Communicable Disease Outbreaks, Epidemics, Pandemics

Epidemic

Frequency	50+ yrs	10-50 yrs	1-10 yrs	Annually
People	<1,000	1,000-10,000	10,000-50,000	50,000+
Economy	1% GDP	1-2% GDP	2-3% GDP	3%+ GDP
Environment	<10%	10-15%	15%-20%	20%+
Property	<$100M	$100M-$500M	$500M-$1B	$1B+
Hazard scale	< Low to High >			

Risk Level

- Frequency – Communicable Disease outbreaks occur annually in Washington. An epidemic or pandemic happens two or three times a century.
- People –There is the potential for significant hospitalizations and loss of life from outbreaks of communicable diseases. According to the pandemic modeling software, FluAid, developed by the U.S. Center for Disease Control, over 1 million people in Washington State may become ill if a severe pandemic, such as the 1918 pandemic event occurred.
- Economy – Except for a widespread influenza outbreak, an incident is unlikely to cause the loss of 1% of the State GDP. Nonetheless, during an epidemic/pandemic, businesses that provide goods and services will temporarily close thereby adversely affecting the economy of our state.
- Environment – An incident is unlikely to cause the loss of 10% of a single species or habitat.
- Property – An incident is unlikely to cause $100 million in property damage.

Summary

- The Hazard: Communicable disease outbreaks can be caused by many agents. Public health measures have controlled many diseases in this country. There remains a risk from new agents that emerge with the potential to cause outbreaks, such as new types of influenza or SARS.
- Previous Occurrences: Washington has experience with some communicable disease outbreaks, such as influenza, pertussis, and foodborne outbreaks. International outbreaks include influenza, SARS, and cholera.
- Probability of Future Events: Periodic outbreaks including influenza are likely in Washington. The state's connection to the global economy increases the risk of a new disease being introduced. The potential for natural disasters such as floods, earthquakes or volcanic eruptions could result in displaced populations and mass sheltering, with the potential for communicable disease outbreaks.
- Jurisdictions at Greatest Risk: All jurisdictions are at risk for outbreaks due to contaminated food or spread of respiratory infections such as pertussis or influenza. The risk of outbreaks depends on factors such as population density, contact with animals, international travel and commerce, and access to health care.
- Special Note: This profile will not attempt to estimate potential losses to state facilities due to communicable disease outbreak. This hazard poses little threat to the built environment.

The Hazard[1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22]

Communicable disease outbreaks are defined by the Centers for Disease Control and Prevention (CDC) as the occurrence of more cases of disease than normally expected within a specific place or group of people over a given period of time. Outbreaks may occur on a periodic basis (e.g., influenza), may occur rarely but result in severe disease (e.g., meningococcal meningitis), may occur after a disaster (e.g., cholera), or may represent an intentional release of an agent (e.g., bioterrorism). An epidemic is a disease occurring suddenly in humans in a community, region or country in numbers in excess of normal while a pandemic is the worldwide outbreak of a disease in humans in numbers clearly in excess of normal.

Agents causing outbreaks can be viruses, bacteria, parasites, fungi, or toxins. An individual may be exposed by breathing, eating or drinking, or having direct contact with an agent. These agents can be spread by people, contaminated food or water, animals, insects and other arthropods, or directly from the environment. Some agents, such as *Salmonella* or *E. coli* O157:H7 may have multiple means of spreading. Other agents, such as measles or pertussis, are spread only from one person to another.

In the United States, better hygiene and water quality improved the health of the general population during the first half of the 20th century. The availability of medical care and vaccines further reduced communicable diseases. After World War II, the availability of antibiotics enabled health care providers to treat many bacterial diseases. The development of vaccines assisted in the control of other diseases such as chickenpox, mumps, polio and measles. However, infectious diseases did not vanish as was hoped, but persisted while new strains of pathogens emerged. Antibiotic resistance has emerged and new infectious diseases have been identified.

New agents are continually emerging to cause outbreaks in populations where nobody has immunity. In 1957 and 1968, new strains of influenza (flu) spread rapidly around the world. Although less severe than the 1918 flu strain which caused a global pandemic, these strains still resulted in many deaths. During the 1980s, human immunodeficiency virus (HIV) – the cause of acquired immune deficiency syndrome or AIDS – appeared. In the same years, tuberculosis (including strains harder to treat with antibiotics) increased in cities throughout United States. The 2009 outbreak of variant influenza H1N1 affected the entire globe with associated increased mortality.

There are many causes behind the spread of these diseases, including personal choices such as lack of vaccination, poor hand hygiene, risky sexual practices, and shared needles by drug users. In addition, sick people who travel from country to country can be a source of infection, as occurred in the SARS (Severe Acute Respiratory Syndrome) outbreak in Asia and Canada in 2003. Another reason for disease outbreaks include normal evolution of bacteria and viruses, as well as antibiotic resistance that may occur in response to antibiotic usage. Other factors contributing to the spread of disease include economic growth and land use, global trade and climate and weather changes such as global warming. Development of land in areas previously unpopulated by humans can bring humans and animals into closer proximity. Imported foods such as cantaloupe, mangos, and seeds for alfalfa sprouts have been linked to Salmonella outbreaks. Exotic or imported pets are another risk factor for emerging infections such as salmonellosis or monkey pox. Warmer-than-usual water and air can cause more bacterial growth in ocean waters which contaminate shellfish and can lead to an infectious outbreak. Climate changes allow mosquitoes to breed at higher elevations than in the past, spreading disease in new areas.

The impacts of an epidemic or pandemic can be severe. Depending on its severity, a human epidemic

could result in death or debilitation, and economic hardship from lost work time, loss of productivity and these effects may cause more widespread harm to the economy. In addition, a serious epidemic or pandemic would likely cause a strain on current public health and medical resources statewide.

The Washington Administrative Code (WAC) requires reporting of notifiable conditions by health care providers, laboratories, and health care facilities, as well as veterinarians, schools, child day care facilities, and food service establishments. Individual cases of certain conditions must be reported to the responsible local health jurisdiction for prompt public health actions to prevent outbreaks. Conditions with outbreak potential include measles, meningococcal meningitis, and severe diarrheal diseases. The WAC also requires reporting of all outbreaks or suspected outbreaks of notifiable conditions, and foodborne or waterborne diseases. Outbreaks or suspected outbreaks related to health care is also reported but not required (e.g., black fungus in steroid injections). The local health jurisdiction takes specific actions to identify the source of the agent and to control its spread.

Most communicable disease outbreaks occur when an agent spreads easily among people, such as respiratory spread of influenza or pertussis. Outbreaks occur where many people are exposed at once, as with foodborne exposures or outbreaks of vomiting and diarrhea due to viruses in schools, childcare centers, and long-term care facilities. Outbreaks can occur due to lack of immunity in a population if there is a new agent or due to low immunization rates for known agents, decreased sanitation, increased crowding, or other factors that promotes spread of an agent.

Although public health agencies have experience with many types of communicable disease outbreaks, a larger public health challenge is emerging pathogens, which are new agents causing disease in humans. An emerging agent may be entirely new, newly recognized, new to an area, or expanding its effect. An agent may emerge for any of a number of reasons:

- Changes in the agent, such as resistance to antibiotics (e.g., MRSA or methicillin resistant *Staphylococcus aureus*)
- Altered climate or ecosystems due to economic growth, agriculture, deforestation, dams, and irrigation (e.g., spread of mosquitoes due to irrigation and climate change, exposure to Ebola during forest clearing)
- International travel and commerce (e.g., SARS, West Nile virus)
- Technology and industry such as a globalized food supply or use of antibiotics on farms (e.g., salmonellosis from imported produce)
- Breakdown of public health infrastructure (e.g., increase in tuberculosis)
- Poverty and social inequalities (e.g., reduced access to vaccines)
- Human behavior and demographics (e.g., reduced vaccinations, childcare center outbreaks)
- Human susceptibility to infection (e.g., infections with immunosuppression)

Certain agents have particular potential for causing severe communicable disease outbreaks

Influenza (flu) is a common respiratory infection that spreads among people and can cause serious illness and death. Frequent small genetic changes in the influenza virus necessitate new vaccines because people lack immunity. A large genetic change in influenza could result in a worldwide pandemic before an effective vaccine could be developed. It is forecasted that Washington State could have 5,000 fatalities, 10,000-24,000 patients needing hospitalization, and 480,000-1,119,000 outpatient visits from an influenza pandemic. Antiviral treatment can reduce disease severity. It could take months to develop an entirely new vaccine.

Severe Acute Respiratory Syndrome (SARS) is a respiratory illness caused by a virus called SARS-associated corona virus (SARS-CoV) that spreads among people. In 2003 travelers carried SARS from Asia to more than two dozen countries in North America, South America, Europe, and Asia. A total of 8,098 cases occurred and 774 people died. Only eight people in the United States had laboratory evidence of SARS infection, all following travel to countries with SARS; Washington State had no cases. There is no treatment and no vaccine for SARS.

AIDS results when infection with the human immunodeficiency virus (HIV) causes severe immune system dysfunction called acquired immune deficiency syndrome (AIDS). The virus is transmitted from person to person by sexual contact and blood exposure. Antiviral treatments have greatly improved survival of HIV infection. At least 11,000 people live with HIV/AIDS in Washington State with two thirds of them in King County.

Tuberculosis (TB) is bacterial infection primarily of the lungs that is transmitted from person to person. From the early 1940s until the mid-1980s, tuberculosis cases steadily decreased in Washington State to a low of 207 cases, paralleling the national trend. Cases increased from 1984 until 1991 to a high of 309 cases due to immigration from areas of endemic tuberculosis, erosion of the public health infrastructure for ensuring treatment, and to a lesser extent an increase in susceptible people due to HIV infections. In other area some tuberculosis strains are highly resistant to treatment. Isolation, treatment of patients, and testing of contacts is needed to control tuberculosis. Washington State reported 200 cases of TB for a case rate of 3.0 per 100,000 persons in 2011. Only 7 of the 39 counties had 5 or more cases of TB, accounting for 92% of cases in Washington. King County accounted for 106 cases (53%) of the 200 cases (rate 5.5 per 100,000). About 75% of cases in Washington are among foreign-born persons from countries with high rates of TB. Each year there are approximately 250 cases of TB reported in Washington State in recent years, with the number of deaths ranging from 2 to 18. There continues to be a decrease in crude TB incidence rate.

Mosquito-borne diseases include West Nile virus, dengue and malaria. West Nile virus causes rare severe illness involving meningitis, paralysis, and coma. West Nile virus first appeared in the United States in New York City during 1999 and spread rapidly throughout the country. In Washington State, the first cases of West Nile virus were reported in 2006. Dengue infection has been reported in Washington State only as a travel-associated disease, but infected mosquitoes have become established in Florida in recent years. Malaria could also be introduced into Washington State because the vector mosquitoes are already present in many areas.

E. coli are bacteria that normally live in the intestines of humans and animals, particularly cattle. Although most *E. coli* strains are harmless, strains producing shiga toxin (STEC) can cause severe diarrhea and kidney damage. STEC can be spread by contaminated food (beef, produce) or water or among people if infected persons do not wash their hands after using the toilet or diapering children. Other bacterial agents that can cause severe diarrhea and occur in Washington State include *Salmonella, Shigella,* and typhoid.

*Certain agents have particular potential for causing less than severe communicable disease outbreak*s

Methicillin-Resistant Staphylococcus Aureus or MRSA is an infection caused by Staphylococcus aureus bacteria — often called "staph." That is resistant to the broad-spectrum antibiotics commonly used to treat it. MRSA can be fatal. The Mayo Clinic states that most MRSA infections occur in hospitals or

other health care settings, such as nursing homes and dialysis centers, where it can attack those most vulnerable — older adults and people with weakened immune systems, burns, surgical wounds or serious underlying health problems. This is particularly true for hospital stays of more than 14 days.

Measles is a highly communicable viral rash illness that was a major childhood disease in the pre-vaccine era. Although the disease is now considered rare in Washington and the United States due to routine childhood immunization, sporadic cases of measles and outbreaks continue to occur.

Hepatitis – Hepatitis A, B and C are viral infections that cause inflammation of the liver. Hepatitis A is usually transmitted by eating food prepared by or close contact with someone who is infected. It is usually a self limited illness and infected persons recover fully and are immune. Hepatitis B and C are primarily transmitted through blood exposures. Hepatitis A and B can be prevented by vaccination. Infections from acute hepatitis A, hepatitis B, and hepatitis C have decreased considerably over the past 15 years. Rates of new infections of hepatitis A and hepatitis B have dropped primarily because people can be immunized against those diseases.

Lyme Disease is caused by Borrelia burgdorferii and is transmitted to humans by tick bites. The first reported case in Washington was in 1987. DOH has received 7 to 18 reports of Lyme disease per year in recent years. Although little is known about the epidemiology of Lyme disease in Washington State, the risk of infection appears to be highest in counties around and west of the Cascade Mountains, reflecting the distribution of the local *Ixodes pacificus* tick vector. Lyme disease is the most commonly reported vector-borne disease in the United States with approximately 20,000 cases reported annually. Lyme disease has a wide distribution in northern temperate regions of the world. In the United States, the reported incidence is highest in the Northeast (particularly in southern New England); the upper Midwest; and in northern California.

Hantavirus Pulmonary Syndrome (HPS) causes a rapidly progressive and severe pneumonia that is often fatal. Since the disease's recognition in 1993 through 2011, there have been 43 reported cases of HPS in Washington State with 13 (30%) associated deaths. Between 1 and 5 cases occur annually in the state.

Leptospirosis is a bacterial infectious disease occurring in both human beings and domestic animals, affecting the kidneys and liver. It may be among the world's most common diseases spread from animals to humans. Leptospirosis is rare in Washington State, with 0 to five cases reported each year. No cases were reported from 1987 through 1995. Of leptospirosis cases reported between 1996 and 2004, only four cases (44 %) reported exposure in Washington State.

Previous Occurrences[23,24,25,26, 27,28,29]

Several characteristics of pandemic or epidemic differentiate these episodes from other public health emergencies. First, an epidemic or pandemic has the potential to infect large numbers of Washington State citizens and visitors, which could easily overwhelm the health care system in the state. A pandemic outbreak could also jeopardize essential community services by causing high levels of absenteeism in critical positions in every workforce. It is likely that vaccines against a new virus will not be available for six to eight months following the arrival of the virus in the United States. Basic public services such as health care, law enforcement, fire and emergency response, communications, transportation, and utilities could all be disrupted or severally lessened. Finally, the pandemic, unlike other public health emergencies, could last for several weeks or months. Pandemic influenza will affect many regions simultaneously and therefore outside resources may be unavailable.

Influenza occurs regularly in Washington State. When looking at the death tolls for previous flu pandemics, the number of deaths experienced was influenced by the population of the areas that it was introduced. In 1918, the largest concentrations of people in Washington lived in urban areas such as Seattle (1918 population 315,312), Tacoma (1918 population 96,965) and Spokane (1918 population 104, 437) with an overall state population of 1.35 million. Death tolls for the 1918 influenza pandemic were much higher in these three cities then in other cities in the state (Figure 6-2), likely due to the large population of people living there. The population of the area in which the agent is introduced will largely influence the quantity of people affected by an epidemic or pandemic. The greatest populations in Washington State exist in King, Pierce, and Snohomish counties. These counties should consider their large populations when planning and preparing for the next epidemic or pandemic.

Pandemics of influenza have occurred throughout recorded history and have been documented since the 16th century. Since the well-documented pandemic of influenza-like disease occurred in 1520 there have been 31 influenza pandemics documented. Intervals between previous pandemics have varied from 11 to 42 years with no recognizable pattern. Three pandemics occurred in the last century. The most recent was in 1968/69, with prior pandemics occurring in 1957/58 and 1918/19 (Figure 6-3).

Pandemics Death Toll Since 1900	
1918-1919	
U.S....	675,000+
Worldwide...	50,000,000+
This as per the CDC	
1957-1958	
U.S....	70,000+
Worldwide...	1-2,000,000
1968-1969	
U.S....	34,000+
Worldwide...	700,000+

Figure 6-3 Pandemic Influenza Death Toll since 1900

The 1918/19 Influenza Pandemic "is the catastrophe against which all modern pandemics are measured. Before the 1918/19 pandemic, one has to go back to the "black death" (bubonic plague) of 1346 to find a similarly devastating epidemic in terms of total number of deaths". It is estimated that approximately 20 to 40 percent of the worldwide population became ill during the 1918/19 influenza pandemic. The number of worldwide deaths due to the pandemic was initially reported as 20 million, but consensus among experts now believe the death toll was at least 40 million with some believing it could have been as high as 50 to 100 million deaths. Between September 1918 and April 1919, approximately 500,000 to 650,000 deaths from the pandemic flu occurred in the United States alone. Western Samoa and Iceland were the only countries to avoid the 1918 flu entirely due to the use of strict travel restrictions during the pandemic.

The 1957/58 Influenza Pandemic was on the whole much milder than that of the 1918 influenza, with the global death toll reaching 2 million. The 1968 Hong Kong Flu outbreak resulted in nearly 34,000 deaths in the United States. The 1968/69 influenza pandemic is thought to have caused around 1 million deaths worldwide. Due to advances in science from the 1918/19 influenza, worldwide vaccine production began shortly after the pandemic of 1957/58 and 1968/69, likely lessening the death rates for both of these events.

The 2009/2010 novel influenza A (H1N1) is a new flu virus of swine origin that first caused illness in Mexico and the United States in March and April, 2009. The first novel H1N1 patient in the United States was confirmed by laboratory testing at CDC on April 15, 2009. The second patient was confirmed on April 17, 2009. It was quickly determined that the virus was spreading from person-to-person. On April 22, the Centers for Disease Control and Prevention (CDC) activated its Emergency Operations Center to better coordinate the public health response. On April 26, 2009, the United States

Government declared a public health emergency and implemented the nation's pandemic response plan. By June 3, 2009, all 50 states in the United States and the District of Columbia and Puerto Rico were reporting cases of novel H1N1 infection. The nationwide U.S. influenza surveillance systems report 41,821 hospitalizations and 2,117 deaths from H1N1 through April 16, 2010. The Washington State Department of Health reported 1,516 hospitalizations and 99 fatalities from laboratory confirmed influenza H1N1 cases.

Food-borne outbreaks occur every year in Washington State. Bacteria, viruses, and toxins are responsible for most outbreaks. Although restaurant and commercial exposures are most commonly reported as the cause of outbreaks, it is likely that many more small clusters of illness occur due to mishandled food in the home setting. The largest Washington State *E. coli* O157:H7 outbreak was in 1993, when 477 people were infected from contaminated, undercooked hamburger. In 1994, 11 people were infected from contaminated ground beef and also in 1994, 15 people were infected from contaminated salami. Additional outbreaks have occurred in the United States from non-beef sources including lettuce and salad bars where foods were contaminated by improperly cleaned utensils, working surfaces and infected food handlers. Also, outbreaks have occurred in people who have consumed garden vegetables fertilized with animal manure, unpasteurized apple cider, and homemade venison jerky. Recently there have been cases due to contaminated swimming water and petting farms. Most Shiga toxin-producing *E. coli (*STEC) infections are single cases and not associated with outbreaks. Annually there are 150-300 reported cases in Washington State.

Washington Foodborne Disease Outbreaks 1991-2010

Year	Cases	Outbreaks
1991	1154	47
1992	740	53
1993	1301	130
1994	1462	151
1995	909	138
1996	685	124
1997	810	108
1998	706	60
1999	1164	93
2000	938	66
2001	574	69
2002	704	56
2003	620	55
2004	679	58
2005	390	42
2006	677	51
2007	722	43
2008	564	46
2009	307	27
2010	344	37

Source: Washington State Communicable Disease Report 2010

Pertussis (Whooping Cough) has affected most Washington counties in 2012 with over 2500 cases reported during the first six months of the year, more than double the total of the previous year. The number of cases reported each year varies considerably, ranging from 184 to 1026 cases a year since 1995. There is also a variation in the rate of reported disease among health jurisdictions, reflecting local outbreaks.

West Nile Virus was first identified in the US in 1999. It can affect people, horses, certain types of birds, and other animals. The Washington State Department of Health reports four human cases in 2012. The reported cases peaked in 2009 with 34 reported cases in human. Ongoing West Nile virus monitoring for infected dead birds and mosquitoes is limited to a few counties due to a lack of resources.

Probability of Future Events

There are expected periodic outbreaks of certain communicable diseases. Each winter there is an influenza season, with 10-20% of the state population affected. Washington had 30-50 foodborne outbreaks reported each year. Other outbreaks such as pertussis or hepatitis A may occur every few years while measles outbreaks are rare.

Through Washington's numerous connections to the global economy there is elevated potential for disease introduction due to several factors: the large number of passengers arriving daily at air or sea ports and the intentional or inadvertent importation of infected animals.

Following a disaster such as an earthquake, volcanic eruption, or tsunami, communicable disease outbreaks could result from lack of safe water and food, disruption of waste treatment, and mass sheltering of people. However, the existing public health structure has minimize the presence of potential agents such as measles, typhoid, or hepatitis in the population so large outbreaks are less likely in this country than elsewhere on the globe. Mass sheltering is more likely to result in outbreaks of mild to moderate respiratory infections, viral gastroenteritis, and skin infections.

Determining the probability of future public health events is difficult. There are many factors which influence the probability of future outbreaks of disease and include ill travelers coming in to our region, and increased proximity between animals and people. Another contributing factor includes Washington's role in the global economy. Because of this, the State's potential risk is elevated by several factors: the large number of passengers arriving on daily basis at any of our air or sea ports; infected animals coming into our region through shipping containers that may not be known to be on board the vessels; animals being imported for sale (both as pets and as a food source); or the illegal sale of banned or dangerous animals. Likewise, another potential disease source includes infected animals traveling across the border from neighboring states or British Columbia. Avian diseases could be brought in by birds on their annual migration from Alaska and Canada, or from areas as far south as Mexico or South America. Even travelers to foreign countries who visit agricultural areas may unknowingly transport animal diseases to this country. Contaminated garbage tossed overboard from a ship off the coast has also been identified as a potential source of disease when it washes on shore and is eaten by animals. The transporting of patients from one hospital to another can be a vector for disease transmission, as can visiting someone who is ill in a hospital or nursing home.

Influenza and Pneumonia Deaths in 1918 By Age

Age (yrs)	# Deaths
< 1	333
1	132
2	66
3	54
4	44
5-9	129
10-19	491
20-29	1243
30-39	1218
40-49	435
50-59	257
60-69	190
70-79	165
80-89	87
90-99	12

Figure 6-6 1918 Influenza Pandemic Deaths in Washington by Age

A pandemic influenza outbreak could kill hundreds of thousands of Americans and possibly more than 40,000 Washington citizens. Unlike the ordinary flu, people of any age and health condition can become seriously ill and no one will have immunity to a pandemic flu virus. With a pandemic influenza, no one is immune to this virus and the normally considered vulnerable populations that include the elderly and young children may not be the only portions of the population most vulnerable to a pandemic influenza. In fact, the 1918 pandemic had a gross disproportion of 20 to 40 year olds die in the pandemic, a portion of the population not thought to be the most vulnerable to diseases. This was later found to be contributed to a large portion of this section of the population being carriers of tuberculosis, which weakened their immune system, but no one knows what contributing factors may have an effect on susceptibility to the next pandemic.

Previously, there were no early warning systems in place for the past three pandemics. To reduce the risks of the next pandemic, each country needs to have a communications strategy to educate the public about pandemic flu. Human-to-human transmission needs detected at the earliest to lessen and combat the effects of the next pandemic.

The U.S. Department of Health and Human Services', Centers for Disease Control and Prevention (CDC), Division of Strategic National Stockpile (SNS) staff operates the nation's repository of medical resources, equipment, and services for augmenting within 12-hours State and local resources in the fight against dangerous diseases, chemicals, or other hazards. The SNS is organized for flexible response and is able to deliver medical materiel quickly by using several different concepts: 12-Hour Push Packages, Managed Inventory, and Rapid Purchasing Power. The state has a formal plan within the CEMP, ESF 8, to request and take delivery of SNS resources and distribute them onto local jurisdictions.

A safe water supply, good hygiene, effective sewage and waste disposal, aggressive monitoring, public education, prevention and treatment of potential disease outbreaks by public health officials are the primary mitigation efforts for potential pandemic/epidemic outbreaks. Actions such as frequent hand washings, covering one's mouth when they cough, and staying home when ill have an enormous impact on maintaining control of an infectious disease by limiting the spread of germs.

Basic mitigation measures also include: childhood and adult immunization programs; health education in the schools and on a community level to address disease transmission and prevention; targeting the mechanism of transmission, such as drug usage for diseases like HIV infection and Hepatitis B; maintaining strict health standards for food service employees and eating establishments; maintaining strict health standards for food products; and utilizing accepted and recommended infection control practices in medical facilities.

Jurisdictions Most Vulnerable to Communicable Disease Outbreaks

More densely populated areas have a greater risk for the spread of agents among humans, while areas with a higher density of animals may have a higher potential for acquiring diseases from animals. Urban areas are more likely to require mass sheltering following a disaster, with its inherent potential for disease transmission. Rural areas may have more limited options for health care access. The Puget Sound region has international airports which serve large populations of humans and animals from across the planet. Immigrant and poverty stricken populations are more vulnerable to communicable disease outbreaks. Therefore, the whole state remains vulnerable to the various communicable diseases discussed.

Economic Impacts

The impacts of any large outbreak can be severe, and could result in increased deaths, economic hardship from lost work time, and loss of productivity. There would also be a strain on public health and medical resources statewide. In particular, pandemic influenza or other severe respiratory disease causing many cases with a high death rate could result in severe social disruption and major economic impacts. Other communicable disease outbreaks are likely to have only local impact on businesses, industries, transportation systems, or governmental agencies.

Potential Climate Change Impacts[30]

Climate change could increase outbreaks through several mechanisms including expanding the range of animals or arthropods carrying disease agents, increasing the level of certain agents such as Vibrio

bacteria in shellfish, or promoting environmental growth of agents such as fungi. An example is changes in rodent populations with climate and food supply resulting in Hantavirus outbreaks.

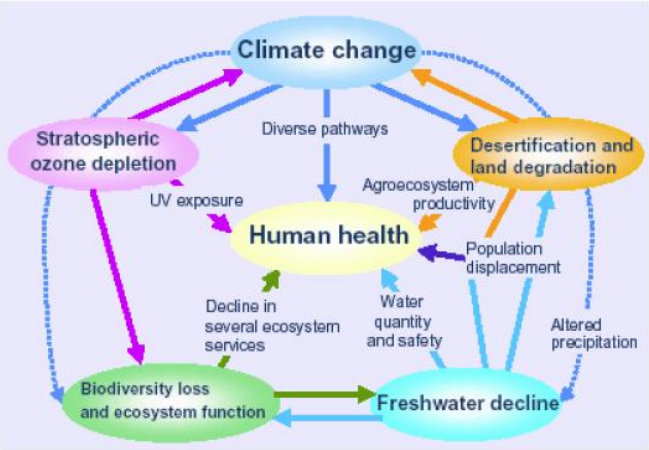

Figure 6-5 Human Health and the Effects of Climate Change

The impacts of climate change on human health will not be evenly distributed around the world. Developing country populations, particularly in small island states, arid and high mountain zones, and in densely populated coastal areas, are considered to be particularly vulnerable. Fortunately, most of the health risk associated with climate change can be avoided through existing health programs and interventions. Concerted action to strengthen key features of health systems and to promote healthy development choices can enhance public health now as well as reduce vulnerability to the effects of future climate change. The risk of a pandemic or epidemic event is not seen as being directly tied to changes in climate in the United States but may play a factor in the spread of such an outbreak in developing countries.

Mitigation Activities

Routine public health interventions at the local level include disease surveillance, immunization program, health education, food safety programs, verifying case treatment (e.g., tuberculosis), excluding ill cases from work or school (e.g., diarrhea), inspecting restaurants (e.g., foodborne outbreak), or recommending vaccination to a community (e.g., pertussis outbreak) can prevent or limit an outbreak. Large scale outbreaks could require additional interventions if there are disrupted water supplies or damaged housing. During a widespread or severe outbreak there are additional areas of potential public health response and mitigation that could include:

- Education of the public, health care providers, and public health system
- Enhanced disease surveillance
- General hygiene measures (food, water, sewage, respiratory hygiene)
- Isolation of cases
- Quarantine of contacts
- Mass distribution of medication for prophylaxis or treatment
- Mass immunization
- Alternate care facilities (acute disease, chronic care)
- Required medical examination
- Seizure of medical equipment
- Provision of food, water, and shelter
- Closure of schools, businesses, entertainment venues, recreational events
- Travel restrictions
- Mass evacuation
- Mass burials of humans
- Dispose of contaminated material
- Decontamination of environment

Special public health response planning would be necessary for large scale community measures such as mass distribution of pharmaceuticals or mass immunization. This could involve national resources like the CDC's Strategic National Stockpile. The SNS is a large national repository (cache) of life-saving pharmaceuticals and medical supplies to protect the American public if there is a public health emergency severe enough to cause local supplies to run out (e.g. terrorist attack, pandemic influenza outbreak, or earthquake).

U.S. Department of Health and Human Services (HHS) will deliver SNS assets to a pre-designated state warehouse. This warehouse is referred to as a receiving, staging, and storing (RSS) site. Once SNS assets arrive at the designated RSS site, HHS will transfer authority for the materiel to state authorities. State and local authorities will then begin the breakdown of the 12-hour Push Package for distribution and dispensing.

- 12-hour Push Package: The first line of Strategic National Stockpile (SNS) support is the 12-hour Push Package, a cache of pharmaceuticals, antidotes and medical supplies designed to provide rapid delivery of a broad spectrum of assets for an ill-defined threat in the early hours of an event. The 12-hour Push Packages are positioned in strategically located, secure warehouses ready for immediate deployment to a designated site within 12 hours of the federal decision to deploy SNS assets. The assets are shipped in specially designed Lexan cargo containers to facilitate rapid staging at the state receipt, stage and store (RSS) facility.
- Managed Inventory: DSNS managed inventory (MI) contains medications and medical supplies for specific threats. MI can be shipped if the disease agent is known or as follow-on material to 12-hour Push Packages during an ill-defined threat. MI will take longer to reach project areas (upwards of 24 – 36 hours) but can be tailored to a specific, well-defined threat or disease agent.
- Rapid Purchasing Power: CDC is able to provide additional medications and medical supplies through contracts with the Veterans Administration. CDC can use this mechanism during an emergency to rapidly procure additional materials that are not typically part of the SNS formulary.

At Risk State Facilities

This profile will not attempt to estimate potential losses to state facilities due to communicable disease outbreak. This hazard poses little threat to the built environment, but can pose significant risk and damage to the state's economy and citizens, residents and tourists.

References

[1] Washington State Department of Health. *Disease Outbreak Reporting*. Accessed 26 June 2012. Available at: http://www.doh.wa.gov/PublicHealthandHealthcareProviders/NotifiableConditions/OutbreakReporting.aspx

[2] Centers for Disease Control and Prevention. *National Outbreak Reporting System*. Accessed 26 June 2012. Available at: http://www.cdc.gov/outbreaknet/nors/

[3] Centers for Disease Control and Prevention. *Fighting Emerging Infectious Diseases*. Accessed 26 June 2012. Available at: http://www.cdc.gov/Features/EmergingInfections/

[4] Centers for Disease Control and Prevention. *Preventing Antibiotic Resistance.* Accessed 25 June 2012. Available at: http://www.cdc.gov/Features/AntibioticResistance/

[5] Centers for Disease Control and Prevention. *Severe Acute Respiratory Syndrome (SARS).* Accessed 26 June 2012. Available at: http://www.cdc.gov/sars/index.html

[6] Washington State Department of Health. *Foodborne Disease Outbreaks*. Accessed 26 June 2012. Available at: http://www.doh.wa.gov/PublicHealthAndHealthcareProviders/NotifiableConditions/FoodborneDiseaseOutbreaks.aspx

[7] Washington State Department of Health. *About the Food Safety Program.* Accessed 26 June 2012. Available at: http://www.doh.wa.gov/AboutUs/ProgramsandServices/EnvironmentalPublicHealth/EnvironmentalHealthSafetyandToxicology/FoodSafety.aspx

[8] Centers for Disease Control and Prevention. *Food Safety at CDC.* Accessed 26 June 2012. Available at: http://www.cdc.gov/foodsafety/

[9] Washington State Department of Health. *Tuberculosis*. Accessed 26 June 2012. Available at: http://www.doh.wa.gov/PublicHealthandHealthcareProviders/NotifiableConditions/Tuberculosis.aspx

[10] Washington State Department of Health. *Pandemic Influenza Response Resources.* Accessed 26 June 2012. Available at: http://www.doh.wa.gov/PublicHealthandHealthcareProviders/EmergencyPreparedness/EmergencyCommunicationsToolkit/Resourcesforspecificemergencies/Pandemicinfluenza.aspx

[11] Centers for Disease Control and Prevention. *CDC Resources for Pandemic Flu.* Accessed 26 June 2012. Available at: http://www.cdc.gov/flu/pandemic-resources/

[12] Washington State Department of Health. *H1N1 Flu.* Accessed 26 June 2012. Available at: http://www.doh.wa.gov/YouandYourFamily/IllnessandDisease/Flu/Pandemicflu/H1N1Flu.aspx

[13] Centers for Disease Control and Prevention. *Seasonal Influenza (Flu).* Accessed 26 June 2012. Available at: http://www.cdc.gov/flu/

[14] Washington State Department of Health. *HIV/AIDS.* Accessed 26 June 2012. Available at: http://www.doh.wa.gov/PublicHealthAndHealthcareProviders/NotifiableConditions/HIVAIDS.aspx

[15] Centers for Disease Control and Prevention. *Dengue*. Accessed 26 June 2012. Available at: http://www.cdc.gov/Dengue/

[16] Washington State Department of Health. *West Nile Virus.* Accessed 26 June 2012. Available at:

http://www.doh.wa.gov/PublicHealthandHealthcareProviders/NotifiableConditions/WestNileVirusWNV.aspx

[17] Centers for Disease Control and Prevention. *West Nile Virus.* Accessed 26 June 2012. Available at: http://www.cdc.gov/ncidod/dvbid/westnile/index.htm

[18] Washington State Department of Health. *Foodborne Disease Outbreaks*. Accessed 26 June 2012. Available at: http://www.doh.wa.gov/PublicHealthAndHealthcareProviders/NotifiableConditions/FoodborneDiseaseOutbreaks.aspx

[19] Washington State Department of Health. *Shiga-Toxin Producing E. coli.* Accessed 26 June 2012. Available at: http://www.doh.wa.gov/PublicHealthAndHealthcareProviders/NotifiableConditions/ShigatoxinproducingEcoliSTEC.aspx

[20] Centers for Disease Control and Prevention. *Escherichia coli O157:H7 and Other Shiga Toxin-producing Escherichia coli.(STEC)* Accessed 26 June 2012. Available at: http://www.cdc.gov/nczved/divisions/dfbmd/diseases/ecoli_o157h7/

[21] Washington State Department of Health. *Emergency Preparedness: Public Health and Partners.* Accessed 26 June 2012. Available at: http://www.doh.wa.gov/PublicHealthandHealthcareProviders/EmergencyPreparedness.aspx

[22] Washington State Department of Health. *Health of Washington State Report. Social and Economic Determinants of Health.* Accessed 26 June 2012. Available at: http://www.doh.wa.gov/DataandStatisticalReports/HealthofWashingtonStateReport/MostRecentReport.aspx

[23] "The Great Pandemic – The United States in 1918-1919: Washington State," *1918 Pandemic Flu*, U.S. Dept. of Health and Human Services, n.d., <http://1918.pandemicflu.gov/your_state/washington.htm> (November 12, 2008).

[24] "Pandemic Influenza," *Global Security*, n.d., <http://www.globalsecurity.org/security/ops/hsc-scen-3_pandemic-influenza.htm> (August 27, 2008).

[25] Eric Alzar, "Open Remarks – Washington State Summit," *Deputy Secretary of Health and Human Services*, April 14, 2006, <http://pandemicflu.gov/general/greatpandemic3.html#washington> (August 25, 2008).

[26] Center for Disease Control (CDC), "Novel H1N1 Flu Situation Update – June 26, 2009", *FluView*, <http://www.cdc.gov/h1n1flu/update.htm>. (June 29, 2009).

[28] "A Message from Governor Chris Gregoire: Preparing for Pandemic Influenza – A Washington State Overview 2006," *WA State Department of Health*, DOH Publication 820-028, March 2006 <http://www.doh.wa.gov/ panflu/ planning_summary/pandemic_overview_smr.pdf> (June 26, 2008).

[29] Wikipedia, the Free Encyclopedia, *2009 flu pandemic in the United State by state*. Accessed 9 November 2012. http://en.wikipedia.org/wiki/2009_flu_pandemic_in_the_United_States_by_state

[30] "Climate Change and Human Health," *World Health Organization*, n.d., <http://www.who.int/globalchange/climate/ en/index.html> (August 25, 2008).