

## 6.1 Disease - Pandemic Influenza / Bioterrorism

- Disease is considered a hazard because:
  - The chance of widespread disease is relatively high
  - Diseases can affect many people
- Social distancing and other counter measures could mitigate the effects.
- Diseases can have high rates of morbidity (illness) and mortality (death), affect large areas, and impede normal social functions. The impact of these diseases varies based on the virulence of the disease, duration of the illness, susceptibility of the population to the disease, and the spread of the disease within the community.
- Common disease outbreaks include influenza, norovirus, pertussis, hepatitis A, Salmonella, and E. coli. Novel strains of influenza are a great risk to King County, because of the lack of immunity to a new influenza virus strain, the potential for severe illness, and the high degree of transmissibility from person to person. It is estimated that a severe pandemic influenza could cause illness in 540,000 people and over 11,000 deaths in King County. The worst-case scenario is the outbreak of a new disease with high rates of morbidity and mortality. New disease outbreaks can quickly overwhelm local healthcare facilities and healthcare providers, and challenge society's ability to maintain critical services.

For King County, the Communicable Disease Epidemiology & Immunization Section within Public Health – Seattle & King County investigates and coordinates the surveillance of communicable disease cases and outbreaks.

### 6.1.1 Context

Disease has been one of the most influential factors in human history. Throughout the 20<sup>th</sup> century great strides in medicine have produced many treatments and cures for the deadliest diseases. These medical advances can give us a false sense of security that all diseases can be treated or cured in a timely manner, even though the potential for a devastating disease outbreak continues to threaten our community.

The impact of a disease can be tracked and characterized using several different indicators. These indicators can help Public Health assess and respond to potential disease outbreaks.

- *Incubation period*: The stage of subclinical disease extending from the time of exposure to onset of disease symptoms.
- *Contagious period*: The duration after infection during which the person can transmit the infection to others.
- *Infectivity*: The proportion of exposed persons who become infected.
- *Pathogenicity*: The proportion of infected persons who develop clinically apparent disease.
- *Virulence*: The proportion of clinically apparent cases that are severe or fatal.

Endemic refers to the usual or predicted rate of a disease for a given area. Epidemic refers to an increase, usually sudden, in the number of cases of a disease beyond what is typically expected for a certain area. Pandemic refers to an epidemic that has spread globally.<sup>315</sup>

Epidemics are not uncommon in the Puget Sound area. Public Health – Seattle and King County monitors dozens of communicable diseases. Some of these, like seasonal influenza, infect many people every year

but most cases are mild. Other epidemics, like whooping cough, are very severe but infect only a small segment of the population. These epidemics can be handled within the normal health care system, and typically do not lead to levels of high morbidity and mortality.

The Center for Disease Control and Prevention (CDC) identifies certain situations that may cause an epidemic to occur.<sup>316</sup> They are:

- A recent increase in the amount or virulence of the disease
- The recent introduction of the disease into a setting where it has not been before
- An enhanced mode of transmission so that more people are exposed
- A change in susceptibility of a person's response to the disease
- Factors that increase a person's exposure or involve introduction through new portals of entry

Although chronic disease has placed a lasting strain on the healthcare system, acute disease is a greater immediate threat to the health system's capacity. Acute disease outbreak has the potential to degrade or paralyze critical medical services.

Many potentially devastating diseases are spread through physical contact, ingestion, insects, animals, and inhalation. Airborne diseases and those spread through physical contact pose higher risks to the community because they are difficult to control. Diseases such as influenza, Pertussis, Tuberculosis, and meningitis are all spread through these methods and pose a significant threat to our community.

Influenza has been the deadliest type of pandemic in Seattle's history. A pandemic influenza is a new influenza virus that is much more severe than the typical seasonal "flu." People have little to no natural resistance to the strain of influenza, so it spreads more easily and can cause more deaths. Adding to the impact is the expected 6-month gap between the virus emerging and the development of a vaccine.<sup>317</sup>

In addition to natural disease outbreaks, there is the possibility of the intentional spread of disease to cause harm, known as bioterrorism. The CDC defines bioterrorism as the biological agents (microbes or toxins) used as weapons to further personal or political agendas (See attacks chapter for other types of terrorism).<sup>318</sup> A biological attack would most likely be covert, meaning people would not express symptoms immediately. Public Health – Seattle and King County identify six priority agents that pose the highest threat due to their high mortality rates and their ease of transmission between people. They are anthrax, botulism, plague, smallpox, tularemia, and viral hemorrhagic fevers.<sup>319</sup> Seattle has never experienced an act of bioterrorism.

## 6.1.2 History

Throughout the 20th century several epidemics and pandemics have affected our community.

**Influenza. 1918-1919:** The highly virulent influenza pandemic of 1918 killed a large number of young, otherwise healthy adults. The pandemic caused more than 500,000 deaths in the United States and more than 40 million deaths around the world. The 1918 pandemic first arrived in Seattle in October 1918; over the next six months the virus claimed 1,600 lives.

**Influenza. 1957-1958:** The influenza pandemic of 1957 was less severe than the 1918 pandemic and caused a total of 70,000 fatalities nation-wide.<sup>320</sup>

**Influenza. 1968-1969:** The influenza pandemic caused more than 34,000 deaths in the U.S. and caused severe morbidity and mortality around the world.<sup>321</sup>

**E.coli. 1993:** E.coli-contaminated hamburger meat from a local Jack in the Box caused illness in 400 people and led to the death of two people within one month in the Washington area. Cases were seen in California, Idaho, and Nevada as well.

**Pertussis. 2002-2005:** Between 2002 and 2003 Public Health reported an 82% increase in the number of Pertussis infections in infants, and a three-fold increase in the number of cases in children <6 months. The occurrence of Pertussis in adolescents and adults has been on the rise since 1990, culminating in a national epidemic in 2005 when 25,616 reported cases nation-wide. Outbreaks within healthcare facilities can occur quickly because the bacterial infection is highly contagious.

**Influenza. 2009:** Like the 1918 pandemic, the H1N1 outbreak of 2009 affected the young and healthy populations as well as those with chronic diseases. This increase in morbidity caused strain on the local healthcare system. King County activated its Pandemic Disease Plan and Seattle closed 3 schools in response to the disease.<sup>322</sup> Although the H1N1 virus was not virulent and there were not nearly as many fatalities as previous pandemics, the outbreak caused a larger than usual amount of disease in the community than seasonal influenza virus does.

While there are no local instances of bioterrorism, there have been a few instances in the Pacific Northwest, and nationally. In 2013, threatening letters containing ricin were intercepted in Spokane, Washington.<sup>323</sup> They were addressed to military bases and U.S. government officials. Nobody was injured from the letters. In 2001, several locations on the East Coast were struck with anthrax. In 1984, the followers of the Bhagwan Shree Rajneesh spread salmonella on food items in restaurants in the Dalles, Oregon; there were no deaths, but 751 cases of illness were confirmed.<sup>324</sup>

### 6.1.3 Likelihood of Future Occurrence

Disease outbreaks are not uncommon and can produce devastating effects on a community. While medical advances have increased our ability to counteract disease, increases in the number of people without adequate healthcare, as well as the evolution of antibiotic resistant bacteria and globalization help make outbreaks spread more quickly and increase their magnitude.

Climate change could influence the likelihood or severity of future disease outbreaks, but much remains unknown. Warming temperatures or precipitation changes could alter the range of insects that carry diseases such as mosquitos and ticks. Likewise, warming water temperatures could affect organisms that contribute to water and food-borne diseases in ways we cannot predict now.

There is disagreement among experts about the likelihood of a non-state actor successfully carrying out a bioterrorism attack. Unlike other methods of terrorism, the materials needed to make a biological weapon are readily available, are inexpensive, and only require graduate-level science.<sup>325</sup> However, some believe that there are too many barriers to make it an attractive tactic for terrorists, including creating a successful strain of a disease, producing a large enough amount, and successfully distributing it where it will infect people.<sup>326</sup> While terrorists groups continue to have an interest in obtaining and using biological weapons, experts believe that conventional weapons (e.g. firearms and bombs) will continue to be the weapons of choice in the future attacks, because they are more easily acquired, cause immediate harm, and have fewer countermeasures.<sup>327</sup>

### 6.1.4 Vulnerability

There are many factors that can increase Seattle's vulnerability to disease exposure and spread.

- Rapid population growth, such as is occurring in King County, increases the potential for acquisition and spread of infectious diseases.
- King County's large international air and seaports (including an active cruise ship industry) increase the number of visitors to our area and the risk for importation of infectious diseases. Diseases that

are not endemic to Washington have the potential for introduction and spread among our residents. Vaccine preventable diseases (e.g., acute viral hepatitis, measles, and influenza) are significant contributors to morbidity and potential mortality in international travelers and can cause local outbreaks among susceptible persons.

- Persons experiencing homelessness often also have limited access to medical care, so many people living homeless and with health problems have difficulty getting prompt treatment. Living conditions – like crowding and fewer opportunities for personal hygiene – can contribute to the spread of disease. If someone has an underlying medical condition, alcohol or drug use, or weakened immune system, they are even more susceptible. In 2017 and 2018, King County’s Communicable Disease Control, Epidemiology & Immunization unit (CD-Imms) responded to increases in several infectious diseases among persons experiencing homelessness; new infections and outbreaks in this population continue to be reported and might continue to rise given the increase in persons experiencing homelessness in King County.

Disease often affects those who are generally considered most vulnerable in our communities. Young children, the elderly, the poor, and those with underlying health conditions typically face the greatest consequences of disease. Those with existing health disadvantages (diabetes, asthma, disabilities, low life expectancy, etc.) appear to be concentrated in south Seattle (Pioneer Square, Sodo, Rainier Valley, Delridge) and north Seattle (Lake City, Bitter Lake, Northgate) (see figure [Map of health disadvantages in Seattle]). The neighborhoods that appear to have both high concentrations of people under 5 years of age and over 65 years of age are Delridge, Fauntleroy, and Beacon Hill.<sup>328</sup>

Seattle has a large concentration of healthcare resources, but in an epidemic or pandemic these resources can be stretched or overwhelmed by the increase in demand that accompanies an outbreak situation. The Seattle area also provides specialized medical care for a large geographic area, including one of the region’s pediatric hospitals and the only Level 1 Trauma center for Washington, Idaho, Montana, and Alaska. In addition, Airlift Northwest, located at Boeing Field, is the only life-flight agency serving the same four-state region. These facilities must continue serving the wider geographic area during a localized outbreak.

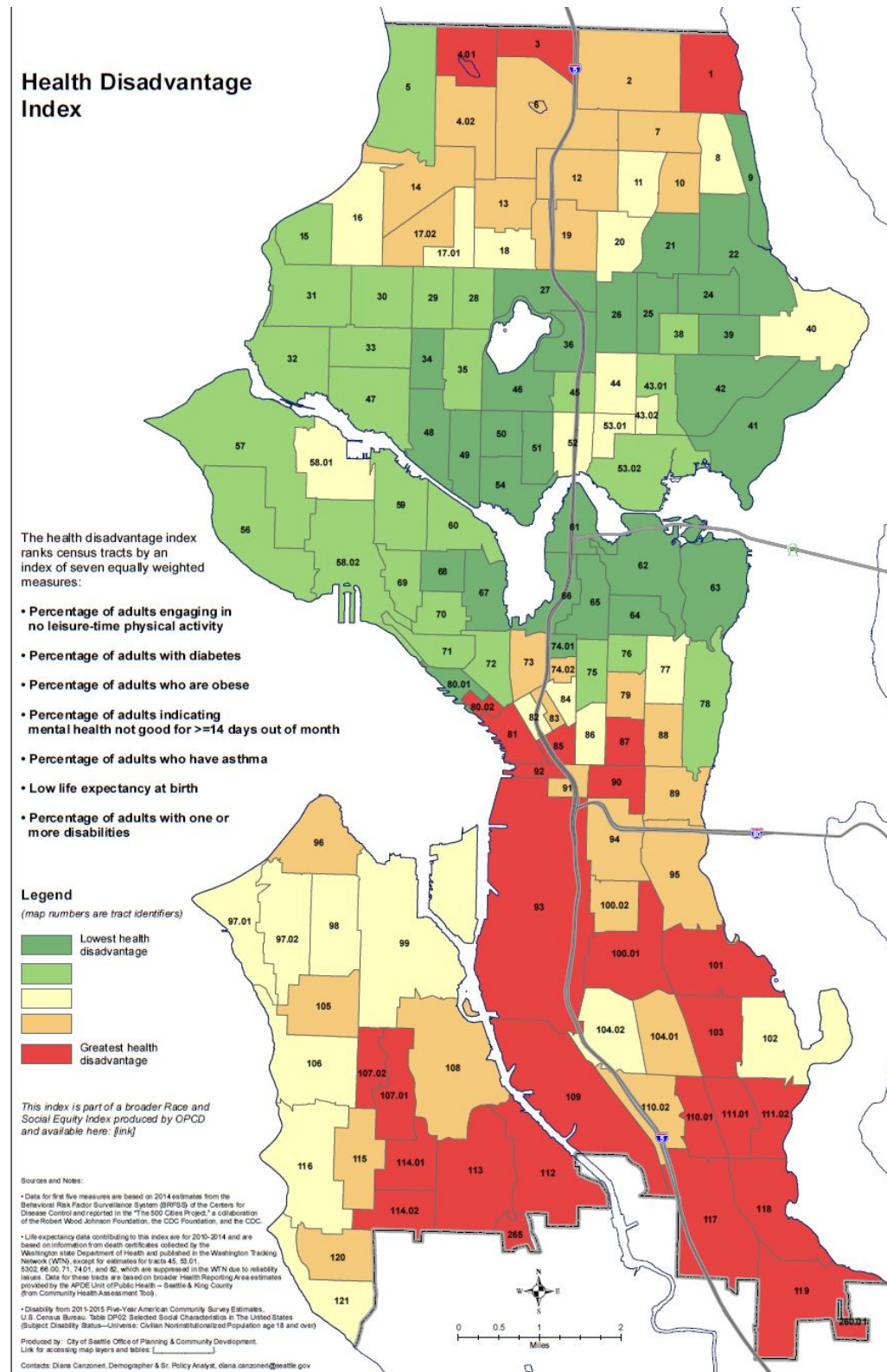
Other resources, such as food and water, are also a concern when planning for disease outbreaks. It is unlikely that Seattle’s water reservoirs, which are underground or on secured watershed lands, would be exposed to potential contamination. On the other hand, food sources can become contaminated by improper food handling practices or ill food workers. Public Health conducts ongoing surveillance for food- and waterborne illnesses to identify and quickly control outbreaks. However, Seattle is still home to a dense network of restaurants that rely on regional farmers and distributors that are all vulnerable to spreading food-borne illness.

### 6.1.5 Consequences

Epidemics directly affect the health of people who live, work and visit a community. They have the potential to be one of the deadliest hazards a community can face. Illness is the most notable consequence of an epidemic, but outbreaks can also severely impact the community as schools, businesses, government agencies and non-profit organizations curtail operations due to employee illness or as countermeasures. The effects of these curtailments grow the longer the disease persists.

The most likely scenario that activates the City’s emergency management system would be a disease outbreak that just exceeds our public health system’s capacity and has many indirect socio-economic effects like the need to close schools or businesses. We have chosen a listeriosis outbreak for the most likely scenario. It occurs in small numbers each year in King County, but more widespread outbreaks occur regularly. It is one of the deadliest food borne pathogens and one of the hardest to investigate because it can be dormant for a while before it makes a person sick.<sup>329</sup> A large outbreak centered in

Figure 6-1. Health Disadvantage Index



Source: Seattle Office of Planning and Community Development

Seattle would cause a strain on the public health system and potentially have strong impacts on local businesses, especially any that the public perceives as responsible for the outbreak.

The most severe disease outbreaks would involve pathogens that would infect a large percentage of an exposed population and hospitalize or kill many people. Pandemic has the potential to cause this disaster. It poses a great threat to the health of our local community as well as the national/international community. In addition to human morbidity and mortality impacts, pandemic influenza has many socio-economic consequences. Cancellations of schools, work, and public gatherings may be enacted to attempt to halt the spread of disease. Staff absenteeism can create a strain on government and healthcare systems causing limitations of services and care. The 2009 H1N1 flu epidemic showed how potentially easy it is to overwhelm the healthcare system, even though H1N1 was an influenza that caused less severe disease than a typical seasonal flu. Seattle-King County Public Health was a leader when the H1N1 flu surprised health officials by not being as severe as feared. The Public Health Director was one of the first in the country to reverse guidance to close schools. A pandemic influenza that caused moderate or severe disease would have a much larger impact on the community. The following table outlines expected disease rates based on Center for Disease Control modeling.

**Table 6-1. Estimated Number of Episodes of Illness, Healthcare Utilization, and Deaths Associated with Moderate and Severe Pandemic Influenza Scenarios for the US Population and King County.**

Characteristic	Moderate (1958/68 - like)		Severe (1918 - like)	
	US	King County	US	King county
Illness	90 million	540,000	90 million	540,000
Outpatient Care	45 million	270,000	45 million	270,000
Hospitalization	865,000	5,190	9,900,000	59,400
ICU Care	128,750	733	1,485,000	8,910
Mechanical Ventilation	64,875	389	742,500	4,455
Deaths	209,000	1,254	1,903,000	11,418

Data Source: Pandemic Influenza Response Plan (2013). Public Health - Seattle & King County. Retrieved August 9, 2018, from <https://www.kingcounty.gov/depts/health/emergency-preparedness/preparing-yourself/~media/depts/health/emergency-preparedness/documents/pandemic/pandemic-flu-response-plan.ashx>

## 6.1.6 Conclusions

Disease outbreaks can be severe and unpredictable. Many diseases can cause epidemics and pandemics such as influenza, pertussis, hepatitis A virus, *Salmonella*, *E. coli*, West Nile virus, and tuberculosis. Outbreaks can cause greatly increased levels of morbidity (illness) and mortality (death) within the community, in addition to overwhelming the healthcare system and disrupting essential community services through staff absenteeism. Public Health – Seattle & King County manages the ESF-8 Health, Medical, and Mortuary Response plan and is responsible for monitoring and responding to any potential disease outbreak.

## 7. INTENTIONAL HAZARDS