



## SECTION 4. RISK ASSESSMENT

### 4.3 Hazard Profiles

#### 4.3.7 Pandemic/Disease Outbreak

The following section provides the hazard profile and vulnerability assessment for the pandemic/disease outbreak hazard in Fort Bend County.

##### *Hazard Profile*

##### *Hazard Description*

An outbreak or an epidemic occurs when new cases of a certain disease, in a given population, substantially exceed what is expected. An epidemic may be restricted to one locale, or it may be global, at which point it is called a pandemic. Pandemic is defined as a disease occurring over a wide geographic area and affecting a high proportion of the population. A disease outbreak can cause sudden, pervasive illness in all age groups on a local or global scale. A pandemic is a novel virus to which humans have no natural immunity that spreads from person to person. A pandemic will cause both widespread and sustained effects and is likely to stress the resources of both the state and federal government (Madhav, et al. 2017). In addition to health impacts, disease outbreaks reaching pandemic proportions can cause social and economic impacts on a global scale (Shang, Li and Zhang 2021).

##### *Coronavirus*

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 (World Health Organization n.d.). With the virus being relatively new, information regarding transmission and symptoms of the virus is still new. The COVID-19 virus spreads primarily through droplets of saliva or discharge from the nose when an infected person coughs or sneezes. Reported illnesses have ranged from mild symptoms to severe illness. Reported symptoms include fever or chills, cough, shortness of breath or difficulty breathing, and fatigue. Symptoms may appear 2–14 days after exposure to the virus (CDC 2021).

In an effort 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, and use various social distancing measures. At the time of this plan update, there are three approved and authorized vaccines available in the United States to reduce risk of severe illness (CDC 2021).

##### *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. An influenza pandemic is a global outbreak of a new influenza A virus. Pandemics happen when new (novel) influenza A viruses emerge that are able to infect people easily and spread from person to person in an efficient and sustained way (CDC n.d.).

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 provides international outbreak investigation assistance (CDC n.d.).

### *West Nile Virus*

West Nile Virus (WNV) encephalitis is a mosquito-borne viral disease that can cause brain inflammation. WNV is commonly found in Africa, West Asia, the Middle East, and Europe. WNV was first reported in Texas in 2002. In a small number of cases, WNV has been spread by blood transfusion, which has resulted in the screening of blood donations for the virus in the U.S., or by organ transplantation. WNV can also be spread from mother to baby during pregnancy, delivery, or breastfeeding in a small number of cases. The symptoms of severe infection (West Nile encephalitis or meningitis) can include headache, high fever, neck stiffness, muscle weakness, stupor, disorientation, tremors, seizures, paralysis, and coma. WNV can cause serious illness, and in some cases, death. Usually, symptoms occur from 2 to 14 days after being bitten by an infected mosquito (Texas Department of State Health Services n.d.).

### *Location*

Disease outbreaks can occur without regard for location; therefore, all of Fort Bend County and its jurisdictions are susceptible to disease outbreak events. However, factors such as density, visitation, and the length of time in which the public spends in a location all contribute to the spread of infectious diseases. For example, COVID-19 is more likely to be spread by persons in close contact. Indoor areas in which people are in close contact with each other appear to be significant vectors for the disease, which is spread through respiratory droplets. Infectious diseases spread by insects may be subject to other types of location hazards. For example, the prevalence of standing water can provide breeding grounds for diseases such as WNV. Diseases that can infect humans are variable in nature and methods of transmission. Ultimately, residents need to be vigilant about diseases altogether to better understand and respond to disease outbreak hazards.

### *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.

### *Worst-Case Scenario*

The worst-case pandemic/disease outbreak scenario for Fort Bend County is the introduction of an emerging infectious disease which spreads rapidly and for which there is no vaccine readily available. As COVID-19 has recently demonstrated, proper testing of and vaccination for a novel disease under the most ideal circumstances can take years.



Previous Occurrences and Losses

*FEMA Disaster Declarations*

Between 1954 and 2022, Fort Bend County was included in two disaster (DR) or emergency (EM) declarations for pandemic-related events. Generally, these disasters cover a wide region of the state; therefore, they can impact many counties. However, not all counties were included in the disaster declarations as determined by FEMA (FEMA 2022). Detailed information about the declared disasters since 1954 is provided in Section 3 (County Profile).

*USDA Disaster Declarations*

The Secretary of Agriculture from the U.S. Department of Agriculture (USDA) is authorized to designate counties as disaster areas to make emergency loans to producers suffering losses in those counties and in counties that are contiguous to a designated county. Between 2012 and 2022, Fort Bend County was not included in any pandemic-related agricultural disaster declarations.

*Previous Events*

For this 2023 Hazard Mitigation Plan (HMP) update, known pandemic events that impacted Fort Bend County between 2017 and 2022 are discussed below.

**Table 4.3.7-1. Pandemic/Health and Safety Events in Fort Bend County (2017 to 2022)**

Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Fort Bend County Included in Declaration?	Description
2017	West Nile Virus	N/A	N/A	The State of Texas reported 135 cases of WNV in 2017. Cases were identified in Fort Bend County, but the number of cases was not identified.
2017	Influenza	N/A	N/A	According to the 2016–2017 Statewide Influenza Activity Map, Fort Bend County had at least one individual test positive for influenza via rapid test in 2017. The type of Influenza was not identified.
2018	Influenza	N/A	N/A	According to the 2017–2018 Statewide Influenza Activity Map, Fort Bend County had at least one Influenza-like illness with no laboratory confirmation. The type of Influenza was not identified.
2019	Influenza	N/A	N/A	According to the 2018–2019 Statewide Influenza Activity Map, Fort Bend County had at least one individual test positive for influenza via rapid test in 2019. The type of Influenza was not identified.
01/20/2020 – continuing	Biological (COVID-19)	EM-3501, DR-4485-TX, EM-3458-TX	No, Yes, Yes	As of May 2, 2023, Fort Bend County had 206,013 confirmed cases and 1,365 reported deaths related to COVID-19. COVID-19, 95,200 were male, and 109,600 were female; there are 1,200 cases where gender was not reported. The age groups with the highest total number of cases were those aged between 0–17 years old, followed by those aged 40–49.
2021	West Nile Virus	N/A	N/A	The State of Texas reported 143 cases of WNV in 2021. Cases were identified in Fort



Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Fort Bend County Included in Declaration?	Description
				Bend County, but the number of cases was not identified.

Sources: FEMA 2022; Texas Health and Human Services 2023; Texas Health and Human Services 2020; Texas Health and Human Services 2023  
 Note: The majority of influenza cases are not reportable by law in Texas. The data retrieved is from sentinel sites and only accounts for influenza and ILI cases that were reported to public health. Positive laboratory results are reported according to specimen collection date, or date received in the laboratory if the former is unknown.

Probability of Future Occurrences

Though occurrences of disease outbreaks overall are often difficult to predict at the local level, it is anticipated that Fort Bend County will continue to be impacted by disease outbreaks for the foreseeable future. Additionally, seasonality for cold and flu is well established and anticipated in Texas on an annual basis.

In Section 4.4, the identified hazards of concern for the Planning Area were ranked (Table 4.4-2). 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 Team, the probability of occurrence for pandemic/health and safety events in the Planning Area is considered "occasional".

Vulnerability Assessment

To understand risk, a community must evaluate assets exposed to and vulnerable to the identified hazard. The following discusses Fort Bend County’s vulnerability, in a qualitative nature, to disease outbreak.

Impact on Life, Health, and Safety

The entire population of Fort Bend County is vulnerable to disease outbreak. 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. Healthcare providers and first responders have an increased risk of exposure due to their frequent contact with infected populations. Areas with a higher population density also have an increased risk of exposure or transmission of disease due to the closer proximity of the population to potentially infected people.

Socially Vulnerable Populations

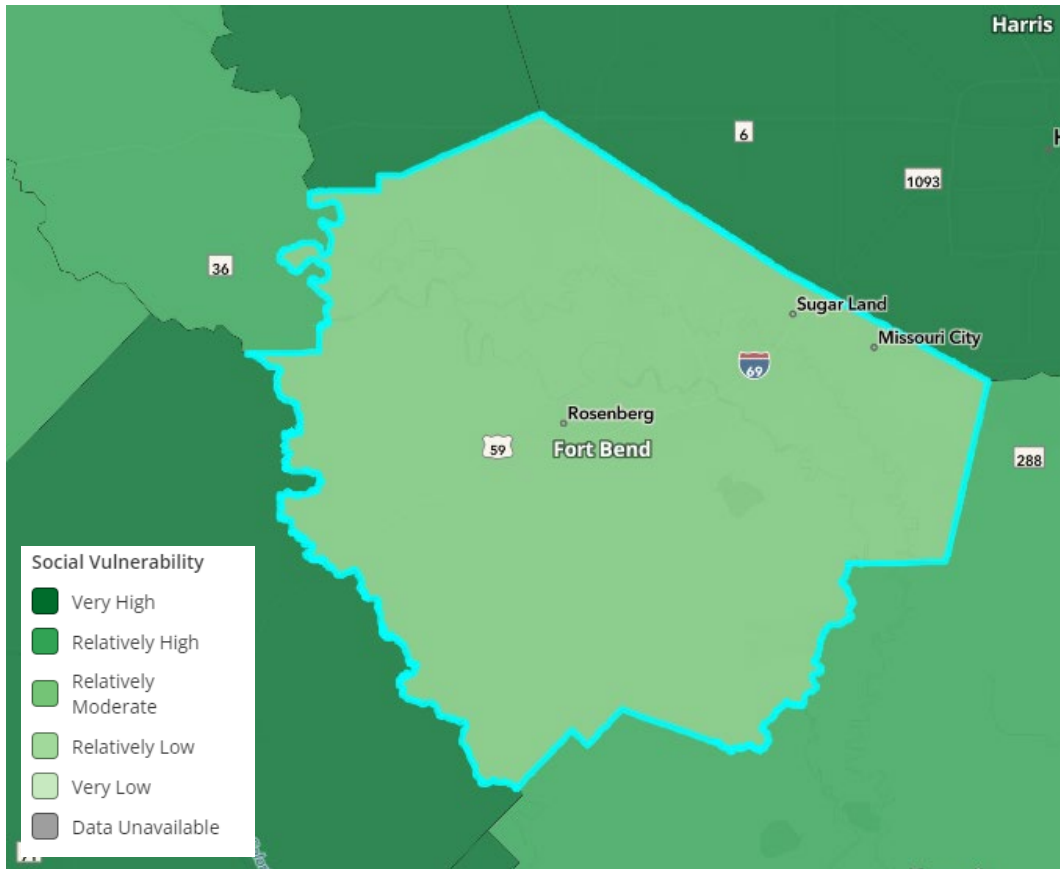
Social vulnerability is defined as the susceptibility of social groups to the adverse impacts of natural hazards, including disproportionate death, injury, loss, or disruption of livelihood. Social vulnerability considers the social, economic, demographic, and housing characteristics of a community that influence its ability to prepare for, respond to, cope with, recover from, and adapt to environmental hazards.

Most recently with COVID-19, the Centers for Disease Control and Prevention have 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 diabetes, severe obesity, serious heart conditions, etc., are at a higher risk of getting severely ill (CDC 2021). According to the 2021 United States Census, 11.3 percent of Fort Bend County residents (approximately 91,379 people) are over the age of 65. Refer to Figure 4.3.7-1 for the social vulnerability index for natural hazards.





Figure 4.3.7-1: FEMA Social Vulnerability Index for Natural Hazards



Source: FEMA NRI

#### Impact on General Building Stock

No structures are anticipated to be directly affected by pandemic events.

#### Impact on Critical Facilities

No critical facilities are anticipated to be affected by disease outbreaks. Hospitals and medical facilities will likely see an increase in patients, but it is unlikely that there will be damages or interruption of services. However, large rates of infection may result in an increase in the rate of hospitalization, which may overwhelm hospitals and medical facilities and lead to decreased services for those seeking medical attention. The 2020 coronavirus pandemic has led to overwhelmed hospitals in numerous hotspots throughout Fort Bend County.

#### Impact on Economy

Disease outbreaks impacts 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. As evidenced in the COVID-19 outbreak, quarantines, shutdowns, and social distancing measures can have outsized economic impacts, particularly on the leisure, tourism, and food/accommodations sectors.



### Impact on Environment

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As seen during the COVID-19 pandemic, widespread public health emergencies can benefit the environment due to diminished impact from humans. As a result of the pandemic, many parts of the world saw improved air quality, lower rates of water pollution, reduced greenhouse gas emissions, and reduced visitation to tourist destinations, which may assist with the restoration of the ecological system (Islamb 2020).

Conversely, a spike in the production and use of personal protective equipment (PPE) can lead to increased litter and pollution. The majority of PPE currently used contains plastic components that take decades to break down and contribute to microplastic poisoning of wildlife. Medical waste from vaccinations is often incinerated, adding harmful heavy metals, particulate matter, and gases into the atmosphere. High concentrations of cleaning chemicals that exceed the capacity of water treatment facilities can negatively affect local freshwater sources, presenting further health risks for human consumption and the environment alike (Johns Hopkins University 2021).

### Future Changes That May Impact Vulnerability

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Understanding future changes that effect vulnerability in Fort Bend County can assist in planning for future development and ensure establishment of appropriate mitigation, planning, and preparedness measures. The County considered the following factors to examine potential conditions that may affect hazard vulnerability:

- Potential or projected development
- Projected changes in population
- Other identified conditions as relevant and appropriate, including the impacts of climate change

### Projected Development

Any areas of growth could be potentially impacted by the pandemic/disease outbreak hazard because Fort Bend County is exposed and vulnerable. Additional development of structures in close proximity to waterbodies or areas with high population density are at an increased risk.

### Projected Changes in Population

Fort Bend County has experienced an increase in population between the 2010 Census (590,177) and the 2020 Census population of 828,632. The population of the County is expected to increase over the next few years. The Texas Demographic Center projects the region's total population to reach 2,267,998 people by 2050 (Texas Demographic Center n.d.).

An increase in population will expose more people to the pandemic hazard as residents move into the area and the population exposed increases. Population density changes when households move throughout the Planning Area could influence the number of persons exposed to disease outbreaks. Higher density jurisdictions are not only at risk of greater exposure to disease outbreak, but density may also reduce available basic services provided by critical facilities such as hospitals and emergency facilities for persons that are not affected by a disease.

### Climate Change

Climate change will likely have significant indirect impacts on disease outbreaks. In Texas, higher temperatures, decreased water availability, and more severe storm events are anticipated due to climate change. According to the WHO, changing climatic conditions are being studied for impacts upon disease transmission. Seasonal infectious diseases that are influenced by meteorological conditions may see significant variability in recurrence and duration. The WHO concludes that variations in infectious disease transmission patterns are likely major consequences of climate change (WHO 2021).



In the publication “What Climate Change Means for Texas,” the US Environmental Protection Agency (EPA) notes that warming temperatures will exacerbate current public health concerns. “Seventy years from now, Texas is likely to have three or four times as many days per year above 100°F as it has today. Certain people are especially vulnerable, including children, the elderly, the sick, and the poor. High air temperatures can cause heat stroke and dehydration and affect people’s cardiovascular and nervous systems” (EPA 2016).

#### Change of Vulnerability Since 2018 HMP

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Disease outbreak was not included as a hazard of concern in the 2018 HMP. However, with an increase in population, it can be assumed that the vulnerability to pandemic/disease outbreak events has slightly increased since 2018.