



3.17 RISK ASSESSMENT: PANDEMIC

DESCRIPTION

A pandemic describes an epidemic that covers a wide geographic area and affects a large proportion of the population with peak times of morbidity and mortality. “Seasonal influenza affects 10% of the population annually, killing up to one million persons worldwide. Pandemic viruses have even greater potential for mortality.....”¹ Previous pandemics including smallpox, tuberculosis, SARS, HIV, West Nile Virus, and H1N1 have historically affected the United States, crossed international borders, and have even spread across populations worldwide.

As defined in Idaho Emergency Operations Plan (EOP), a yearlong pandemic without intervention could result in almost 10 million hospitalizations and an estimated 1.9 million Americans could die.²

Pandemic considerations include infection and illness, disease incubation time, how the disease spreads, and the geographic area affected. In addition, modern air travel has made it possible to spread pandemic worldwide in a very short time period. Psychological effects to consider include increased levels of anxiety and fear of contracting the disease. Implementation of epidemical reaction pertains to pandemic wave or successive waves, infection rates from baseline levels and effective control measures.

Resistant bacteria and the overuse of antibiotics relate to re-emergence of diseases that were once under control. Pandemic definitions below are described by the Center for Disease Control (CDC).

Cholera is a bacterial infection in the small intestine that may cause diarrhea, dehydration, and death. It spreads by ingesting food or water contaminated with the feces from infected persons. Cholera outbreaks no longer exist in the United States due to water treatment and sanitation systems.

“About 425 million doses of trivalent influenza vaccine are produced annually, enough to protect less than 7% of the world's population. In the event of a pandemic, well-matched protective vaccines against a novel agent would not be available for at least several months, highlighting the importance of therapeutic options.”

~ Science 20 March 2009, Vol. 323. No. 5921, pp. 1560-1561.
Pandemic Influenza: An Inconvenient Mutation

¹ "[Pandemic Influenza: An Inconvenient Mutation](#)," Scott P. Layne, Arnold Monto and Jeffery K. Taubenberger, Science 20 March 2009: Vol. 323. no. 5921, pp. 1560 - 1561.

² Idaho Bureau of Homeland Security. (2012). *Idaho Emergency Operations Plan*. Boise.



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Diphtheria is a contagious infection caused by bacteria affecting the upper respiratory tract and less often the skin. Coughing, sneezing, or even laughing easily transmits the disease. Complications are breathing problems, heart failure, and nervous system damage. Diphtheria is rare in the United States due to immunizations.

HIV/AIDS is an abbreviation for Human immunodeficiency virus infection/acquired immunodeficiency syndrome. A viral infection transmitted by sexual intercourse, contaminated blood transfusions, or from infected mother to child during pregnancy or breastfeeding compromises the immune system. This disease is recent compared to other pandemics first recognized by the Centers for Disease Control and Prevention in 1981, and no current cure exists although breakthroughs in research are promising.

Influenza is an infectious viral disease of birds and mammals commonly transmitted through airborne aerosols such as coughing or sneezing. Symptoms are chills, headache, fever, nausea, muscle pain and occasionally pneumonia. New flu strains caused pandemics in the late 19th and 20th Centuries: Russian flu, 1918 Spanish influenza, Asian flu, Hong Kong flu, and A/H1N1 or the swine flu. According to the CDC, "Avian influenza refers to the disease caused by infection with avian (bird) influenza (flu) Type A viruses. These viruses occur naturally among wild aquatic birds worldwide and can infect domestic poultry and other bird and animal species. Avian flu viruses do not normally infect humans." The recent avian flu strains H5N1 and H7N9 have caused human deaths but have not escalated to pandemic proportions.



1918 Pandemic / Source: *Office of Public Health Service Historian*

Measles is a serious respiratory disease caused by a virus. It spreads easily through coughing and sneezing. In rare cases, it can be deadly. The measles, mumps, rubella (MMR) vaccine protects against measles.

Pertussis (Also, known as Whooping cough) is a very serious respiratory (in the lungs and breathing tubes) infection caused by the pertussis bacteria. It causes violent coughing you cannot stop. Whooping cough is most harmful for young babies and can be deadly. The DTaP vaccine protects against whooping cough.

Plague is a disease that affects humans and other mammals-caused by the bacterium, *Yersinia pestis*. Humans usually get plague after rodent fleabite that is carrying the plague bacterium or by handling an animal infected with plague. Plague is infamous for killing millions of people in Europe during the Middle Ages. Today, modern antibiotics are effective in treating plague. Without prompt treatment,



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the disease can cause serious illness or death. Presently, human plague infections continue to occur in the western United States, but significantly, more cases occur in parts of Africa and Asia.

Polio (or poliomyelitis) is a disease caused by poliovirus. It can cause lifelong paralysis (cannot move parts of the body), and it can be deadly. Nevertheless, the polio vaccine can protect against polio.

Q fever is a worldwide disease with acute and chronic stages caused by the bacteria *Coxiella burnetii*. Cattle, sheep, and goats are the primary reservoirs although a variety of species may be infected. Organisms, excreted in milk, urine, and feces of infected animals. During birthing, the organisms are shed in high numbers within the amniotic fluids and the placenta. The organism is extremely hardy and resistant to heat, drying, and many common disinfectants which enable the bacteria to survive for long periods in the environment. Infection of humans usually occurs by inhalation of these organisms from air that contains airborne barnyard dust contaminated by dried placental material, birth fluids, and excreta of infected animals. Other modes of transmission to humans, including tick bites, ingestion of unpasteurized milk or dairy products, and human-to-human transmission, are rare. Humans are often very susceptible to the disease, and very few organisms may be required to cause infection.

Severe Acute Respiratory Syndrome (SARS) is a viral respiratory illness caused by a coronavirus, called SARS-associated coronavirus (SARS-CoV). SARS was first reported in Asia in February 2003. Over the next few months, the illness spread to more than two dozen countries in North America, South America, Europe, and Asia before the SARS global outbreak of 2003 was contained.

Smallpox is a serious, contagious, and sometimes fatal infectious disease. There is no specific treatment for smallpox disease, and the only prevention is vaccination. The *pox* part of *smallpox* is derived from the Latin word for “spotted” and refers to the raised bumps that appear on the face and body of an infected person.

There are two clinical forms of smallpox. Variola major is the severe and most common form of smallpox, with a more

extensive rash and higher fever. There are four types of variola major smallpox:

ordinary (the most frequent type, accounting for 90% or more of cases); modified (mild and occurring in previously vaccinated persons); flat; and hemorrhagic (both rare and very severe). Historically, variola major has an overall fatality rate of about 30%; however, flat and hemorrhagic smallpox usually are



Source: South Central Public Health District



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fatal. Variola minor is a less common presentation of smallpox, and a much less severe disease, with death rates historically of 1% or less.

Smallpox outbreaks have occurred from time to time for thousands of years, but the disease is now eradicated after a successful worldwide vaccination program. The last case of smallpox in the United States was in 1949. The last naturally occurring case in the world was in Somalia in 1977. After the disease was eliminated from the world, routine vaccination against smallpox among the public was stopped because it was no longer necessary for prevention.

Tuberculosis (TB) is a disease caused by a bacterium called *Mycobacterium tuberculosis*. The bacteria usually attack the lungs, but TB bacteria can attack any part of the body such as the kidney, spine, and brain. If not treated properly, TB disease can be fatal. TB disease was once the leading cause of death in the United States. TB is spread through the air from one person to another. The TB bacteria are put into the air when a person with TB disease of the lungs or throat coughs, sneezes, speaks, or sings. People nearby may breathe in these bacteria and become infected.

Typhoid Fever is a bacterial infection of the intestinal tract and bloodstream. Most of the cases are acquired during foreign travel to underdeveloped countries. The germ that causes Typhoid is a unique human strain of *Salmonella* called *Salmonella typhi*.

West Nile Virus (WNV) is a potentially serious illness. Experts believe WNV established as a seasonal epidemic in North America that flares up in the summer and continues into the fall.

LOCATION, EXTENT, AND MAGNITUDE

The 1918 flu or “The Spanish flu” (Spain was one of the earliest and hardest hit countries) made its way around the world in just a few months. Many victims were healthy adults and younger populations. Masks and shutters were required in U.S. public places, in hope to avoid spreading the disease. Many victims died within hours to days of contracting the Spanish flu.

During this pandemic, a number of World War I (1914-18) service members contracted the infectious illness. Journalist Gina Kolata reported more U.S. soldiers died from the virus

In the U.S., “flu season” generally runs from late fall into spring. In a typical year, flu-related symptoms hospitalize more than 200,000 Americans, and over the past three decades, there have been some 3,000 to 49,000 flu-related deaths in the U.S. annually, according to the Centers for Disease Control and Prevention. – Although typical flus are not pandemic, their early symptoms often present the same.



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than from battle. “Even President Woodrow Wilson (1856-1924) reportedly contracted the flu in early 1919 while negotiating the Treaty of Versailles, which ended World War I.”³

The relative ease of world-wide travel in addition to the world’s expanding global food industry ensures that all countries are vulnerable to pandemic events at any time.

PAST OCCURRENCE

In June 2012, Idaho Governor Butch Otter’s office released a public information memo regarding The Idaho State Department of Agriculture (ISDA) Division of Animal Industries investigation that confirmed detection of Q Fever in two goats, testing positive for *Coxiella Burnetii* (*the causative organism for Q Fever*). Unknowingly, a fellow goat producer attending the Goat Expo in Boise entered the contaminated goats into the competition.

Due to pro-active mitigation measures including immediate notification to the public, best practices to prevent the illness, and response measures, such as producers and handlers testing their potential exposed livestock via comingled or individual milk samples through the state laboratory, this incident’s impact was minimal.⁴

Idaho Department of Health and Welfare releases an annual reportable disease summary. CY2010 and CY2011 are listed below in Table 3.17.A.⁵

Table 3.17.A State of Idaho Reportable Disease Summary		
Reportable Disease	CY2010	CY2011
Diphtheria	0	0
HIV	32	50
Pertussis	187	192
Plague	0	0
Q Fever	3	0
SARS (severe acute respiratory syndrome)	0	0
Smallpox	0	0

³ <http://virus.stanford.edu/uda/>

⁴ Office, S. o. (2012, June 15). Public Information Release Memo - Confirmed Q Fever Case. Boise, Idaho, United States.

⁵ <http://www.healthandwelfare.idaho.gov/Health/Epidemiology/IdahoDiseaseSummary/tabid/202/Default.aspx>



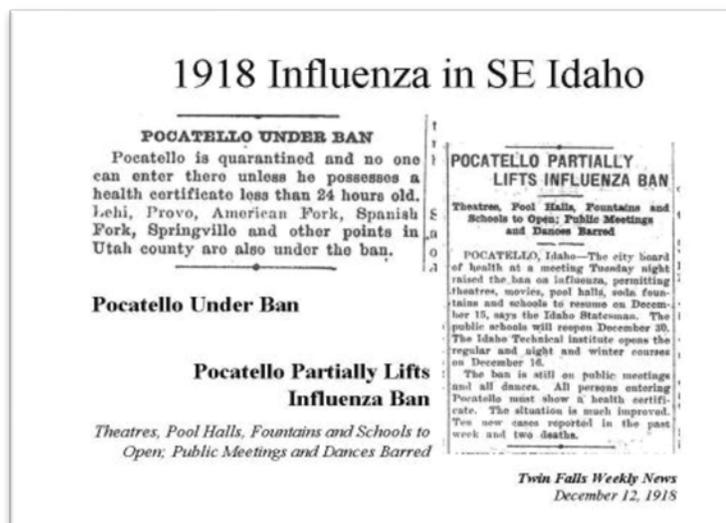
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Tuberculosis	15	12
West Nile Virus Infections	3	3

Other pandemic influenza events occurred in 1958, killing 2 million people worldwide, including some 70,000 in the United States. The pandemic influenza of 1968 killed approximately 1 million (1968 to 1969), including 34,000 Americans, and the H1N1, also known as the Swine Flu, killed nearly 12,000 Americans from 2009 to 2010.

Researchers have estimated that the global mortality population ranged between 21.5 and 50 million people as a result the Great Pandemic of 1918. During that pandemic, twenty-five percent of the American population became ill and 675,000 Americans died.

Communities throughout Idaho reported 1918 influenza outbreaks and deaths and prohibited public events. The State Board of Health cancelled public and private schools statewide in hopes of preventing the spread to children and families. The community of Hansen reported 46 cases in one day.⁶ The Pandemic of 1918 first affected Idaho in Canyon County. In less than two weeks, the number of cases grew to the extent the State was unable to track the disease accurately. Idaho officials and media urged Idahoans to remain calm, adding prohibition of public gatherings. By late October, there were reported influenza cases in Boise, Coeur d’Alene, Idaho Falls, Lewiston, Moscow, Pocatello, Twin Falls, Wallace, and other areas in the state.⁷ The military servicemen suffered great losses. Special trains transported the dead and coffins were in short supply.⁸



A summary of some of the larger scale pandemic influenza episodes world-wide is depicted below in Table 3.17.B.

⁶ http://www.phd5.idaho.gov/PanFluSouthIdaho/docs/panflu_need_to_know.pdf

⁷ http://www.messenger-index.com/news/article_03e7637e-4de8-11e2-bde7-001a4bcf887a.html

⁸ CDC Pandemic Influenza – Past, Present, Future Workshop, Oct.17, 2006



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Pandemic Influenza	Outbreak-Finish Time	Death toll	Description	Subtype involved
Russian Flu	1889–1890	1 million	Some believe that the 1889 - 1890 Russian flu was caused by the influenza virus A virus subtype H2N2, but the evidence is not conclusive. It is the earliest flu pandemic for which detailed records are available. The 1889 pandemic, known as the Russian Flu, began in Russia and spread rapidly throughout Europe. It reached North America in December 1889 and spread to Latin America and Asia in February 1890.	possibly H2N2
Spanish Flu	1918–1920	50-100 million worldwide 675,000 Americans	The 1918 influenza pandemic (the "Spanish flu") was an unusually deadly and severe pandemic that spread across the world. This influenza pandemic was caused by an unusually severe and deadly Influenza A virus strain of subtype H1N1. Most victims were healthy young adults, in contrast to most influenza outbreaks, which predominantly affect juvenile, elderly, or weakened patients. The Spanish flu was implicated in the outbreak of encephalitis lethargica in the 1920s. The pandemic lasted from January 1918 to December 1920, spreading even to the Arctic and remote Pacific islands. Between 20 and 50 million died, making it one of the deadliest natural disasters in human history. Approximately 20-40% of the world's population contracted the illness.	H1N1 - non-standardized virus (resulting in multiple names)
Asian Flu	1957–1958	1.5 to 2 million worldwide 69,800 Americans	The 1957 influenza pandemic (the "Asian flu") was a category 2 flu pandemic outbreak of avian influenza that originated in China in early 1956 lasting until 1958. It originated from mutation in wild ducks combining with a pre-existing human strain. A vaccine for H2N2 was introduced in 1957, and the pandemic slowed down. There was a second wave in 1958, and H2N2 went on to become part of the regular wave of seasonal flu. In 1968, the H2N2 Asian flu disappeared from the human population and is believed to have gone extinct in the wild.	H2N2
Hong Kong Flu	1968–1969	1 million worldwide 33,800 Americans	Caused by H3N2 strain of the influenza A virus. Category 2 flu caused an estimated .5% of the world's population or one million deaths, 33,800 American deaths. The virus entered California from returning Vietnam War troops. Symptoms lasted 4-5 days and most elderly over the age of 65 died.	H3N2
Swine Flu	2009-2010	18,300 worldwide	The H1N1 swine flu or 2009 flu pandemic was an influenza pandemic, and the second of the two pandemics involving H1N1 influenza virus (the first of them was the 1918 flu pandemic), albeit in a new version. First described in April 2009, the virus appeared to be a new strain of H1N1 which resulted when a previous triple reassortment of bird, swine and human flu viruses further combined with a Eurasian pig flu virus, leading to the term "H1N1 swine flu" to be used for this pandemic.	novel H1N1
Avian Flu	2013	36 worldwide 0 Americans	Subgroup of influenza viruses established by circulating among birds. There is limited information about the scope of the disease. Most infections occurred in association with poultry outbreaks. Symptoms include conjunctivitis and mild upper respiratory symptoms: fever, cough, and shortness of breath. Treatment includes intensive care and mechanical ventilation. Humans cases first reported in China. There is no current prevention vaccine.	H7N9
http://www.influenzavirusnet.com/1889-russian-flu.html				
http://www.sinobiological.com/2009-Influenza-Pandemic-Swine-Flu-a-3264.html#Swine flu deaths				

Table 3.17.B: Major World Pandemic Influenza Outbreaks

FUTURE OCCURRENCE

Future occurrences of pandemic events are expected to continue. As bacteria and viruses continually evolve, there is always the opportunity for new diseases to occur. As mentioned previously, the overuse of antibiotics has the possibility to re-emerge diseases that were once under control.

H5N1 viruses are consistently changing. Public health agencies, such as the CDC look for genetic changes in H5N1 viruses that may influence HPAI H5N1 viruses' susceptibility to influenza antiviral drugs and their spread from person to person. Another trend among research includes CDC inventory



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databases compiling known H5N1 genetic changes to support international surveillance and pandemic preparedness efforts for avian influenza A H5N1 viruses.

RELATIONSHIPS TO OTHER HAZARDS

Pandemic events do not influence any natural hazards. From a human-caused perspective, it is possible that a large, long-term event could result in civil disorder.

ENVIRONMENTAL IMPACTS

Diseases that began from or are infectious animal diseases are referred to as zoonoses and include SARS, Ebola, HIV/AIDS, brucellosis, and smallpox. Zoonotic diseases transmitted to humans increased over the past 40 years. The US Institute of Medicine observed that it was ‘unable to identify a single example of a well-functioning, integrated zoonotic disease surveillance system across human and animal sectors’. However, collaborative expertise and resources are making a difference. Satellite technology led to successful prediction of a Rift Valley Fever outbreak in 2006-2007 and provided a two to six week warning period to mobilize resources to contain the epidemic.⁹

Environmental impacts include infected livestock and poultry populations: costs of quarantine, treatment, and potential destruction and cleanup infected animal populations. Governor Otter’s office reported the State Department of Agriculture confirmed case of *Q Fever* in June 2012.¹⁰ Identifying environmental impact gaps remain a priority.

BHS obtained a very complex analysis of the pandemic hazard from the University of Idaho performed by Dr. Tim Frazier and Courtney Thompson. The analysis is comprehensive and far reaching and included county-by-county assessments. For intended State Hazard Mitigation Plan (SHMP) purposes, the information provided here is for public health policy makers and emergency managers. BHS recommends holding preparedness and protection components to the forefront at all planning levels. While this hazard remains among the low-probability-high-impact threats, planning and exercises to mitigate the impact are essential.

⁹ “Zoonoses – From Panic to Planning”, IDS Rapid Response Briefing, was the work of Dynamic Drivers of Disease in Africa Consortium, with contributions from Delia Grace (ILRI), Catherine Holley (IDS/STEPS), Kate Jones (UCL) Melissa Leach (IDS/STEPS), Naomi Marks (IDS/STEPS), Ian Scoones (IDS/STEPS), Sue Welburn (University of Edinburgh) and James Wood (University of Cambridge)

¹⁰ <http://www.ktvb.com/news/local/159310085.html>



DEVELOPMENT TREND IMPACTS

Development trends across the State will have a relatively minimal influence or impact to future pandemic events.

CRITICAL INFRASTRUCTURE AND STATE FACILITY IMPACTS

As a pandemic sweeps across an area, first responders such as police and fire, medical staff, hospitals, pharmacies, drug stores, and other local businesses will be strained from the impact of the disease on the community. Emergency rooms will reach capacity, and social services and support agency offices (including shelters, Health & Welfare, Social Security, Disability, Unemployment, and Probation and Parole) will potentially close as skeleton crews are unable to maintain the workload. Health clinics, non-governmental organizations (NGOs), community-based organizations, such as after school programs for working families, and financial institutions may be limited and forced to close doors because of ill employees while others refuse to come to work—either staying home to care for loved ones, or simply from fear of obtaining the illness. Entire court systems, prisons, and hospitals have potential, if strained enough, to collapse.

The excerpt below details past impacts of a pandemic occurrence:

“With the military patients coming home from the war with battle wounds and mustard gas burns, hospital facilities and staff were taxed to the limit. This created a shortage of physicians, especially in the civilian sector, as many had been lost for service with the military. Since the medical practitioners were away with the troops, only the medical students were left to care for the sick.

Third and fourth year classes were closed and the students’ assigned jobs as interns or nurses (Starr, 1976). The shortage was further confounded by the added loss of physicians to the epidemic. In the U.S., the Red Cross had to recruit more volunteers to contribute to the new cause at home of fighting the influenza epidemic. To respond with the fullest utilization of nurses, volunteers and medical supplies, the Red Cross created a National Committee on Influenza.”¹¹

¹¹ <http://virus.stanford.edu/uda/>

“The arsenal of public health tools to reduce morbidity and mortality from an influenza pandemic is limited. Options include vaccines, antiviral drugs, and interventions such as respiratory protection and social distancing. According to the World Health Organization (WHO), “Influenza vaccination is the most important intervention in reducing the impact of influenza, and a key component of the WHO response and preparedness efforts for influenza of pandemic potential, including avian influenza A (H5N1), A (H9N2) and A (H7N9).”³ However, seasonal and pandemic influenza vaccines have significant limitations,⁴ including limited vaccine effectiveness, the inability to identify reliable correlates of protection, and the need to distribute large quantities of vaccine early in the pandemic course.” ~ JAMA

Osterholm MT, Ballering KS, Kelley NS. Major Challenges in Providing an Effective and Timely Pandemic Vaccine for Influenza A (H7N9). *JAMA*. 2013 ;():1-2. doi:10.1001/jama.2013.6589.



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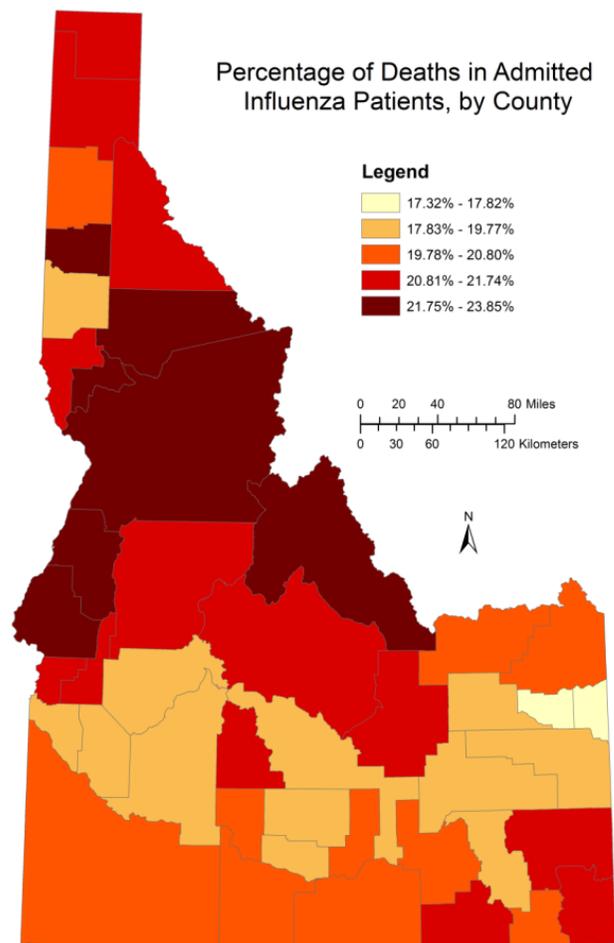
VULNERABILITY ASSESSMENT

As recorded in March 2007 Issue Report, *Pandemic Flu and the Potential for U.S. Economic Recession – A State by State Analysis*, published by Trust for America’s Health (www.healthyamericans.org) the table below reflects an Idaho Overview¹²

- 2005 Total State GDP: \$47.2 billion
- Projected GDP Loss from Pandemic: \$2.6 billion*
- Projected GDP Percentage Loss from Pandemic: 5.42%
- Ranking of Percentage Losses Out of 50 States (Highest = 1): 35
- Projected Impact on the Workforce: \$1.1 billion in losses
- Projected Impact on Industries: \$1.0 billion in losses
- Projected Trade Impact: \$0.5 billion in losses
- Projected Number of Lives Lost: 9,000*
- Projected Number of Sick Workers [3 weeks of work lost (with 50 weeks of work per year) from those who are either ill, fear the risk of infection at work, or need to take care of sick family members]: 425,000*

* Note: “Projected GDP Loss from Pandemic” may differ slightly from the sum of the projected impact from the workforce, industries, and trade due to rounding. The projected number of lives lost and sick workers are rounded to the thousandths place. GDP numbers are rounded to the billionths place for clarity and presentation. More precise numbers were used for the calculations in the model analysis.

Recent analysis by the CDC has provided a look at how a 1918-type pandemic might affect the State. Figure 3.17.D below show how varying attack rates might equate to resulting deaths. Figure 3.17.C shows the percentage of deaths in admitted influenza patients, by county across the State.



Source: CDC FluSurge Model

Figure 3.17.C: Estimated Pandemic Death Percentage

¹² Trust for America's Health. (2007). *Pandemic Flu and the Potential for U.S Economic Recession - A State-by-State Analysis*. Washington, D.C.: Trust for America's Health.

Number of Total Deaths by Attack Rate - 1918 Type Pandemic

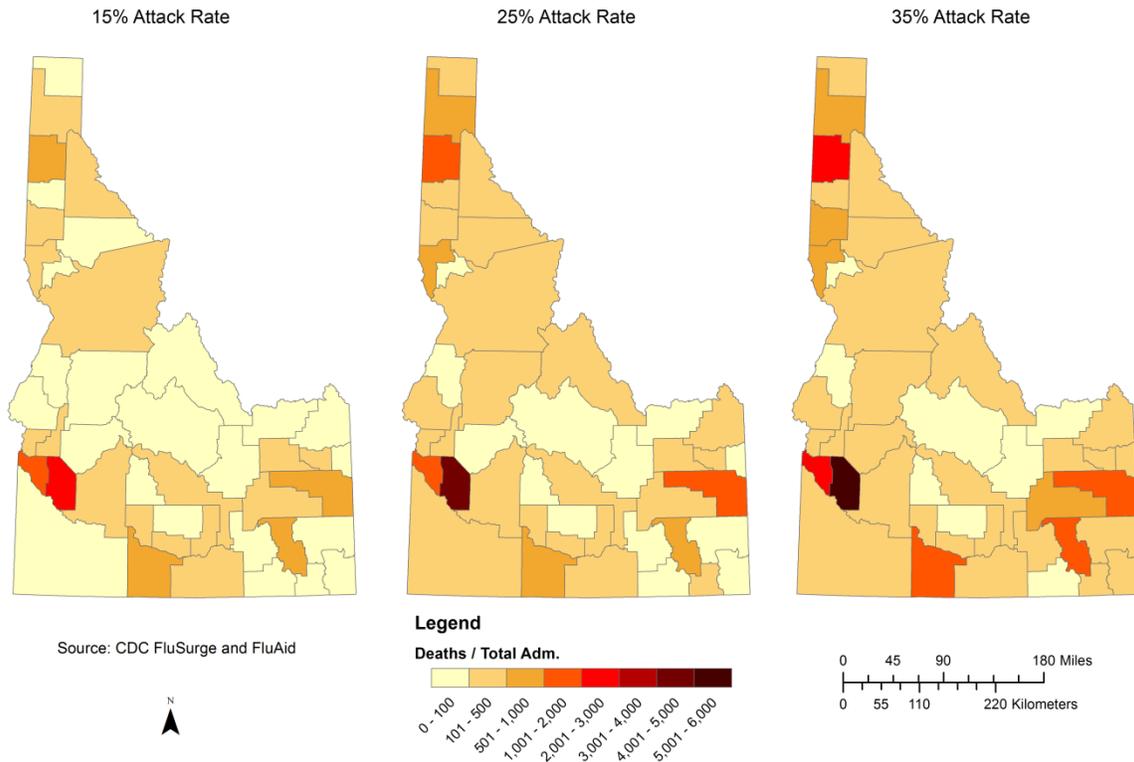


Figure 3.17.D: Estimated Pandemic Deaths per Attack Rate

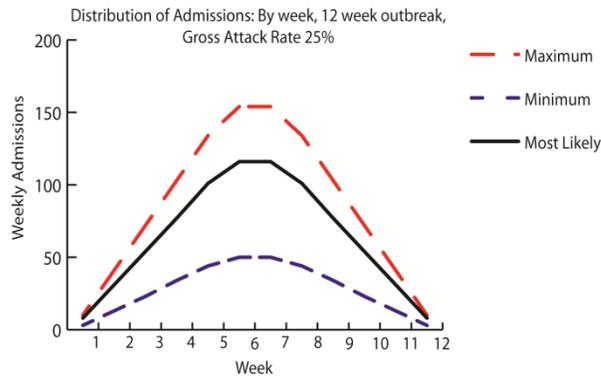
Additional assessments have been conducted that look at a variety of components including: population vulnerability, at-risk populations, and social vulnerability. Figure 3.17.E shows a sample capacity analysis that includes tables and charts, which quantify hospital admissions, resulting deaths, and how those would affect regional hospital capacity over the course of a pandemic event.



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SAMPLE COUNTY PANDEMIC CAPACITY ANALYSIS

Pandemic Influenza Impact / Attack Rate	25%
Total Hospital Admissions	
Most Likely Scenario	774
Minimum Scenario	335
Maximum Scenario	1,028
Total Deaths	
Most Likely Scenario	161
Minimum Scenario	102
Maximum Scenario	259



Hosp Adm. / Week	1	2	3	4	5	6	7	8	9	10	11	12
Most Likely Scenario	8	31	54	77	101	116	116	101	77	54	31	8
Minimum Scenario	3	13	23	34	44	50	50	44	34	23	13	3
Maximum Scenario	10	41	72	103	134	154	154	134	103	72	41	10

Regional Hospital Capacity

Pandemic Influenza Impact / Weeks		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Hospital Admission	Weekly admissions	8	31	54	77	101	116	116	101	77	54	31	8		
	Peak admissions/day	0	0	0	0	0	18	18	0	0	0	0	0		
Hospital Capacity	# of influenza patients in hospital	6	23	40	57	74	85	88	79	67	51	34	18		
	% of hospital capacity needed	2%	6%	11%	16%	20%	23%	24%	22%	18%	14%	9%	5%		
ICU Capacity	# of influenza patients in ICU	1	5	10	15	20	24	26	25	22	17	12	7		
	% of ICU capacity needed	3%	15%	30%	45%	60%	71%	75%	74%	63%	50%	35%	21%		
Ventilator Capacity	# of influenza patients on ventilators	1	3	5	8	10	12	13	13	11	8	6	3		
	% usage of ventilator	2%	8%	16%	23%	31%	37%	39%	38%	33%	26%	18%	11%		
Deaths	# of deaths from influenza			2	6	11	16	21	24	24	21	16	11	6	2
	# of influenza deaths in hospital			1	5	8	11	15	17	17	15	11	8	5	1

Figure 3.17.E: Sample Pandemic Capacity Analysis

Local Hazard Mitigation Plan Vulnerability Assessments

Local jurisdictions are actively planning on how to mitigate for pandemic. Such measures include *Get Pandemic Ready* (<http://www.getpandemicready.org/>), as listed in Idaho County's Multi-Hazard Mitigation Plan (<http://www.idahocounty.org/disaster-management-home/hazard-mitigation-plan>). Multi-layered resources assist public education with pandemic questions and answers, as well as practical preparation measures. Thirty-five of forty-seven jurisdictional mitigation plans include pandemic language. Several counties, including Latah, Washington, and Adams counties, noted addressing pandemic as a high priority for future planning revision action-items. Although some counties labeled pandemic under *Communicable Disease*, clear language, along with description,



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comparisons to pandemic versus regular influenza, SARS, and historical pandemic events, impacts, vulnerabilities, and loss estimations were included. Several plans identified specific mitigation action items, including public education on pandemic influenza.

“By 2009, however, 98% of circulating influenza A/H1N1 strains in North America has become resistant to the frequently prescribed and widely stockpiled neuraminidase inhibitor oseltamivir (Tamiflu), and 98% of A/H3N2 strains are resistant to the adamantanes. The alternative neuraminidase inhibitor zanamivir and the two approved adamantanes-- amantadine and rimantadine-- are all in short supply, and the adamantanes have substantial side effects. Influenza therapeutic options are clearly unraveling at a time when public health officials are appropriately concerned about pandemic emergence.”

~ Science 20 March 2009, Vol. 323. No. 5921, pp. 1560-1561.
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Although not all individual counties have a current pandemic mitigation narrative, plans are available through other state agencies and private sectors, including the Idaho Bureau of Homeland Security (BHS) *Emergency Operations Plan (EOP)*, Idaho Department of Health and Welfare *Be Ready*, and St. Luke’s Health System <http://www.stlukescr.org/filesimages/Services/Work%20Well%20Solutions/Flu%20Information/CommunityStrategy.pdf> . Idaho State Department of Education addresses pandemic on their website <http://www.sde.idaho.gov/site/flu/> .

LOSS ESTIMATION

Loss estimations during a pandemic event are difficult to determine. However, pandemics, whether locally, nationally, or worldwide, have great economic consequences. Media sources consistently report \$800 billion (U.S. figures) of estimated losses, based on ideology of 2% global GDP reduction.¹³ The majority of losses would not directly come from the flu pandemic itself, rather the secondary effects of the event. According to the Congressional Budget Office (CBO), a pandemic magnitude contracting by 2 percent, would lead to the second worst recession in America since World War II.¹⁴

According to Associated Press, “The Asian Development Bank projected a bird flu pandemic in Asia could kill around 3 million people, cause economic losses of up to nearly \$300 billion and possibly push the world into a recession.” Two scenarios were outlined, causing 20 percent of the Asian

region population contracting the flu and 0.5% (3 million people) dying. In the first scenario, where an outbreak seriously affects economic demand for six months, the reduction of consumer spending, services, trade, and investment could potentially results in a loss of \$99.2 billion lost — the equivalent to

¹³ http://economics.about.com/od/healthcareconomics/a/flu_pandemic.htm

¹⁴ Congressional Budget Office, *A Potential Influenza Pandemic: Possible Macroeconomic Effects and Policy Issues* (Washington, D.C.: Congressional Budget Office, 8 December 2005; revised 27 July 2006)



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a contraction of 2.3 percentage points in regional gross domestic product. The grimmer yearlong scenario reflects losses up to \$282.7 billion or a 6.5% reduction from Asia’s collective GDP. In both cases, the report projected another \$14.2 billion, or 0.3 percentage points of regional GDP, would be lost due to reduction in labor due to workers’ incapacity and deaths. Obviously, this type of scenario would affect the global economy on all levels.¹⁵

This specified flu pandemic related to poultry is projected to have many indirect effects. “Economic costs that need to be considered include direct costs such as losses of poultry due to the disease and to culling, with impacts extending not only to farmers but also to upstream and downstream sectors such as poultry traders, feed mills, breeding farms etc.”¹⁶

Like most influenzas, all nations would be gravely concerned with preventing such pandemics from spreading. Identifying the epidemiological, health, and economical gap issues along with international partnership is essential for successful mitigation.

Table 3.17.F presents the potential GDP losses, by industry, during a severe flue pandemic.

Private Industry/ Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Agriculture, forestry, fishing, and hunting	2,168,000,000	54,000,000
Mining	203,000,000	5,000,000
Utilities	783,000,000	0
Construction	2,811,000,000	70,000,000
Manufacturing	6,306,000,000	158,000,000
Wholesale trade	2,605,000,000	65,000,000
Retail trade	4,043,000,000	101,000,000
Transportation and warehousing	1,336,000,000	224,000,000
Information	1,180,000,000	0
Finance and insurance^^	2,404,000,000	60,000,000
Real estate, rental, and leasing	5,688,000,000	0
Professional and technical services	3,338,000,000	0
Management of companies and enterprises	685,000,000	0
Administrative and waste services	1,352,000,000	0
Educational services^^	262,000,000	7,000,000

¹⁵ Press, A. (2005, November 3). *NBC News*. Retrieved March 21, 2013, from http://economics.about.com/od/healthcareconomics/a/flu_pandemic.htm

¹⁶ Brahmabhatt, M. (2005). Avian Influenza: Economic and Social Impacts. *The World Bank*.



CHAPTER 3

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Table 3.17.F Idaho: Potential GDP Losses by Industry During a Severe Flu Pandemic**		
Private Industry/ Government	2005 Annual GDP (Rounded to millions of dollars)	Demand Loss in GDP (Rounded to millions of dollars)
Health care and social assistance ++	3,113,000,000	-117,000,000
Arts, entertainment, and recreation	381,000,000	76,000,000
Accommodation and food services	1,174,000,000	235,000,000
Other services, except government	959,000,000	12,000,000
Government	6,397,000,000	0

**Industry/Government groups from the 2005 Bureau of Economic Analysis. (Available at <http://www.bea.gov/bea/regional/gsp/>; accessed on January 26, 2007). Demand losses are for a 3-month period. Numbers are rounded to the millionths place for clarity and presentation. Numbers that are more precise were used for the calculations in the model analysis.

^^The TFAH model assumes that educational services and the finance and insurance industry will experience a drop in demand. The CBO model assumed that these industries were unaffected.

++Healthcare is assumed to increase on a macro-level, due to a surge in hospitalizations based on the CBO model.

Table 3.17.F

The SARS scare represents a global reaction. As people tried to avoid infection by minimizing face-to-face interactions, affected sectors included tourism, mass transportation, retail sales, hotels, and restaurants. Workplace absenteeism, disruption of production processes, and shifts led to costly procedures and increase in production, employment, and training costs. “This led to an immediate economic loss of perhaps 2% of East Asian regional GDP in the second quarter of 2003, even though only about 800 people ultimately died from SARS. Note that a 2 percent loss of global GDP during a global influenza pandemic would represent around \$200 billion in just one quarter (or \$800 billion over a whole year), and it is fair to assume the immediate shock during a flu epidemic could be even larger than in SARS.”¹⁷

¹⁷ Brahmhatt, M. (2005). Avian Influenza: Economic and Social Impacts. *The World Bank*.



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The costs of prevention and control should also be taken into account. These might include costs to the government for the purchase of poultry (or other flu source identified), vaccines, medications, and other inputs, hiring workers for culling and cleanup, surveillance and diagnosis, hire of transportation, and many others. Governments also face the need to pay compensation to livestock/poultry owners, which induces owners not to conceal that a particular outbreak has occurred. While such payment is in the nature of a transfer payment for the economy as a whole, it can impose a significant fiscal burden on the government.

Further mitigation strategies should include development of well-integrated assessments to bridge gaps in identification, containment, response and recovery, as well as costs for effective surveillance systems.

Congress first passed The *Pandemic and All Hazards Preparedness Reauthorization Act (PAHPA)* PAHPA in 2006, reauthorizing the Act March 13, 2013, following *Hurricane Katrina*. This act supports communities in preventing, preparing for, and responding to adverse health effects of such disasters. The 2013 law enhances national health security, authorizing funding for programs, such as Public Health Emergency Preparedness Cooperative Agreement, which paid out nearly \$9 billion to respond to public health threats, including infectious diseases, natural disasters, and biological, chemical, nuclear, and radiological events.¹⁸

Local Hazard Mitigation Plan Loss Estimations

At the present time, none of the 35 local jurisdictions that included mention of pandemic presented any loss estimations.

MITIGATION RATIONALE

In comparison to other hazards, pandemics have low structural impact, but high socio-economic impact. Employers may find their employees unwilling or unable to work during an event. Consequently, effective mitigation strategies will be constrained by sometimes irrational and possibly inconsistent implementation. The main opportunity for mitigation for this hazard lies primarily with individual prevention, professional medical personnel, public affairs personnel, and educators.

Poll Results: Financial Problems in a Severe Pandemic

- Fall 2006 survey*
- Percent of respondents who said they would have serious financial problems if they had to miss work for one month ranges from
 - 37% of those who make \$75K or more
 - to 84% of those who make less than \$25K

* Harvard School of Public Health Project on the Public and Biological Security

¹⁸ <http://www.cdc.gov/phpr/coopagreement.htm>

GENERAL MITIGATION APPROACHES

National policies, as defined in the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) and Code of Federal Regulations (CFR) 44, Emergency Management and Assistance, outline the types of eligible planning and protective measures. These fall under the Public Assistance Program in the event of a major disaster or emergency pandemic-related declaration. For further information, contact FEMA at www.ready.gov.

Health outcomes, costs, and cost-effectiveness of antivirals and social distancing are planning efforts within a typical US community during an event with influenza-pandemic characteristics. Closing non-essential businesses, public gathering places holding community events, while restricting nonessential movement of citizens will restrain the spread of the illness. Within the planning process, considerations of vulnerable populations, including the elderly, caregiver dependent, young children, pregnant women, chemically dependent, non-English speaking, homeless, and other at-risk populations should also be taken into account.



Source: <http://dsc.discovery.com/tv-shows/curiosity/topics/10-worst-epidemics.htm>



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The ripple effect applies to pandemic occurrence response measures. It begins with the individual and works its way outward to others within the community. As illness strikes, individual accountability through active participation includes, simple infection-control measures such as hand washing, wearing facemasks, and staying home when ill are. Expanding workspace distance between workers, using alcohol-based hand sanitizers and disposal receptacles for used tissues, and keeping work surfaces clean are mitigated measures that can reduce the impacts of a pandemic. Workforce planning may also include orders of succession and delegations of authority. Maintaining a cadre of trained staff is often the most essential, yet most difficult, mitigation action that can be commenced during a pandemic.

Considerations of mitigation strategies of a pandemic plan must include protection of staff. Teleworking is most practical in the reduction of person-to-person contact. Other long-term mitigation goals may include moving to a “paperless” environment and encourage telecommuting through secure websites.

The Private Sector must plan and prepare for pandemics through integrated community sustainment, providing essential services while significant absenteeism occurs within community planning. Protection of Critical Infrastructure and Key Resources (CIKR) are essential for continuity of operations. FEMA’s pandemic planning resources, *Pandemic Influenza Preparedness, Response, and Recovery Guide for critical infrastructure and key resources* can be found at <http://emilms.fema.gov/IS520/assets/cikrpandemicinfluenzaguide.pdf>.

Adequate pre-mitigated Continuity of Business checklists and Securities and Exchange Commission (SEC) critical operations plans are in place, so if/when a super-flu hits, businesses will be less likely to collapse. FEMA has free private sector on-line educational training, including the *Pandemic Influenza Business Planning Toolkit*,

<http://training.fema.gov/EMIWeb/edu/docs/busind/BCCM%20-%20Session%2023%20-%20Handout%20IV%20-%20Pandemic%20Influenza%20Business%20Planning%20Toolkit.pdf>

As well as the Continuity of Operations plan (COOP) template, <http://www.fema.gov/planning-templates>.

The private sector cannot only mitigate potential pandemics, but it can also assist in how to reduce their affects through science and technology. The private sector is certainly ahead of the game when it comes to prediction and modeling disease-spreading techniques. *Predict*, a group of experts researching wildlife-borne viruses, are building a virus identifier library. Predict is currently working with EcoHealth and its partners – the University of California at Davis, the Wildlife Conservation Society, the Smithsonian Institution, and Global Viral Forecasting, to map where deadly viruses exist historically.¹⁹

Scientists using modern day technology are working overtime to mitigate pandemic illnesses. Researchers from Mount Sinai and the Armed Forces Institute of Pathology in Washington D.C. resurrected the permanently preserved 1918 Virus in frozen Alaskan soil.²⁰ The *Crossrail Project* in London is excavating unearthed bodies believed to have died from the *Black Death* dated mid-14th

¹⁹ <http://www.nytimes.com/2012/07/15/sunday-review/the-ecology-of-disease.html?pagewanted=all>

²⁰ <http://www.mc.vanderbilt.edu/reporter/index.html?ID=6621>



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Century. The extraction of thirteen bodies and their DNA from the skeletons will help epidemiologists to study modern day strains of today's pathogens.²¹

Epidemiology and Genomic Research²² broadly recommended overarching thematics. These recommendations add to development trend impacts on immunizations.

- **Recommendation #1:** Extend the reach of epidemiology to include development and evaluation of clinical and population interventions, implementation, dissemination, and outcomes research.
- **Recommendation #2:** Increase access to data, metadata, and specimens to foster collaboration, ensure reproducibility and replication, and accelerate translation to population health impact.
- **Recommendation #3:** Expand cohort studies across the lifespan and include multiple health outcomes.
- **Recommendation #4:** Develop, evaluate, and use novel technologies to quantify exposures and outcomes on a large scale and assess multiple factors in complex diseases.
- **Recommendation #5:** Develop systematic approaches to manage, analyze, display, and interpret large, complex datasets.
- **Recommendation #6:** Expand knowledge integration to drive research, policy, and practice.
- **Recommendation #7:** Transform epidemiology training by emphasizing team science, multilevel analyses, knowledge integration, and translation.
- **Recommendation #8:** Develop and design rational, cost-effective resources to optimize funding for epidemiology studies, accelerate translation, and maximize health impact.

State and Local Governments should prepare for the worst case scenario—pandemics can be global events. With clear guidance, local governments should prepare to implement community-wide measures, such as school closures and suspension of public gatherings, to mitigate spread of disease. Idaho Department of Health and Welfare (DHW) <http://www.healthandwelfare.idaho.gov/> established 2-1-1 Careline linking Idahoans with health and human service providers and programs. According to Idaho Reportable Diseases Rules (IDAPA 16.02.10 <http://www.healthandwelfare.idaho.gov/Portals/0/Health/Epi/Rules%20&%20Regulations.pdf>), health care providers, laboratorians, and hospital administrators are required to report communicable diseases and conditions included on the Idaho Reportable Disease List (<http://www.epi.idaho.gov/>) to their local health district or the Epidemiology Program within the Bureau of Communicable Disease Prevention.²³ According to the CDC's planning assumptions workforce impacts, the attack rate of a pandemic influenza will likely be 30 percent. Absenteeism rates for workers caused by fear of contracting the disease, or for need to care for loved ones, range from 20 to 40 percent. It is estimated

²¹ <http://www.bbc.co.uk/news/science-environment-21784141>

²² <http://epi.grants.cancer.gov/workshops/century-trends/>

²³ <http://www.healthandwelfare.idaho.gov/Default.aspx?TabId=111>



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that epidemics will last six 6 to 8 weeks within the community and there will likely be multiple waves, each lasting 2 to 3 months.²⁴

The Centers for Disease Control and Prevention (CDC) Public Response Hotline offer communication materials as well. Resources may be requested through the Idaho Emergency Operations Center (IDEOC) by local jurisdictions, should such a pandemic hinder/disable their operations.

Federal workforce pandemic planning closes the response gap through essential functions and protective measures. When employees cannot work remotely, mitigated policies to include procuring pharmaceutical interventions, social distancing strategies, information technology testing, and communication of human capital pandemic are considered.

In March 2013, Congress amended H.R. 307 (formerly H.R. 2405), *Pandemic and All-Hazards Preparedness Act of 2013 (PAHPA)*. “The bill would authorize \$11 billion over a five year period (FY2014-2018). H.R. 307 would authorize \$5.18 billion in FY 2014, and \$2.39 billion for FY 2015-2018. It would decrease the deficit by \$58 million over the 2013-2018 periods, but would balance over the FY2013-2023 period. Pay-as-you go procedures apply because it affects direct spending,” according to Congressional Budget Office (CBO).²⁵ The PAHPA is part of the National Health Security Strategy. <http://www.phe.gov/Preparedness/planning/authority/nhss/Pages/default.aspx>

The United States Government Accountability Office (GAO) identified many gaps and need for further pandemic planning. <http://www.gao.gov/new.items/d11632.pdf>. “Specifically, CDC established four goals during the Pandemic to guide communication efforts.”²⁶

- Provide timely, accurate, and credible information about the public health threat and government actions to prevent 2009 H1N1 influenza and mitigate its impact. (According to CDC, Idaho utilized \$9,451,889 for H1N1, with the Public Health Emergency Response (PHER) Grant.²⁷)
- Increase public awareness, knowledge, and adoption of influenza prevention, mitigation, and treatment recommendations. These recommendations included promotion of vaccines, community measures, personal and institutional infection control, and the correct use of antiviral drugs.
- Guide public expectations for change and variability related to prevention and mitigation recommendations.
- Protect the health of the public while minimizing social, economic, and educational disruption.

Other potential mitigation approaches could include:

²⁴ <http://emilms.fema.gov/IS520/PAN0101000.htm>

²⁵ <http://cbo.gov/sites/default/files/cbofiles/attachments/hr307.pdf>

²⁶ FEMA GAO-11-632 H1N1 Pandemic Lessons

²⁷ http://www.cdc.gov/phpr/documents/PHER_Funding_Totals_by_Awardees_v2.pdf



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- Monitoring disease spread nationally and internationally to support rapid response
- Established website, www.flu.gov
- Pandemic preparedness checklists and guidance materials
- Develop and purchase of vaccines and vaccine productions capacity
- Stockpile antivirals, supplies, and other countermeasures, such as diagnostics and surveillance tools
- Upgrade state and local capacity
- Upgrade laboratories and research at CDC

The Project BioShield Act (FY2004-2013), signed in by 109th Congress, allows U.S. Department of Health and Human Services (HHS) Secretary to authorize the use of funds and response medical products, including FDA unapproved/unlicensed countermeasures during an emergency such as pandemic.²⁸ Exercising this authority would require:

- The agent for which the countermeasure is designed can cause serious or life threatening disease
- The product may reasonably be believed to be effective in detecting, diagnosing, treating, or preventing the disease
- The known and potential benefits of the product outweigh its known and potential risks
- No adequate alternative to the product is approved and available; and any other criteria prescribed in regulation are met.²⁹

Preparedness is imperative to mitigating the effects of a pandemic influenza while avoiding interruptions to family life and essential services.

The monitoring of infectious diseases has recently been combined into biosurveillance as part of the mission of the Armed Forces Health Surveillance Center (AFHSC) under the Department of Defense. Multiple agencies such as the CDC and the World Health Organization will coordinate with AFHSC to “quickly detect and respond to global health and security hazards.”

²⁸ <http://www.fas.org/sgp/crs/terror/R42349.pdf>

²⁹ 21 U.S.C. §360bbb-3(c). For more information on how the Secretary determines whether a product meets these conditions, see U.S. Department of Health and Human Services, Food and Drug Administration, *Guidance—Emergency Use Authorization of Medical Products*, July 2007, at <http://www.fda.gov/RegulatoryInformation/Guidances/ucm125127.htm>.

COMMUNITY STRATEGY FOR PANDEMIC INFLUENZA MITIGATION

“This document provides interim planning guidance for State, territorial, tribal, and local communities that focus on several measures other than vaccination and drug treatment that might be useful during influenza pandemic to reduce its harm. Communities, individuals and families, employers, schools, and other organizations will be asked to plan for the use of these interventions to help limit the spread of a pandemic, prevent disease and death, lessen the impact on the economy, and keeps society functioning.”

~ St. Luke’s Hospital
Pandemic Plan Executive
Summary



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