

Introduction

CHAPTER 1

Public Health Security: Protecting Populations from Emergencies

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PUBLIC HEALTH EMERGENCIES

Large-scale population crises continue to threaten communities in the United States and in other countries around the globe. The past few decades have seen an increasing number of both natural and deliberate events that have resulted in large numbers of injuries and deaths and billions of dollars of financial losses (see Figure 1-1). These public health emergencies not only have caused immediate devastation, but also have led to long-term periods of rebuilding and rehabilitation of the affected areas. Although nations frequently confront public health crises, critically important practices are not consistently being implemented during many of these events. Familiarity with and recurrence of public health emergencies has not necessarily led to improved outcomes.

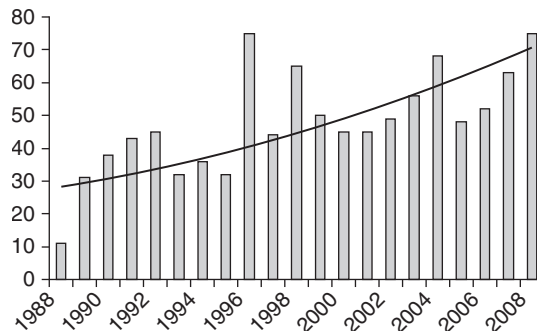


FIGURE 1-1 Number of Declared U.S. Disasters 1988–2008

Source: Data from FEMA. http://www.fema.gov/news/disaster_totals_annual.fema

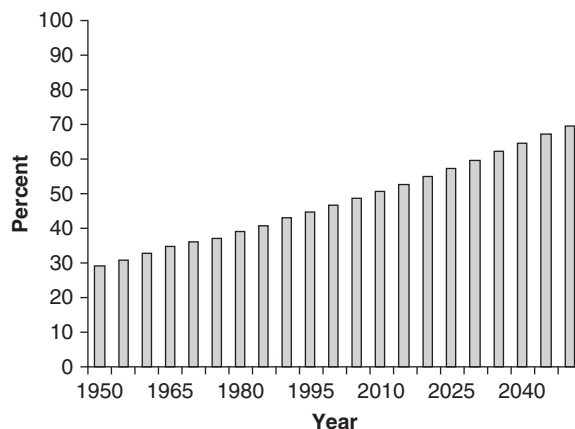


FIGURE 1-2 Current and Projected Percentage of Global Population Living in Urban Areas 1950–2050

Source: Data from UN World Urbanization Prospects: The 2007 Revision Population Database. <http://esa.un.org/unup/index.asp?panel=1>

Globalization is resulting in an increasing number of people living in urban areas. From 1950 to 2010, the share of the global population living in urban areas has expanded from 29 percent to more than 50 percent (see Figure 1-2). With increasingly larger numbers of people living in densely populated urban regions, the number of people who are vulnerable to public health risks and the magnitude of public health crises increases exponentially.^{1,2}

Emergency public health differs from disaster medicine in that it involves more than just the management of specific hazards. The term “hazard” is used to describe the events that cause emergencies; these hazards can be natural (e.g., earthquakes, hurricanes, droughts), deliberate (e.g., bombing, chemical attack, biological attack), or accidental (e.g., nuclear plant malfunction). The scope of emergency public health addresses these hazards but additionally encompasses the following issues:

- Multiple sectors
- Public health tools applied during emergencies
- Resilience analysis
- Systemization of efforts

Multiple components of society are disrupted by public health emergencies: health, mental health, security, housing, food, and water. In addition, these events may threaten the political and economic stability of the community or the country. Large-

scale crises will affect all sectors of the community, including the government, private sector, nongovernmental organizations (NGOs), and civilians.³ Each of these sectors will collectively provide and utilize resources during a crisis, and, therefore, each of these sectors will possess a collective responsibility in a community's resilience to public health emergencies. By increasing the systemized surveillance, assessments, coordination, and communication among sectors and among levels of government jurisdictions, communities can achieve greater levels of protection from collapse in the event of a public health emergency.

A fundamental aspect of public health emergencies is their unpredictability. Even though they are unpredictable in terms of when and where they will strike, all public health emergencies progress through predictable stages: preparedness, response, and mitigation. Nevertheless, communities cannot prepare for every possible public health scenario that may occur. For this reason, communities must always maintain a range of preparedness regardless of the type of incident that may occur. Given the difficulty of preparing and responding to a large number and variability of potential public health emergencies, an "all hazards" approach can help protect a population by having available a continuous and minimum level of personnel, resources, and training that can address a broad scope of hazards.⁴ Furthermore, the uncertainty regarding the timing and location of an incident will require communities to have baseline levels of capabilities to be able to respond effectively to public health crises.⁴ Finally, to ensure mitigation, a community will need to apply lessons learned from prior events within the community and from other regions to implement measures to reduce vulnerability and decrease risks from future events.

HISTORICAL PERSPECTIVES

The past decade has seen a greater awareness for expanded and improved public health infrastructure to respond to increasing threats. In November 2000, the U.S. Congress passed the Public Health Threats and Emergencies Act of 2000 (P.L. 106-505), which was the first law to direct large amounts of resources toward public health preparedness for bioterrorism and other communicable disease outbreaks. The legislation authorized \$540 million in fiscal year 2001 to improve public health agencies' response capabilities and capacities. The objective was to elevate state and local capacity and to meet the following goals:⁵

- Require the development of a fundamental set of public health capacities to be implemented by states and municipalities
- Establish a state grant program to evaluate their public health capacity

- Authorize increased funds for state and local planning and implementation of these capacity-building goals

In June 2002, the U.S. Congress passed the Public Health Security and Bioterrorism Preparedness and Response Act (P.L. 107-188) in response to the September 11, 2001, terrorist attacks and the anthrax attacks that occurred later in 2001. This legislation authorized even greater funding and provided new measures for the following purposes:⁵

- Improving public health capacity
- Upgrading health professionals' ability to recognize and treat diseases caused by bioterrorism
- Accelerating the development of new vaccines and other countermeasures
- Upgrading protections for water and food supplies
- Tracking and regulating the use of dangerous pathogens within the United States

Because of their specific focus on bioterrorism and communicable diseases, these legislative efforts did not address many aspects of emergency public health capacity building that will be required to respond to other public health hazards.

On May 23, 2005, the World Health Assembly unanimously passed the International Health Regulations (IHR). This legally binding international agreement emphasized the building and strengthening of national surveillance and response systems. The IHR contains a commitment from the World Health Organization (WHO) and its 193 member-states to improve capacity for disease prevention, detection, and response. It also provides recommendations to address national public health threats that have the possibility of escalating to global emergencies.⁶ Fundamental changes include the following measures:

- Expanding reportable diseases beyond only cholera, plague, and yellow fever
- Improving notification processes
- Structuring contact points and communications among nations
- Strengthening surveillance and response capacities at the national level

Although the IHR advanced public health efforts at the national and global levels for communicable diseases, it remains a limited instrument and does not adopt an “all hazards” approach.

PUBLIC HEALTH SECURITY FRAMEWORK

Historically, public health security has been viewed narrowly as a domain encompassing infectious diseases and bioterrorism. In reality, the public health infrastruc-

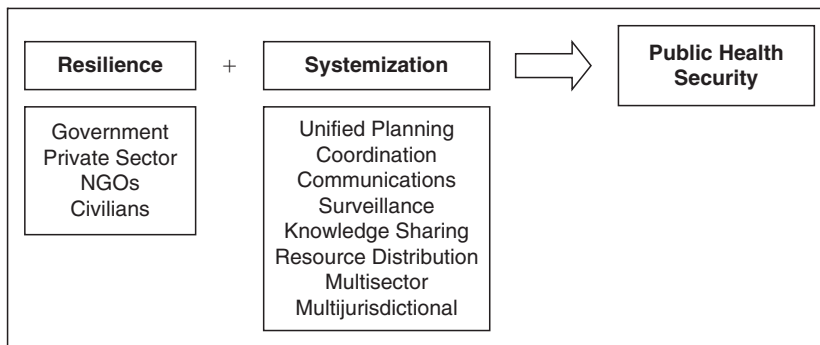


FIGURE 1-3 Public Health Security Framework

ture plays a critical role in ensuring a population's resilience to all hazards. In addition, specific systems criteria can determine whether a community will be able to provide protection to its residents from public health emergencies. The combination of resilience and systemization will lead to public health security for a population (see Figure 1-3).

Resilience Analysis Model

Resilience is a population's capacity to withstand adversity and to recovery quickly. A community's resilience to a public health crisis has traditionally been defined as the government's ability to provide personnel and resources to an affected group of people during a large-scale emergency. However, emerging studies and evaluations of communities during public health emergencies are revealing that multiple sectors contribute important functions to the preparedness and response to these large-scale crises.⁷⁻⁹

To analyze a community's resilience to public health emergencies, both actors and their contributions throughout the emergency cycle will provide valuable information on the level of resilience (see Table 1-1). In addition to the government, other key actors in public health emergencies include the private sector, NGOs, and civilian populations. Understanding their roles and contributions will allow public health professionals and policy makers to improve the community's capacity to provide public health security. Knowing the resources available from each actor during each stage of a potential emergency (preparedness, response, and mitigation) can optimize the collective protection of the population.

TABLE 1-1 Resilience Analysis Model

Actors	Stages of Public Health Emergency		
	Preparedness	Response	Mitigation
Government	1. Training 2. Plans 3. Drills 4. Surveillance 5. Stockpiles	1. Personnel 2. Material supplies 3. Medical care 4. Security 5. Needs assessments	1. Return to normal activity 2. Design improvements 3. Technology advancements 4. Standards and regulations
Private sector	1. Contingency operations plans 2. Information backup 3. First-aid training	1. Evacuation 2. First aid 3. Material supplies	1. Return to normal activity 2. Design improvements 3. Technology advancements 4. Implementation of standards and regulations
Nongovernmental organizations	1. Training 2. Plans 3. Stockpiles	1. Personnel 2. Material supplies 3. First aid 4. Counseling 5. Family reunification 6. Food 7. Shelter 8. Clothing	1. Targeted stockpiles 2. Increased training
Civilian population	1. First-aid training 2. Emergency contacts 3. Home-preparedness kits	1. Evacuation 2. First aid 3. Counseling 4. Food 5. Shelter 6. Clothing	1. Return to normal activity 2. Housing modifications

Systemization

Although multiple actors provide capacity for public health emergencies, their resources and personnel alone cannot ensure public health security. Specific systems criteria must be established to unify the multisector and multijurisdictional capabilities that are deployed before, during, and after a large-scale crisis. The key systems components are summarized here:

- Unified planning
- Coordination
- Communications
- Knowledge sharing
- Surveillance
- Resource distribution

With this systemization of the actors and their capabilities, the available capacity can be more effectively and more quickly implemented during a sudden, large-scale event.

Unified planning allows sectors and government agencies the ability to plan and train together prior to an actual event. These interagency and multisector efforts offer various entities an opportunity to become familiar with one another's personnel and to become aware of all available resources. While conducting unified planning, the multiple actors can also develop plans on improved coordination among the responders. In 2005, Hurricane Katrina demonstrated that large-scale public health emergencies require enormous logistical planning and coordination to achieve effective results. The U.S. Government Accountability Office (GAO) found that there was inadequate delineation of responsibilities across agencies and jurisdictions to ensure effective outcomes.¹⁰ In addition, resources were not shared and distributed among agencies that would have allowed for greater efficiency and more timely delivery of goods and services to the communities that were devastated by the storm.

Communications become vital for both knowledge sharing and surveillance. If different sectors or agencies have access to varying levels of information, then the public health infrastructure is at risk for a systemic breakdown. The September 11, 2001, terrorist attacks revealed the potential systems failures that may occur if the sectors do not possess shared communications. The New York Police Department (NYPD) and the New York Fire Department (NYFD) used separate radio communications channels. When it became evident that the World Trade Center towers were going to collapse, the NYPD officers in the helicopters who had knowledge of the threat posed by structural instability were not able to communicate evacuation information to the NYFD fire fighters in the buildings.¹¹ Hundreds of NYFD fire fighters lost their lives because of this lack of systemized communication and inability to share knowledge across jurisdictions.

CONCLUSION

Whether due to natural, deliberate, or accidental causes, public health emergencies continue to increase in the United States and other countries. As the global population becomes more urbanized, larger numbers of people living in densely populated

“mega-cities” are exposed to public health hazards. If such an event does occur, the magnitude of its impact is likely to be enormous simply because of the large number of individuals exposed to the threat. Although recent U.S. and international laws have attempted to strengthen the public health infrastructure, these efforts have focused specifically on communicable disease threats and bioterrorism. A broader and more extensive public health security framework that includes resilience and systemization will assist federal, state, and local public health professionals, policy makers, responders, and public officials in protecting communities from public health emergencies. Collective multisector efforts will lead to collective public health security for populations.

NOTES

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