Wastewater-Based Disease Surveillance for Local Public Health Action

TEXAS Health and Human Services
Texas Department of State Health Services

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Introduction

Background

Wastewater-based disease surveillance is an innovative approach in public health, utilizing the analysis of municipal wastewater to detect the presence of pathogens within a community before trends in clinical cases are observed. This method provides a non-invasive, anonymous approach to monitor pathogen trends and can offer early warning signs of disease outbreaks, including COVID-19, influenza, and other communicable diseases. By examining municipal wastewater, public health officials can identify potential threats by pathogens before they become widespread, enabling a rapid response to mitigate their impact.

Wastewater-based disease surveillance involves the collection and analysis of sewage samples from municipal wastewater treatment plants and sewer systems. These samples are tested for genetic material of pathogens that provide insights into the level of disease transmission within a population. The data obtained from wastewater-based disease surveillance complements traditional public health surveillance methods, offering a broader and more inclusive snapshot of community health.

The Texas Department of State Health Services (DSHS) Wastewater Epidemiology and Surveillance Program is a statewide disease monitoring system. The program partners with local water utilities and health departments to monitor pathogens in municipal wastewater and help communities prepare for and act against disease outbreaks.

Purpose

The primary objective of this document is to translate the data gathered from wastewater-based disease surveillance for public health insight and action. Local public health departments have a critical role in protecting and promoting the health of their communities, and this document aims to provide them with a structured approach to utilize wastewater data effectively. By integrating wastewater data into public health practice, local health departments may enhance their surveillance capabilities, improve outbreak response times, and ultimately safeguard the health and wellbeing of our communities.

The document was developed by the DSHS Wastewater Epidemiology and Surveillance Program in consultation with the DSHS Disease Surveillance and Epidemiology Section. This document is not prescriptive, and public health action at various levels of pathogen detection should be tailored to each local health department and community.

Resources

CDC National Wastewater Surveillance System (NWSS)
https://www.cdc.gov/nwss/

Houston National Wastewater Surveillance System Center of Excellence
https://www.hou-wastewater-epi.org/

Contact

DSHS Wastewater Epidemiology & Surveillance Program
https://www.dshs.texas.gov/wastewater-epidemiology-surveillance-program

DSHS Disease Surveillance and Epidemiology Section
https://www.dshs.texas.gov/disease-surveillance-epidemiology-section

Bordetella pertussis

Pertussis, also known as whooping cough, is a very contagious respiratory illness caused by a type of bacteria called *Bordetella pertussis*. Pertussis can cause early symptoms that resemble the common cold with later symptoms escalating to severe coughing fits (often followed by a high-pitched "whoop" when inhaling), thick mucus, and vomiting. Infants are at high risk for severe pertussis disease and death, whereas severe complications are rare among healthy, vaccinated individuals. Shedding of *Bordetella pertussis* DNA has been reported in respiratory secretions of infected individuals, which may be detected in wastewater samples.[1, 2]

Bordetella pertussis wastewater signals are grouped into three categories:

- **No recent detection**: *Bordetella pertussis* was not detected in any samples in the past four weeks.
- **Detection**: *Bordetella pertussis* was detected in one or two samples in the past four weeks.
- **Persistent detection**: *Bordetella pertussis* was detected in more than two samples in the past four weeks.

Actions to Consider

No Recent Detection	Detection	Persistent Detection
Prepare a prevention and response plan that includes vaccines, testing, and public health follow-up. Develop educational materials for high-risk populations and health care providers. Continue monitoring public health surveillance systems.	Conduct community outreach (e.g., K-12 text or email alerts, media outreach, social media outreach, etc.). Offer pertussis education and vaccines during public health activities. Include pertussis prevention and postexposure prophylaxis in discussions with healthcare providers. Consider a Health Alert notifying healthcare providers – include a recommendation to consider pertussis in providers' differential diagnoses.	Expand approval processes to increase testing and case identification. Remind higher risk facilities (e.g., childcare centers, schools, long term care facilities, prisons) of infection control measures. Provide infection control education to healthcare facilities and providers. Consider targeted awareness and vaccination campaigns.
If suspected cases exist, encourage healthcare providers to coordinate with local health departments on clinical sample submission and public health follow-up. Implement a prevention and response plan as applicable based on level of detection. As one moves to higher levels of detection, actions at lower levels may be considered or continue to be implemented as appropriate.		

Contact the DSHS Vaccine-Preventable Disease Team (vpdtexas@dshs.texas.gov) and your appropriate Public Health Region for assistance with local public health response efforts.

Chikungunya virus

Chikungunya is a mosquito-borne illness caused by chikungunya virus (ChikV). Chikungunya can cause mild illness (e.g., fever, joint pain, muscle pain, rash, headache) and can lead to recurring musculoskeletal disease and further acute or chronic disability. Chikungunya is endemic in tropical and sub-tropical regions with sporadic large outbreaks that have increased in frequency, leading to an increase in travel-associated cases. Though chikungunya is not endemic in Texas, infected travelers visiting during their viremic period (about one week after onset of illness) may infect local mosquito populations that may in turn directly infect others in the region. Shedding of chikungunya virus RNA has been reported in blood, saliva, urine, and genital secretions of infected individuals, which may be detected in wastewater samples.[3, 4]

Chikungunya virus wastewater signals are grouped into three categories:

- **No recent detection**: Chikungunya virus was not detected in any samples in the past four weeks.
- **Detection**: Chikungunya virus was detected in one or two samples in the past four weeks.
- **Persistent detection**: Chikungunya virus was detected in more than two samples in the past four weeks.

Actions to Consider

No Recent Detection	Detection	Persistent Detection
Prepare a prevention and response plan that includes testing and public health follow-up. Develop educational materials for high-risk populations and health care providers. Continue monitoring public health surveillance systems.	Identify infected individuals in the community by reviewing National Electronic Disease Surveillance System (NEDSS) data for evidence of ChikV positive lab results or clinical diagnoses. Follow up as soon as possible with identified individuals to assess patient travel history. Immediately notify DSHS Zoonosis Control Branch (ZCB) (wnv@dshs.texas.gov) of suspected locally acquired cases. Consult with DSHS ZCB on necessity of forwarding available commercially positive specimens for public health repeat ChikV testing.	Consider a Health Alert notifying healthcare providers – include a recommendation to collect travel history for patients and consider chikungunya in providers' differential diagnoses. Conduct community and occupational outreach for preventative education (e.g., email alerts, media outreach, social media outreach, etc.).
If suspected cases exist, encourage healthcare providers to coordinate with local health departments on clinical sample submission and public health follow-up. Implement a prevention and response plan as applicable based on level of detection. As one moves to higher levels of detection, actions at lower levels may be considered or continue to be implemented as appropriate.		

Contact the DSHS Zoonosis Control Branch (wnv@dshs.texas.gov) and your appropriate Public Health Zoonosis Control Region for assistance with local public health response efforts.

Dengue virus

Dengue is a mosquito-borne illness caused by four types of dengue virus (DENV-1, DENV-2, DENV-3, DENV-4). Dengue can cause mild illness (e.g., fever, aches and pains, nausea, rash) and can lead to severe illness (e.g., internal hemorrhaging, sudden drop in blood pressure) or death. Dengue is endemic in tropical and sub-tropical regions and is the second-largest global cause of mosquito-borne morbidity and mortality (after malaria). Texas has experienced periodic small outbreaks of local dengue activity, typically in southern counties in the fall and winter. Though dengue is not endemic in Texas, infected travelers visiting during their viremic period (about one week after symptom onset) may infect local mosquito populations that may in turn directly infect others in the region. Shedding of dengue virus RNA has been found in blood, respiratory secretions, urine, and feces of infected individuals, which may be detected in wastewater samples.[4, 5]

Dengue virus wastewater signals are grouped into three categories:

- **No recent detection**: Dengue virus was not detected in any samples in the past four weeks.
- **Detection**: Dengue virus was detected in one or two samples in the past four weeks.
- **Persistent detection**: Dengue virus was detected in more than two samples in the past four weeks.

Actions to Consider

No Recent Detection	Detection	Persistent Detection
Prepare a prevention and response plan that includes testing and public health follow-up. Develop educational materials for high-risk populations and health care providers. Continue monitoring public health surveillance systems.	Identify infected individuals in the community by reviewing National Electronic Disease Surveillance System (NEDSS) data for evidence of DENV positive lab results or clinical diagnoses. Follow up as soon as possible with identified individuals to assess patient travel history. Immediately notify DSHS Zoonosis Control Branch (ZCB) (wnv@dshs.texas.gov) of suspected locally acquired cases. Consult with DSHS ZCB on necessity of forwarding available commercially positive specimens for public health repeat DENV testing.	Consider a Health Alert notifying healthcare providers – include a recommendation to collect travel history for patients and consider dengue in providers' differential diagnoses. Conduct community and occupational outreach for preventative education (e.g., email alerts, media outreach, social media outreach, etc.).
If suspected cases exist, encourage healthcare providers to coordinate with local health departments on clinical sample submission and public health follow-up. Implement a prevention and response plan as applicable based on level of detection. As one moves to higher levels of detection, actions at lower levels may be considered or continue to be implemented as appropriate.		

Contact the DSHS Zoonosis Control Branch (wnv@dshs.texas.gov) and your appropriate Public Health Zoonosis Control Region for assistance with local public health response efforts.

Hepatitis A virus

Hepatitis A is a highly contagious illness caused by hepatitis A virus (HAV) that spreads through close person-to-person contact or by eating contaminated food or drink. Hepatitis A most often causes mild, short-term illness (e.g., dark urine or stool, diarrhea, fatigue, fever, joint pain, loss of appetite, nausea, jaundice), though it can lead to liver failure or death among individuals who are elderly or have comorbidities. Clinical surveillance for hepatitis A is difficult as individuals infected with HAV are often undetected and spread infection if asymptomatic or during the presymptomatic infectious period (10 to 12 days prior to symptom onset). Shedding of hepatitis A virus RNA has been reported in feces of infected individuals, which may be detected in wastewater samples.[6, 7]

Hepatitis A virus wastewater signals are grouped into three categories:

- **No recent detection**: Hepatitis A virus was not detected in any samples in the past four weeks.
- **Detection**: Hepatitis A virus was detected in one or two samples in the past four weeks.
- **Persistent detection**: Hepatitis A virus was detected in more than two samples in the past four weeks.

Actions to Consider

No Recent Detection	Detection	Persistent Detection
Prepare a prevention and response plan that includes vaccines, testing, and public health follow-up. Develop educational materials for high-risk populations and health care providers. Continue monitoring public health surveillance systems.	Conduct community outreach (e.g., K-12 text or email alerts, media outreach, social media outreach, etc.). Offer hepatitis A education and vaccines during public health activities. Include hepatitis A prevention and postexposure prophylaxis in discussions with healthcare providers.	Consider a Health Alert notifying healthcare providers – include a recommendation to consider hepatitis A in providers' differential diagnoses. Remind higher risk facilities (e.g., childcare centers, schools, long term care facilities, prisons) of infection control measures. Provide infection control education to healthcare facilities and providers. Consider targeted awareness and vaccination campaigns.
If suspected cases exist, encourage healthcare providers to coordinate with local health departments on clinical sample submission and public health follow-up. Implement a prevention and response plan as applicable based on level of detection. As one moves to higher levels of detection, actions at lower levels may be considered or continue to be implemented as appropriate.		

Contact the DSHS Vaccine-Preventable Disease Team (vpdtexas@dshs.texas.gov) your appropriate Public Health Region for assistance with local public health response efforts.

Influenza virus

Influenza is a contagious respiratory illness caused by four types of influenza viruses (A, B, C, D). Influenza can cause mild to severe illness (e.g., fever, cough, body aches, fatigue), and at times can lead to death. Influenza A and influenza B viruses cause seasonal epidemics of disease (known as flu season) every fall and winter in the United States. Influenza A viruses are the only influenza viruses known to cause flu pandemics (i.e., global epidemics of influenza disease). Shedding of influenza virus RNA has been reported in respiratory secretions and in feces of infected individuals, which may be detected in wastewater samples.[8, 9]

Influenza virus wastewater data is normalized using sewershed population and is reported as gene copies per liter per 1,000 individuals (gc/L/1,000). Seasonal influenza virus baselines are evaluated weekly and are calculated as the tenth percentile of non-zero seasonal influenza virus wastewater values. Non-zero seasonal influenza virus wastewater values are ordered from lowest to highest and the ordered values are grouped into five categories: Very Low (1-20%), Low (21-40%), Moderate (41-60%), High (61-80%), and Very High (81-100%).

Actions to Consider

Very Low	Low	Moderate	High	Very High
Prepare a prevention and response plan that includes vaccines and testing. Develop educational materials for high-risk populations and health care providers.	Continue monitoring public health surveillance systems.	Remind higher risk facilities (e.g., childcare centers, schools, long term care facilities, prisons) of infection control measures.	Conduct community outreach (e.g., K-12 text or email alerts, media outreach, social media outreach, etc.). Consider targeted awareness and vaccination campaigns.	Consider a Health Alert to notify healthcare providers.
If suspected cases exist, encourage healthcare providers to coordinate with local health departments on clinical sample submission. Implement a prevention and response plan as applicable based on level of detection. As one moves to higher levels of detection, actions at lower levels may be considered or continue to be implemented as appropriate.				

Contact the DSHS Influenza Team (flutexas@dshs.texas.gov) and your appropriate Public Health Region for assistance with local public health response efforts.

Influenza A(H5) virus

Highly pathogenic avian influenza (HPAI) viruses usually spread between birds. One subtype of HPAI viruses, HPAI A(H5), caused sporadic outbreaks in U.S. poultry and dairy cows in 2025. In addition to spreading to an increasing number of mammals, HPAI viruses caused some rare human infections. Human illness caused by HPAI A(H5) viruses has ranged from mild symptoms (e.g., mild fever, eye redness and irritation, cough, sore throat, runny or stuffy nose, muscle or body aches, headaches, fatigue) to severe illness (e.g., high fever, shortness of breath, altered consciousness, seizures). Most human cases of HPAI A(H5) in the U.S. have been mild and most had known exposure to sick or infected animals. Infected birds and other animals can spread HPAI A(H5) virus RNA through their mucous, saliva, or feces. HPAI A(H5) virus RNA may enter sewage systems through discarded contaminated animal products (e.g., milk, poultry, etc.) or through secretions or excretions from asymptomatic or symptomatic individuals, which may be detected in wastewater samples.[10, 11]

HPAI A(H5N1) virus wastewater signals are grouped into three categories:

- **No recent detection**: HPAI A(H5N1) virus was not detected in any samples in the past four weeks.
- **Detection**: HPAI A(H5N1) virus was detected in one or two samples in the past four weeks.
- **Persistent detection**: HPAI A(H5N1) virus was detected in more than two samples in the past four weeks.

Actions to Consider

No Recent Detection	Detection	Persistent Detection
Prepare a prevention and response plan that includes testing and public health follow-up. Develop educational materials for high-risk populations and health care providers. Continue monitoring public health surveillance systems.	Consider potential animal sources of HPAI A(H5). Contact the DSHS Zoonosis Control Branch (ZCB) (the.vet@dshs.texas.gov) and your appropriate Public Health Region for assistance.	Consider a Health Alert notifying healthcare providers – include a recommendation to consider HPAI A(H5) in providers' differential diagnoses. Consider occupational health education and/or surveillance (e.g., dairy or poultry farm workers) if applicable. Contact the DSHS Occupational Health Surveillance Program (epitox@dshs.texas.gov) for assistance.
If suspected human cases exist, encourage healthcare providers to coordinate with local health departments on clinical sample submission and public health follow-up. Implement a prevention and response plan as applicable based on level of detection. As one moves to higher levels of detection, actions at lower levels may be considered or continue to be implemented as appropriate.		

Contact the DSHS Influenza Team (flutexas@dshs.texas.gov), DSHS Zoonosis Control Branch (the.vet@dshs.texas.gov), and your appropriate Public Health Region for assistance with local public health response efforts.

Measles virus

Measles is a highly contagious respiratory illness caused by measles virus. Measles can cause mild to severe illness (e.g., fever, cough, runny nose, red eyes, sore throat, rash), severe complications (e.g., pneumonia, encephalitis, weakened immune system), and at times can lead to death. Measles is one of the most contagious of all infectious diseases. Individuals infected with measles are contagious about four days before rash onset to four days after the rash appears. Up to nine of ten individuals nearby a person with measles will also become infected with measles if not immune. Shedding of measles virus RNA has been reported in urine from infected individuals, which may be detected in wastewater samples.[12, 13]

Wild-type measles virus wastewater signals are grouped into three categories:

- **No recent detection**: Measles virus was not detected in any samples in the past four weeks.
- **Detection**: Measles virus was detected in one or two samples in the past four weeks.
- **Persistent detection**: Measles virus was detected in more than two samples in the past four weeks.

Actions to Consider

No Recent Detection	Detection	Persistent Detection
Prepare a prevention and response plan that includes vaccines, testing, and public health follow-up. Develop educational materials for high-risk populations and health care providers. Continue monitoring public health surveillance systems.	Conduct community outreach (e.g., K-12 text or email alerts, media outreach, social media outreach, etc.). Offer measles education and vaccines during public health activities. Include measles prevention and postexposure prophylaxis in discussions with healthcare providers. Consider a Health Alert notifying healthcare providers – include a recommendation to consider measles in providers' differential diagnoses.	Expand approval processes to increase testing and case identification. Remind higher risk facilities (e.g., childcare centers, schools, long term care facilities, prisons) of infection control measures. Provide infection control education to healthcare facilities and providers. Consider targeted awareness and vaccination campaigns.
If suspected cases exist, encourage healthcare providers to coordinate with local health departments on clinical sample submission and public health follow-up. Implement a prevention and response plan as applicable based on level of detection. As one moves to higher levels of detection, actions at lower levels may be considered or continue to be implemented as appropriate.		

Contact the DSHS Vaccine-Preventable Disease Team (vpdtexas@dshs.texas.gov) and your appropriate Public Health Region for assistance with local public health response efforts.

Monkeypox virus

Monkeypox is a disease caused by two types of monkeypox virus (clade I and clade II). Individuals with monkeypox often get a rash that may be located on their hands, feet, chest, face, mouth, or genital area. Clade I is responsible for the rise of cases in Western Europe in 2025 that stem from ongoing outbreaks in Central and Eastern Africa. Historically, clade I caused higher numbers of severe illnesses than clade II, with up to 10% of individuals dying. Recent outbreaks have seen much lower death rates of about 1 to 3%. Clade II is endemic to West Africa and is the type that caused the global outbreak that began in 2022. Infections by clade II are less severe – more than 99.9% of individuals survive. Shedding of monkeypox virus DNA has been reported in skin lesions, saliva, feces, and urine from infected individuals, which may be detected in wastewater samples.[14, 15]

Monkeypox virus wastewater signals are grouped into three categories:

- **No recent detection**: Monkeypox virus was not detected in any samples in the past four weeks.
- **Detection**: Monkeypox virus was detected in one or two samples in the past four weeks.
- **Persistent detection**: Monkeypox virus was detected in more than two samples in the past four weeks.

Actions to Consider

No Recent Detection	Detection	Persistent Detection
Prepare a prevention and response plan that includes vaccines, testing, and public health follow-up. Develop educational materials for high-risk populations and health care providers. Continue monitoring public health surveillance systems.	Offer monkeypox education and vaccines during public health events and activities. Include monkeypox prevention in discussions about HIV PEP (post-exposure prophylaxis), HIV PrEP (pre-exposure prophylaxis), or doxy PEP.	Consider a Health Alert to notify healthcare providers – include a recommendation to consider monkeypox in providers' differential diagnoses. Consider targeted awareness and vaccination campaigns.
If suspected cases exist, encourage healthcare providers to coordinate with local health departments on clinical sample submission and public health follow-up. Implement a prevention and response plan as applicable based on level of detection. As one moves to higher levels of detection, actions at lower levels may be considered or continue to be implemented as appropriate.		

Contact the DSHS High Consequence Infectious Diseases Team (eaidumonitoring@dshs.texas.gov) and your appropriate Public Health Region for assistance with local public health response efforts.

Norovirus

Norovirus is a very contagious virus that causes acute gastroenteritis, an inflammation of the stomach or intestines, that leads to vomiting and diarrhea. Norovirus is the leading cause of foodborne illness in the United States. Clinical surveillance for norovirus is difficult as individuals infected with norovirus often go undetected and spread infection if asymptomatic or from symptom onset to more than two weeks after recovery. Noroviruses are classified into ten genogroups, with most human infections resulting from genogroups GI and GII. Shedding of norovirus RNA has been reported in vomit and in feces of infected individuals, which may be detected in wastewater samples.[16, 17]

Norovirus wastewater data is normalized using sewershed population and is reported as gene copy per liter per 1,000 population (gc/L/1,000). Norovirus baselines are evaluated weekly and are calculated as the 10th percentile of non-zero norovirus wastewater values. Non-zero norovirus wastewater values are ordered from lowest to highest and the ordered values are grouped into five categories: Very Low (1-20%), Low (21-40%), Moderate (41-60%), High (61-80%), and Very High (81-100%).

Actions to Consider

Very Low	Low	Moderate	High	Very High
Prepare an outbreak prevention and response plan that includes testing and public health follow-up. Develop educational materials for high-risk populations and health care providers.	Continue monitoring public health surveillance systems.	Remind food services of safe food handling practices. Remind higher risk facilities (e.g., childcare centers, schools, long term care facilities, prisons) of infection control measures.	Conduct community outreach (e.g., K-12 text or email alerts, media outreach, social media outreach, etc.).	Consider a Health Alert to notify healthcare providers.
Report suspected norovirus outbreaks in the CDC National Outbreak Reporting System (NORS) and the CDC National Environmental Assessment Reporting System (NEARS). If a suspected outbreak exists, encourage healthcare providers to coordinate with local health departments on clinical sample submission and public health follow-up. Implement a prevention and response plan as applicable based on level of detection. As one moves to higher levels of detection, actions at lower levels may be considered or continue to be implemented as appropriate.				

Contact the DSHS Foodborne Illness Team (foodbornetexas@dshs.texas.gov) and your appropriate Public Health Region for assistance with local public health response efforts.

Respiratory syncytial virus

Respiratory syncytial virus, or RSV, is a common respiratory virus. RSV symptoms most often resemble a cold, the flu, or COVID-19. Infants and adults who are older or have certain risk factors are more likely to develop severe RSV illness and need hospitalization. RSV spreads in the fall and winter along with other respiratory viruses and usually peaks in December and January. Shedding of RSV RNA has been reported in respiratory secretions and in feces of infected individuals, which may be detected in wastewater samples.[18, 19]

RSV wastewater data is normalized using sewershed population and is reported as gene copy per liter per 1,000 population (gc/L/1,000). RSV baselines are evaluated weekly and are calculated as the 10th percentile of non-zero RSV wastewater values. Non-zero RSV wastewater values are ordered from lowest to highest and the ordered values are grouped into five categories: Very Low (1-20%), Low (21-40%), Moderate (41-60%), High (61-80%), and Very High (81-100%).

Actions to Consider

Very Low	Low	Moderate	High	Very High
Prepare a prevention and response plan that includes vaccines, testing, and public health follow-up. Develop educational materials for high-risk populations and health care providers.	Continue monitoring public health surveillance systems.	Remind higher risk facilities (e.g., childcare centers, schools, long term care facilities, prisons) of infection control measures.	Conduct community outreach (e.g., K-12 text or email alerts, media outreach, social media outreach, etc.).	Consider a Health Alert to notify healthcare providers. Consider targeted awareness and vaccination campaigns.
If a suspected outbreak exists, encourage healthcare providers to coordinate with local health departments on clinical sample submission and public health follow-up. Implement a prevention and response plan as applicable based on level of detection. As one moves to higher levels of detection, actions at lower levels may be considered or continue to be implemented as appropriate.				

Contact the DSHS Vaccine-Preventable Disease Team (vpdtexas@dshs.texas.gov) and your appropriate Public Health Region for assistance with local public health response efforts.

SARS-CoV-2

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is the virus that causes coronavirus disease 2019 (COVID-19). COVID-19 most often causes respiratory symptoms that resemble a cold, the flu, or pneumonia. Other parts of the body may also be affected by the disease. Most individuals with COVID-19 have mild symptoms, though some individuals may become severely ill. Shedding of SARS-CoV-2 RNA has been reported in respiratory secretions and in feces of infected individuals, which may be detected in wastewater samples.[20, 21]

SARS-CoV-2 wastewater data is normalized using sewershed population and is reported as gene copy per liter per 1,000 population (gc/L/1,000). SARS-CoV-2 baselines are evaluated weekly and are calculated as the 10th percentile of non-zero SARS-CoV-2 wastewater values. Non-zero SARS-CoV-2 wastewater values are ordered from lowest to highest and the ordered values are grouped into five categories: Very Low (1-20%), Low (21-40%), Moderate (41-60%), High (61-80%), and Very High (81-100%).

Actions to Consider

Very Low	Low	Moderate	High	Very High
Prepare a prevention and response plan that includes vaccines, testing, and public health follow-up. Develop educational materials for high-risk populations and health care providers.	Continue monitoring public health surveillance systems.	Remind higher risk facilities (e.g., childcare centers, schools, long term care facilities, prisons) of infection control measures.	Conduct community outreach (e.g., K-12 text or email alerts, media outreach, social media outreach, etc.).	Consider a Health Alert to notify healthcare providers. Consider targeted awareness and vaccination campaigns.
If a suspected outbreak exists, encourage healthcare providers to coordinate with local health departments on clinical sample submission and public health follow-up. Implement a prevention and response plan as applicable based on level of detection. As one moves to higher levels of detection, actions at lower levels may be considered or continue to be implemented as appropriate.				

Contact the DSHS Vaccine-Preventable Disease Team (vpdtexas@dshs.texas.gov) and your appropriate Public Health Region for assistance with local public health response efforts.

West Nile virus

West Nile is a mosquito-borne condition caused by West Nile virus (WNV). A small proportion of infected individuals may develop a mild form of disease called West Nile fever, which may include fever, headache, body aches, nausea, vomiting, diarrhea, or rash. Less than one percent of infected individuals develop a severe form of West Nile known as West Nile neuroinvasive disease (WNND), which affects the central nervous system and can cause neck stiffness, disorientation, coma, muscle weakness, numbness, paralysis, or lead to hospitalization or death. Since its introduction to North America in 1999, WNV is the largest endemic cause of arboviral disease in the United States and causes significant morbidity and mortality in Texas. All areas of Texas are considered endemic for WNV transmission during the typical season of May to November. Shedding of West Nile virus RNA has been reported in respiratory secretions, blood, and urine, which may be detected in wastewater samples.[22, 23]

West Nile virus wastewater signals are grouped into three categories:

- **No recent detection**: West Nile virus was not detected in any samples in the past four weeks.
- **Detection**: West Nile virus was detected in one or two samples in the past four weeks.
- **Persistent detection**: West Nile virus was detected in more than two samples in the past four weeks.

Actions to Consider

No Recent Detection	Detection	Persistent Detection
Prepare a prevention and response plan that includes testing and public health follow-up. Develop educational materials for high-risk populations and health care providers. Continue monitoring public health surveillance systems.	Identify infected individuals in the community by reviewing National Electronic Disease Surveillance System (NEDSS) data for evidence of WNV positive lab results or clinical diagnoses. Follow up as soon as possible with identified individuals to assess patient travel history. Immediately notify DSHS Zoonosis Control Branch (ZCB) (wnv@dshs.texas.gov) of suspected locally acquired cases. Consult with DSHS ZCB on necessity of forwarding available commercially positive specimens for public health repeat WNV testing.	Consider a Health Alert notifying healthcare providers – include data on infected mosquito pool detections, reported WNV cases (see DSHS ZCB weekly arbovirus report for weekly updates), and include a recommendation to consider West Nile in providers' differential diagnoses. Conduct community and occupational outreach for preventative education (e.g., email alerts, media outreach, social media outreach, etc.).
If suspected cases exist, encourage healthcare providers to coordinate with local health departments on clinical sample submission and public health follow-up. Implement a prevention and response plan as applicable based on level of detection. As one moves to higher levels of detection, actions at lower levels may be considered or continue to be implemented as appropriate.		

Contact the DSHS Zoonosis Control Branch (WNV@dshs.texas.gov) and your appropriate Public Health Zoonosis Control Region for assistance with local public health response efforts.

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