



5.4.9 Disease Outbreak

The following section provides the hazard profile (hazard description, location, extent, previous occurrences and losses, probability of future occurrences, and impact of climate change) and vulnerability assessment for the disease outbreak hazard in Warren County.

5.4.9.1 Profile

Hazard Description

An outbreak or an epidemic exists when there are more cases of a particular disease than expected in a given area, or among a specific group of people, over a particular period of time. An aggregation of cases in a given area over a particular period, regardless of the number of the number of cases, is called a cluster. In an outbreak or epidemic, it is presumed that the cases are related to one another or that they have a common cause (Center for Disease Control [CDC] 2004). There are other diseases that impact Warren County which includes foodborne illness, vaccine-preventable disease, and vector-borne diseases (tick-borne and mosquito-borne). However, for the disease outbreak profile, the County identified influenza, the Zika virus and the Ebola virus as the main diseases that may lead to a pandemic outbreak.

Influenza

The risk of a global influenza pandemic has increased over the last several years. This disease is capable of claiming thousands of lives and adversely affecting critical infrastructure and key resources. An influenza pandemic has the ability to reduce the health, safety, and welfare of the essential services workforce; immobilize core infrastructure; and induce fiscal instability.

Pandemic influenza is different from seasonal influenza (or "the flu") because outbreaks of seasonal flu are caused by viruses that are already among people. Pandemic influenza is caused by an influenza virus that is new to people and is likely to affect many more people than seasonal influenza. In addition, seasonal flu occurs every year, usually during the winter season, while the timing of an influenza pandemic is difficult to predict. Pandemic influenza is likely to affect more people than the seasonal flu, including young adults. A severe pandemic could change daily life for a time, including limitations on travel and public gatherings (Barry-Eaton District Health Department 2013).

At the national level, the CDC's Influenza Division has a long history of supporting the World Health Organization (WHO) and its global network of National Influenza Centers (NIC). With limited resources, most international assistance provided in the early years was through hands-on laboratory training of in-country staff, the annual provision of WHO reagent kits (produced and distributed by CDC), and technical consultations for vaccine strain selections. The Influenza Division also conducts epidemiologic research including vaccine studies and serologic assays and provided international outbreak investigation assistance (CDC 2011).

Ebola Virus

Ebola, previously known as Ebola hemorrhagic fever, is a rare and deadly disease caused by infection with one of the Ebola virus strains. According to the CDC, the 2014 Ebola epidemic is the largest in history affecting multiple countries in West Africa. Two imported cases, including one death, and two locally-acquired cases in healthcare workers have been reported in the United States. CDC and partners are taking precautions to prevent the further spread of Ebola in the United States (CDC, 2014).



Zika Virus

Zika is a flavivirus related to dengue, West Nile, yellow fever and Japanese encephalitis. It was first isolated in 1947 from a Rhesus monkey in the Zika region of Uganda and in 1968 from a human in Nigeria. Since that time, serologic evidence of human infections has been reported in several countries in tropical Africa and parts of Southeast Asia. In addition, Zika virus has been implicated as the cause of three mosquito-borne disease outbreaks outside of Africa and Asia, including Micronesia in 2007, French Polynesia in 2013, and the current outbreak in the Americas, which was first identified in May 2015 (New York State Department of Health [NYS DOH] 2016).

Infection with Zika virus is usually mild. About one in five people develop symptoms; hospitalization is rare. If someone is going to have symptoms, they usually start between two and seven days following the bite of an infected mosquito. Additionally, there have been reports of the virus impacting women who are pregnant and their child. In Brazil and other countries, there have been reports of microcephaly in babies of mothers who were infected with Zika virus while pregnant. While more studies are needed to learn more about the risks of Zika virus infection during pregnancy, public health authorities are recommending that pregnant women, women actively trying to become pregnant, or women of child-bearing age take special precautions to reduce their risk of exposure to Zika virus (NYS DOH 2016).

Location

Due to the geographic location and demographic characteristics of Warren County, make it vulnerable to importation and spread of infectious diseases. Additionally, the County is a tourist destination all year long, leading to people from all over coming into contact with each other and making the County more susceptible to the spread of diseases. Disease outbreaks pose serious threats to the County and could strain the capacity of hospitals, clinics and other healthcare facilities to respond to those seeking medical attention.

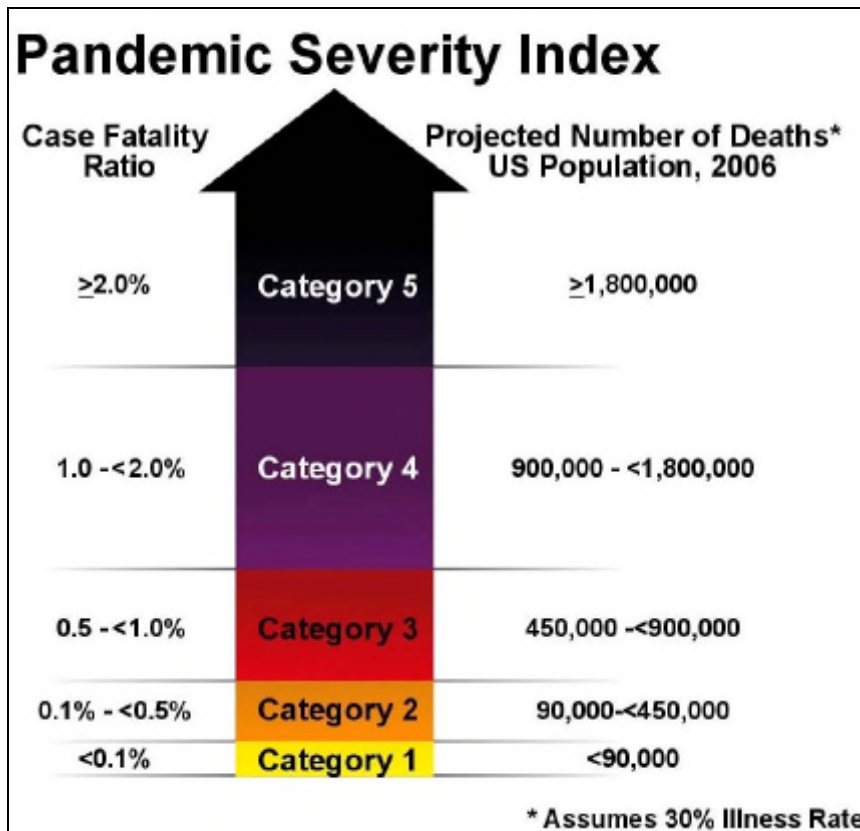
Extent

The exact size and extent of an infected population depends on how easily the illness is spread, the mode of transmission, and the amount of contact between infected and uninfected individuals. The transmission rates of pandemic illnesses are often higher in more densely populated areas. The transmission rate of infectious diseases will depend on the mode of transmission of a given illness. The Ebola virus is spread to others through direct contact; it is not spread through the air like influenza.

The CDC and Prevention Community Strategy for Pandemic Influenza Mitigation guidance introduced a Pandemic Severity Index (PSI), which uses the case fatality ratio as the critical driver for categorizing the severity of a pandemic. The index is designed to estimate the severity of a pandemic on a population to allow better forecasting of the impact of a pandemic, and to enable recommendations on the use of mitigation interventions that are matched to the severity of influenza pandemic. Pandemics are assigned to one of five discrete categories of increasing severity (Category 1 to Category 5) (CDC 2012). Figure 5.4.9-1 illustrates the five categories of the PSI.



Figure 5.4.9-1. Pandemic Severity Index



Source: CDC 2015

There are number of pandemic levels that are identified by the WHO and CDC. Additionally, NYSDOH and State EOC have their own activation levels in response to a pandemic event. Multiple waves of pandemic can be anticipated throughout the life cycle of an event. Refer to <https://www.health.ny.gov/diseases/communicable/influenza/pandemic/> for information regarding the various levels in New York State.

Previous Occurrences and Losses

Between 1954 and 2015, New York State was included in one disease outbreak-related emergency (EM) declaration, classified as a virus threat due to West Nile Virus impacting the State (EM-3155, May – November 2000). Generally, these disasters cover a wide region of the State; therefore, they may have impacted many counties. However, not all counties were included in the disaster declarations. Warren County was included in this declaration (FEMA 2016).

Each year, cases of influenza have been reported in Warren County. As for Ebola and Zika, there have been no reported cases.

Probability of Future Occurrences

Predicting the future occurrences of disease outbreaks is difficult to predict; however, based on the history of occurrences in Warren County, the likelihood of a disease outbreak impacting the County is possible. Additionally, increases in population and population density and increase in tourism numbers in the County have the potential to increase exposure and susceptibility of its residents to outbreaks.



In Section 5.3, the identified hazards of concern for Warren County were ranked. The probability of occurrence, or likelihood of the event, is one parameter used for hazard rankings. Based on historical records and input from the Planning Committee, the probability of occurrence for disease outbreaks in the County is considered ‘frequent’ (likely to occur within 25 years, as presented in Table 5.3-3).

Climate Change Impacts

Climate change is beginning to affect both people and resources in New York State, and these impacts are projected to continue growing. Impacts related to increasing temperatures and sea level rise are already being felt in the State. ClimAID: the Integrated Assessment for Effective Climate Change in New York State (ClimAID) was undertaken to provide decision-makers with information on the State’s vulnerability to climate change and to facilitate the development of adaptation strategies informed by both local experience and scientific knowledge (New York State Energy Research and Development Authority [NYSERDA] 2011).

Each region in New York State, as defined by ClimAID, has attributes that will be affected by climate change. Warren County is part of Region 7, Adirondack Mountains. Some of the issues in this region, affected by climate change, include: loss of high elevation plants, animals and ecosystem types; decline in winter recreation; decline in milk production, etc. (NYSERDA 2011).

Temperatures in New York State are warming, with an average rate of warming over the past century of 0.25° F per decade. Average annual temperatures are projected to increase across New York State by 2° F to 3.4° F by the 2020s, 4.1° F to 6.8° F by the 2050s, and 5.3° F to 10.1° F by the 2080s. By the end of the century, the greatest warming is projected to be in the northern section of the State (NYSERDA 2014).

Regional precipitation across New York State is projected to increase by approximately one to eight-percent by the 2020s, three to 12-percent by the 2050s, and four to 15-percent by the 2080s. The results for future time periods are compared to the model results for the baseline period (1971 to 2000). By the end of the century, the greatest increases in precipitation are projected to be in the northern areas of the State (NYSERDA 2014).

In Region 7, it is estimated that temperatures will increase by 3.7°F to 7.4°F by the 2050s and 4.2°F to 11.8°F by the 2080s (baseline of 39.9°F). Precipitation totals will increase between 2 and 15% by the 2050s and 3 to 17% by the 2080s (baseline of 40.8 inches). While annual precipitation and temperature projections are more certain than seasonal results, much of this additional precipitation is expected to occur during the winter months, which may result in greater annual snowfall in Warren County.

An increase in temperature and humidity may also lead to a larger number of influenza outbreaks. Studies have shown that warmer winters led to an increase in influenza cases. During warm winters, fewer people contract influenza which causes a large number in population to remain vulnerable into the next season. This causes an early and strong occurrence of the virus (Spross 2013).



5.4.9.2 Vulnerability Assessment

To understand risk, a community must evaluate what assets are exposed or vulnerable in the identified hazard area. For disease outbreaks, all of Warren County is considered exposed to the hazard. Therefore, all assets in the County, as described in the County Profile (Section 4), are exposed and potentially vulnerable. The following text evaluates and estimates the potential impact of disease outbreaks on the County including:

- Overview of vulnerability
- Data and methodology used for the evaluation
- Impact on: (1) life, health and safety of residents, (2) general building stock, (3) critical facilities, (4) economy, and (5) future growth and development
- Effect of climate change on vulnerability
- Further data collections that will assist understanding this hazard over time

Overview of Vulnerability

Disease outbreaks are a significant concern to Warren County, mainly due to its impact on public health and natural resources. Estimated losses are difficult to quantify; however, disease outbreaks can impact the County's population and economy. Areas with a higher population density will have a higher exposure to disease outbreaks, especially those populations living in areas prone to mosquitoes and ticks. Additionally, vulnerable populations such as the young and elderly are considered at higher risk.

Data and Methodology

Due to a lack of quantifiable loss information, a qualitative assessment was conducted to evaluate the assets exposed to this hazard and the potential impacts associated with this hazard.

Impact on Life, Health and Safety

The entire population of Warren County is vulnerable to the disease outbreak hazard. Healthcare providers and first responders have an increased risk of exposure due to their frequent contact with infected populations.

Impact on General Building Stock and Critical Facilities

No structures are anticipated to be directly affected by disease outbreaks.

Impact on Economy

The impact disease outbreaks have on the economy and estimated dollar losses are difficult to measure and quantify. Costs associated with the activities and programs implemented to conduct surveillance and address disease outbreaks have not been quantified in available documentation. Instead, activities and programs implemented by the County to address this hazard are described below, all of which could impact the local economy.

Effect of Climate Change on Vulnerability

The relationship between climate change and infectious diseases is somewhat controversial. The notion that rising temperatures will increase the number of mosquitoes that can transmit diseases among humans (rather than just shift their range) has been the subject of debate over the past decade. Some believe that climate change may affect the spread of disease, while others are not convinced. However, many



researchers point out that climate is not the only force at work in increasing the spread of infectious diseases into the future. Other factors, such as expanded rapid travel and evolution of resistance to medical treatments, are already changing the ways pathogens infect people, plants, and animals. Climate change accelerates may likely to work synergistically with many of these factors, especially in populations increasingly subject to massive migration and malnutrition (Harmon 2010).

Impact of Future Growth and Development

As discussed in Section 4, areas targeted for future growth and development have been identified across the County. Any areas of growth could be potentially impacted by the disease outbreak hazard because the entire planning area is exposed and vulnerable.

Additional Data and Next Steps

For the Plan Update, any additional information regarding historic costs incurred to conduct surveillance, prevent, treat and eradicate disease outbreaks may help with quantifying losses, given a margin of uncertainty. This data will be developed to support future revisions to the plan. Mitigation efforts could include building on existing New York State, Warren County, and local efforts.