4.5 Epidemic

Description

The Centers for Disease Control and Prevention (CDC) defines an epidemic as "an increase, often sudden, in the number of cases of a disease above what is normally expected in that population in that area." Moreover, the World Health Organization (WHO) defines a pandemic as "an epidemic occurring worldwide, or over a very wide area, crossing international boundaries and usually affecting a large number of people."

Epidemics occur when an agent and susceptible hosts are present in adequate numbers, and the agent can be effectively conveyed from a source to the susceptible hosts. More specifically, an epidemic may result from any of the following:

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

Table 4.5.1 lists the names of diseases, causes (bacteria, insect, virus, etc.), symptoms, and risk in Ohio. Diseases and epidemics can also impact animals that can then carry and spread harmful pathogens to people and cause illness. These are known as zoonotic diseases or zoonoses. Zoonotic diseases can cause many different types of illnesses in people and animals, ranging from mild illness to sometimes death. The most common ways people can get infected with germs that can cause zoonotic diseases are:

- Direct contact with the saliva, blood, urine, mucous, feces, or other body fluids of an infected animal
- Indirect contact with areas or surfaces where animals live and roam
- Vector-borne when bitten by a tick, or an insect like a mosquito or a flea
- Foodborne from eating or drinking contaminated or unsafe food or drink, such as unpasteurized (raw) milk, undercooked meat or eggs, or fruits and vegetables that are contaminated with feces from an infected animal
- Waterborne from drinking or coming in contact with water that has been contaminated with feces from an infected animal

Location

Epidemics can develop with little or no warning and quickly erode the capacity of local medical care providers. A fast-developing epidemic can last several days and extend into months or even years in extreme cases. Epidemics can occur at any time of the year, but the warm summer months are favorable for bacteria and microorganism growth resulting in a higher risk for epidemics occurring due to these agents as seen in the case of Cholera. Figure 4.5.2 indicates otherwise for COVID-19 showing that the winter months have been the deadliest. Poor living conditions and lack of hygiene where many people live in close proximity can also cause the incubation of pathogens that lead to diseases. An epidemic has the potential to affect the entire County but is more probable to occur in densely-populated areas, especially at facilities with large numbers of occupants.

Table 4.5.1: Zoonotic Diseases of Concern in Ohio

Name of the Disease	Pathogen Type	Carried by Animal	Method of Transmission to Humans	Affect/Impact	Risk in Ohio
Rabies	Virus	All livestock; sometimes pets and other stray animals	Animal bites	Affects both animals and humans	Low
Mad cow disease - Bovine spongiform encephalopathy (in cows) and variant Creutzfeldt-Jakob disease (in humans)	Prion protein	Cattle	Eating contaminated meat	Affects the brains of cattle and humans leading to death	Low
Brucellosis	Bacteria	All livestock	Contact with birthing materials, aborted fetuses/tissues or through consumption of raw milk and cheeses from infected animals	Causes abortion in livestock	Low
Campylobacteriosis	Bacteria	All livestock	Consumption of raw or undercooked meat, milk, or cheeses	Diarrhea in calves, abortion in sheep, udder infection in cattle	Low
Cryptosporidiosis	Protozoa	All livestock	Consumption of contaminated food or water or contact with animal feces	Diarrhea	Low
Ringworm - Dermatophytosis	Fungi	Cattle, sheep, goats	Contact with infected livestock or their environment	Scaly white lesions with hair loss leading to thick light brown scabs in calves	Low

Name of the Disease	Pathogen Type	Carried by Animal	Method of Transmission to Humans	Affect/Impact	Risk in Ohio
Shiga toxin-producing E. coli	Bacteria	Cattle	Consumption of contaminated food or water, unpasteurized milk, contact with cattle or their environment or contact with feces of an infected person	No impact on animals; people develop vomiting, diarrhea, and stomach cramps; sometimes hemolytic uremic syndrome (HUS)	Low
Swine Flu - Influenza A (swine triple reassorting (tr) H1N1 influenza virus, trH3N2 virus, and trH1N2 virus)	Virus	Pigs/Swine	Direct contact with pigs or their environment (slaughterhouses)	High levels of illness in pigs can cause few deaths; does not usually infect humans	Moderate
Bird Flu – Influenza A (H5N1)	Virus	Birds and Poultry (Other animals and sporadic human cases)	Direct contact or contaminated environments (contact with contaminated surfaces, feed, water)	Can cause high levels of mortality in poultry, raising egg prices and poultry prices; can cause mild flu-like symptoms in humans	Low
Leptospirosis	Bacteria	All livestock and domestic animals	Exposure to contaminated water or soil or through direct contact with the infected animals' urine	Fever, lethargy, and lack of appetite	Low
Scabby mouth - Orf	Virus	Goats and sheep	Direct contact with an infected animal or by touching contaminated equipment	Blisters and crusty scabs on lips, muzzle in the mouth of animals; people get infection and blisters on fingers	Low

Name of the Disease	Pathogen Type	Carried by Animal	Method of Transmission to Humans	Affect/Impact	Risk in Ohio
Q fever	Bacteria	Cattle, sheep, and goats	Inhalation of contaminated dust, contact with birthing materials, aborted fetuses and tissues, consumption of raw milk and cheeses from infected animals	Abortion in cattle, sheep, and goats; people experience mild flu-like illness; some develop atypical pneumonia - if untreated, may result in endocarditis and heart valve damage	Low
Salmonellosis	Bacteria	Cattle and pigs; less commonly, sheep and goats	Consumption of contaminated food	Diarrhea in animals	Moderate
Toxoplasmosis	Protozoa	Birds and mammals	Consumption of undercooked or contaminated meat; contact with contaminated objects and surfaces	Development of infective cysts in muscles and other organs in animals; affects pregnant women and their babies	Moderate
Yersiniosis	Bacteria	Pigs/Swine	Direct contact with infected pigs or consuming contaminated pork products	In children and adolescents, acute appendicitis	Low
West Nile Virus	Virus	Mosquitoes	Bite of an infected mosquito	In humans, mild fever; sometimes fatal affecting the central nervous system	Moderate

Name of the Disease	Pathogen Type	Carried by Animal	Method of Transmission to Humans	Affect/Impact	Risk in Ohio
La Crosse virus (LACV)	Virus	Mosquitoes, chipmunks, and squirrels	Bite of an infected mosquito	Fever, headache, nausea, vomiting, fatigue, and lethargy; severe cases affecting the nervous system occurs most frequently in children under the age of 16; fatal cases are rare	Low
Lyme disease, anaplasmosis, babesiosis	Parasites	Ticks	Bite of an infected tick	Red ring-like rash, flu-like symptoms, fever, chills, fatigue, muscle pain, headache, nausea, vomiting, diarrhea, dark urine	Low
Rocky Mountain spotted fever	Bacteria	Tick	Bite of an infected tick	Fever, headache, and rash	Low

History

Epidemics have impacted the United States including Ohio several times over the past several centuries. A brief description of these outbreaks and their impacts are summarized below:

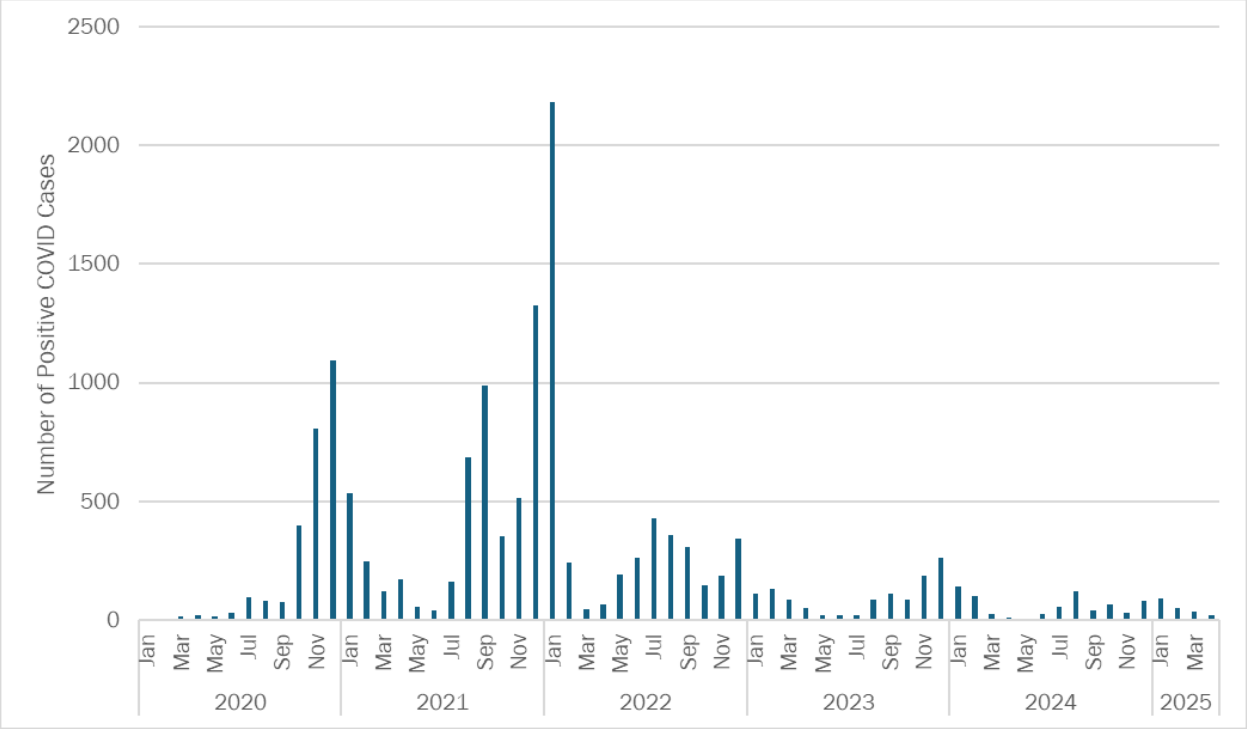
The Coronavirus (COVID-19) pandemic, March 2020 – May 11, 2023:

Most recently, the Coronavirus (COVID-19) pandemic has impacted the County, along with the rest of the world, beginning in March of 2020. A National Emergency Declaration went into effect on March 13, 2020. Governor Mike DeWine and Ohio Department of Health Director, Dr. Amy Acton, issued a stay-at-home order on March 23, 2020. At that time, the stay-at-home order included refraining from going outdoors to public places and gatherings, to following social distancing guidelines (at least six feet apart) in public places and at events, regulating the number of people allowed to be in closed areas or establishments, and mandating 14-day quarantine for travelers from out of state. The COVID-19-related health orders have changed since then.

In early May 2020, businesses and other organizations in Ohio started the process of reopening; however, by June, hospitals begin to see an uptick in the number of COVID-19 hospitalizations. As the

school year began, local schools utilized a combination of in-person and virtual education. **Figure 4.5.2** shows the winter months of December 2021 to January 2022 had the most cases.

Figure 4.5.2: Clinton County COVID-19 Cases by Month



Source: Ohio Department of Health

The U.S. Food and Drug Administration (FDA) authorized Pfizer's COVID-19 vaccine for emergency use in December 2020. This vaccine, along with other authorized vaccines, was made available to the public shortly after. There has been a decline in the number of cases and deaths since January 2021. However, in July 2021, the Delta variant of the COVID-19 virus was spreading fast in the United States, even in some vaccinated individuals. In 2024, a subvariant called XEC started to spread. It became the dominant variant in the United States as of December 2024.

As of January 10, 2025, Clinton County had 14,716 total confirmed cases and 199 deaths attributed to COVID-19. Additionally, Clinton County has about 21,081 persons who have received at least one dose of a COVID vaccine and 19,782 persons who are fully vaccinated.

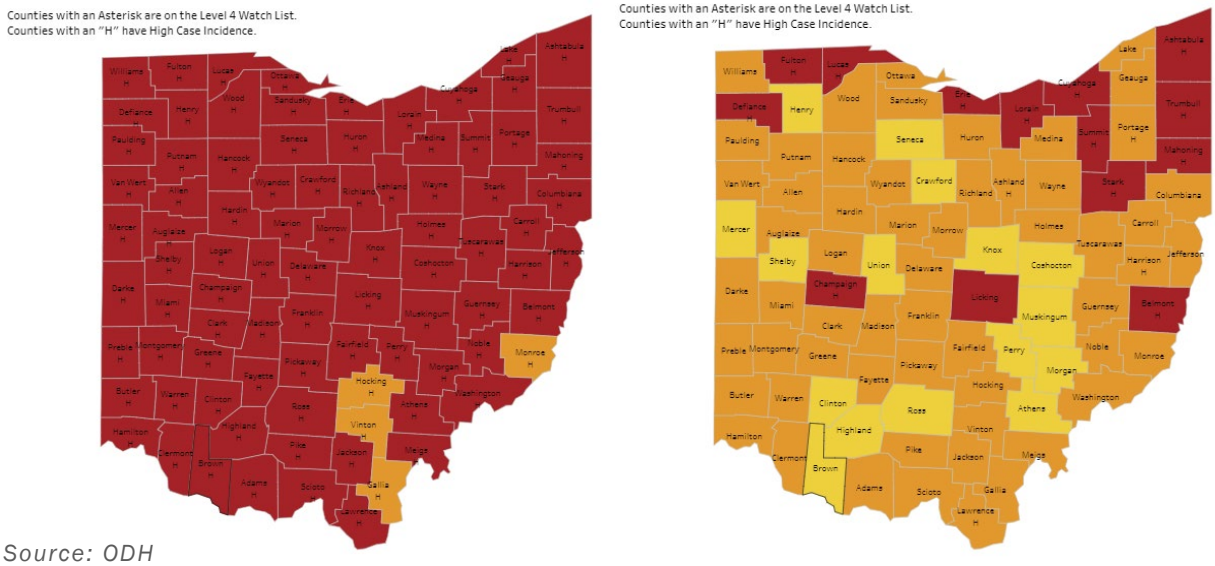
The Ohio Department of Health (ODH) maintained a Public Health Advisory Alert System to supplement existing statewide orders to assess the degree of the virus' spread. There are four levels, with designated colors to help visualize the risk, as described in **Table 4.5.3**. As of May 27, 2021, ODH cancelled the Ohio Public Health Advisory System but will continue to share COVID-19 cases, hospitalizations, deaths, current trends, key metrics, and vaccination data daily at coronavirus.ohio.gov. **Figure 4.5.4** shows the Public Health Advisory System as of December 31, 2020, in comparison to the status on May 20, 2021.

Table 4.5.3: Public Health Advisory Alert System

Color	Public Emergency Level	Risk Information
Yellow	Level 1 Public Emergency	Active exposure and spread.
Orange	Level 2 Public Emergency	Increased exposure and spread. Exercise high degree of caution.
Red	Level 3 Public Emergency	Very high exposure and spread. Limit activities as much as possible.
Purple	Level 4 Public Emergency	Severe exposure and spread. Only leave home for supplies and services.

Source: ODH

Figure 4.5.4: Public Health Advisory System on December 31, 2020 (left) and May 20, 2021 (right)



Source: ODH

The Spanish Influenza, 1918 – 1919:

Spanish flu, also known as the Great Influenza epidemic or the 1918 influenza pandemic, was an exceptionally deadly global influenza pandemic caused by the H1N1 influenza A virus.

After World War I, soldiers who were living in dirty and squalid conditions began falling sick of a flu-like disease. Spain first reported this disease. A strong case of the disease was observed in the United States in March 1918, when about 500 soldiers were hospitalized in a week at Fort Riley in the State of Kansas. Given the contagious nature of the flu, the disease was passed on to their family and friends. It caused soreness and tiredness, a cough, loss of appetite, and sweating, and was particularly deadly for people in their 20s and 30s.

By October, then-Governor of Ohio, James Cox, and ODH began making recommendations to close public gathering places, including schools, when the influenza arrived (**Figure 4.5.5 and Figure 4.5.6**). The prevention methodologies adopted by the officials and the citizens are reportedly like the COVID-19 pandemic including shortage of medical staff, wearing of masks, staying at home, maintaining social distancing, and isolating when infection was suspected (**Figure 4.5.7 and Figure 4.5.8**).

By early 1919, after three waves of the pandemic, Ohio came out of quarantine. By this time, the Spanish Flu had caused about 50 million deaths around the world and approximately 675,000 in the United States. In Ohio, Cleveland was the worst hit with a total death rate of 474 per 100,000, even more than New York City or Chicago. Toledo reported the lowest death rate, at about 311 deaths per every 100,000 people.

Figure 4.5.5: The news on October 11, 1918, related to the Spanish Flu

Ohio State Lantern

COLUMBUS, OHIO, FRIDAY, OCTOBER 11, 1918.

GIVE INSTRUCTIONS SO INFLUENZA MAY BE HELD IN CHECK

WEIRD FIGURES AND STRANGE ACTS HERALD CHAPTER INITIATIONS

QUARANTINE RULES WILL NOT AFFECT FOOTBALL GAME

Bulletin Board

C. E. SEDDON'S DEATH CANNOT BE CONFIRMED

UNIVERSITY CLOSES TODAY TO STOP SPREAD OF INFLUENZA

Act Is Precautionary Measure and Courses Will Be Resumed when State Board of Health Raises Ban on Meetings.

S. A. T. C. MEMBERS ATTEND CLASSES AS USUAL

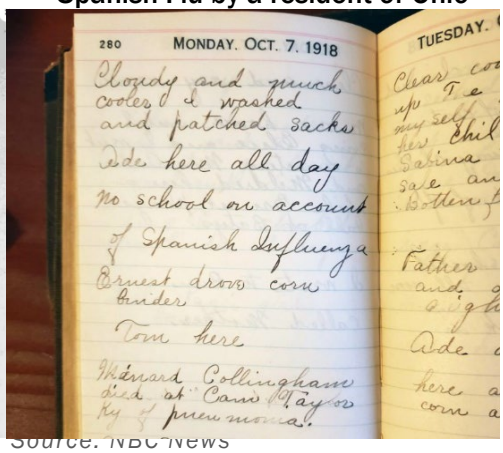
Military School Under Orders from War Department and State Acts Do Not Affect Inducted Men—Students Directed to Go Home.

NOTICE

WORLD WAR PROBLEMS SUBJECT OF NEW COURSE

Source: The Lantern

Figure 4.5.6: Diary written during the Spanish Flu by a resident of Ohio



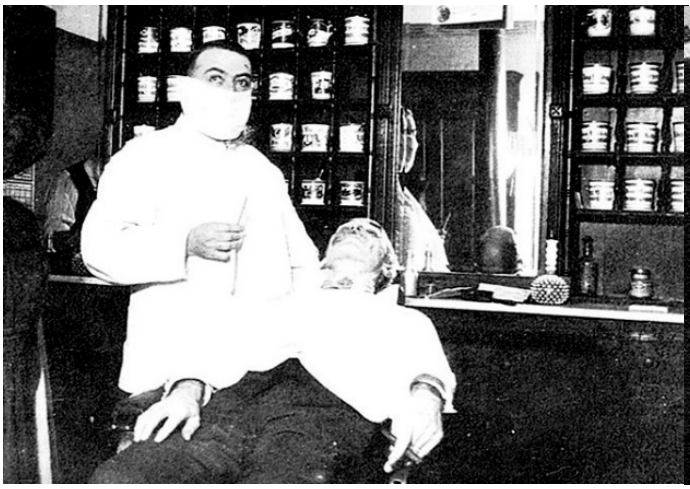
280 MONDAY. OCT. 7. 1918

Cloudy and much cooler I washed and patched sacks Ade here all day no school on account of Spanish Influenza Ernest drove corn binder Tom here Bernard Collingham died at Camp Sayre of pneumonia.

TUESDAY.

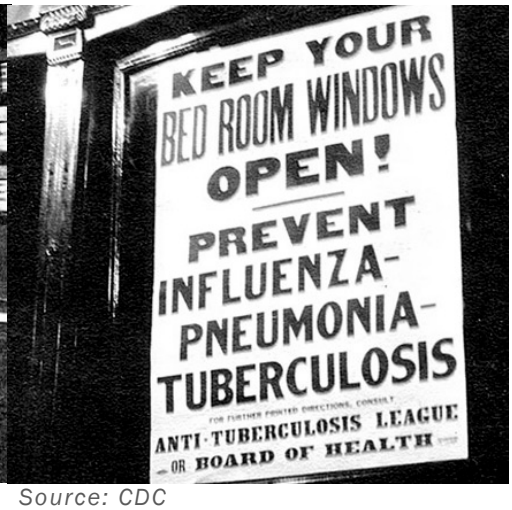
Source: NBC News

Figure 4.5.7: A Cincinnati barber wears a mask to help reduce the spread of the Flu in 1918



Source: CDC

Figure 4.5.8: Cincinnati Board of Health sign during the 1918 epidemic

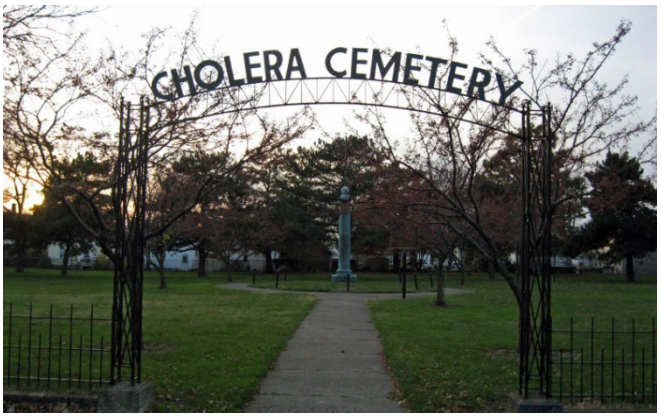


Source: CDC

The Cholera Epidemic/Pandemic, 19th century (Starting in the Unites States in 1832):

Cholera is an infectious disease caused by a bacterium called *Vibrio cholerae*. The bacteria typically live in waters that are salty and warm, such as waters along coastal areas. The disease is spread by drinking liquids or eating foods that are contaminated with bacteria. People who contract cholera generally suffer from severe diarrhea, vomiting, and cramps causing rapid loss of fluids and electrolytes. People with this illness can die from dehydration within a few hours or days after the symptoms first appear. A single diarrhea episode can cause a one-million-fold increase of bacterial numbers in the environment. Figure 4.5.9 is a Cemetery in Ohio dedicated to people who succumbed to cholera.

Figure 4.5.9: Cholera Cemetery in Ohio



Source: Travel 88

There have been seven cholera outbreaks since 1817. The first outbreak started in India in 1817, stemming from contaminated rice. The disease quickly spread to other countries in Asia. The pandemic dwindled out six years later, probably due to a severe winter in 1823, which may have killed the bacteria living in the water. The second cholera pandemic began around 1829. This time, it spread beyond Asia, into Europe and the Americas. In 1832, the disease made it to the Americas in a ship that arrived at Quebec. The bacteria spread along the St. Lawrence River and its tributaries, and the Ohio and Mississippi Rivers allowed the disease to spread across the United States in all directions.

Cleveland was the first place in Ohio to report cases. Cholera reached Ohio's interior through canals that provided stagnant water that allowed cholera to thrive. The same modes of transportation, that is, canals, railroads, and steamboats that benefited Ohioans economically, also brought disease. By late 1832, the illness had reached Cincinnati. Ohio was hit the worst in 1849 with about 8,000 deaths in Cincinnati alone. In Brown County, a small town named New Hope was swept by the cholera illness killing about 22 percent of the town's population.

Cholera tended to be most visible in cities with poor sanitation systems and contaminated community wells. It affected Ohio's working class first and most widely as they lived in close quarters with poor access to clean water, safe food, and opportunities to separate themselves from ill family members. The pandemic continued during the warm months for two decades until it subsided around 1851.

The third pandemic, stretching 1852–1859, was the deadliest. In 1854, a British physician named John Snow carefully mapped the disease to a public water pump, hence, confirming that cholera was waterborne bacteria. This eventually led to the improvement of sanitation practices that would help fight off cholera outbreaks more permanently.

The fourth (1863–1875) and fifth (1881–1896) cholera pandemics were less severe than the previous instances. By the fifth outbreak, the United States was mostly safe thanks to improved water supplies, including chlorination of water, and quarantine measures. Illness due to cholera continued in the United States till the early 1900s. By the sixth cholera pandemic (1899–1923) the United States remained unaffected, but the disease still impacted other places around the world. The seventh, and the latest, cholera pandemic started in 1961 and ended in 1975.

Today, cholera is treated through fluid replacement and antibiotics. Cholera vaccines are available, though they only offer roughly 65 precent immunity, according to WHO.

Disease in Songbirds, August 2021:

Songbirds in Ohio are being affected by a disease and developing symptoms of conjunctivitis. The primary species affected at this time are blue jays, common grackles, European starlings, American robins, and house sparrows. Ohio counties experiencing the bulk of the outbreak include Brown, Butler, Clark, Clermont, Delaware, Franklin, Greene, Hamilton, Montgomery, and Warren counties. Cause(s) of illness or death are under investigation currently. People are advised to stop feeding birds and clean their bird feeders.

The 2009 H1N1 Pandemic (H1N1) virus), June 11, 2009:

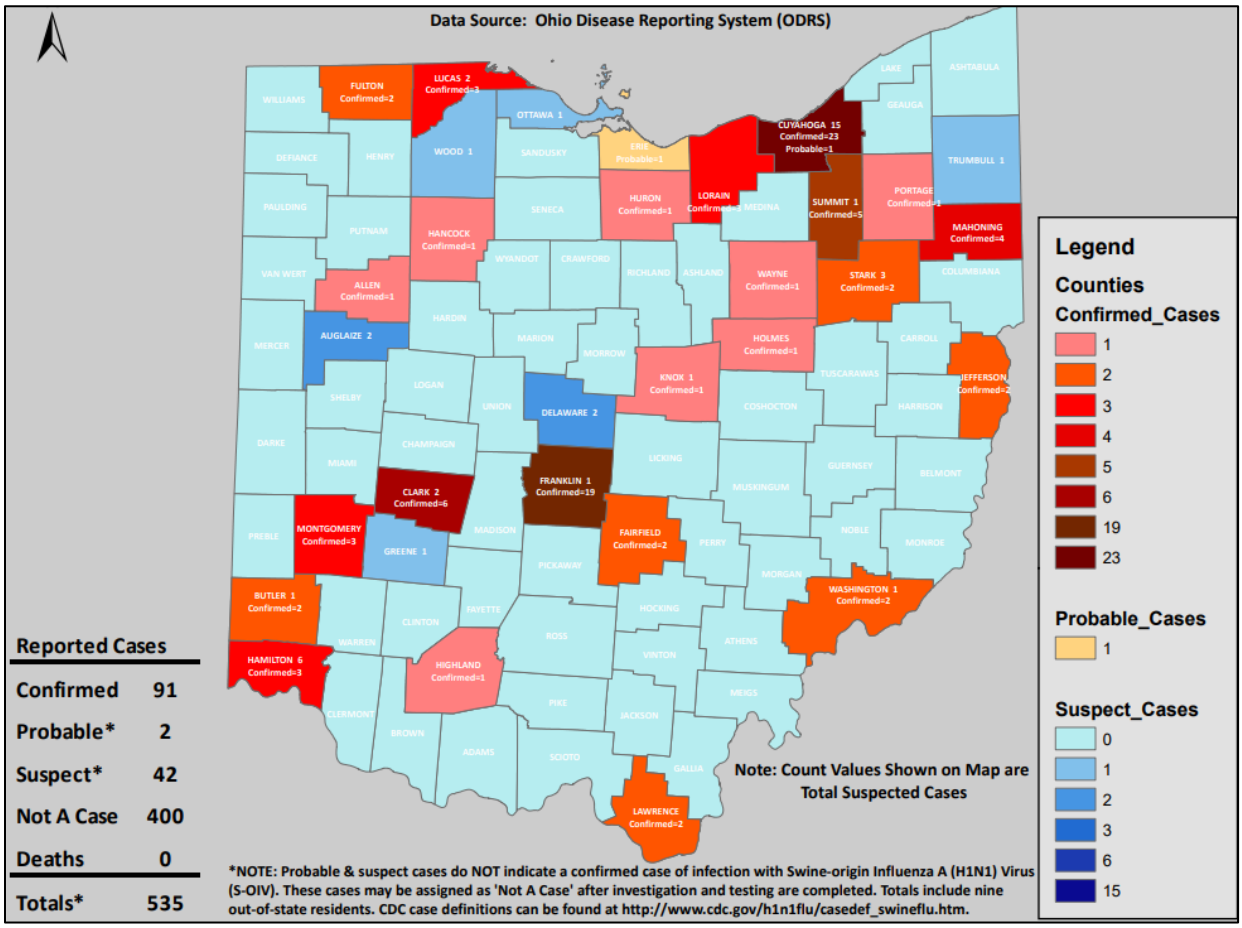
The swine flu was identified in humans in California in April 2009. On June 11, 2009, the WHO declared a pandemic. The new (H1N1) virus spread between humans through infected droplets from a cough or sneeze. Earlier strains of the H1N1 virus passed from animals to humans through close contact with infected meat, such as at slaughterhouses. By June 19, 2009, all 50 U.S. states had reported cases of 2009 H1N1 infection.

As of June 24, 2009, there were 91 confirmed cases of swine flu in Ohio and 44 possible cases (**Figure 4.5.10**). By February 2010, the state had recorded 51 deaths. From April 12, 2009, to April 10, 2010, the CDC estimated there were approximately 60.8 million cases (range: 43.3 - 89.3 million), 274,304 hospitalizations (range: 195,086 - 402,719), and 12,469 deaths (range: 8,868 - 18,306) in the United States due to the (H1N1) virus.

In September 2009, the FDA announced its approval of four vaccines, and in November, of a fifth vaccine to protect against the 2009 H1N1 flu virus. The first doses were administered on October 5, 2009. On August 10, 2010, the WHO declared an end to the global 2009 H1N1 influenza pandemic. However, the (H1N1) virus continues to circulate as a seasonal flu virus, and causes illness, hospitalization, and deaths every year.

To monitor large-scale outbreaks of Influenza A Viruses (IAV) among swine, pigs at Agricultural Fairs in Ohio are randomly checked each year by the Ohio State University's Department of Veterinary Preventive Medicine. They found that, on average, at least one animal at 25 percent of county fairs tests positive for swine flu. In 2012, out of 40 Ohio agricultural fairs, 10 pigs with H3N2 infection were found, and at many fairs with infected swine, people also caught the flu. In 2017, they identified sick pigs at fairs in Clinton and Franklin counties. The strain of the Influenza A flu detected in the pigs at Clinton County was H3N2, whereas the strain of the Influenza A flu detected in the pigs at Franklin County was H1N1. H3N2 is most spread to humans and that year about 11 individuals who had contact with the pigs tested positive for H3N2.

Figure 4.5.10: The spread of the Influenza A H1N1 virus in Ohio on June 24, 2009



Source: Ohio Disease Reporting System

The Bird Flu (H5N1) virus, 2024 – 2025:

The Bird flu was identified in humans in Texas in April 2024 when a dairy worker was exposed to infected cows. Since then, there have been at least 16,600 people monitored for exposure to Influenza A, 9,300 from dairy cows and 7,300 from birds and other animals including poultry. Of those, 880 persons were tested for novel Influenza A according to the CDC. In Ohio, there are 21 counties where a bird flu has been detected, including one case in Clinton County (**Table 4.5.11**).

Table 4.5.11: Bird Flu (H5N1) Detection in Ohio

County	Date Detected	Strain/Type/Source	Totals
Auglaize	4/15/2022	EA/AM H5N1	1
Clermont	11/28/2022	EA/AM H5N1	1
Clinton	4/15/2022	EA/AM H5N1	1
Cuyahoga	10/13/2022	EA/AM H5N1	6
Delaware	9/30/2022	EA H5N1	7
Erie	3/10/2022	EA/AM H5N1	1
Franklin	10/6/2022	EA H5N1	1

County	Date Detected	Strain/Type/Source	Totals
Greene	12/2/2023	EA H5N1	1
Guernsey	3/24/2022	EA/AM H5N1	1
Lake	3/20/2023	EA/AM H5N1	2
Mercer	1/21/2025	EA/AM H5N	1
Miami	4/13/2023	EA H5	1
Montgomery	4/15/2022	EA/AM H5N1	1
Muskingum	1/22/2025	EA/AM H5N1	7
Ottawa	3/25/2024	EA H5N1	136
Pickaway	1/30/2025	EA H5	1
Sandusky	3/25/2024	EA H5N1	10
Stark	1/24/2025	EA/AM H5N1	4
Summit	11/17/2023	EA H5N1	3
Wayne	11/3/2023	EA H5N1	3
Wood	2/29/2024	EA H5N1	1
Total			**190**

Source: CDC

Probability

Epidemics are rare, do not occur at regular intervals, and can begin without warning. However, various factors such as increasing urbanization, increased urban density, rapid globalization and mobility of people, demand for animal protein, habitat loss, and increased interactions at the human-animal interface increase the probability of a trigger event that may lead to the spread of a pathogen. If these trends continue, public health systems will have less time to detect and contain a pandemic before it spreads (Madhav N, Oppenheim B, Gallivan M, et al. 2017).

The report - Disease Control Priorities: Improving Health and Reducing Poverty, 3rd edition – published by World Bank Group, states that "Influenza is the most likely pathogen to cause a severe pandemic. Exceedance Probability analysis indicates that in any given year, a 1 percent probability exists of an influenza pandemic that causes nearly 6 million pneumonia and influenza deaths or more globally."

Furthermore, as global weather patterns shift and permafrost in areas of the world melts, there will be more opportunity for diseases that have been frozen within layers of permafrost to be released, exposing humans to new diseases. As such, there will be more potential for epidemics to arise from these diseases. In addition, the recent increase of disease emergence from animals associated with environmental change suggests a high probability of epidemics in the coming decades.

Vulnerability Assessment

Given the lack of historic epidemic events in the County, it is difficult to estimate potential damage. Additionally, the long-term impacts of a widespread virus like COVID-19 are still unknown. The following assessment was developed to provide a general vulnerability assessment for epidemics in Clinton County.

Infrastructure Impact

There is likely to be little-to-no impact to infrastructure in the event of an epidemic. However, hospitals will be challenged during an epidemic. Hospitals will need to double or even triple their supplies, facilities, and staff, while depending on other critical infrastructure outside of their own organization such as transportation. The failure of one such system can trigger a cascading effect of breakdowns in systems. This makes interconnected systems highly vulnerable to disruptions such as an epidemic. The construction and infrastructure sectors relying on global supply chains and supply of labor from around the world, can also have damaging impacts. Epidemics, such as the COVID-19 outbreak, caused offices to close and downtown areas to empty.

However, during the COVID-19 Pandemic, cities around the world reused their infrastructure systems in a variety of creative ways. For instance, parking lots were converted to drive-in test clinics and drive-in movie theaters, some cities reused their transit systems as medical supply units and mobile clinics, and with the drop in personal vehicle usage, certain urban areas saw a rise in pedestrian only spaces and bicycle lanes. While most of these measures were temporary, some cities have made it permanent.

Population Impact

The population of Clinton County is likely to be significantly impacted should an epidemic occur. Day-to-day life can be significantly interrupted, and people may lose their jobs or need to work from home. Diseases are especially fatal to older adults and those with a weakened immune system. Population groups that are faced with long-standing systemic health and social inequities are at an increased risk of getting sick and dying during an epidemic. These groups include many racial and minority groups, people with disabilities, people in prison, and people living in rural areas without sufficient access to basic amenities (Source: CDC).

As described in **Chapter 2: Demographics**, approximately 9.5 percent of Clinton County's population has an annual income of less than $15,000 and approximately 7.5 percent do not have a vehicle. A lack of health insurance, transportation, childcare, and/or sick leave from work can make it more difficult to seek healthcare. In addition, those with mental health concerns are also vulnerable and can be worsened by isolation during an epidemic if not approached sensitively.

Property Damage

Property damage is not likely to occur as a direct result of an epidemic event, but most property insurances and policies do not cover losses resulting from a disease outbreak. This can cause detrimental damage to properties. During the COVID-19 Pandemic, insurance companies such as Desjardins, dropped liability and property damage coverage related to communicable diseases stating that they will "not cover them (their clients) in the event they are sued for spreading a communicable disease, nor will it cover decontamination or property damage costs related to those diseases."

Loss of Life

Loss of life is a potential outcome from any epidemic event. Epidemics are especially fatal to older adults and those with a pre-existing weak immune system. Adults of any age with medical conditions such as, but not limited to, cancer, diabetes, chronic lung and kidney diseases, heart conditions, liver disease, down syndrome, HIV infection, dementia or other neurological conditions, obesity, and pregnancy, are more likely to get severely sick or die from diseases and epidemics such as the Spanish Flu and COVID-19 (Source: CDC).

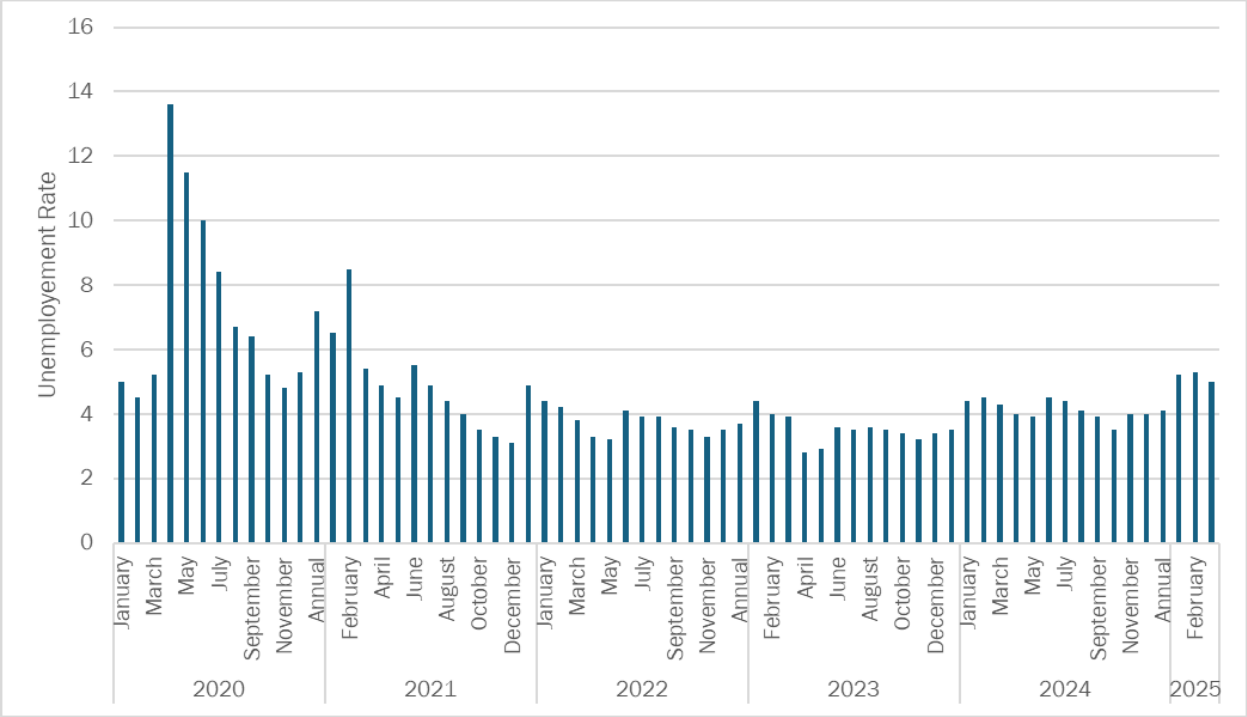
Economic Losses

While there is no widely accepted methodology for estimating the economic impacts of pandemics, losses would likely be observed through the inability for individuals to work. Large-scale epidemics then can have a significant impact on production and the supply chain. As such, these events can

disrupt the flow of the economy. In the long run, the threat of epidemics is low, and there is little risk that economic losses will occur in the County due to an epidemic. With that being said, the COVID-19 pandemic has proven to be a multiple-year event resulting in ongoing losses. The full extent of this pandemic is still to be determined.

Figure 4.5.12 displays the unemployment rate for Clinton County from January 2020 through February 2025. This shows the significant increase in unemployment associated with COVID-19 and accompanying business closures mandated by the State of Ohio. Clintons County's unemployment percentage rose to 13.5 percent in March 2020.

Figure 4.5.12: Unemployment Rates in Clinton County January 2020 to February 2025



Source: Ohio Department of Job & Family Services

Economic impacts can also be observed should a swine influenza outbreak occur. Swine influenza costs pork production approximately $3.23 - $10.31 per pig produced (national average).

Future Trends

Land Use and Development Trends

Land use and development are not likely to be impacted by epidemics. However, development can halt in a pandemic due to increased social distancing, spread of the virus and/or bacteria, and increased cost of building materials. Building costs have skyrocketed after COVID-19 due to supply chain disruptions, labor shortages, and a construction demand increase.