



5.4.9 Pandemic

This section provides profile information, including description, location, extent, previous occurrences and losses, probability of future occurrences, and climate change impacts as well as the vulnerability assessment for the epidemic hazard in Erie County.

5.4.9.1 Hazard Profile

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 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 and Prevention [CDC] 2004). Diseases that impact Erie County include 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 Ebola virus, and COVID-19 as the diseases that may lead to an epidemic.

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 changes daily life for some time, including limitations on travel and public gatherings (CDC 2016).

At the national level, the CDC's Influenza Division has a long history of working with 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 provides international outbreak investigation assistance (CDC 2020).

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 was the largest in history, affecting multiple countries in West Africa. From 2014–2016, 11 people were treated in the United States, two of whom died (CDC 2019).

COVID-19 Virus

Coronavirus disease (COVID-19) is an infectious disease first identified in 2019. The virus rapidly spread into a global pandemic by spring of 2020. Older people and those with underlying medical problems like



cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely to develop serious illness (WHO 2020). With the virus being relatively new, information regarding transmission and symptoms of the virus is still fresh. The COVID-19 virus spreads primarily through droplets of saliva or discharge from the nose when an infected person coughs or sneezes. Illnesses have ranged from mild symptoms to severe illness and death. Reported symptoms include flu-like symptoms, trouble breathing, persistent pain or pressure in the chest, headaches, and loss of taste. Symptoms may appear 2–14 days after exposure to the virus (based on the incubation period of MERS-CoV viruses) (CDC 2020).

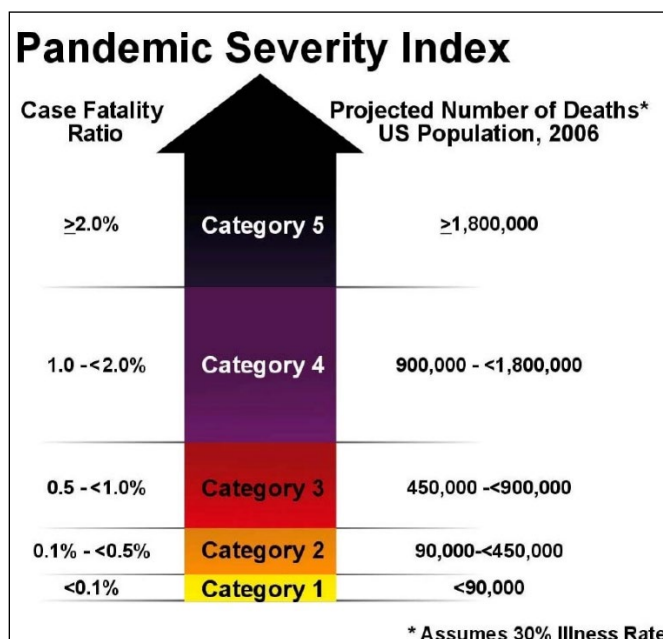
In order to slow the spread of the virus, the federal government and states have urged the public to avoid touching of the face, properly wash hands often, wear a face mask in public areas, and use various social distancing measures. Vaccines and treatments have been developed and are continuing to be refined for COVID-19. Many ongoing clinical trials are evaluating potential treatments (WHO 2020).

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 or COVID-19.

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 2016). Figure 5.4.9-1 illustrates the five categories of the PSI.

Figure 5.4.9-1. Pandemic Severity Index



Source: CDC 2016



WHO and CDC identify pandemics according to a number of pandemic classification levels. Additionally, New York State Department of Health (NYSDOH) and State Emergency Operations Center (EOC) have their own activation levels in response to a pandemic event. Multiple waves of a 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.

Location

Erie County’s geographic location and demographic characteristics make it vulnerable to importation and spread of infectious diseases. The county has experienced the effects of a pandemic or diseases outbreak, including influenza and COVID-19. There are some densely populated municipalities in the county, which can lead to the spread of influenza and COVID-19 more quickly than less densely populated communities. See Section 4 (County Profile) for a population density map of Erie County.

Previous Occurrences and Losses

Between 1954 and 2020, New York State was included in two disease outbreak-related emergency (EM) declarations, classified as a virus threat due to both West Nile Virus (EM-3155, May–November 2000) and COVID-19 (EM-3434, January 2020–Ongoing) impacting the State. Generally, epidemic disasters cover a wide region of the State; therefore, they may have impacted many, but not all, counties. Erie County was included in these two declarations (Federal Emergency Management Agency [FEMA] 2020). Table 5.4.9-1 provides details on epidemic episodes that occurred in Erie County between 2015 and 2020.

Table 5.4.9-1. Influenza, Ebola and COVID-19 Epidemics Affecting Erie County, 2015 to 2020

Date(s) of Event	Event Type	FEMA Declaration Number (if applicable)	County Designated?	Event Details
2020 & ongoing	COVID-19	EM-3434	Yes	COVID-19 epidemic. 1,600 deaths in county reported (as of March 5, 2021)
2019–(June) 2020 Season	Influenza	N/A	N/A	454 cases of influenza reported
2015–2016 Season	Influenza	N/A	N/A	117 cases of influenza reported
2016–2017 Season	Influenza	N/A	N/A	63 cases of influenza reported
2017–2018 Season	Influenza	N/A	N/A	284 cases of influenza reported
2018–2019 Season	Influenza	N/A	N/A	288 cases of influenza reported
2015–2019	Ebola	N/A	N/A	0 confirmed cases of Ebola

Source: NYSDOH 2021

Note: *COVID-19 count as of March 5, 2021

Probability of Future Events

Predicting the future occurrences of disease outbreaks is difficult; however, based on the history of occurrences in Erie County, it is possible to predict the likelihood of a disease outbreak impacting the County. Additionally, increases in population and population density 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 Erie 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 “occasional” (likely to occur within 100 years, as presented in Table 5.3-1).

Impacts of Climate Change

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. Erie County is part of geographical Region 1, Western New York and the Great Lakes Plain. Some of the issues in this region affected by climate change include: relatively low seasonal rainfall and increased summer drought risk, high-value crops could need irrigation, and growing conditions will improve for some crops, such as grapes. (NYSERDA 2014). The relationship between climate change and increase in infectious diseases is difficult to predict with certainty; there are scientific linkages between the two. As warm habitats that host insects such as mosquitoes increase, more of the population becomes exposed to potential virus threats (The Washington Post, 2017).

Temperatures and precipitation amounts are expected to increase throughout the State as well as within Region 1. Within Region 1, temperatures are anticipated to increase between 4.3 to 6.3 °F by the 2050s and 5.7 to 9.6 °F by the 2080s (baseline of 47.7 °F, middle-range projection). Precipitation totals will increase between 4 and 10 percent by the 2050s and 6 to 13 percent by the 2080s (baseline of 34.0 inches, middle-range projection).

Annual temperatures have been rising throughout New York State since the start of the 20th century. State average temperatures have increased by approximately 0.6 °F since 1970, with winter warming exceeding 1.1 °F per decade. Extreme heat events are likely to increase throughout New York State, and short-duration warm season droughts will become more common (NYSERDA 2014).

With the increase in temperatures, heat waves will become more frequent and intense, as shown in Table 5.4.9-2 below. Heat waves are defined as three or more consecutive days with maximum temperatures at or above 90 °F. Summer droughts are projected to increase under these conditions, affecting water supply, agriculture, ecosystems, and energy projects (NYSERDA 2014).

Table 5.4.9-2. Extreme Event Projections for Region 1

Middle Range (25 th to 75 th Percentile)	2020s	2050s	2080s
Days over 90 °F (8 days)	14 to 17	22 to 34	27 to 57
# of Heat Waves (0.7 heat waves)	2 to 2	3 to 4	3 to 8
Duration of Heat Waves (4 days)	4 to 4	4 to 5	5 to 6
Days below 32 °F (133 days)	103 to 111	84 to 96	68 to 88
Days over 1” Rainfall (5 days)	5 to 5	5 to 5	5 to 6
Days over 2” Rainfall (0.6 days)	0.6 to 0.7	0.6 to 0.8	0.6 to 0.9

Source: NYSEDA 2014

Warmer temperatures and changing rainfall patterns provide an environment where mosquitoes can remain active longer, greatly increasing the risk for animals and humans. Lyme disease could also expand throughout



the United States as temperatures warm, allowing ticks to move into new areas of the country. The changes in climate can also allow tropical and subtropical insects to move from regions where diseases thrive into new places (Natural Resources Defense Council 2017).

An increase in temperature and humidity may also lead to a larger number of influenza outbreaks. Studies have shown that warmer winters lead 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 (Natural Resources Defense Council 2018).

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 Erie 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.

Impact on Life, Health, and Safety

The entire population of Erie County is vulnerable to the epidemic hazard. Healthcare providers and first responders have an increased risk of exposure due to their frequent contact with infected populations. As of February 27, 2021, the total confirmed cases of COVID within the county over the past year was 64,838 and the death toll was 1,651.

Most recently with COVID-19, the CDC has indicated that persons over 65 years and older, persons living in a nursing home or long-term care facility, and persons with underlying medical conditions such as cancer, chronic kidney disease, severe obesity, serious heart conditions, immunocompromised, etc. are at a higher risk of getting severely ill (CDC 2020). Population data from the 2019 U.S. Census Population Estimates indicates that 161,806 persons over 65 years old in Erie County would be considered at risk for getting severely ill from the COVID-19 virus. While the statistics of this virus are subject to change during the publication of this Hazard Mitigation Plan (HMP), the New York Department of Health dashboard shows that there is a higher percentage of illnesses within this particular age group.

Impact on General Building Stock, Critical Facilities, and Lifelines

No structures are anticipated to be directly affected by epidemics. An important secondary impact of a pandemic is that health care facilities can become overwhelmed with patient numbers and intensity of care needs.

Impact on Economy

The impact epidemics 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 epidemics 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.

Most recently, the New York State Health Department has played an active role in maintaining and controlling COVID-19 protocols across the state. This activity requires additional costs from the State and Erie County to manage COVID-19 in the communities. Further, there has been secondary economic impact of closing non-essential facilities to reduce the spread of the virus. At the time of this HMP Update, the final costs of this virus are yet to be determined.

Impact on Environment

Disease outbreaks may have an impact on the environment if the outbreaks are caused by invasive species. Invasive species tend to be competitive with native species and their habitat and can be the major transmitters of



diseases like Zika, dengue, and yellow fever (Placer Mosquito and Vector Control District 2019). Secondary impacts from mitigating disease outbreaks could also have an impact on the environment. Pesticides used to control disease-carrying insects like mosquitoes have been reviewed by the Environmental Protection Agency (EPA) and the New York Department of Environmental Conservation. If these sprays are applied in large concentrations, they could potentially leach into waterways and harm nearby terrestrial species. As a result, pesticides must be registered before they can be sold, distributed, or used in the state (New York Department of Environmental Conservation 2020).

Cascading Impacts on Other Hazards

There are no known cascading impacts that disease outbreaks can cause to other hazards of concern for Erie County.

Future Changes that May Impact Vulnerability

Understanding future changes that effect vulnerability in the county can assist in planning for future development and ensure establishment of appropriate mitigation, planning, and preparedness measures. Changes in the natural environment and built environment and how they interact can also provide insight about ways to plan.

Project 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 epidemic hazard because the entire planning area is exposed and vulnerable.

Projected Changes in Population

According to the U.S. Census Bureau, the population in Erie County has increased by a negligible amount between 2010 and 2019 (U.S. Census Bureau 2020). Estimated population projections provided by the Cornell Program on Applied Demographics indicate that the county’s population will grow overall up to 2040, resulting in a projected population of 945,891 persons. (Cornell Program on Applied Demographics 2017). While fewer people will reside in the county, those who remain are still vulnerable to an epidemic or pandemic event. Section 4, County Profile, presents additional discussion on population trends.

Climate Change

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. Climate change may affect the spread of disease. 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 accelerations may likely work synergistically with many of these factors, especially in populations increasingly subject to massive migration and malnutrition (American Journal of Epidemiology 2019).

Changes in Vulnerability Since the 2015 HMP

An epidemics analysis was not conducted as part of the 2015 HMP risk assessment. Therefore, it is not possible to compare the change in vulnerability to the pandemic hazard.