



# Pandemics – The Threat That Will Never Go Away

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Most people associate homeland security with counterterrorism intelligence-gathering, investigations and tactical teams breaking down doors to capture suspects. Those who travel frequently often associate the field with aviation security when they encounter Transportation Security Administration (TSA) personnel at an airport checkpoint. Others associate homeland security with geographical areas, such as border security and disaster relief. Few people, however, realize that public health, particularly elements that focus on discovering, mapping and addressing major disease outbreaks, is a critical aspect of the homeland-security enterprise. In many ways, pandemics represent a far greater threat in terms of lives lost and economic damage than any terrorist – unless that terrorist has access to a weapon of mass destruction. While public health, in most people’s minds, may not be as “sexy” as counterterrorism, it is of grave importance to homeland security.

This backgrounder will delve into the realm of pandemics in an effort to understand the nature of the threat they pose to homeland security. First we’ll look at what pandemics are in terms of definition and characteristics. Then we’ll explore examples of pandemics throughout history before moving on to what pandemics could potentially do to our contemporary world – and what we need to do to prepare for them.

## **Pandemic vs. Epidemic**

A pandemic can be defined as a disease that attacks a large population across great geographic distances – in other words, a disease outbreak of national or global proportions. Pandemics are larger than epidemics in terms of the area and number of people affected. Epidemics are typically seasonal and affect a much smaller area. Seasonal outbreaks of the flu virus, or influenza, are examples of epidemics. Pandemics, on the other hand, are usually caused by novel subtypes of viruses or bacteria for which human beings have little or no natural resistance. Consequently, they typically result in more deaths, social disruption and economic loss than epidemics. Generally speaking, influenza viruses represent the most common agent for pandemics.



According to the Geneva-based World Health Organization (WHO), a part of the United Nations, an influenza pandemic can go through six phases:

- **Phase 1** is the natural state in which influenza viruses circulate continuously among animals, especially birds, but do not affect humans.
- **Phase 2** involves animal influenza circulating among domesticated or wild animals that have caused specific cases of infection among humans.
- **Phase 3** represents the mutation of the animal influenza virus in humans so that it can be transmitted to other humans under certain circumstances (usually very close contact between individuals). At this point, small clusters of infection have occurred.
- **Phase 4** involves community-wide outbreaks as the virus continues to mutate and becomes more easily transmitted between people (such as transmission through the air).
- **Phase 5** represents human-to-human transmission of the virus in at least two countries in a given WHO region (the WHO divides the world into six geographic regions) and suggests that a global pandemic is imminent.
- **Phase 6** is the pandemic phase, characterized by community-level influenza outbreaks in at least one other country in another WHO region, which often means that the pandemic has spread to multiple locations around the world.

### **Pandemic Investigations**

So who tracks all these phases and makes sense out of them? In a word, epidemiologists. Epidemiologists are public health researchers who study the causes, effects and spread of communicable diseases, as well as their potential treatments. They are, in other words, the public health equivalent of the FBI agent gathering intelligence and building cases against suspected terrorist cells. These researchers engage in “syndromic surveillance,” also known as “clinical surveillance,” which is the collection and analysis of data about diseases, particularly infectious diseases. Syndromic surveillance through the analysis of medical data can help epidemiologists identify new disease outbreaks, isolate the infectious agent and determine the “disease vector” – the person, animal or microorganism that spreads the disease. They look at data on hospital admissions and reports from physicians to public health officials on patients exhibiting mysterious symptoms or symptoms caused by a known infectious agent, all in an effort to discern patterns.

Pandemics often start with a “whimper” rather than a “bang” with a few people (sometimes in disparate geographic locations, though usually with a person or animal acting as a disease vector) exhibiting symptoms that are sometimes misdiagnosed. Then they spread, either gradually or quickly depending on



the behavior of the bacteria or viruses in question. Just as a counterterrorism investigation can begin with information provided to the FBI from a local law-enforcement agency that received a report from a patrolman who noticed suspicious behavior, epidemiologists at the Centers for Disease Control (CDC), the nation's premier federal public health agency, are often dependent on reports reaching them via city or county public health agencies that have, in turn, been alerted to a problem by a sharp-eyed physician in a hospital or clinic.

As with other areas of homeland security, the system is only as good as the links that make up the chain of information. An isolated bit of information in a specific location can sometimes have implications with truly profound consequences for the nation and the world.

### **Pandemics: Past to Present**

Of course, we've come a long way in terms of identifying and managing pandemics. Human history records a number of significant pandemics, from influenza to tuberculosis, with devastating results. From this, most people associate pandemics with death, but few understand the severe impact pandemics have on society as a whole. The following three cases explore the potentially devastating nature of pandemics, in terms of both the loss of life and economic impact.

#### **The Black Death**

In the spring of 1348, the bubonic plague struck Asia and Europe and continued to return, in varying degrees of virulence, until the 18th century. The plague caused painful swelling of the lymph nodes, known as "buboes," which caused the skin to be covered with dark blotches. From this, the name, "black death," was popularized.

Rodents carried the disease, while another version of it, known as the pneumonic plague, was transmitted by air. Set in a period devoid of modern medical care and sterile hygiene standards, four out of five infected persons died within a week of contracting the bubonic plague, or in as few as one or two days if infected by the pneumonic plague. Collectively, some 75 million people are thought to have died from the pandemic with at least 20 million deaths in Europe, which accounted for potentially two-thirds of Europe's population.

The impact of a highly contagious pandemic of such virulence led to what is commonly referred to today as "social distancing," but in a very extreme way. People fled cities, abandoning family and friends, which caused old class and religious structures to break down. For a time, the process of urbanization was reversed and Europe reverted to a more agrarian society. The economic impact was startling. With fewer



people left to produce goods, basic commodities became extremely expensive. Additionally, wages for peasants increased creating slightly more social mobility for those who were lucky enough to survive.

### **Smallpox**

Smallpox is a highly contagious disease caused by the variola virus, which in the 20th century, is thought to have killed 300 to 500 million people globally. Its more virulent strain has a mortality rate of 30 percent to 35 percent. Originally transmitted by Europeans to the Americas during the Spanish and Portuguese colonization of Latin America, smallpox is thought to have been the main reason for the devastating drop in population among the native peoples because they had no natural immunity to the disease. Some estimates suggest as many as 95 percent of the native population perished. Further, the collapse of advanced Native American civilizations, such as the Aztecs and the Incas, has been attributed to ravages of smallpox.

In 1979, as a result of successful worldwide vaccination campaigns, the WHO declared smallpox to have been completely eradicated. The virus is thought to exist only in a handful of laboratories around the world.

Ironically, the success of the WHO's eradication campaign has left today's human population at risk. People are no longer vaccinated against the virus and, consequently, human populations are highly vulnerable to it. The virus could reappear as a result of human encroachment on various biospheres, global warming or poor security at the handful of labs that maintain samples of smallpox for research purposes.

### **Spanish Flu**

Between 1918 and 1919, the Spanish flu killed approximately 50 million people globally. Some people were able to stave off the disease and only experienced severe flu symptoms. Yet many fought a losing battle with the disease and experienced an excruciating death as their lungs filled with fluid and they asphyxiated. The disease was so rapid that people sometimes died only hours after being infected.

This strain of influenza received its name because Spain, a non-combatant in World War I, provided most of the information about the outbreak. Other combatant countries, including the United States, suppressed the news, choosing to exercise military censorship. Due to that censorship, it is difficult to know the exact number of people who became infected, but the worldwide impact is clear.

The Spanish flu claimed the lives of 20 to 50 million people around the world, infecting people in all age groups, from the very young to the elderly. But most striking and of greatest social impact was the very large percentage of working-age people, aged 15 to 34, who were killed by the disease.



## Are We Prepared for Pandemics?

Considering the extent of disruption pandemics caused before jet travel, it's disconcerting to contemplate how our constantly mobile world might be affected today. Pandemics are poised to spread more quickly than they did in the past, which complicates the process of identifying the virus or bacteria in question and developing vaccinations and drug treatments. Ultimately, by spreading rapidly, pandemics can potentially kill many more people before they can be stopped.

Despite our knowledge that a pandemic outbreak could claim hundreds to millions of lives, it is not clear whether existing systems can cope with a particularly nasty outbreak. Looking at just the broad strokes, these are a few issues that must be addressed when planning for pandemics if we are to lessen their impact and foster societal resilience.

**Business Continuity** – In addition to being a threat to the health of the population, pandemics also represent a significant economic threat because large numbers of incapacitated or deceased persons mean a significant drop in the economy's productivity and function. Some public health officials estimate that in a major pandemic, particularly one that is highly contagious, some 60 percent of the workforce will be homebound, resulting in both basic goods disappearing from store shelves and the shutting down of basic services, such as municipal services, health care, transportation, law enforcement and schools. All could lead to runaway inflation due to price hikes.

Vital for large and small businesses is a pandemic response plan that enables operations to continue, even at a minimal level. That plan may include:

- Defining roles and responsibilities for planning
- Identifying critical activities in the business that must be staffed under any conditions
- Cross-training workers so that they can fill other roles as needed
- Conducting risk assessments to determine the parts of the business most likely to be vulnerable and the potential impact
- Assessing the impact of local, national or global travel restrictions on the functioning of the business
- Creating a communications plan for company employees to provide up-to-date information and instructions



**First-Responder Community** – The first-responder community is vital for meeting needs that range from providing transportation to medical facilities, to law enforcement handling crowd control, traffic and quarantine enforcement. These services require trained first responders who are capable of managing pandemic scenarios, and who have the equipment necessary for protecting themselves from disease agents transmitted through the air. Additionally, the issue of first-responder absenteeism must be addressed. Panic that often ensues with the outbreak of a major pandemic can create pressure on first responders to stay with their families or avoid work for fear of being infected.

**Transportation and Borders** – The transportation sector must prepare contingency plans to manage restrictions to the movement of persons and goods. The transportation network, which includes land, maritime and air borders, plays a critical role in slowing the spread of a pandemic. Steps must be taken to limit person-to-person contact, which naturally limits the freedom of movement via transportation networks.

**Syndromic Surveillance and Diagnostic Testing** – The U.S. public health system is underfinanced and incapable of effectively accomplishing all of its missions. This means that when a pandemic occurs, it may not be spotted for some time because the cost of effective diagnostic tests is prohibitive. Also, the ability to collate and analyze the massive amount of information about an outbreak coming in from clinics, hospitals and other health care facilities is not optimal. Better coordination between local, federal and international agencies is needed. Moreover, the recent economic crisis has led to significant budget cuts in public health at a time when public health resources need to be bolstered rather than reduced.

**Prophylaxis and Treatment** – Public health systems will need to ensure their plans for the provision of vaccines to prevent, and/or medications to treat, pandemic outbreaks are up-to-date and effective. The cycle between development and production will need to be vastly more efficient. In addition, getting the vaccine or medication to distribution points requires considerable planning, from proper administration and management of adequate supply levels, to ensuring public order at dispensing sites.

**The Health Care System** – The cost of truly preparing for a major disease outbreak is prohibitive, and the medical system is unlikely ever to have the capacity to cope with the potential number of sick individuals that could inundate clinics and hospitals. In the case of a pandemic, the best approach is to provide as many health care resources to an affected area as quickly as possible, and preferably have dual-use personnel and facilities available. This means all medical personnel must be trained to play emergency roles in the event of a pandemic, and hospitals and other health care facilities must find ways to quickly scale resources.



## Conclusions

Unlike foreign and domestic terrorist threats, pandemics can occur spontaneously or intentionally, assuming that a hostile regime could access and unleash a biological weapon. Also unlike a bomb or traditional warfare, it is impossible to predict with absolute certainty how or where a pandemic will spread. This fact alone puts the entire globe at risk given today's fluid transportation among countries and continents. And yet there is one arena in which pandemics have something in common with more familiar terrorist threats: their prevention. Just as a population and its crucial components (i.e., first responders and law enforcement) must educate themselves if they stand any chance of effectively managing and mitigating a traditional terrorist threat, so too must they prepare themselves thoroughly for the possibility of a pandemic. Indeed, education and preparedness is anyone's best defense, whether it's a government, a business or an individual. We have seen what pandemics can do to populations, societies and economies. It's up to us how we change that for the future.

For more interesting background information on pandemics, see the TED Ed presentation: "[How Pandemics Spread](http://ed.ted.com/lessons/how-pandemics-spread)" <<http://ed.ted.com/lessons/how-pandemics-spread>>.

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## Homeland Security and CTU

The field of homeland security continues to evolve, as does the focus of dedicated professionals seeking advanced knowledge and skills relevant to the protection of United States and its territories, communities and organizations from a variety of threats, including **cybersecurity**.

Colorado Technical University is proud to be one of just a handful of universities in the United States to offer a **Master's in Homeland Security** (HLS). CTU's program is designed to provide students with a broad understanding of the homeland security enterprise at the strategic policymaking level. Geared toward homeland security practitioners, the program provides them with analytical and communication tools that can prepare them to become decision-makers in their chosen area of expertise. It has also been designed to expand students' knowledge of other disciplines within the larger homeland security enterprise, thus helping them understand the roles of given disciplines, such as law enforcement, fire, emergency services, **cybersecurity** and public health.



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