

2. Flu Pandemic Background

What is a pandemic?⁶

The word pandemic is used to describe a disease that affects people on a worldwide scale. Flu pandemics have occurred roughly every 20 to 30 years throughout history, the most serious being the misnamed “Spanish flu” of 1918, the “Asian flu” of 1957 and the “Hong Kong flu” of 1968.

Three conditions must be met to result in a pandemic:

1. The emergence of a new flu strain
2. The ability of that strain to infect humans and cause serious illness
3. The ability to spread easily among humans

Influenza pandemic is inevitable

Most experts agree that the question is not *if* another flu pandemic will occur, but *when*. But while some scientists worry that the current situation indicates a looming pandemic, others doubt that there is any immediate danger. Regardless of whether a pandemic occurs in the next year or the next 50 years, however, the consensus among public health officials is that we should prepare ourselves for this eventuality now. The Centers for Disease Control and Prevention (CDC) has developed a comprehensive pandemic planning guide that is updated regularly. Find it at www.pandemicflu.gov.



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How does seasonal flu differ from pandemic flu?⁷

Seasonal Flu	Pandemic Flu
Outbreaks follow predictable seasonal patterns; occurs annually, usually in winter, in temperate climates	Occurs rarely (three times in 20th century—most recently in 1968)
Usually some immunity built up from previous exposure	No previous exposure; little or no preexisting immunity
Healthy adults usually not at risk for serious complications; the young, the elderly and those with certain underlying health conditions at increased risk for serious complications	Healthy people may be at increased risk for serious complications
Health systems can usually meet public and patient needs	Health systems may be overwhelmed
Vaccine developed based on known flu strains and available for annual flu season	Vaccine probably would not be available in the early stages of a pandemic
Adequate supplies of antivirals are usually available	Effective antivirals may be in limited supply
Average US deaths approximately 36,000/year	Number of deaths could be high
Symptoms: fever, cough, runny nose, muscle pain. Deaths often caused by complications, such as pneumonia	Symptoms may be more severe and complications more frequent
Generally causes modest impact on society (eg, some school closings, encouraging people who are sick to stay home)	May cause major impact on society (eg, widespread restrictions on travel, closing of schools and businesses, cancellation of large public gatherings)
Manageable impact on domestic and world economy	Potential for severe impact on domestic and world economy



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Who is most at risk for pandemic flu?

Pandemic flu

A flu pandemic occurs when a new flu virus appears against which the human population has no immunity. This results in several simultaneous epidemics worldwide, with enormous numbers of infections and deaths. With the increase in global transport and communications, as well as urbanization and overcrowded conditions, epidemics due to the new flu virus are likely to take hold quickly around the world.⁶

Pandemic flu doesn't discriminate. In the worst pandemic of all time, the "Spanish flu" of 1918, as many as 50 million people perished worldwide. This pandemic caused most deaths in young and healthy persons in the age range of 15 to 35 years. In a complete reversal of previous patterns, 99% of deaths occurred in people younger than 65 years.⁸ The "milder" flu pandemic that occurred during 1968 and 1969 killed 1 million people across the globe.⁹



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What is the likelihood of a flu pandemic occurring?

The evolution of flu viruses cannot be predicted. This makes it difficult to know if or when a virus might mutate to become easily transmittable among humans. Therefore, it is impossible to say when another pandemic will arise, or whether it will be mild or severe.

However, the World Health Organization asserts that once a virus allows for efficient human-to-human transmission, a pandemic can occur. Because of high global mobility and interconnection, illness could spread quickly, and, if the virus has a high fatality rate, threaten millions of lives around the world.¹⁰

A lesson from the past

Pandemics are a reality. Health records show at least 10 influenza pandemics over the past 300 years.^{11,12}

1732-1733
1781-1782
1800-1802
1830-1833
1847-1848
1857-1858
1889-1900
1918-1919
1957-1958
1968-1969



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What are the levels of severity of a flu pandemic?¹³

The WHO's monitoring system shows signs of progression toward what has the potential of becoming a pandemic.

Interpandemic Period	Phase 1	No new flu subtypes in humans	Low risk of human infection from flu present in animals
	Phase 2	No new flu subtypes in humans	Animal flu subtype poses substantial risk to humans
Pandemic Alert Period	Phase 3	Human infections with new flu subtype	Rare human-to-human transmission of disease
	Phase 4	Small clusters of human-to-human transmission	Infected areas highly localized
	Phase 5	Larger clusters of human-to-human transmission	Infected areas still localized
Pandemic Period	Phase 6	Increased and substantial transmission in general population	Global pandemic risk
Postpandemic Period	Post-pandemic Period	Return to interpandemic period	

Estimated Current Pandemic Phase (as of 4/06)



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How would a pandemic impact the United States?¹⁴

A flu pandemic may strike in waves, each of which could last for 6 to 8 weeks. An especially severe pandemic could lead to widespread illness, a large number of deaths and economic loss. Everyday life would be disrupted because so many people in so many places would become seriously ill at the same time. Impact could range from school and business closings to the interruption of such basic services as public transportation and food delivery.

Health services overwhelmed

A substantial portion of the world's population would require some form of medical care. Healthcare facilities would be overwhelmed, creating a strain on hospital staff and a shortage of beds, ventilators and other supplies. To cope with the demand, "surge capacity" at nontraditional sites, such as schools, may need to be created. The need for vaccine is likely to outstrip supply, and the supply of antiviral drugs is also likely to be inadequate early in a pandemic. Difficult decisions would need to be made regarding who gets the vaccinations and antiviral therapy.



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How would a pandemic impact the United States?¹⁴ (cont'd)

High rates of mortality

Mortality rates are determined by four factors:

1. Number of people who become infected
2. Virulence of the virus
3. Underlying characteristics and vulnerability of affected populations
4. Availability and effectiveness of preventive measures

Pandemic	US Deaths	Worldwide Deaths
1918/19	500,000+	40,000,000+
1957/58	70,000+	1,000,000-2,000,000
1968/69	34,000	700,000+



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How would a pandemic impact mortality?

A wide range of estimates¹⁵

Central to preparedness planning is estimating the mortality rate of the next pandemic. Experts' answers to this fundamental question have ranged from 2 million to more than 50 million. All of these predictions are scientifically grounded. The reasons for the wide range of estimates are numerous.

Some estimates are based on extrapolations from past pandemics but significant details of these events are disputed, such as the true numbers of resulting deaths. The most precise predictions are based on the pandemic in 1968, but even in this case, estimates vary from 1 million to 4 million deaths. Similarly, the number of deaths from the "Spanish flu" pandemic of 1918 is posited by different investigators to range from 20 million to well over 50 million.

Extrapolations are problematic because the world of today is a different place from the world of 1918. The impact of greatly improved nutrition and healthcare needs to be weighed against the contribution that the increase in international travel would have on global spread. The specific characteristics of a future pandemic virus cannot be predicted. It may affect 20% to 50% of the total population. It is also unknown how pathogenic a novel virus would be.



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How would a pandemic impact mortality? (cont'd)

Millions likely to be affected—even in a moderate pandemic¹⁵

Even in the best-case scenarios of the next pandemic, 2 to 7 million people could die and tens of millions could require medical attention worldwide.

Two scenarios for the potential impact of a flu pandemic on the US¹²:

Characteristic	Moderate (1957-/68-like)	Severe (1918-like)
Illness	90 million (30%)	90 million (30%)
Outpatient medical care	45 million (50%)	45 million (50%)
Hospitalization	865,000	9,900,000
ICU intervention	128,750	1,485,000
Mechanical ventilation	64,975	742,500
Deaths	209,000	1,903,000



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If pandemic flu were to emerge in the US, what interventions might slow its spread and minimize its impact?¹⁶

Overview

Researchers from the Los Alamos National Laboratory evaluated the effectiveness of different intervention strategies for a flu pandemic by developing a model that represents the US population and tests different properties of a potential pandemic flu virus. They found that, depending on the contagiousness of the virus, a variety of approaches could reduce the number of flu cases to fewer than that of an annual flu season.

Method

The scientists simulated a virtual outbreak on computers at the Los Alamos National Laboratory. The researchers tested different interventions: distributing antiviral treatments to infected individuals and others near them to reduce symptoms and susceptibility; vaccinating people, possibly children first, with either 1 or 2 shots of a vaccine not well matched to the strain that may emerge; social distancing, such as restricting travel and quarantining households; and closing schools.



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If pandemic flu were to emerge in the US, what interventions might slow its spread and minimize its impact?¹⁶ (cont'd)

No interventions

The results showed that, with *no* intervention, a pandemic flu with low contagiousness could peak after 117 days and infect about 33% of the US population. A highly contagious virus could peak after 64 days and infect about 54% of the population.

Using interventions

The researchers then compared what might happen in scenarios involving the use of different interventions. When the simulated virus was less contagious, the 3 most effective single measures included: distributing several million courses of antiviral treatment to targeted groups 7 days after a pandemic alert; school closures; and vaccinating 10 million people per week with 1 dose of a poorly matched vaccine. The results also showed that vaccinating school children first is more effective than random vaccination when the vaccine supply is limited. Regardless of contagiousness, social distancing measures, alone, had little effect. But when the virus was highly contagious, all single-intervention strategies left nearly half the population infected. In this instance, the only measures that reduced the number of cases to below the annual flu rate involved a combination of at least three different interventions, including a minimum of 182 million courses of antiviral treatment.



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How would a pandemic impact the US economy?

A pandemic could deliver a “shock” to the economy, with immediate demand- and supply-side effects, as well as longer-term supply-side effects.¹⁷

The general slowdown in economic activity would reduce gross domestic product (GDP). Business confidence would be dented, the supply of labor would be restricted, supply chains would be strained as transportation systems were disrupted and arrears and default rates on consumer and business debt would probably rise. It seems likely that the stock market would initially fall and rebound later.¹⁷

Estimates of the economic impact vary widely. A pandemic could cause a serious recession in the US economy, with immediate costs ranging from \$500 billion to \$675 billion. The following is a sampling of predictions from financial leaders¹⁸:

- WBB Securities LLC** predicted that a pandemic could cause a 1-year economic loss of \$488 billion and a permanent economic loss of \$1.4 trillion to the US economy
- The Congressional Budget Office** said a pandemic could deal a \$675 billion hit to the US economy
- The World Bank** has predicted that a pandemic could cost the global economy \$800 billion a year



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How would a pandemic impact my organization?

Decline in travel and leisure activities¹⁷

In all likelihood, during the spread of a flu pandemic, international travel would dramatically decline as people avoided flu “hotspots” and governments restricted travel. People would quarantine themselves and their families by staying at home more. Nonessential activities requiring social contact would be sharply curtailed, leading to significant declines in retail trade. People would avoid public places, such as shopping malls, community centers, places of worship and public transit. Attendance at theaters, sporting events, museums and restaurants would decline.

Schools and business would suffer¹⁷

It seems likely that many schools would close, and even if they did not, attendance would fall dramatically as parents kept their children at home. In either event, large-scale school closings would lead to a spike in workplace absences because parents would stay home to care for their children even if they were not sick. The impact on businesses of all kinds due to employee absenteeism would be dramatic. Many would close, at least temporarily.



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How would a pandemic impact my organization? (cont'd)

Supply-side impact¹⁷

Lost Employee Productivity

- Increase in absenteeism due to illness, caring for sick and implementation of policies to contain the pandemic (eg, social distancing); could reach 30% during peaks
- Risk that some companies do not have capacity to support increases in telecommuting

Disruption of Supply Chains

- Disruption of transportation networks that limit ability to receive and distribute goods

Operations and Facilities Shutdown

- Increase in absenteeism due to illness, caring for sick and social distancing policies; could reach 30% during peaks
- Inability to maintain operations because of shortages of staff, supplies or utilities
- Closure of facilities due to social distancing

Demand-side impact¹⁷

Drop in Demand for Products and Services

- Many companies will see drops in demand for products and services
 - Reduction in customer base due to illness and death
 - Customers likely to avoid public shopping areas, restaurants, entertainment facilities, etc
 - Potential decline in discretionary income as businesses are forced to halt operations
- Closure of facilities due to social distancing



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Is the world prepared for a pandemic?¹⁹

No. Despite the advance warning, the world is ill-prepared to defend itself against a flu pandemic. WHO has urged all countries to develop preparedness plans, but only approximately 40 have done so.

WHO has further urged countries with adequate resources to stockpile antiviral drugs nationally for use at the start of a pandemic.

Under the current situation, most developing countries may have limited access to vaccines and antiviral drugs throughout the duration of a pandemic.

