West nile virus in Texas

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Introduction

West Nile Virus (WNV) remains the leading cause of mosquito-borne illness in the contiguous United States and presents a persistent public health concern, particularly in high-transmission regions like Texas. This virus is a neurotropic arbovirus that can cause a spectrum of illness, ranging from asymptomatic infection to life-threatening neuroinvasive disease (meningitis or encephalitis).

Certain geographic areas and populations are disproportionately affected by WNV, making regional surveillance crucial. Texas, a state with significant mosquito populations and high population density, consistent with reports a high number of cases annually/The public health response is further limited by the diverse clinical presentations, lack of specific antiviral treatment, and need to robust vector control.

This regional report will discuss the epidemiology of WNV in Texas, focusing on its transmission cycle, clinical spectrum, and risk factors for severe disease and will analyze national data and regional data to characterize the burden of WNV in the United States, with a particular emphasis on trends and recent cases in Texas. Finally, it will discuss the public health implications of WNV, including the necessity of robust surveillance and targeted prevention strategies to mitigate its impact.

Epidemiology and Risk Factors

First isolated in Uganda in 1937, WNV was first detected in the United States in 1999 during an outbreak in New York City that resulted in 62 cases of encephalitis and seven deaths.[1] This virus maintains itself in nature through a bird-mosquito-bird transmission cycle. Mosquitoes of the *Culex* genus are the primary vectors, with bird serving as the main amplifying hosts throughout the cycle. Humans, hordes, and other mammals are considered “dead-end” or incidental hosts due to the low levels of virus in their blood that is typically too low to infect any additional mosquitoes and continue the viral cycle.[2]

After a bite by an infected mosquito, the virus replicates in skin cells like keratinocytes and dendritic cells before spreading to draining lymph nodes. This is followed by viremia, which allows for dissemination to organs like the spleen and kidneys. In a small percentage of cases, the virus crosses the blood-brain barrier to cause neuroinvasive disease, possibly via direct infection of the endothelium or a “Trojan horse” mechanism where the virus is carried by infected immune cells.[2]

The primary risk factor for developing severe neuroinvasive disease is advanced age. Approximately 2% of people aged 65 or older developed neuroinvasive disease compared to younger populations, where the risk was less than 0.5%. Compared to younger adults, patients aged 60–69 years old were more than twice as likely to be hospitalized due to WNV, with that likelihood going up to six times as likely with people ≥70 years of age.[2]

A 2025 systematic review and meta-analysis confirmed that other significant risk factors for severe disease and mortality include many traditional medical comorbidities, including a history of diabetes (OR: 2.43), hypertension (OR: 4.01), and chronic kidney disease (OR: 5.99).[3]

Clinical Presentation

The incubation period of WNV is typically 2 to 14 days, with most human infections (~80%) being asymptomatic or subclinical.[4] Two separate reviews also noted that ~20–25% of those infected develop

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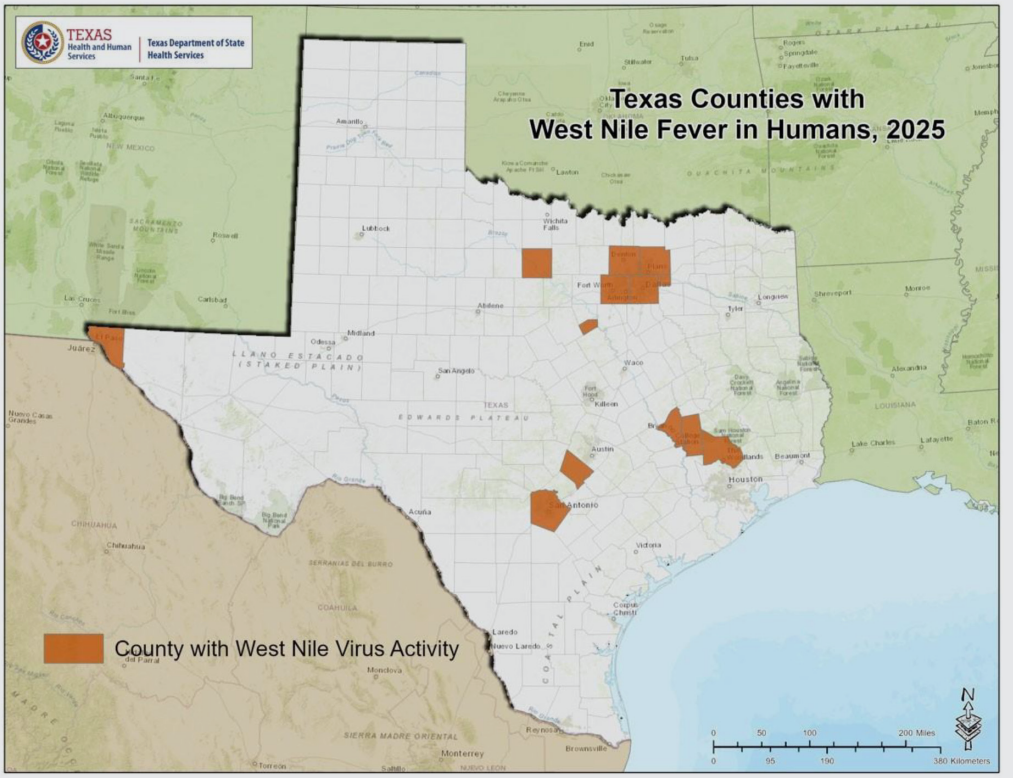

Figure 1. From DHHS Report on WNF in Humans (2025).

a self-limited febrile illness known as West Nile fever (WNF). This typically presents as fever, headache, fatigue, myalgia, nausea, vomiting, and rarely a maculopapular rash. While fever is one of the most common symptoms, some studies have found that it can still be absent in a substantial number of symptomatic cases.[5]

Less than 1% of patients infected develop West Nile neuroinvasive disease (WNND), which can present as either meningitis, encephalitis, or acute flaccid paralysis. Patients with meningitis typically present with fever, severe headache, neck stiffness, and photophobia.

Encephalitis is the most severe presentation, with patients having altered mental status, confusion, lethargy, as well as extrapyramidal symptoms such as tremors and parkinsonism. Those with acute flaccid myelitis present with rapid onset asymmetric weakness without sensory loss.

Overall, non-neuroinvasive WNV or WNV meningitis patients recover completely but tend to have lingering malaise, fatigue, or weakness that can last for months. Those diagnosed with WNV encephalitis tend to be more permanently affected, with 30–40% of patients being discharged to long term care facilities or rehabilitation with symptoms lingering for over a year. Patients diagnosed with neuroinvasive WNV or acute flaccid paralysis have a case-fatality rate of ~10% with this number varying depending on what comorbidities the patient has. Those ≥70 years of age have a ~20% mortality rate while those ≤50 have a ~2% mortality rate. This number jumps up to 30–40% for patients with blood cancers, on immunosuppressants, or receiving anti-CD20 monoclonal antibodies such as Rituximab.[2–4,6]

West Nile Rates in Texas

As of the 40th week of this year, the Texas Department of Health and Human Services (DHHS) reports that there have been approximately 64 cases of WNV in Texas. Of these, 16 were classified as WNF, and 48 resulting in WNND. The geographic spread of

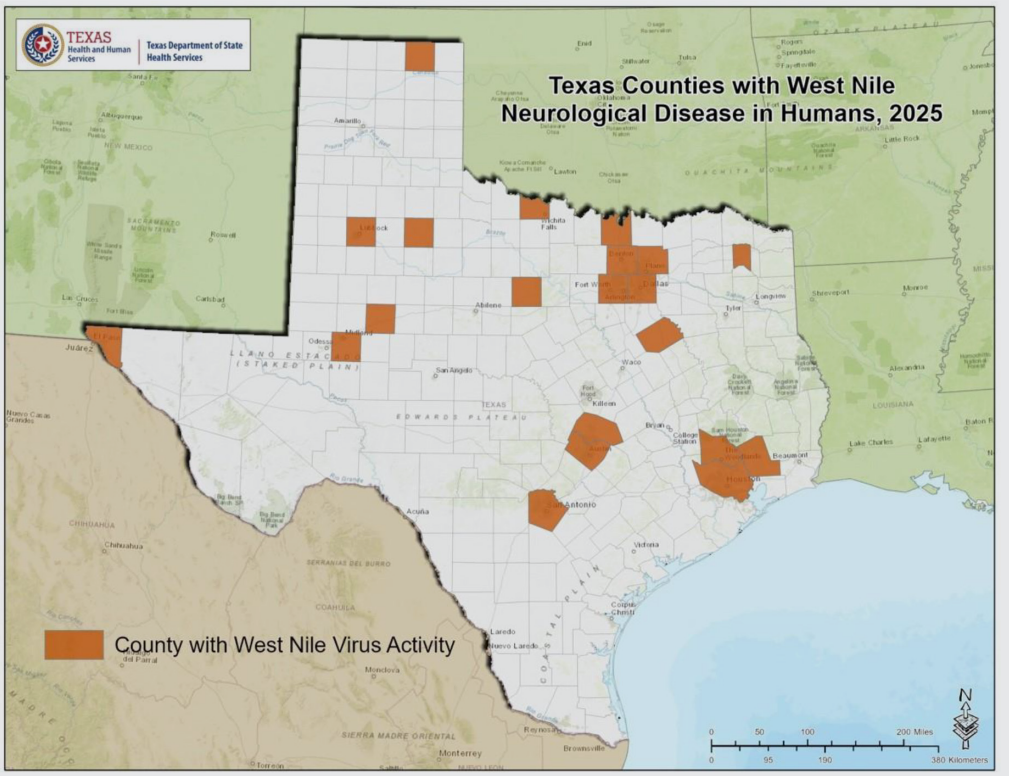

Figure 2. From DHHS Report on West Nile Neuroinvasive Disease in Humans (2025).

these illnesses can be seen in Figures 1 and 2, which show what counties have reported WNF and WNND, respectively.[7]

Compared to previous years, the number of cases reported is lower. In 2023, Texas reported a total of 54 human cases and 6 deaths by week 40, while 2024 saw 82 cases and 9 deaths. The current trend could be influenced by delays in reporting and data publication by DSHS. Weekly reporting data for WNV activity in Texas, as seen in Figure 3, shows that WNV activity tends to increase drastically in the summer and fall

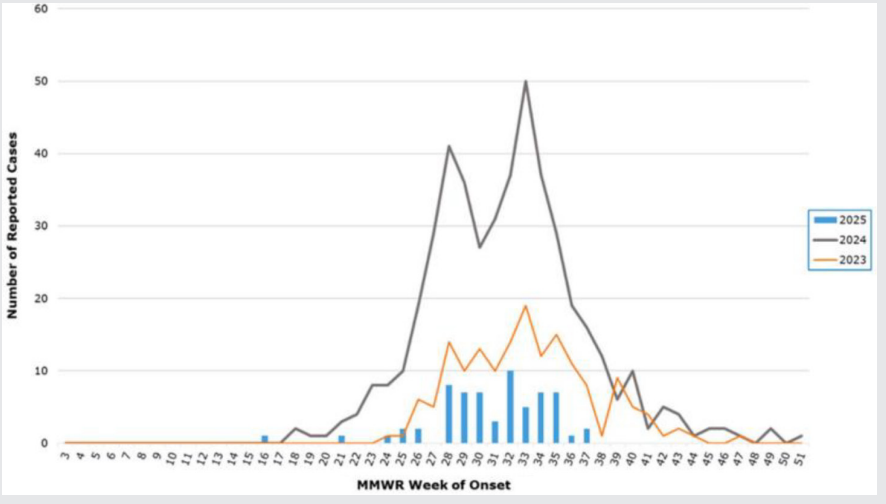

Figure 3. DHHS report on West Nile Virus Reported in Texas, 2023–2025, Week 40.

and decrease in the colder months as mosquito populations decline.[8]

Public Health Implications

Given the absence of a human vaccine or a specific antiretroviral therapy, the public health response to WNV is centered on surveillance, prevention, and vector control. Already, Texas uses robust surveillance systems to monitor for potential outbreaks including testing pools of mosquitos for WNV RNA, using sentinel chicken flocks to test for WNV antibodies. Prevention of WNV and the possible long-term sequela of the more dangerous WNND involves community and personal measure. At the community level, mosquito populations should be monitored and controlled to reduce the density of possible vectors.[9] At the patient level, patients should be counseled to wear loose-fitting long sleeve shirts and pants, wear insect repellant, avoid being outside between dusk and dawn, and prevent mosquitos from entering inside. Since there is no direct treatment for WNV, most forms of care given are supportive. Over the counter medications to treat fever, pain, and headaches as well as hydration are helpful. For those concerning for encephalitis or acute flaccid myelitis, patients should be monitored for the development of increased ICP, seizures, or neuromuscular respiratory failure.[9]

Conclusions

WNV is a persistent and significant public health threat in Texas and the leading cause of mosquito-borne viral illness in the United States. While most infections are asymptomatic, the potential for severe, life-threatening neuroinvasive disease and long-term neurological sequelae results in substantial morbidity and mortality. The 2012 epidemic in North Texas serves as a stark reminder of the virus's potential to cause severe outbreaks. The high ratio of asymptomatic infections to severe disease underscores that reported WNND cases are a canary in the coalmine for the rates of viral transmission within a community.

Addressing the ongoing threat of WNV requires a sustained and multifaceted public health approach. This includes continued robust, integrated surveillance systems, clear public health messaging, and a strategic, data-driven vector control operations. As noted a recent systematic review, changing climate patterns may also serve to alter mosquito habitats and lengthen the duration of transmission seasons, making is increasing critical to mitigating the impact of WNV on the health of Texans.[10]

Keywords: West Nile Virus, arbovirus, encephalitis, epidemiology, Texas, public health

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