
Public Health at the Local, State, National, and Global Levels



Learning Outcomes

1. Explain why public health issues in one country often become a concern in other countries.
2. List the key functions of public health organizations or systems.
3. Explain the role of surveillance in mitigating the spread of disease.
4. Describe how the U.S. public health system is structured at the national, state, and local levels.
5. Describe the roles of the World Health Organization, Pan-American Health Organization, and non-governmental organizations such as the Red Cross, International in addressing public health issues.

Introduction

Public health activities are performed at many levels from local to national to global. The organizations and agencies devoted to public health at these different levels share many of the same functions including disease surveillance, policy development, and provision of access to health care. To better understand how all these agencies fit together to provide public health services, this chapter will look at public health organizations within the United States and organizations that exist for international public health needs. Agencies of particular interest to pharmacists, such as the Food and Drug Administration, will be emphasized. To illustrate how the various agencies work, a case study based loosely on the 2002–03 SARS pandemic will be used.

Public Health from Local to Global

The primary site of activity for most public health interventions is within individual communities or neighborhoods. This locale is where the members of the population and the public health practitioners interact. For issues that are unique to the community or do not spread beyond the community, the local approach is effective. However, many public health problems extend beyond local borders, for example toxic waste spills, infectious diseases, wars, and **natural disasters**. Any of these problems may require involvement of counties, states, the nation, or even other countries to fully understand the scope of the problem and respond to it. National and global organizations can often facilitate communication among the affected populations, provide access to expertise not available locally, and coordinate efforts to respond. The most effective responses to public health problems are those that involve local, state, national, and international partners.

Many international **outbreaks** of infectious disease often begin as a single episode of illness or injury that quickly spread if not contained. In the case of an outbreak of a new viral disease, public health organizations at all levels need to minimize the spread of the disease and reduce the **mortality** and **morbidity** rates because of interdependence and the global nature of our world today. More than at any other time in history, trade, travel,

and communication span the globe and connect populations in ways never imagined 100 years ago. It has been said that an infectious disease outbreak in any part of the world can be in a person's backyard half a world away within 24 hours. Luckily, information about an approaching virus can be transmitted even faster via web and telecommunications, so a population can prepare if it is warned. That is where the **SARS**-inspired case begins—a single patient who has an unknown respiratory illness. The case is designed to show how this disease impacts patients and practitioners in other continents. What starts as a local outbreak quickly becomes a global health issue.

CASE STUDY 1

How a local outbreak can become a global public health issue

Yi Chen gets a mysterious viral illness

Yi Chen is a 52-year-old male who was born and raised in the Guangdong province of southern China. His work as a shrimp salesman requires travel to many communities within his sales region. He averages six trips a month via the local train system. During those trips, he often stays at nice hotels where businessmen from countries also lodge. He chats with other travelers as he enjoys his after dinner cigarette and cup of beer.

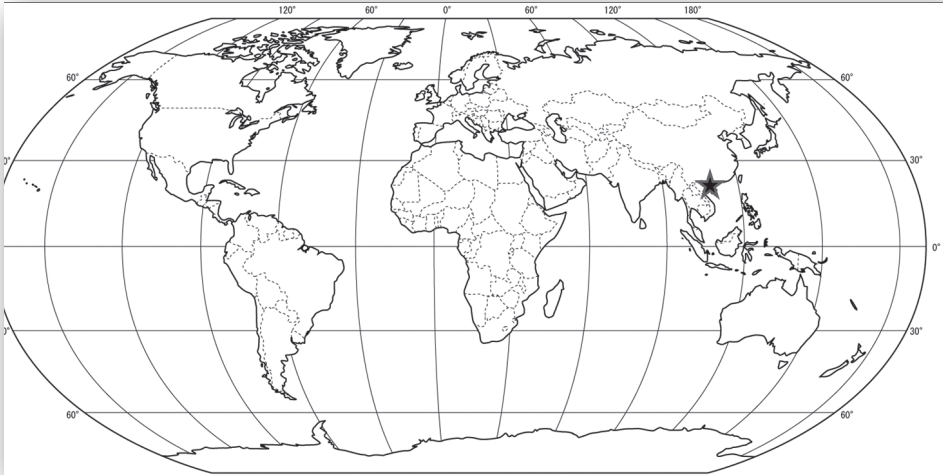
After his most recent trip, Yi Chen began to feel feverish and achy. Ming, his loving wife of 34 years, made a broth soup called qing fei jiy du tang (a soup for clearing the lungs) to help him fight the illness. Her herbal remedies for fever did not seem to work for this illness. By the next morning, Yi had developed a cough that was dry (no sputum or congested sound), which compounded the diarrhea that began during the night. Ming Chen loaded Yi into a taxi and took him to the local hospital just 8 miles away where he was admitted for treatment. Yi was placed in a room where he could be separated from other patients, health care workers, and visitors.

The mystery illness begins to spread

When Ming returned in the morning, she found her husband quite ill. Pneumonia had developed, and his breathing was labored and painful. The physicians had called an infectious disease specialist and asked medical students to examine Yi. By noon, they decided he should be treated at the larger regional hospital in Guangzhou and transported him via ambulance to the large medical center. Several physicians, including Dr. Zhang, seven nurses, and four medical students worked closely with Yi during the course of his illness that lasted almost 2 weeks. Yi Chen was their eighth case that week.

By the time Yi left the hospital, his local hospital had received another six cases, three of which were health care workers from the hospital. The regional medical center in Guangzhou had admitted around 45 people that week—many were transferred from smaller hospitals in the province. In spite of the growing number of cases of this mystery illness, Dr. Zhang and his colleagues did not have much information about the outbreak or disease. They were not aware that the illness had begun to appear in other provinces and major cities such as Beijing where hundreds of residents were now diagnosed with a mysterious disease (Figure 3.1).

Figure 3.1—November 2002: A cluster of mysterious atypical pneumonia cases appear in southeastern China. Total cases: unknown.



Key Functions of Public Health Organizations and Agencies

Regardless of whether an organization is a local **health department** or an international entity, several key functions are typically performed. As Table 3.1 shows, the activities include monitoring the population’s health as well as the presence of disease, developing policies to promote health or reduce preventable disease or death, advocating for vulnerable members of the community, and supporting programs that improve community

Table 3.1
The Ten Essential Public Health Services

General Area	Specifics
Monitor	Health status to identify and solve community health problems
Diagnose and investigate	Health problems and health hazards in the community
Inform, educate, and empower	People about health issues
Mobilize	Community partnerships and action to identify and solve health problems
Develop	Policies and plans that support individual and community health efforts
Enforce	Laws and requirements that protect health and ensure safety
Link	People to needed personal health services and assure the provision of health care when otherwise unavailable
Assure	Competent public and personal health care workforce
Evaluate	Effectiveness, accessibility, and quality of personal and population-based health services
Research	For new insights and innovative solutions to health problems

Source: Centers for Disease Control and Prevention (CDC). National Public Health Performance Standards Program. Available at: <http://www.cdc.gov/od/ocphp/nphpsp/EssentialPHServices.htm>. Accessed September 28, 2008.

infrastructure and quality of life. Some interventions may be directly related to health (e.g., access to medical care and pharmaceuticals through public insurance and clean drinking water), while others may be indirectly related to health (e.g., improved educational system and higher wages known to positively influence health). Because the case scenario in this chapter is focused on an outbreak of an infectious disease, additional information about **disease surveillance** is included.

Disease surveillance


Disease surveillance is the process of monitoring the number of new and existing cases, **incidence** and **prevalence rates**, respectively, of a disease in a population.

The information can indicate whether there is a higher-than-usual number of cases of a particular illness. Although originally used for infectious diseases, surveillance could include any disease of interest to decision-makers in the community. Examples include monitoring the level of substance abuse, chronic diseases like diabetes or heart disease, and the number of medication error cases that caused death. This chapter will focus on the use of surveillance to monitor an infectious disease outbreak.

Not all infectious diseases are monitored and reported through surveillance programs. For infectious diseases, the surveillance focuses on a limited list of diseases that spread easily through intimate or close contact. They are called **reportable diseases**, which indicate they are being monitored by public health agencies and must be reported when they are suspected or confirmed. Historically, physicians and medical laboratories were most likely to identify reportable diseases so they were usually the people who reported them to a local health department; however, any health care professional including pharmacists could submit the report.

Figure 3.2 shows an example of a state reporting form used to pass information about a disease under surveillance to state and federal agencies. There is a national list of **notifiable diseases** for which each state is required to report cases, but states may have additional diseases of interest that they are tracking so their list may include more reportable diseases. The diseases on the national and state lists will fall into several general categories: sexually transmitted infections, childhood infectious diseases, and bioterrorism-related infections. Most lists will include a catch-all category such as the “unusual cluster of disease” category to ensure that new diseases like SARS as well as any unusual behavior of existing diseases are also reported.


The individual reports of a reportable disease are forwarded to state and then national health departments where they are compiled, analyzed, and disseminated via the web and publications (e.g., Weekly Morbidity & Mortality Report) to keep all health officers informed about possible outbreak in their area and surrounding communities.



Surveillance refers to actively monitoring a population for the appearance of a new disease or the sudden increase in an existing disease. The disease under surveillance may be an infectious disease, chronic disease, or preventable injuries or exposures. International travel has made surveillance a global activity because of its ability to spread disease quickly and widely.

Figure 3.2— Example of Infectious Disease Reporting Form

Source: Texas Department of Public Health Services



TEXAS
Department of
State Health Services

Infectious Disease Report

Form is published at
<http://www.dshs.state.tx.us/idcu/investigation/conditions/>

General Instructions
 This form may be used to **report suspected cases and cases of notifiable conditions** in Texas, listed with their reporting timeframes on the reverse side of this form or available at www.dshs.state.tx.us/idcu/investigation/forms/101A.pdf. In addition to specified reportable conditions, **any outbreak, exotic disease, or unusual group expression of disease that may be of public health concern should be reported by the most expeditious means available**. A health department epidemiologist may contact you to further investigate this Infectious Disease Report. Information needed to classify cases of infectious disease is outlined in the Epi Case Criteria Guide found at www.dshs.state.tx.us/idcu/investigation/forms/EpiCaseGuide.pdf.
Suspected cases and cases should be reported to your local or regional health department at the following address, phone or fax number.

Information for your local or regional health department can be found at:
<http://www.dshs.state.tx.us/regions/default.shtm>

As needed, cases may be reported to the Department of State Health Services at 1-800-252-8239, 512-458-7676, or after-hours at 512-458-7111

Disease or Condition		Date: _____ (Check type) <input type="checkbox"/> Onset <input type="checkbox"/> Specimen collection (Please fill in onset or closest known date) <input type="checkbox"/> Absence <input type="checkbox"/> Office visit	
Physician Name		Physician Address <input type="checkbox"/> See Facility address below	
		Physician Phone <input type="checkbox"/> See Facility phone below () - -	
Diagnostic Criteria (Diagnostic Lab Result and Specimen Source or Clinical Indicators)			
Patient Name (Last)		(First)	(MI)
Telephone () - -			
Address (Street)		City	State
		Zip Code	County
Date of Birth (mm/dd/yyyy)	Age	Sex <input type="checkbox"/> Male <input type="checkbox"/> Female	Ethnicity <input type="checkbox"/> Hispanic <input type="checkbox"/> Not Hispanic
			Race <input type="checkbox"/> White <input type="checkbox"/> Black <input type="checkbox"/> Asian <input type="checkbox"/> Other <input type="checkbox"/> Unknown
Notes, comments, or additional information such as other lab results/clinical info, pregnancy status, occupation (food handler), school name/grade, travel history			

Disease or Condition		Date: _____ (Check type) <input type="checkbox"/> Onset <input type="checkbox"/> Specimen collection (Please fill in onset or closest known date) <input type="checkbox"/> Absence <input type="checkbox"/> Office visit	
Physician Name		Physician Address <input type="checkbox"/> See Facility address below	
		Physician Phone <input type="checkbox"/> See Facility phone below () - -	
Diagnostic Criteria (Diagnostic Lab Result and Specimen Source or Clinical Indicators)			
Patient Name (Last)		(First)	(MI)
Telephone () - -			
Address (Street)		City	State
		Zip Code	County
Date of Birth (mm/dd/yyyy)	Age	Sex <input type="checkbox"/> Male <input type="checkbox"/> Female	Ethnicity <input type="checkbox"/> Hispanic <input type="checkbox"/> Not Hispanic
			Race <input type="checkbox"/> White <input type="checkbox"/> Black <input type="checkbox"/> Asian <input type="checkbox"/> Other <input type="checkbox"/> Unknown
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Notes, comments, or additional information such as other lab results/clinical info, pregnancy status, occupation (food handler), school name/grade, travel history			

Name of Reporting Facility		Address	
Name of Person Reporting		Title	Phone Number () - - extension _____
Date of Report (mm/dd/yyyy)		E-mail	

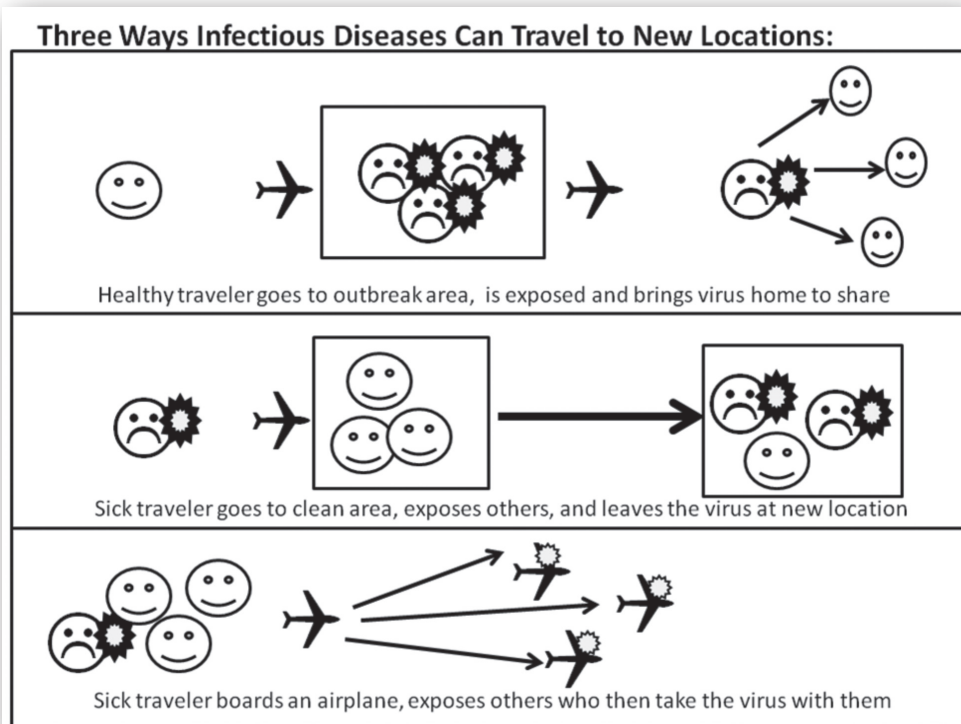
Above Information is CONFIDENTIAL. Please notify sender if received in error, and return or destroy. EEPI-1(Rev. 2/09)

Once a **sentinel case** (i.e., initial case) of an infectious disease is detected in a community, the reporting system is used to alert local health care providers who will watch for additional cases. The general public may receive instructions about how to limit exposure or which symptoms require medical care, and adjoining communities and the state may be alerted about the existence of an outbreak in the area. The state health de-

partment receives information from the local agency and forwards it to the **Centers for Disease Control and Prevention (CDC)** where it becomes part of the ongoing statistics of disease outbreak. The CDC also provides support back to the local health department via the state. In cases of outbreak where the organism is unknown or the spread of disease is rapid, the CDC will provide additional expertise to identify cause and technical assistance for limiting spread of disease. The CDC will also alert its international partners about outbreaks since global travel makes the spread of many diseases quick and easy.

International travel has added a new dimension to disease surveillance and quarantine efforts. As Figure 3.3 shows, travel aids in the spread of disease in several ways. First, a person traveling to an area where a disease outbreak exists may become infected and bring the disease with him or her upon return home. Second, a person with a contagious disease who is not yet experiencing illness may travel to another area and infect local residents. Third, a traveler may infect or be infected by fellow travelers who then go to their destination or return home and inadvertently expose others. If the infecting organism can exist outside the human body, the luggage may also be a source of infection when handled by others. As a result of these pathways for spreading disease, many surveillance programs include plans for screening international travelers and using quarantine for people, pets, or luggage as needed.

Figure 3.3—How Trade and Travel Can Spread Disease and Exposures



Failure of local surveillance delays response efforts

Local surveillance and communication fails

Within the Guangdong province there was a lack of communication about a new mystery illness that was spreading among residents. The local health care providers, including Dr. Zhang who cared for Yi Chen, did not know that they were a high-risk group for contracting the illness due to their prolonged close contact with infected and ill patients. Although some efforts to isolate the sick patients were made, stringent precautions to avoid exposure were not immediately taken since the scope of the outbreak was not known.

When Dr. Zhang first noticed the fever, he had been in close contact with at least 60 patients, his colleagues at the clinics, numerous nurses, and other hospital and clinic-based health care workers. His greatest concern was a recent flight he took to Hong Kong to attend a medical convention—he knew enough about infectious disease to be concerned about the other attendees, other hotel guests, and fellow travelers on the airplane. When several of his colleagues began complaining of similar symptoms, they quickly polled their closest co-workers to see if anyone else was potentially infected. They found four other physicians, six nurses, and three medical students with fevers and early symptoms, so they voluntarily put themselves in quarantine in one wing of the hospital where they planned to stay until they were sure that they were not sick or the illness ran its course. They took these measures to protect their families and others from exposure to the mystery illness. The loss of these health care workers from their usual routine put a great strain on the hospital, but the severity of the illness and the sheer mystery of it kept the accountants and CEO from complaining about the lost revenue.

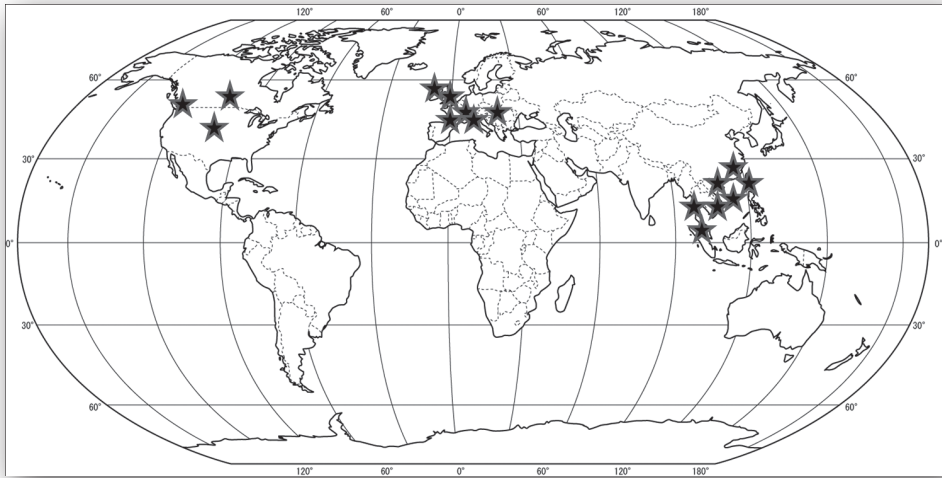
The health care worker quarantine wing soon became an **isolation** medical wing as each one developed the mystery illness. Of the 16 workers in the isolation wing, seven died from the disease or its complications. The remaining nine recovered, but were not fully returned to health for another 4 weeks. The experience of being confined to a single wing in the hospital had been incredibly difficult, and most of the survivors found themselves facing depression and anxiety. Access to reports of other outbreaks were limited so Dr. Zhang and his colleagues did not know that the disease had taken a toll in their province or that it was beginning to appear in other countries in southeast Asia. Provincial and national officials in China did not notify other provinces or other countries about an outbreak of a viral pneumonia of unknown cause for another 3 months.

Mystery illness spreads to other countries

By February 2004, Dr. Zhang had recovered sufficiently to be released from the isolation wing. He resumed his practice and cared for more patients with the mystery illness. His own illness had conferred active immunity, and he was one of a few medical providers who could work with patients without fear of contracting their mystery illness. He had recently heard from his old medical school friend, Dr. Trang, who was now practicing in Hanoi; he was treating a patient with a pneumonia that appeared to be viral but was not a known illness. It was an interesting case, and he wondered if Dr. Zhang had ever seen anything like it.

Dr. Trang had time to email Dr. Zhang because he had taken the day off due to a slight fever. Before leaving work the day before, he had contacted the local health officials to report this unusual and potentially contagious illness. This time, the health report made its way from local officials to national agencies that contacted the **World Health Organization (WHO)** where similar reports had recently arrived from Hong Kong and Singapore (Figure 3.4).

Figure 3.4—March 31, 2003: Outbreaks of mysterious atypical pneumonia cases first appear in other southeastern Asia countries then other continents as travelers return home. Total cases: 1,622.



International Public Health Network

Because so many public health issues occur across borders, an international system or network is needed to coordinate efforts and transfer information. As the SARS case will show, the spread of a contagious, infectious disease can be worldwide. Only a global effort to mitigate the spread of the disease will stop the outbreak before it becomes a full-blown **pandemic** (a global outbreak of disease). This section will look at the various international organizations that share information and coordinate actions across borders as well as some of their key functions.

International organizations devoted to public health issues depend upon the voluntary reporting and cooperation of nations around the globe to identify, communicate, and respond to public health emergencies and issues.

Participation in international organizations is voluntary; not all countries participate.

Voluntary collaboration instead of mandates

A key difference between international and national public health systems is whether the organization has the ability to mandate and enforce behaviors. Because international public health organizations are not associated with a particular government, they do not have the inherent powers to pass or enforce laws that will protect health. All efforts to intervene are voluntary and succeed only if each country involved in the issue takes steps internally to follow the recommendations of the international organization.


Voluntary participation instead of required membership

Another key difference between international and national public health systems is the voluntary nature of participation in the international public health system. Not all countries are members of the international organizations, which creates gaps in the global system. Because participation cannot be enforced, the international public health organizations attract countries by providing information and expertise that they need to keep their populations healthy.

The World Health Organization (WHO, International)

The World Health Organization (WHO) is the primary international public health organization. The role of WHO in public health can be defined by its core functions of providing leadership and engaging partners in issues of critical importance to health; promoting areas of research and ensuring findings are disseminated widely; developing standards and promoting their use; promoting the use of ethical and evidence-based options; monitoring and assessing health and trends; and developing its own capacity to ensure that its efforts can be sustained.¹ In essence, WHO exists to promote communication and collaboration among nations on important matters of health. Its key functions are summarized in Table 3.2.

WHO was created in 1948 by the **United Nations** as the global health authority that would coordinate and guide health policy, practice, research, and disease surveillance in participating countries. It has become a respected partner in many public health endeavors. Any nation that participates in the United Nations can



The World Health Organization (WHO) is the primary international, intergovernmental public health entity. Countries considered members of the United Nations are WHO member countries. WHO cannot mandate action but it can provide expertise, support, and guidance to each country while it promotes communications and collaborations. WHO's efforts are supported by regional offices and non-governmental entities.

Table 3.2

Functions of the World Health Organization (WHO)

- Provide leadership on important health matters
- Partner with other public or private organizations as needed
- Shape the research agenda and ensure new knowledge is disseminated
- Develop standards and set norms and monitor implementation
- Promote policy options that are ethical and evidence based
- Provide technical support and expertise
- Monitor and assess the trends in health
- Promote change and support the development of its own sustainable institutional capacity

Source: World Health Organization, International. The Role of WHO in Public Health. Available at: <http://www.who.int/about/role/en/index.html>. Accessed September 23, 2008.

also be a member of WHO. The international headquarters for WHO is located in Geneva, Switzerland, a historically neutral country. The organization is headed by the Director General who is appointed by the World Health Assembly, which is the decision-making body of WHO and consists of representatives from the member nations.²

The member countries are divided into six regions that span the globe. Each region represents countries within a distinct geographic area, such as the “**Region of the Americas**,” which consists of North, Central, and South American countries including the United States.

Table 3.3 lists the eight regions. WHO conducts its work and communication primarily through these regional groups. Each region is able to concentrate on public health issues that may be unique to its geography and populations. Like its parent organization, each region is an international entity.³

As an international entity, WHO can serve as a focal point for reporting disease outbreaks and sharing information across many countries. Because membership and participation in WHO and its programs are voluntary and limited to nations that are participants in the United Nations, some gaps exist in membership and participation. Not all countries are represented, and recommendations for practice or policy within countries cannot be enforced.

Pan-American Health Organization (PAHO)

Another international health organization to which the United States belongs is the **Pan-American Health Organization (PAHO)**, which includes North, Central, and South American countries. This regional organization was actually created about 50 years before WHO. It came into existence as a result of coordinating regional efforts to control the spread of infectious disease through increased sea travel.⁴ At the time, global air travel did not exist, so disease outbreaks were generally contained within a continent or region.

When WHO was created in the 1940s, the PAHO assumed the role of the “Regional Office of the Americas.” The headquarters for PAHO are in Washington, DC, where staff members focus their efforts on getting member nations to collaborate on international health issues that are found in the Americas.⁴ As a regional office for WHO, PAHO has the same issues associated with voluntary membership and compliance with policies and standards as its parent organization. Although PAHO is primarily linked with WHO, it also serves other agencies of the United Nations (e.g., World Bank).

The mission of PAHO is to improve the health of the people in the Americas and to strengthen health systems from local to national levels. It does this by promoting health care programs that increase access and add efficiency to systems, promoting education and social communications, reducing the spread of transmissible diseases and chronic diseases, and fighting outbreaks of disease in countries in the Americas.⁴ **Vulnerable populations** such as mothers, young children, poor, elderly, and refugees or displaced individuals are the target groups for health improvement. Focus areas for interventions

Table 3.3

Six Regional Offices of the World Health Organization (WHO)

African Region
Region of the Americas (PAHO)
South-East Asia Region
European Region
Eastern Mediterranean Region
Western Pacific Region

Source: WHO—its people and offices. Regional offices. Available at: <http://www.who.int/about/structure/en/index.html>. Accessed September 23, 2008.

are the safety of the blood supply, safe drinking water, sanitation, and tobacco use. To accomplish its mission, PAHO partners with other UN and WHO agencies, national public health agencies, and private, non-governmental organizations.


Non-Governmental Organizations (NGOs)

In addition to international agencies whose membership is comprised of countries, some private organizations are not representative of a particular country or government. These **non-governmental organizations (NGOs)** frequently partner with governmental and intergovernmental organizations to achieve a health goal. Members of NGOs may be private citizens or businesses; the organizations may be supported by private, public, or both types of funds. Even NGOs receiving public funds (i.e., funds from governments) are considered non-governmental as long as their governing boards do not include representatives from the government providing the financial support. The NGOs often supplement services or provide programs within countries when the local public health system lacks sufficient funds or resources, which further differentiates them from WHO and PAHO.

Many NGOs begin as an effort to fill a specific niche that the governmental and intergovernmental organizations are unable fill. Like their public counterparts, the NGOs grow and expand over time often making the scope of their missions broad and overlapping their work with other NGOs and government organizations. For example, CARE, International began as a nongovernmental food relief agency after World War II when its sole purpose was to provide packages (CARE packages) to starving families in war-ravaged Europe. Today, CARE's humanitarian aid now includes fighting global poverty and its related health issues. The organization focuses on women since they can impact the entire family. Projects supported through CARE include efforts to improve basic education, reduce spread of HIV, increase clean water and sanitation, grow economic opportunities, protect natural resources, and provide emergency aid.⁵ Other examples of international NGOs that focus on health and vulnerable populations are the International Federation of Red Cross and Red Crescent Societies (IFRC), which provides emergency services in areas struck by disaster as well as basic health care services.⁶ Oxfam, International is a famine-relief NGO, and Doctors without Borders (*Médecins Sans Frontières*) provides international teams of health care providers to countries and areas where services are not available or other NGOs will not go.⁷

Global network of public and private public health partners

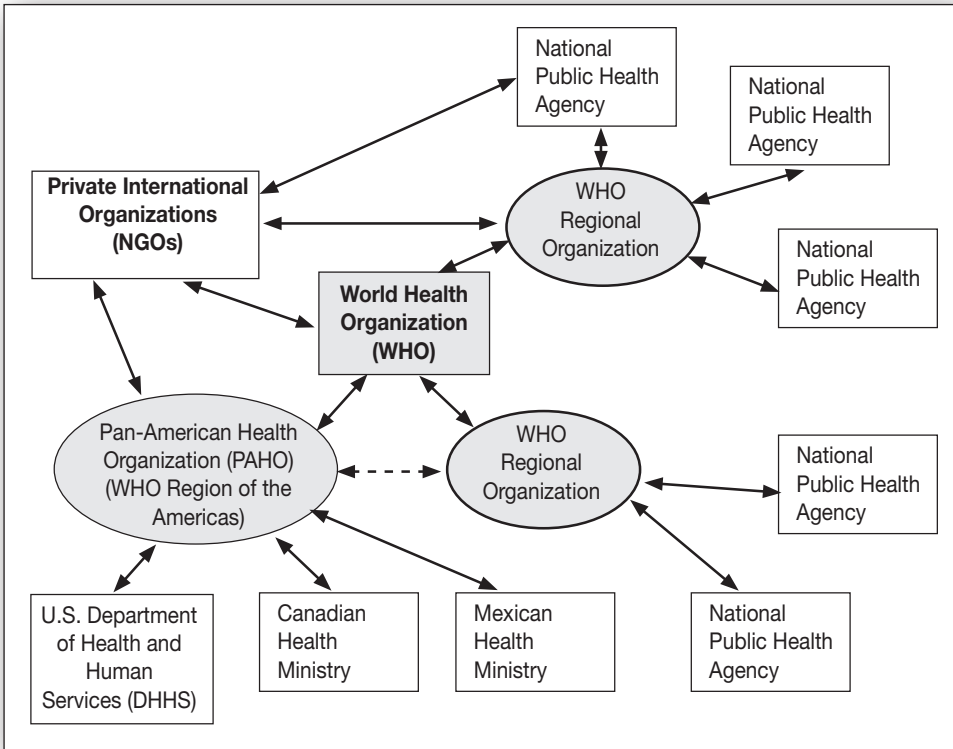
As Figure 3.5 shows, the public and private elements of the global public health system form a network that is designed to improve communication and coordinate responses to issues that extend beyond the borders of individual countries. Over time, the intergovernmental agencies such as WHO and nongovernmental agencies



The global network of public health organizations consists of a complex web of governmental, intergovernmental, and non-governmental organizations that have formed many partnerships to address public health issues. The NGOs are often able to implement local services based on national or international policies and standards set by intergovernmental groups such as WHO.

such as the IFRC have expanded the scope of their missions so that they now often have overlapping missions. This forms a complex network of partnerships and activities for many public health concerns.

Figure 3.5—Relationships among Public and Private Participants in the Global Public Health System



CASE STUDY 1 (continued)

WHO gets the world involved in the mystery illness

WHO epidemiologist Urbani names the mystery illness SARS

Although Yi Chen had recovered from his illness, the virus that caused the disease was spreading to other countries. During a recent trip to Hong Kong, Yi Chen had noticed people wearing face masks. He tried to buy some masks for himself and his family, but the local pharmacies and hospitals had already sold their supplies. Like many of his neighbors, Yi asked a distant relative living in Kansas City to send him a supply of face masks. He had just begun to hear about the mystery illness, and it sounded like it was spreading to other towns, provinces, and countries.

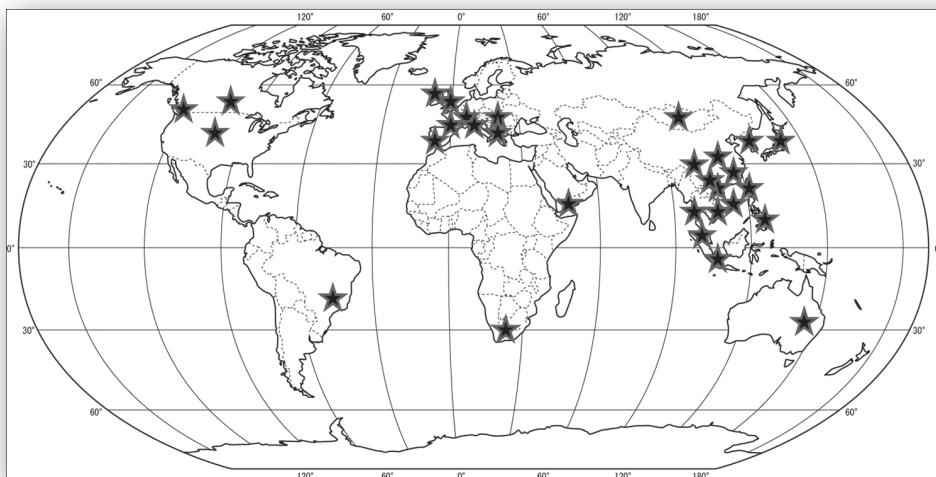
During March, the mystery illness had been named SARS for Severe Acute Respiratory Syndrome by a physician who was investigating the outbreak for WHO. Yi was sorry to hear that the physician, Dr. Urbani, had contracted SARS and died several weeks later. During those early spring months, Yi had to rethink his travel plans because travel advisories and alerts were appearing for many southeastern Asian countries. Many alerts were for other prov-

inces in China and the city of Beijing, which had reported over 400 cases of SARS. Yi also found that his business contacts in other provinces and countries were not eager to have him conduct business in person since he was from an outbreak area and may have had SARS.

Global collaboration to fight the spread of SARS

Yi was not aware of a concurrent international effort to isolate and identify the virus that caused SARS. News reports about the disease and international efforts were still limited in his hometown and did not describe the international team of 11 leading research labs that were working on the genetic sequence of the virus. During a business trip to Singapore, he learned that the virus was a coronavirus from the same group of viruses that also causes the common cold. The newly identified virus had been named SARS co-V. Apparently, it was a small germ; those face masks he had shipped from the United States could not block it. From his conversations with other businessmen, Yi learned that the disease was now appearing all around the world. It was interesting to hear stories about how various countries were taking different approaches to detecting and controlling the SARS outbreaks (Figure 3.6).

Figure 3.6—May 1, 2003: Clusters of SARS cases appear on six continents and spread within China. Total cases: 5,663.



Public Health Systems within Countries

While efforts to address public health problems at the international level are based on the voluntary cooperation of countries, efforts within a country may actually be enforceable depending on how the nation has established its public health system. Although the structure of these public health systems within different countries varies and their issues are not the same, the key functions of the public health systems remain similar. Unlike their international counterparts, public health

Public health systems within a country often have the authority to mandate and enforce behaviors that are deemed to be in the interest of the public's safety and welfare. This authority may be delegated to local governments or agencies.

organizations or agencies with a country often have the ability to mandate behavior and require participation. This section of the chapter will look at the U.S. public health system beginning with the federal level. After looking at the federal agencies, the state and local levels of public health will be examined.

The U.S. Public Health System


Federal authority

The establishment of health or public health services in the United States was not specifically addressed by our founding fathers in the U.S. Constitution. In other countries, such as Mexico, constitutional provisions establish public health services. In the United States, public health services were established indirectly through several mechanisms. First, the commerce clause of the Constitution gives the federal government the power to regulate trade with other nations, including tribal nations, and between states. An example of this type of power is seen with the regulation of the pharmaceutical industry and the advertisement of pharmaceuticals. Second, the power to tax citizens and spend tax dollars allows the federal government to raise funds that support national public health programs and initiatives and allocate the monetary resource to state and local governments that will conduct the programs.⁸

State and local authority

Powers not specifically given to the federal government via the U.S. Constitution were retained by the states. This state-level authority, which is called police power, allows a state to set laws and enforce them for the welfare of its citizens; however, these powers are subject to limitation by the U.S. Constitution, state constitution, and a balance of individual rights and public welfare. The 10th Amendment, which granted authority for each state to act on behalf of its citizens for matters not specified by the Constitution, made this implicit authority more explicit.⁸

In general, federal laws related to public health take precedence over state laws, which in turn take precedence over local laws. When federal laws do not exist, the state sets its own. As a result of the delegation of most public health authority to the states, great variation exists in the structure and function of local and state health agencies across the country. Tribal health authority results from negotiated treaties with the federal government, and the extent to which that authority is granted to local governing bodies is determined by each tribe.



U.S. public health system functions include:

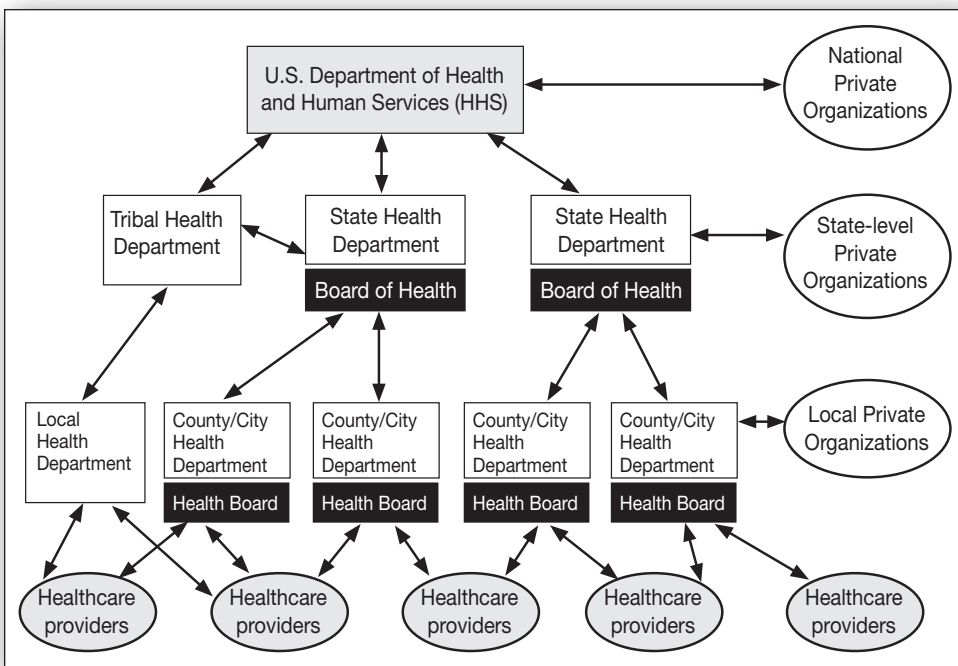
- Interacting with international organizations;
- Interacting with state and tribal public health systems;
- Delegating authority to states to care for the health of their citizens;
- Regulating activities that cross state lines or are specifically named in the Constitution; and
- Determining how public funds are distributed and used.

Structure of the U.S. Public Health System

As Figure 3.7 shows, three levels or tiers exist in the U.S. public health system: local, state, and federal. The local agencies may be established at the county, city, or neighborhood level depending on the state system and the size of the population served. Public health agencies may be as simple as a single health officer or as complex as a multi-state, multi-center, complex of services provided by thousands of individuals. Tribal agencies operate at a level that is most similar to the state level public health agencies; they are shown at the same level in the figure.

The flow of information, funding, and policy-making between local, state, and national health departments helps to delineate the relationships among the different entities. For example, health care, which is a component of public health, is practiced at the local level but may be affected by state licensing laws and national policies on access. In return, health care providers and their professional organizations may help to shape policies at the local, state, and federal levels. Many other organizations and agencies contribute to the public's health, including law enforcement, environmental quality, agriculture, and schools. Although this chapter will not focus on their contributions, remember that most public health issues affect and can be affected by virtually every aspect of the community.

Figure 3.7—Public and Private Elements of the U.S. Public Health System



Department of Health and Human Services (HHS)

Mission

The U.S. Department of Health and Human Services (HHS) is the principal national organization charged with both protecting health and providing essential human services for Americans. As a federal program, the HHS serves more as a source of policy, guid-

ance, and funding but does not directly administer the programs. Administration is delegated to state health departments or their designees. Therefore, HHS works with state and local (i.e., county or city) governments to ensure information and services reach the public. The support often comes in the form of financial resources, technical assistance, education, and goals for the program. It has been estimated that almost one-fourth of the federal budget is spent on HHS programs, which indicates the size of the department and the focus on keeping residents healthy and productive.⁹

Background

The HHS was officially established in 1980 from two groups of pre-existing agencies: those that were in the **U.S. Public Health Service** and those that were devoted to the welfare of citizens. As Table 3.4 shows, HHS now consists of 11 operating divisions or agencies that can still be roughly divided into those that focus on health and those that focus on the welfare of vulnerable populations such as children and the elderly.⁹ Many divisions and departments are within each agency. For example, within the **Food and Drug Administration (FDA)**, six centers and three offices are devoted to various regulatory and review functions related to food and product safety. These 11 agencies and their departments are responsible for over 300 programs that address health and human service needs including research in health and social sciences, food and drug safety, educational programs for children, disaster preparedness, and substance abuse prevention or treatment.

U.S. Public Health Service (USPHS)

The U.S. Public Health Service (USPHS) is perhaps the oldest of the federal services or departments focused on public health. USPHS began as the Marine Hospital Service, which was dedicated to the care of sick or disabled seamen. Over time, the service expanded to include more public health duties and agencies that were eventually incorporated into the HHS.¹⁰ Table 3.4 indicates the HHS agencies that are considered part of the USPHS. To fulfill its mission, the USPHS established its own health care staff called the commissioned corps.

The commissioned corps of the USPHS has around 6000 health care providers and researchers in its ranks. Pharmacists are one of a number of health professions included in the corps. Most USPHS pharmacists work with one these four agencies: the Indian Health Service (47%), the Food and Drug Administration (26%), Bureau of Prisons (14%), and the National Institutes of Health (13%).¹⁰ In addition to their usual clinical duties, PHS pharmacists are also expected to assist with responses for disasters such as hurricanes. These positions may be located in Washington, DC, or spread throughout the country. Most are clinical pharmacy positions, but some have additional advisory or consultative aspects. For example, a PHS pharmacist working with the Health Resources and Services Administration (HRSA) is required to provide medications for HIV/AIDS to patients in an underserved population and study national pharmacy manpower requirements.¹¹

As a federal employee, pharmacists are not required to be licensed in the state where they are stationed as long as they have a current license in at least one of the states in the union. With regard to the SARS outbreak, PHS pharmacists in clinical positions were affected in the same manner as health care providers in other settings.

Table 3.4

Major Agencies of Health and Human Services (HHS) and Their Primary Roles

Agency		Primary Roles
HHS agencies for health (public health) services		
AHRQ	Agency for Healthcare Research and Quality	Supports research on the health system, including quality and cost issues
ATSDR	Agency for Toxic Substances and Disease Registry	Works to prevent exposure to hazardous substances created by wastes
CDC	Centers for Disease Control and Prevention	Provides a system of disease surveillance and reporting
FDA	Food and Drug Administration (FDA)	Assures safety and efficacy of medications; safety of food and cosmetics
HRSA	Health Resources and Services Administration	Provides access to basic health care services in underserved populations
IHS	Indian Health Service	Works with tribes to provide health services to American Indians and Alaska Natives
NIH	National Institutes of Health	Promotes and funds biomedical research
SAMHSA	Substance Abuse and Mental Health Services Administration	Works to improve availability and quality of prevention and treatment programs
HHS agencies for human (welfare) services		
CMS	Centers for Medicare & Medicaid Services	Administers the Medicare and Medicaid programs
ACF	Administration for Children and Families	Promotes the economic and social well-being of children, families, and their communities
AoA	Administration on Aging	Provides services to the elderly to help them remain independent

Source: U.S. Department of Health and Human Services. Available at: <http://www.hhs.gov/about/whatwedo.html>. Accessed September 14, 2007.

Centers for Disease Control and Prevention (CDC)

The Centers for Disease Control and Prevention (CDC), which supports surveillance of health status and disease, maintains the related statistics and promotes disease prevention. This division of the DHHS is tasked with monitoring and preventing international transmission of disease. The director of the CDC also leads the Agency for Toxic Substances and Disease Registry (ATSDR), which is dedicated to reducing exposure to toxics in the environment, particularly those found in waste sites designated as priorities by the Environmental Protection Agency (EPA).¹²


In the 2002–03 SARS outbreak, the CDC served as a source of information and the group to which state health departments reported both suspected and confirmed cases of SARS. The CDC web site has numerous resources for a variety of diseases that can be used by practitioners as well as the general public. For pharmacists, this site can provide just-in-time information about topics of concern for patients such as travel vaccination

recommendations, epidemiology of diseases, and in the present case, information about how SARS is spread, early symptoms, best treatment options, and areas where travel restrictions or cautions exist. Information about SARS can still be found on the web site because of concerns that it will reappear.

Food and Drug Administration (FDA)

One of the divisions in the HHS that is most familiar to pharmacists is the Food and Drug Administration (FDA), which is deeply involved in the drug development and production process. FDA works with the manufacturers rather than researchers to ensure products are both safe and effective. As one might expect, pharmacists are included among the employees of this division.¹³ The mission of the FDA is to protect the health of the public by assuring medications, food, cosmetics, and products that emit radiation are safe, effective, and secure (i.e., not tampered with or contaminated). Its goal is to do this in a speedy and efficient manner that does not compromise safety.¹³ Virtually all efforts to ensure drug product safety come from the FDA with one notable exception being child safety caps, which are regulated by the **U.S. Consumer Product Safety Commission (CPSC)**.

The FDA is best known for its work to promote legislation that regulates pharmaceutical manufacturers and the drug approval process. The FDA has many other roles that promote safety. It has several voluntary reporting systems for issues related to medication including its safety reports for adverse events (**MedWatch**), vaccines adverse events (**VAERS**), **counterfeit medications**, and problems with online pharmacies. Through its **Center for Drug Evaluation and Research (CDER)**, FDA provides oversight of marketing of new medications, generics, new indications for existing products, and post-marketing surveillance. Personnel in this center are primarily MDs and PhDs, but some pharmacists are in key positions and on the staffs. In addition to drug approval duties, the CDER also provides counterterrorism and emergency response support related to medication supplies and access.¹⁴



At the national level, public health activities focus on issues that are interstate and international. In the United States, the primary federal agency for public health is the Department of Health and Human Services (HHS). Through its 11 agencies, HHS provides a broad array of services, support, and policy for states. Among those divisions are several with strong ties to pharmacy, including the FDA and USPHS.

The FDA has created a Counterfeit Drug Task Force to combat counterfeit medications in the United States and abroad. Its efforts complement those of the **International Medication Products Anti-Counterfeiting Taskforce (IMPACT)**, which was created by WHO. In addition, it provides travelers with advice about the dangers of purchasing medications while traveling since counterfeit medications in some areas are more common than genuine products and problems can arise with buying medications via the Internet.¹⁴ Pharmacists are among the personnel and consultants that work with the FDA. As an employee, pharmacists are technically hired as USPHS pharmacists who are

assigned to the FDA. In addition to being an employee of the FDA where duties reflect standard clinical practice as well as proposal review duties, pharmacists can also be found on the rosters of the various FDA advisory committees.¹⁵

With regard to the 2002–03 SARS outbreak, the FDA could potentially become involved in expedited approval of a vaccine found to be effective against the virus if such a vaccine were discovered. FDA could also be involved with approval of off-label use of existing medications if they showed efficacy against the SARS virus. In the case as presented in this chapter, the role of the FDA is minimal.

State public health structures and functions


Basis of Authority and Ability to Delegate

The 10th Amendment to the U.S. Constitution made state governments the primary protectors of the health of people living within their borders. A state may undertake a myriad of activities to meet this responsibility, including the creation of an administrative agency called the health department (or public health agency). Activities conducted by the state health department in one state may be quite different than those in another due to differences in state priorities, politics, and ability to delegate to local governments.

State Health Departments and Boards of Health

Like their local counterparts, state health agencies are under the direction of the **Health Officer** (or Medical Officer) whose work is guided by the state's **Board of Health**. The structure of the state health departments and boards vary by state. In general, the state health departments may be organized in several different ways. The traditional public health agency limits its oversight to just public health and primary care services. If a health department is organized as a “super public health agency,” it also oversees mental health and substance abuse services in the state; one that is a “super health agency” may include supervision of Medicaid instead of mental health and substance abuse services. The largest of all organizations, the “umbrella agency,” oversees all of the above mentioned services plus other human services programs.¹⁶

At both the state and local levels, two separate but related entities are the Board of Health and the health department. The Board of Health is comprised of a group of volunteers from the community or state that represent various points of view including health care. The board provides oversight and guidance for public health agencies. These volunteers are usually appointed by the local government and selected to represent a variety of interests and expertise. The duties of the health board focus on oversight of the health agency's progress towards meeting its mission and its fiduciary responsibilities.



Most of the authority to act on public health issues on behalf of the population resides within the state health boards and departments. This authority, which was conferred upon the states by the federal government, can be and is often delegated to the local public health organizations. Tribal public health organizations are similar to state health departments in their authority to act on behalf of their citizens.

Health boards generally hire and evaluate the Health Officer who serves as the director of the local health agency. The Health Officer is responsible for ensuring that programs and services are implemented and carried out. This usually means delegating duties to divisions within the organization where the staff members actually conduct the work. Historically, Health Officers were physicians, but some now have other graduate credentials such as a Master of Public Health (MPH) degree.


Some local health agencies are so small that the Health Officer is technically the agency; most others are true health departments with several divisions, numerous programs, and more than one person on staff. When the health agency is large enough to employ more than one person, it is generally referred to as a health department. The health department is the organization that does the work deemed necessary to protect the health of the citizens.

Both health departments and Boards of Health are created by the local government and have their authority bestowed upon them by those governments as an extension of the same authority that was given to the state. Some municipal and county departments are combined into a single city-county organization through agreements between the municipal and county governments.

Local public health structures and functions

Boards and departments of health also exist at the city or county level. Larger metropolitan areas may have a city health department in addition to a county department. In rural or frontier areas where the populations are sparse, the department may consist of a single person. In other areas, the city and county departments may be combined into a single entity. The local government decides how it will delegate the authority and the scope of that authority.

The local level is where public health really meets the population it serves. Most programs are administered at this level, local citizens are involved on the Boards to provide the community perspective, and disease reports are collected case-by-case and fed to the state's epidemiologist for analysis before being forwarded to the CDC for national statistics to be monitored and reported.



At the local level, the policies and funds dedicated to public health work are put into practice. This is the level where the governmental entity interacts directly with the populations for which it exists to serve. The local level is also where much of the disease monitoring data is collected and sent back to state, federal, and international public health entities.

The United States prepares for the arrival of SARS

Kansas prepares for its first case

In Kansas City, Lai Chen, a fourth-year pharmacy student, arrived at her community retail pharmacy for a 6-week experience in clinical pharmacy activities in a retail setting. She had a vested interest in the SARS outbreak because one of her great aunts, Ming Chen, had apparently died from the disease just last winter. Her great uncle, Yi, had been corresponding with Lai's mother who naturally asked Lai for information. Her first task had been to find face masks to mail to her extended family in Guangdong province. She had been surprised to learn that she was not the only one looking for this scarce commodity.

As Lai settled into her rotation, she became one of many health care workers preparing for the inevitable arrival of SARS in the U.S. heartland. Recent cases in Toronto had piqued interest in early detection of SARS cases and implementation of safety precautions for health care providers working with SARS patients. Lai was asked to find information on the disease, guidelines for clinicians, and treatment options. Lai began with a search of the CDC and WHO web sites where the latest information was being posted. Her preceptor suggested that she also look at the Canadian national health service site (**Health Canada**) for additional updates and information.

Based on her search of the literature, Lai prepared a brief list of potential issues that the retail store could face if a SARS outbreak occurred in Kansas City. Her list is shown in Table 3.5 along with possible methods for addressing them. Key components included providing information to patrons of the store without scaring them, clarifying or correcting misunderstandings of reported literature or news reports, providing patients with tangible things they can do to reduce their risk, discouraging purchases of devices or medicines that are not effective, and keeping the pharmacy personnel safe while working with exposed or sick patients or handling or discarding their unused medications.^{17,18}

Case post-mortem

By the time the SARS outbreak ended in late 2003, over 8000 probable SARS cases and 774 deaths were reported across 29 countries.¹⁹ In the United States, eight cases out of 29 were confirmed and no deaths were reported. All the confirmed U.S. cases were tied to travel to areas where SARS outbreaks were known to exist and were not caused by human-to-human transmission while in the states.²⁰ Figure 3.8 shows all countries with one or more cases of SARS.

Fears that the following 2002–03 winter season would produce another outbreak were largely unfounded with only few cases reported in China and no evidence of another global SARS event. The experience from the SARS outbreak did provide valuable information for individuals who are preparing plans for responding to an **avian flu pandemic**, which has been predicted to occur at any time.

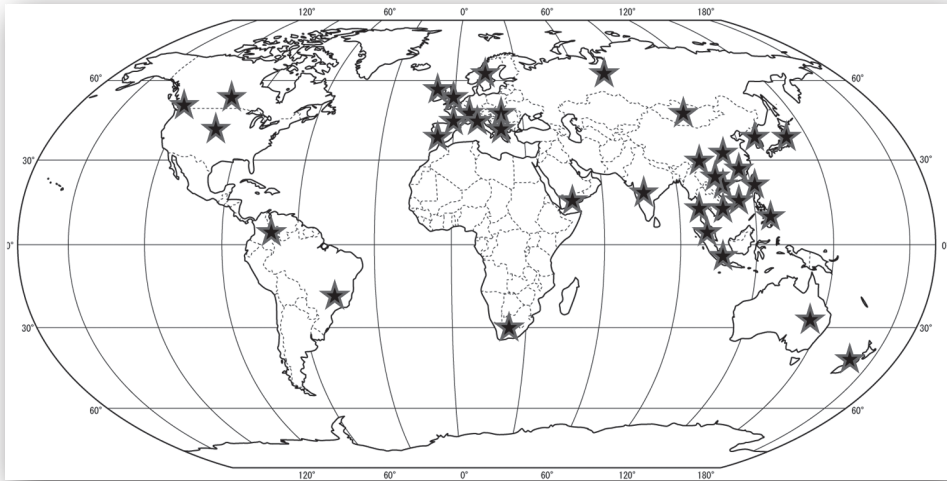
Table 3.5

Lai's List of Potential SARS-Related Issues for a Retail Pharmacy

Prepare for:	Cause	Issues
Patient surge (increased number of patients)	If local hospitals are closed or put under quarantine, patients will seek other sources of care and information	Increase staffing to handle increased traffic Prepare information for patients
Sicker patients	These patients may be sicker than usual but barred from hospital	Review info and help triage patients
Worried well	Patrons who have respiratory symptoms but no history of exposure	Provide information and reassurance
Poor communication or information	Health officials may change information frequently to adjust to evolving situation	Seek reliable information sources Seek local info for current quarantine/treatment info
Protecting workforce from exposure	Health care workers are highly likely to become infected if they work closely with a SARS patient Need to limit exposure time and closeness	Use standard and respiratory precautions Handle items for potentially exposed SARS patients while wearing gloves Frequent hand washing Use face masks if counseling coughing or feverish patients Use telephone for counseling Drop off prescriptions at homes Bill via credit card numbers to avoid handling checks or money
Monitoring pharmacy staff	Fever is an early sign of SARS; if a family member is sick, put employee on sick leave	Take temperature of workers once a shift; if fever is present, send worker to designated SARS clinic site
Requests to dispose of potentially contaminated medications	Family members of potential SARS cases may have unused medications they want to throw away	Determine local health department recommendations for disposing of unused medication products that had been dispensed to a SARS patient
Requests for ineffective prevention and treatment options	Remedies for self-treating SARS may be requested by patients even though they are not effective	Provide patients with most current treatment and prevention information

Sources: 1. Revised U.S. Surveillance Case Definition for Severe Acute Respiratory Syndrome (SARS) and Update on SARS Cases—United States and Worldwide, December 2003. *MMWR*. 2003; 52(49):1202–6. Available at: <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5249a2.htm>. Accessed September 23, 2008. 2. Centers for Disease Control and Prevention. Severe Acute Respiratory Syndrome (SARS). Fact Sheet: Basic Information about SARS. Available at: <http://www.cdc.gov/ncidod/sars/factsheet.htm>. Accessed September 23, 2008.

Figure 3.8—August 7, 2003: SARS cases appeared in 26 countries around the world. Total cases: 8,422. Total cases in health care workers: 1,725 (20%).



Local to Global Roles for Pharmacy in Public Health

As the SARS case showed, many facets and levels exist in public health. Almost all are places where pharmacists can become involved. Table 3.6 shows, local, state, national, and international organizations offer numerous opportunities for pharmacists to participate. It may be easiest to start close to home at the local level when the Health Board requests nominees to fill open positions.

Table 3.6

Pharmacy Roles in Local to Global Public Health

At the local or state level

- Contact Health Boards and task forces
- Use education and awareness programs
- Report unusual sales volumes for medications or patient complaints
- Be an advocate for local citizens and keep eyes open for issues

At the federal level

- Contact task forces with professional organizations
- Serve on review panels or government committees
- Use national voluntary reporting systems

At the international level

- Participate in voluntary medical and humanitarian aid
- Raise awareness for international travelers of risks and prevention
- Donate money or supplies

Pharmacists will be affected by and can provide interventions for global public health issues, which include identifying and reporting new or emerging cases of resistance to antibiotics and antivirals, the quality of products purchased via the web, and counterfeit medications obtained from supposedly reliable wholesalers and secondary wholesalers. Pharmacists can also ensure access to medications during emergencies and for vulnerable populations who lack sufficient resources or insurance to purchase them.

Chapter 3 Summary

To learn about the various levels of the U.S. and international public health systems, this chapter looked at the flow of information during the 2002–03 SARS pandemic. Local health departments are the point of contact with the individual residents, and care and data collection occur primarily at that level. State departments of health provide support to local department as well as a conduit for information to federal agencies. At the national level, policy, guidance, funding, and interaction with international partners become the primary activities. Globally, the public health system is a voluntary network of countries and private organizations that work to facilitate the flow of information and expertise to parts of the world where it is most needed. These systems are interdependent, and pharmacists have the potential to be involved at any level of the public health system.

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Chapter 3 Review Questions

1. Explain why an outbreak of poliomyelitis in Mexico may be a concern to the citizens of Canada.

Polio is caused by a virus that may be transmitted to others who have not been vaccinated or have had acquired immunity from a prior infection. An outbreak of polio in Mexico could easily travel to any part of the globe via international air travel, so all countries, not just Canada, should be concerned about a large outbreak of the disease.

2. Which of the following best describes a key function of WHO?

- (a) Monitor health and disease trends (b) Provide technical support
 (c) Set standards (d) All of these

The answer is (d).

3. Explain the role of surveillance in mitigating the spread of disease.

Surveillance should allow for early detection of an outbreak so that steps can be taken to slow or stop its spread before it becomes an epidemic. Surveillance also provides information about the level of disease in the community; therefore, it can be monitored to determine when an outbreak is over.

4. Describe how the U.S. public health system is structured at the national, state, and local levels.

The national or federal level of the U.S. public health system is anchored by the large HHS department that includes key agencies such as the FDA, CDC, and PHS. The Public Health Service is the medical or health care corporation of the HHS, which employs pharmacists for clinical pharmacy and dispensing roles. The FDA ensures products are safe and effective, while the CDC serves as the surveillance and reporting sector of HHS.

At the state level, Boards of Health and departments of health are given authority to act on behalf of their residents by the federal government. The health departments are usually large and complex, while the health boards are relatively simple in composition and small in size. Boards of Health provide oversight of the department.

At the local level, the city or county health department is headed by a Health Officer who is hired by the local health board. Local health departments may be small (one person) or larger multi-divisions departments that administer programs to the local populace.

Tribal health departments work at a level similar to the state health departments in regard to their relationship with the federal government.

5. Describe the roles of the World Health Organization (WHO), Pan-American Health Organization (PAHO), and non-governmental organizations such as the Red Cross, International in addressing public health issues.

The WHO is the primary organization for the international public health network. It does much of its work through its regional offices, which includes PAHO. Non-governmental organizations such as the Red Cross, International often provide supplementary support at the local level when local systems cannot.

Applying Your Knowledge

- 1. Describe how pharmacists can become involved in disease surveillance.**
- 2. Using the CDC web site, determine the prevalence of malaria, polio, and pertussis (whooping cough) in the United States and in your home state. Using the WHO web site, determine the prevalence of these diseases in Somalia. Find the country with the highest prevalence of HIV/AIDS.**
- 3. Look for information about West Nile virus on the CDC web site. When did it arrive in the United States and how did it get here?**
- 4. Think about a recent food recall or warning. How was the FDA involved? Why was it so difficult to determine the source?**
- 5. What are WHO, CDC, and FDA doing to reduce the problem of counterfeit medications? Where is this problem especially bad and what types of medications are being counterfeited?**