclusively relied on curative methods, but rather embraced a tradition of combining therapeutic treatments with prevention measures. Because disease was believed to reflect an imbalance in the *humours*, preventing the disturbance of equilibrium was thought to be essential. To preserve equilibrium, physicians proposed an ideal model of life that required that nutrition, excretion, exercise, and rest remain in perfect balance. However, very few people in ancient Greece could afford to live such a life and this recommended regimen was limited

to the upper classes whose lives consisted of leisure. In ancient Greece, the upper classes were supported by a slave economy; thus, for most Greeks the recommended equilibrium was virtually unattainable.[1] The theoretical idea of equilibrium proposed by the ancient Greeks has had a profound impact on the perceptions of health and healing throughout the ages. Today it remains at the conceptual core of homeostasis, the foundation of modern allopathic medicine.

Latin Engineering and Administration

Hellenistic expansion through the conquests of Alexander the Great spread Hippocratic traditions throughout parts of Europe, the Middle East, and North Africa. However, nothing had as profound an impact on the spread of Hippocratic traditions and the abandonment of religious and mystical healing techniques as the emergence of the Roman Empire. Rome conquered the Mediterranean world and embraced the legacy of Greek culture. Although the Romans adopted the philosophies proposed by Hippocratic traditions, they added to them components that were distinctly Roman. The Roman clinician was, in most respects, an imitation of the Greek physician, embracing the Hippocratic traditions. Roman elites frequently hired Greek physicians as their personal healers. In fact, the famed Roman physician Galen (129–200 CE) was ethnically Greek. Where the Romans differed from the Greeks was in their abilities in engineering and administration, as builders of complex sewage systems and baths, and as providers of water supplies and other health facilities.[1] Through the construction of complex engineering projects and the establishment of sophisticated administration systems, the Romans forever changed how the world addressed health.

Sanitation reform in Rome was catalyzed by the growth of the bureaucratic imperial state and the development of sophisticated civil engineering to provide rapid communication across the empire.[2] By the 2nd century BCE, an elaborate system of aqueducts was bringing fresh water into the city of Rome; eventually most cities throughout the empire would have systems in place that were on par with Rome's. Many cities also had sophisticated baths, public fountains, piped water, drainage systems, underground sewage systems, and public pay lavatories located in the busier sections of town.[1,2,13] The public routinely retrieved water from communal water sources, whereas aristocrats and the ruling elite typically had their own private water supplies.[1] The administration of public health services was a responsibility of the imperial state. In Rome, government supervision and regulations extended to public baths, water supplies, street cleaning, and the sale of spoiled food.[14] The state also commissioned and oversaw innumerable building projects that contributed to health and sanitation. By the early 2nd century, physicians were given immunity from taxation by most civil authorities.[2] Furthermore, physicians were employed by many municipalities to provide medical services for the poor; however, these services were limited and inadequate for addressing the needs of the expansive poor populations.[1,2,15] Infirmaries were established in the first century CE throughout the empire to service sick slaves; occasionally these facilities were utilized by free citizens, although, this was rare. Also, military hospitals were established at large fortresses to services the expansive military.[16] While hospitals were provided for soldiers and slaves, the duel engines of the imperial economy, such provisions for the poor members of Roman society were virtually nonexistent.[1,2] Although the

Roman state provided a salubrious metropolitan environment for its aristocracy and ruling elite, most citizens lived in overcrowded squalid conditions in burgeoning cities.[14]

In addition to their revolutionary sanitation reforms, the Romans recognized the connection between swamps and marshes and disease, especially malaria. In the 1st century BCE, the Roman scholar and writer Marcus Terentius Varro advised against establishing farms near swamps and marshes because "there are bred certain minute creatures which cannot be seen by the eyes, which float in the air and enter the body through the mouth and nose and there cause serious disease."[1, p. 19] Despite all of the public engineering projects and sanitation regulations and reforms, Rome was burdened by the many endemic and epidemic diseases similarly experienced by other peoples of the Mediterranean basin.

The Middle Ages

In the Middle Ages (500–1500 CE), continual epidemics of infectious diseases spurred collective activities by communities to promote the public's health, presaging the later formation of boards of health and public health departments in the 1800s. The Middle Ages were marked by two major epidemics of bubonic plague, the Plague of Justinian (543 CE) and the Black Death (1348 CE), with smaller outbreaks of various diseases in the intervening period including leprosy, smallpox, tuberculosis, and measles.[17]

The decline of the Roman Empire was most pervasive in the City of Rome and the empire's western provinces. The emperor Constantine accelerated this decline when he relocated the administrative capital of Rome to Byzantium, current day Istanbul. The Western Roman Empire eventually dissolved, unofficially ushering in the Middle Ages. However, the Eastern Roman Empire, often referred to as the Byzantine Empire, thrived for several hundred more years. During the Middle Ages, the Eastern Roman Empire, Persia, and Arab city-states became economically interrelated fostering the exchange of knowledge and ideas, including health and healing methods. The disintegration of the Roman Empire in the west led to the decentralization of government and administration. The sophisticated cities built by the Romans were largely abandoned and their maintenance and upkeep went unattended. This decentralization of civic power coupled with mass emigration from the dilapidated cities dissolved the administrative health reforms established by the empire. The absence of centralized governance gave rise to the expansive power of the Christian Church. The Church became the presiding authority over Europe during this period and thus inherited the responsibilities required by such a position, including public health administration. The Church, unlike the Roman Empire, had no established bureaucracy in place to administrate complex public health measures. This led to a reliance on municipal initiatives that were endorsed by the Church. With the emergence of the Church over the Roman State, cultural preoccupations with health in this period began to focus less upon the comfort of aristocrats and ruling elites and more upon the dangerous effects disease had on the general population.[1,2] The needs and health of the poor became objects of Christian welfare provisions.

Changing patterns in agriculture production during this period led to a substantial increase in the population. Furthermore, there was increased trade with the densely urbanized societies of the Middle East. These two developments contributed to the urbanization of Europe, and

people began to aggregate in and around old Roman cities and newly established settlements. These new cities relied on encircling fortifications for security and consequently suffered from overcrowding in the confined spaces.[2] As social, economic, and demographic factors began to change, there were new opportunities for pestilence and disease to exploit, and approaches to disease prevention faced new challenges.

The Black Death, a bubonic plague that peaked in 1348, had devastating consequences on medieval Europe. At the time, it was unknown that bubonic plague was transmitted to humans via the fleas of rodents; consequently, it was regarded as a communicable disease. One countermeasure employed to combat the pestilence was the isolation of individuals who were ill. In addition, victims of the disease had to be reported to authorities, an antecedent of the basic public health functions of disease reporting and surveillance. **Quarantine** measures were instituted to prevent entry of the plague from outside regions. Quarantine consists of the systematic isolation of travelers and ships for a period of 40 days, hence the name quarantine. The period of 40 days was believed to separate acute infection from chronic illness.[1] Italian administrative measures to prevent the import of disease became the model eventually adopted by the rest of Europe.[18] In 1348, Venice, a chief port of entry for commerce from Asia, was the first city to institute quarantine, requiring the inspection and segregation of ships and individuals suspected of carrying disease. These early efforts of isolation remain relevant today, as they are precedents to the contemporary public health practice of quarantine.

Industrialization and the Influence of Great Britain

Public health activities in Great Britain were greatly influenced by the growing urbanization and industrialization of the 1800s. Conditions in England and the responsive social reforms and public health policies had a profound influence on how the United States addressed similar problems. London more than tripled in size from approximately 200,000 inhabitants in 1600 to 675,000 in 1700. During the 1700s, London grew only by approximately one-third and still had less than 1 million residents, but between 1800 and 1840, London doubled in size to nearly 2 million residents.[19] Malnutrition, overcrowding, filth, and poor working conditions contributed to severe disease outbreaks.[20] Similarly, in New York City, the rise of typhus as a significant cause of death was attributed in part to the large increase in the number of immigrants in the 1840s and 1850s. In New York, the rise of tenement housing transformed typhus into an endemic slum disorder, but because it affected the poorest groups of society, it aroused little public concern.[21]

In 1842, Edwin Chadwick published the "General Report on the Sanitary Condition of the Laboring Population of Great Britain."[17] This and follow-up reports became essential public health documents, stimulating sanitary awareness and social reforms.[17,20,22,23] Chadwick described the prevalence of disease among the laborer populations, showing that the poor exhibited a preponderance of disease and disability compared to more affluent populations,[22] an observation that remains true throughout the world today. Chadwick's report concluded that unsanitary environments caused the poor health of working people. At the time, disease was often attributed to miasma and foul odors,[22] and epidemics such as typhus, typhoid, and cholera were attributed to filth, stagnant pools of water, rotting animals and vegetables, and garbage.[19]

As chief administrator of the Poor Law Commission, Chadwick was responsible for providing relief to impoverished populations in England and Wales. He championed sanitary reform, which became the basis for public health activities in Great Britain and the United States alike.

Chadwick was also the chief architect of the 1848 Public Health Act, which created a general board of health empowered to establish local boards of health and appoint an officer of health.[17,24] The latter was required to be a medically qualified practitioner and inspector of sanitary conditions. The board of health incurred opposition from those with property interests who, for economic reasons, were against proposals for the improvement of drainage and water systems. In 1854, only 5 years after its commencement, Parliament refused to renew the Public Health Act, thereby dissolving England's first national board of health.[17]

Although repealed, the 1848 Public Health Act was instrumental in improving public health and remains relevant to current population-based preventive efforts.[24] Based on available morbidity and mortality data, the Act identified major public health issues of the time and assigned responsibility to national and local boards including inspectors and officers of health.[24] The identified issues included poverty, housing, water, sewerage, the environment, safety, and food. Public health in England and Wales was thus organized with the primary purpose of improving the sanitary conditions of towns. The drafters of the Public Health Act, concerned with population health, assigned the responsibility of public health to national and local governments.[24] The sanitation reforms in Great Britain had profound influence on the development of public health administration in America as the two nations confronted similar problems throughout the 19th century.

The Emergence and Impact of Bacteriology

During the latter part of the 1800s and the early 1900s, scientific advances, particularly in microbiology, ushered in a new era for the fields of public health and medicine.[20] Sometimes referred to as the bacteriologic phase of the public health movement, this era was led by the discoveries of Louis Pasteur and Robert Koch and the subsequent germ theory of disease. Pasteur discovered aerobic and anaerobic organisms and began to consider the possibility of a causal relationship between germs and disease. Koch, a country physician, discovered the bacillus responsible for anthrax and was able to demonstrate that the disease was transmissible in mice. He later discovered other disease-causing bacteria, including those that caused tuberculosis and cholera. This new germ theory afforded new opportunities for infectious diseases control, including improved diagnosis, understanding of carrier states, and insight into the importance of vectors with respect to the transmission of disease. Furthermore, in New York City in the 1920s, the development of antitoxin and immunizations against diphtheria were harbingers of the abilities of organized public health programs to prevent a wide range of communicable diseases.[17]

The bacteriologic discoveries of Pasteur and Koch became a marker between the "old" and the "new" public health.[25] The association between bacteria and disease causation drew attention away from the sanitary problems of water supply, street cleaning, housing, and living conditions of the poor.[25,26,27] Disease-oriented approaches to public health were adopted by health officers and local health agencies.[27] Polluted water was demonstrated to be responsible for the transmission of typhoid fever, and methods were developed to measure bacteria in air, water, and milk.[25]

Although disease-oriented approaches became the standard during this period, public health professionals continued to emphasize social reform with the realization that diseases, even those caused by germs, could not be separated from living and working conditions.[10]

Public Health in the United States

> The specters cholera, yellow fever, and smallpox recoil in fear as their way through the port of New York is blocked by a barrier labeled "Quarantine" and by an angel holding a sword and a shield on which is written "Cleanliness."[28, p. 139]
>
> **—Description of "At the Gates," an etching printed by Harper and Brothers, New York, September 5, 1885**

The American Colonies and the Early United States

The early American colonists struggled with hunger and malnutrition, their respective diseases, and infectious diseases such as smallpox, cholera, measles, diphtheria, and typhoid fever.[29] Malaria was endemic in parts of the colonies and smallpox was epidemic throughout the 1600s, yellow fever in the 1700s, and the pervasive disease of the 1800s was cholera.[22] The major public health measure employed by the colonies was the control of communicable diseases through legal efforts regarding quarantine and sanitation. The early colonies consisted of a series of seaports connected by ships. In 1699, William Penn, concerned about yellow fever in the colony he had established, passed the Act to Prevent Sickly Vessels from Coming into This Government.[22] The Massachusetts Quarantine Act of July 1701 required parties bringing infectious diseases within the colony to pay all associated costs and damages and compelled confinement of individuals who were infected with pestilential illnesses. Quarantine laws were enacted in all major cities and towns along the eastern seaboard. Other laws that protected the health of the community included sanitary laws regulating such matters as privies and disposal of wastes and of animals.

In addition to the passage of these laws, another notable public health intervention of the colonial period was smallpox inoculation. Reverend Cotton Mather, known for his involvement in the Salem Witch trials, provided an account of the smallpox epidemic of 1689–1690 in New England: "In about a twelvemonth, one thousand of our neighbors have been carried to their long home."[22, p. 22] The total population of Boston at that time was only 6,000. In 1721, during a smallpox epidemic in Boston, Mather suggested the use of smallpox inoculation. As with many public health interventions, initially there was considerable controversy concerning smallpox inoculation; however, inoculation efforts eventually prevailed. Years later, when smallpox again struck Massachusetts, the death rate was 1.8% in individuals who were vaccinated, compared to 14% in those who were not.[22]

Yellow fever, an acute mosquito-borne viral infectious disease of short duration and varying severity, was the scourge of the 1700s.[30] In 1702, following importation of the disease from the Virgin Islands, New York City was particularly affected by the yellow fever epidemic, although numerous other cities, including Philadelphia, Norfolk, Charleston, New Orleans, and Boston, also fell victim to the disease. When a ship was quarantined in a harbor because it was a suspected

carrier of yellow fever, it was required to fly a yellow flag upon its mast; hence, the name of the disease was derived. Yellow fever epidemics were experienced in cities throughout the century with some cities experiencing multiple epidemics.[31] An example is Philadelphia in which nearly 50,000 people were reported to have contracted yellow fever (with 4,044 reported deaths) in 1793 only to be devastated by the disease again 5 years later, when another 3,506 deaths were attributed to the disease.[26] In the northern colonies the disease was noted to occur only in summer, after ships arrived from ports affected by yellow fever, whereas when the fall frost arrived the epidemics ended. This underscored the importance of the environment in epidemic disease and improved understanding of the opportunity and necessity for public health measures.

Public Health in the 19th Century

In the 1800s, New York City was ravaged by several epidemics, including cholera, smallpox, typhus, dysentery, and diphtheria.[26] In addition to epidemics, the health of the public was threatened by the constant presence of tuberculosis (TB), the leading cause of death in the United States at that time. In 1890, nearly one out of every four dwellings in New York City experienced a TB-related death. The toll was much higher in poorer neighborhoods, leaving these communities devastated by the disease.[26]

As in Britain, public health activities in the United States were greatly influenced by the growing urbanization and industrialization of the 1800s. Early health reformers in the United States, including Lemuel Shattuck of Boston, identified environmental improvement to prevent epidemic disease as a moral mission.[32] Shattuck was the foremost American advocate for community action in the area of environmental health. In the report, Census of Boston, Shattuck reported on high mortality rates, including maternal and infant mortality rates, and the prevalence of communicable diseases.[33] He described these findings as directly related to living conditions and low income. In 1850, Shattuck published *General Plan for the Promotion of Public and Personal Health*, describing health and social conditions in Massachusetts and extolling the sanitary movements taking place in Britain and Europe.[33] Sewage, refuse, and waste disposal and drainage were identified as priority public health measures; of these, sewage disposal was considered the most important.[34]

C. E. A. Winslow characterized **sanitation**, ensuring healthful environmental conditions, as the first stage in public health. He stated:

> To a large section of the public, I fear that the health authorities are still best known as the people to whom one complains of unpleasant accumulations of rubbish in the backyard of a neighbor, accumulations which possess such offensive characteristics which somehow can only originate in a neighbor's yard and never in one's own.[35, p. 5]

Early public health interventions in the United States, like those enacted in Europe and Great Britain, often required government authority to address environmental factors thought to be compromising the health of communities. Local public health agencies in the United States developed from the local boards of health dating to the 1700s.[36] Various claims have been made asserting community formation of the first board of health in the United States with Baltimore, Charleston, New York City, and Philadelphia all contending for the honor. New York City, for

example, established a board of health in 1796, which consisted of three commissioners and a health officer. The term *health officer* designated the responsibilities of a quarantine officer. From 1832, repeated cholera epidemics stimulated the creation of boards of health in the eastern United States, and port cities instituted a 40-day quarantine of ships entering harbors.[27] In his 1850 report, Shattuck emphasized the importance of government involvement in public health when he recommended the establishment of a state health department and local boards of health in each town.[33] In 1865, the Association of New York issued a report, Sanitation of the City, pressuring New York (both the city and state) to organize a Metropolitan Board of Health the following year.[26] The report documented the intimate relationship between social and economic forces contributing to ill health. A newly organized New York City Department of Public Health followed, focusing on cleaning the streets, regulating sewage and waste disposal, and mandating tenement reforms.[26] It soon became a model that many other cities emulated.

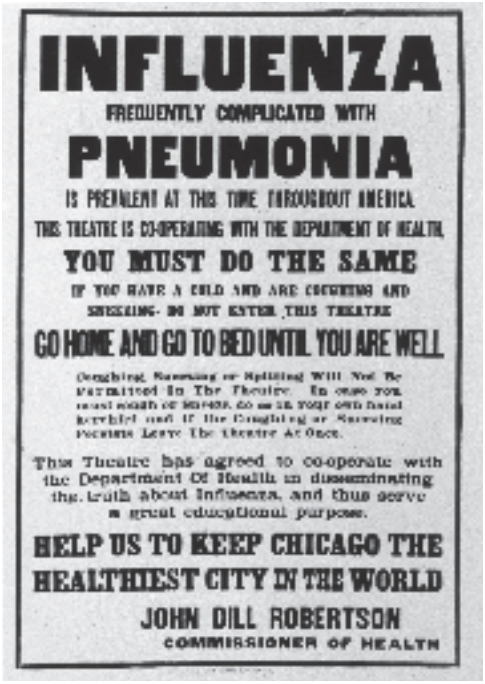
Subsequent development of local health departments was sporadic until around 1910 when severe epidemics of typhoid fever occurred in a number of cities. In response, the federal government recommended the establishment of full-time local health departments throughout the United States. In the meantime, the New York City Health Department continued to address environmental concerns during the 1900s. In a 1912 annual report, the health department described the removal of 20,000 dead horses, mules, donkeys, and cattle from the streets of New York in addition to nearly half a million smaller animals such as pigs, hogs, calves, and sheep. In total, the disposal of more than 5 million pounds of spoiled poultry, fish, pork, and beef was accomplished. The report also noted that there were records of 343,000 complaints from the public with respect to poor ventilation, waste disposal, and unlicensed manure dumps.[26]

The development and spread of state health departments were similar to that of local health departments. The first state board of health was established by the Louisiana State Legislature in 1855 in response to yellow fever, but this proved not to be a functional organization. The first successful board of health was established in Massachusetts in 1869; it followed Shattuck's earlier recommendation.[22,33] Other states quickly followed: California (1870), Minnesota (1872), Virginia (1872), Michigan (1873), Maryland (1874), and Alabama (1875). By 1900, all but eight states had boards of health. With the formation of the New Mexico board of health in 1919, all states had boards of health.[22]

Public Health in the 20th Century

In the early part of the 1900s, the public health workforce had gained skills in understanding the impact of the environment on the community's health and was beginning to understand the relationship between bacteria and infectious diseases. An example of a city-wide public health effort pertaining to the control of influenza can be seen in **Exhibit 2.1**. Over the next several decades, public health realized tremendous gains with interventions such as improved sanitation, water purity, nutrition, control of infectious disease, and immunization.[37] This translated into major gains in health. Life expectancy increased by more than 30 years, and the quality of life remarkably improved. Much of the increase was experienced in the first 25 years of the century. For example, the death rate from all causes in New York City was 31 per 1,000 in 1825; this rate had dramatically fallen to 12 per 1,000 a century later in 1925. Similarly, in 1880, the

Exhibit 2.1 Early Influenza Warning



INFLUENZA

FREQUENTLY COMPLICATED WITH

PNEUMONIA

IS PREVALENT AT THIS TIME THROUGHOUT AMERICA.

THIS THEATRE IS CO-OPERATING WITH THE DEPARTMENT OF HEALTH.

YOU MUST DO THE SAME

IF YOU HAVE A COLD AND ARE COUGHING AND SNEEZING DO NOT ENTER THIS THEATRE

GO HOME AND GO TO BED UNTIL YOU ARE WELL

Coughing, Sneezing or Spitting Will Not Be Permitted In The Theatre. In case you must cough or sneeze, do so in your own hand kerchief and if the Coughing or Sneezing persons Leave the Theatre At Once.

This Theatre has agreed to co-operate with the Department Of Health in disseminating the truth about Influenza, and thus serve a great educational purpose.

HELP US TO KEEP CHICAGO THE HEALTHIEST CITY IN THE WORLD

JOHN DILL ROBERTSON
COMMISSIONER OF HEALTH

Source: Reproduced from National Library of Medicine. Office of Public Health Historian.

average life expectancy in New York City and Brooklyn was 36 years; by 1920, life expectancy had increased to 53 years, an increase of 47% in a 40-year period.[38] As exclaimed by Winslow and others, public health activities were responsible for reducing environmental and infectious disease threats and that such "achievements were almost wholly based on the organized application of the sciences of sanitary engineering and bacteriology."[38, p. 1079]

Attempts to replicate the successes achieved with infectious and environmentally related diseases have been extended to the contemporary health challenges of obesity, diabetes, injury prevention, violence, substance abuse, HIV infection, tobacco-related diseases, and other noncommunicable diseases. As early as 1926, Winslow argued early for this extension in a speech delivered before the American Public Health Association in Buffalo, New York:

> We may . . . say that the health officer should concern himself only with communicable disease. Or we may say that the field of the health department includes all the health problems of the infant and the child plus the communicable diseases of the adult. This is a second clear and defensible position and one that approximates current-day practice. Or we may take a still wider view and envisage the whole field of the prevention of disease and the promotion of physical and mental health and efficiency.[38, p. 1080]

As Americans began to live longer, the impact of injuries and noncommunicable diseases and the potential for prevention of these health threats became a priority for public health professionals, with positive outcomes including a substantial decrease in cigarette smoking, declines in

the rates of heart disease mortality and motor vehicle–associated fatalities, and improved quality of the workplace.[39] While King James I of England had written and published an anti-smoking treatise in 1604, titled *A Counterblaste to Tobacco*, certainly the first public health document on smoking to be promoted by a national leader, in 1966 the United States enacted legislation to require warning labels on cigarette packages. This effort to address one of the world's greatest noncommunicable public health problems was further advanced by the U.S. Surgeon General, C. Everet Koop who advocated for a smoke-free America by the year 2000 and began the practice of rotating messages on warning labels, as shown in **Exhibit 2.2**.

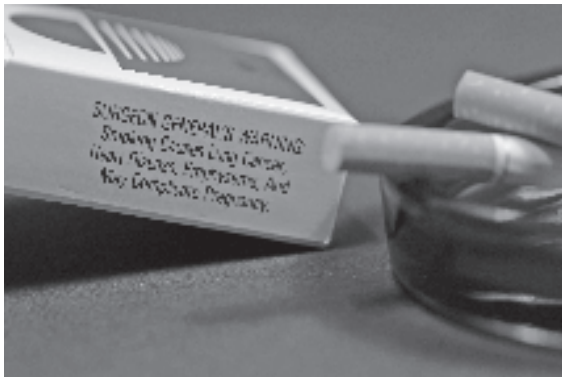
The 10 great public health achievements in the United States in the 1900s include advances in both communicable and chronic disease prevention, as listed in **Exhibit 2.3**.

The public may not recognize many of these gains because it has become accustomed to the accrual of long-standing benefits from communal efforts to protect against hazards to health. Quentin Young, former president of the American Public Health Association, remarked: "Turning on any kitchen faucet for a glass of drinking water without hesitation or peril is a silent homage to public health success, which would not have been possible at the start of the twentieth century."[40, p. 1]

It is ironic that the very accomplishments in population-based prevention have probably resulted in decreased visibility for public health activities in our communities. When these protective activities work well, illnesses from water, food, and environmental toxins do not occur. In the absence of clearly visible problems, the public knows little about the methods of assurance, and, historically, collective support for public health resources and programs has been nominal.

One of the biggest public health challenges that emerged toward the end of the 20th Century was HIV/AIDS. Since first being reported in the Unites States in 1981, more than 600,000 men, women, and children have died as a result of HIV disease, and, globally, according to UNAIDS, the estimate of HIV-related deaths is 30 million. Many public health interventions have been used over the decades since 1981, and there has been considerable success in slowing the spread of HIV in the general population and major advances in treating the associated

Exhibit 2.2 Surgeon General's Warning



Source: CDC/Debora Cartagena.

Exhibit 2.3 Ten Great Public Health Achievements

1. Vaccines: Few treatments were effective in the prevention of infectious diseases in 1900. Now, smallpox, measles, diphtheria, pertussis, rabies, typhoid, cholera, and the plague are preventable through widespread use of vaccines.
2. Recognition of tobacco use as a health hazard: Since the 1964 surgeon general's report on risks associated with smoking, smoking among adults has decreased, saving lives.
3. Motor vehicle safety: Improved engineering of vehicles and roads plus the use of seat belts, car seats, and helmets have reduced the number of deaths, as has decreased drinking and driving.
4. Safer workplaces: A 40% decrease in fatal occupational injuries (since 1980) has resulted through efforts to control work-related disease such as pneumoconiosis (black lung) and silicosis, which are associated with coal mining, and to improve safety in manufacturing, construction, transportation, and mining.
5. Control of infectious diseases: Efforts to protect the water supply and keep it clean with improved sanitation methods have greatly improved health, particularly curbing the spread of cholera and typhoid. The discovery of antimicrobial therapy has helped to control tuberculosis and sexually transmitted diseases (STDs).
6. Fewer deaths from heart disease and stroke: Smoking cessation, blood pressure control, early detection, and better treatments have resulted in a 51% decrease in death rates for coronary heart disease since 1972.
7. Safer and healthier foods: Major nutritional deficiency diseases such as rickets, goiter, and pellagra have been virtually eliminated in the United States through greater recognition of essential nutrients, increases in nutritional content, food fortification, and decreases in microbial contamination.
8. Healthier mothers and babies: Better hygiene, nutrition, access to health care, antibiotics, and technologic advances have helped to reduce infant mortality by 90% and maternal mortality by 99%.
9. Family planning and contraceptive services: These services have altered the social and economic roles of women. Access to counseling and screening has resulted in fewer infant, child, and maternal deaths. Contraceptives have provided protection from human immunodeficiency virus and other STDs.
10. Fluoridation of drinking water: Nearly 150 million people have access to treated water, a safe and effective way to prevent tooth decay. Fluoridation has helped reduce tooth decay in children 40–70% and tooth loss in adults 40–60%.

Source: Adapted from Centers for Disease Control and Prevention. Ten great public health achievements—United States, 1900–1999. *MMWR*. 1999;48(12):1–3.

diseases. Jones and Johnson have described a range of successful education and prevention programs and initiatives.[41] (Additionally, a timeline of AIDS developments and milestones was published on the 30th anniversary of the first cases identified in the United States, which can be viewed at http://aids.gov/hiv-aids-basics/hiv-aids-101/aids-timeline/.) The White House Office of National AIDS Policy has also identified strategies designed to reduce HIV-related disparities and health inequities. The Director of the Office of HIV/AIDS Policy commented:

> There is no doubt we have made substantial progress in confronting HIV/AIDS . . . but we continue to face challenges. Identifying effective prevention packages for at-risk populations and bringing them to scale, modifying health care and other systems so they can work efficiently across organizational boundaries, and altering the social determinants that impede individuals and communities from living healthy, disease-free lives.[42, p. 5]

Public Health in the 21st Century

From the early understanding of the importance of covering sewers in ancient India to the practice of isolation and quarantine in the Middle Ages to the recognition of poverty as a significant determinant of health in the 1800s to the increasing recognition of the impact of social, behavioral, and environmental determinants and of the need for evidence-based, systematic approaches to improve the public health in the 1900s along with meeting the ever-vexing challenge of HIV/AIDS, the field of public health is rapidly evolving. Despite this increasing recognition and the commensurate increase in the public's expectations of public health, the economic crisis of the first decade of the 21st Century resulted in dramatic reductions in the public health workforce at federal, state, and local levels, threatening the successes in improving the public's health. In a May 2012 research brief, "Local Health Department Job Losses and Program Cuts," the National Association of County and City Health Officials estimated that more than 40,000 employees have lost their jobs in local public health since 2008.[43] When combined with cuts at state agencies, the total loss of public health jobs reached 55,000.[44] Concurrently, at the federal level, there has been an astounding 21.5% decrease in funding for the Centers for Disease Control and Prevention since 2009, with other federal agencies in the public health system experiencing similar cuts.[44]

In addition to the assault on the public health workforce and programs, another challenge facing public health administrators is evidence that gains made in life expectancy over the past 100 years are actually being reversed in certain demographics. In a 2012 publication, Olshansky identified that white men and women with fewer than 12 years of education had a shorter life expectancy in 2008 than they did in 1990. For example, the life expectancy of women with low educational achievement decreased by more than 5 years in this timeframe. Furthermore, the author describes widening disparities in life expectancy with highly educated white males now living more than 14 years longer than black males with fewer than 12 years of education.[45] Low educational achievement is a leading determinant of poor health outcomes for numerous reasons, including, but not limited to, increased prevalence of behaviors (e.g., tobacco use, poor nutrition, low physical activity) associated with chronic diseases, decreased effectiveness and fewer resources to manage such diseases, and less access to health care and related services.

A third challenge for public health administrators is that even in the face of fewer resources for public health, there are greater expectations for the discipline. The public understandably expects that public health will not only address the widening disparities and the impact of chronic and emerging diseases but that it will also play a prominent role in understanding and mitigating the impact of natural and man-made disasters including, among others, the effects of climate change.

Despite these daunting challenges, there are many reasons to be optimistic about the future of public health in the United States in the 21st Century. All of the work of generations of public health leaders has led to a much better understanding of the determinants of health and opportunities for impact (Thomas Frieden's "Health Impact Pyramid," see **Figure 2.1**),[46] a potentially important role for public health in the field of genomics, exciting new information technology advances that may dramatically change public health surveillance and evaluation, new openings

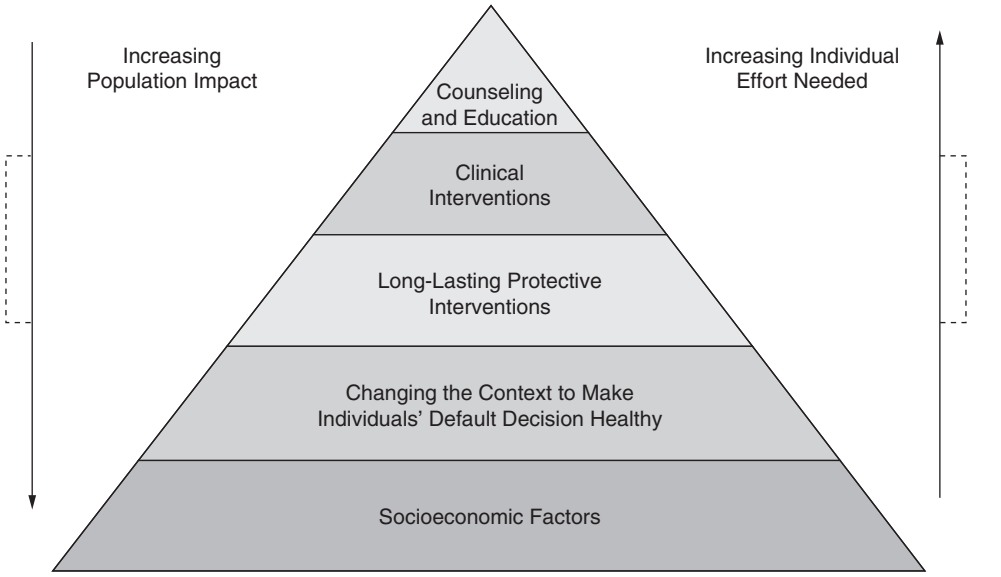


Figure 2.1 Health Impact Pyramid
Source: Reproduced from Figure 1, "State Legislative and Regulatory Action to Prevent Obesity and Improve Nutrition and Physical Activity." Published by the National Center for Chronic Disease Prevention and Health Promotion, Division of Nutrition, Physical Activity & Obesity.

with social media to effect behavioral change, a greater appreciation for the importance of evidence-based public health and public health systems research, and a new emphasis on accreditation and quality improvement. These are just some of the factors that show promise for the field.

A recent series of reports by the Institute of Medicine, "For the Public's Health," provides a roadmap for future public health efforts. The first in the series, "The Role of Measurement in Action and Accountability"[47] addresses the need to improve data collection and analysis and communication of information about health outcomes and of social, economic, and environmental determinants of health. Furthermore, it calls for a "cohesive national strategy" and a "measurement framework that provides the clear accountability needed to enable communities and policy makers to understand, monitor, and improve the contributions of various partners in the health system."[47]

The brief on the second report, "Revitalizing Law and Policy to Meet New Challenges," begins with, "Good health is not merely the result of good medical care but the result of what we do as a society to create the conditions in which people can be healthy."[3] This report proposes to create such conditions by modernizing laws and policies, improving use of legal and policy tools, and being more proactive by challenging all public health partners to "explore and implement '*health in all policies*' (HIAP)."[48] The third and final report, "Investing in a Healthier Future" addresses the problems that currently exist with funding of public health efforts in the United States, the disconnect between the level of funding and the scope of the mission for public

health, and the need for significantly increased investment in public health. Collectively, this series provides guidance that has the potential to significantly improve the public's health in the 21st century.[49] One of the reports includes a recommendation to "ensure that all public health agencies have the mandate and the capacity to effectively deliver the Ten Essential Public Health Services."[48, p. 5] Furthermore, in a great show of support for the move toward standardization in public health practice across the country, the committee recommended that "states revise their laws to *require* [emphasis added] public health accreditation for state and local health departments."[48, p. 6] Accreditation, through its emphasis on "improving and protecting the health of the public by advancing the quality and performance of tribal, state, local, and territorial public health departments," truly has the potential to transform the traditional public health system in the 21st century.

To fully realize improvement in health outcomes at both the individual and population levels, however, public health and the clinical healthcare delivery system must work in concert to improve health outcomes. Successful integration of the two disciplines has not yet occurred. The 2012 publication of the Institute of Medicine's report on *Primary Care and Public Health: Exploring Integration to Improve Population Health*[50] is another resource for public health administrators and as such, has the potential to galvanize the relationship between these currently distinct systems.

While all of the described advances and reports will contribute to a healthier nation in the 21st Century, President Barack Obama's signing of the **Patient Protection and Affordable Care Act (ACA)** in 2010 has arguably the greatest potential to improve the public's health. The Supreme Court's June 2012 decision about the Act and President Obama's reelection in November 2012 ensured that healthcare delivery and public health in the United States have forever changed.

It is widely accepted that the ACA will result in increased access to health insurance, however, many of the other provisions in the ACA are less well understood. The National Association of County and City Health Officials (NACCHO) has an excellent overview of the "Public Health and Prevention Provisions of the Affordable Care Act."[51] **Box 2.1** provides descriptions of selected funded provisions detailed in the report:

While the provisions listed in Box 2.1 will not result in restoration of the public health workforce that was lost in the economic downturn at the beginning of the century, the scope of the provisions and their potential to significantly impact the public's health are exciting. For example, in 2011, Community Transformation Grants were awarded to 61 state and local government agencies, tribes and territories, and nonprofit organizations in 36 states, in addition to 6 national networks of community-based organizations, potentially impacting 120 million people.[52] In 2012, another 40 grants were awarded to smaller communities, potentially impacting an additional 9 million people. Another example of how the ACA has already impacted public health is the June 2012 publication of the National Prevention Council Action Plan. This plan provides specific plans federal agencies are currently implementing "to move America from a system of sick care to one based on wellness and prevention."[53] While there is an overall vision for the plan (see **Figure 2.2**) the action plan provides specific details about what agencies will be doing. One example of a project highlight in the report is Promise Neighborhoods,

Box 2.1 Affordable Care Act Public Health Elements

- Investments in public health and prevention:
  - Prevention and Public Health Fund (PPHF): Provides the greatest amount of funding for public health initiatives including Community Transformation Grants; Epidemiology and Lab Capacity Grants; National Public Health Improvement Initiatives; and National Diabetes Prevention Programs
  - National Prevention, Health Promotion, and Public Health Council: Establishes a council to coordinate and lead federal government's prevention, wellness, and health-promotion efforts
  - Maternal, Infant, and Early Childhood Home Visitation Programs: Authorizes funds for evidence-based home visitation programs for this target population
- Public health workforce:
  - Fellowship Training in Public Health (partially funded by PPHF)
  - Public Health and Preventive Medicine Programs (partially funded by PPHF)
- Expansion of coverage, awareness, and access to clinical preventive services:
  - Contains numerous provisions to improve insurance coverage of family planning services and U.S. Preventive Services Task Force (USPSTF)–recommended services, in addition to many areas of expanded coverage under Medicare and Medicaid specifically
  - Authorizes funding for Personal Responsibility Education (adolescent abstinence, contraception, and prevention of sexually transmitted infections), Pregnancy Assistance Fund (support of victims of domestic violence and sexual assault), school-based health centers, and oral health activities
  - Provides recommendations with respect to the USPSTF and the Community Preventive Service Task Force (Community Guide) with funding from PPHF
- Wellness programs:
  - Authorizes grants to small businesses to provide comprehensive workplace wellness programs
  - Requires the Centers for Disease Control and Prevention (CDC) to provide employers with assistance to evaluate worksite wellness programs
- Public health research and data:
  - Directs the CDC to fund research on effectiveness of evidence-based practices that relate to public health initiatives
  - Authorizes funds for a childhood obesity demonstration project through the Centers for Medicare and Medicaid Services (CMS)
- Other:
  - Requires the U.S. Department of Health and Human Services (HHS) to develop a national quality improvement plan
  - Requires nutrition labeling at restaurants with more than 20 locations

Source: Adapted from NACCHO. Public Health and Prevention Provisions of the Affordable Care Act. Available at: http://www.naccho.org/advocacy/upload/PH-and-Prevention-Provisions-in-the-ACA-Revised.pdf. Accessed February 8, 2013.

a collaboration among the White House, DHHS, and the Departments of Education (ED), Housing and Urban Development, Justice, and the Treasury that:

> aims to transform high-poverty neighborhoods. Led by ED, Promise Neighborhoods aims to address significant challenges faced by students and families living in distressed communities by providing resources to plan and implement a continuum of services from early learning to college and career with the goal of improving educational and developmental outcomes for children and youth.[8, p. 23]

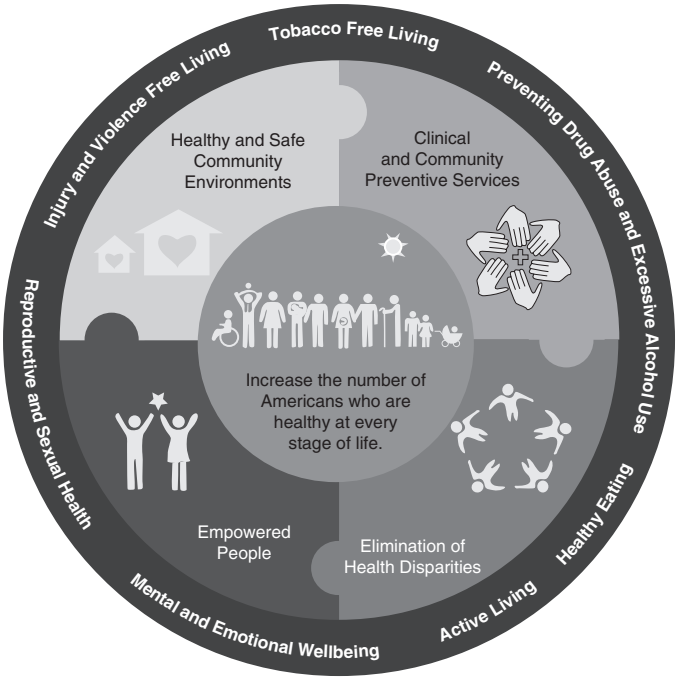


Figure 2.2 National Prevention Council Action Plan
Source: Reproduced from National Prevention Council. National Prevention Council Action Plan 2012. Available at: http://www.healthcare.gov/prevention/nphpphc/2012-npc-action-plan.pdf. Accessed December 4, 2012.

As stated by James A. Johnson, coeditor of this text, "Public health policy in the twenty-first century is still emerging, but many of the older themes of democracy, federalism, social justice, human rights, and dignity continue to provide a link to the Nation's founding principles."[54] Yet, the 21st century promises to be a uniquely challenging time for public health with fewer resources and greater expectations in a rapidly transforming healthcare and public health system. However, a new political mandate and new standards for evidence-based public health, in addition to an energizing emphasis on quality improvement and accreditation, set the stage for public health to achieve tremendous gains.

Discussion Questions

1. Identify 10 milestones in the evolution of public health and discuss each one.
2. Describe the focus of the various Institute of Medicine reports discussed in this chapter.
3. How does public health align with the nation's founding principles?
4. Describe the public health elements of the Affordable Care Act.

5. As a future public health administrator, why do you feel it is important to know the history presented in this chapter? What are some emerging challenges that you might face in your public health role?
6. As a cross-disciplinary exercise, choose an event you studied in one of your history classes and revisit it from a public health perspective. What did you learn?

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