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Vector-borne Diseases: Mosquito Season 2025

Introduction

Vector-borne diseases are human illnesses caused by parasites, viruses, and bacteria that are transmitted by carriers of those microorganisms. Mosquitoes are some of those vectors and their bites are a common consequence of outdoor exposure in many parts of the world. In the United States, except for the southernmost states, mosquito season starts in the summer and continues into fall.¹ While both mosquito sexes exist, only female mosquitoes bite, as they require blood meals to develop their eggs.¹ While many mosquito bites result only in minor skin irritation, some species are vectors of serious infectious diseases, making mosquito-borne illness a significant public health concern.¹

Epidemiology

Vector-borne diseases account for more than 17% of all infectious diseases worldwide, causing more than 700,000 deaths annually by either parasites, bacteria or viruses.¹ In the United States and its territories, over 200 mosquito species have been identified; however, only about 12 of these are recognized as vectors capable of transmitting pathogens that cause disease in humans.² Although many mosquito species are classified as nuisance pests and do not transmit pathogens, certain species are competent vectors capable of spreading bacteria, viruses and parasites.²

Because it is not possible to distinguish between harmful and harmless mosquitoes by appearance, it is important to take protective measures against all mosquito bites.² The primary mosquito species known to transmit diseases in the U.S. include *Aedes aegypti*, which can spread viruses such as dengue, Zika, and chikungunya; *Culex* species, which can carry West Nile virus; and *Anopheles* species, the known vectors of malaria, which is not endemic in the United States [Table 1].²

Table 1: List of Vector-borne Diseases According to their Vector

Mosquito	Disease Caused	Pathogen
<i>Aedes aegypti</i>	Chikungunya	Virus
	Dengue	Virus
	Zika	Virus
	Yellow Fever	Virus
	Rift Valley Fever	Virus
	Lymphatic filariasis	Parasite
<i>Anopheles</i>	Malaria	Parasite
	O'nyong'nyong	Virus
	Lymphatic filariasis	Parasite
<i>Culex</i>	Japanese encephalitis	Virus
	West Nile	Virus
	Lymphatic filariasis	Parasite

Source: World Health Organization. Available at: <https://www.who.int/news-room/fact-sheets/detail/vector-borne-diseases>

Among the numerous arboviral diseases transmissible via mosquito vectors, West Nile Virus (WNV) remains one of the most prevalent in the United States. Human cases typically emerge during the seasonal peak of mosquito activity, which spans from summer through fall.² In 2024, a total of 1,466 human WNV cases were reported across 49 states. Specifically, the state of Nevada documented 27 confirmed human cases during the same period.³

Despite Nevada's arid climate, vector species capable of transmitting diseases such as WNV persist in areas with fresh, standing water, such as those in the Tahoe Basin. According to data from the CDC's National Arboviral Surveillance System, 748 cases of WNV infection were reported in Nevada between 1999 and 2024. Of those, 66 were identified through blood donor screening, suggesting the presence of asymptomatic or subclinical infections within the population.³ These data underscore the importance of vector surveillance and public health interventions, as evidence indicates

that a portion of WNV transmission is occurring locally rather than being exclusively travel-related.

Preventing Mosquito Bites

Mosquitoes serve as vectors for numerous pathogens affecting not only humans but also animals, transmitting diseases and parasites to which dogs and horses are particularly susceptible, including *Dirofilaria immitis* (canine heartworm), Eastern equine encephalitis virus (EEEV), and West Nile virus (WNV).⁴ Mosquitoes with WNV also bite and infect people, horses, and other mammals. Given the significant health risks posed by mosquito-borne pathogens to both humans and animals, proactive prevention strategies and behavioral interventions are essential components of effective disease control.⁵

The Environmental Protection Agency (EPA) recommends using insect repellent and taking the following preventative actions:⁴

Eliminate breeding grounds by removing standing water from containers like birdbaths, fountains, and plant trays. Make sure there are no areas around the home that can collect water like cans, tires, toys, buckets, puddles, and even places as small as bottle caps.

Use pesticides properly to control larvae and adult mosquitoes.

Installing barriers like screens and confirming they are intact. Sealing gaps in walls, doors, and windows will ensure mosquitoes don't enter the home.

Prevent bites by wearing protective clothing, staying indoors during peak mosquito activity times in the day, and using EPA-approved repellents as directed. When applied according to the labeled instructions, EPA-registered products have been demonstrated to be both safe and effective, including for use by individuals who are pregnant or breastfeeding. Utilize insect repellents registered with the U.S. Environmental Protection Agency (EPA) that contain one of the following active ingredients:

- DEET
- picaridin (also known as KBR 3023 or icaridin outside the United States)
- IR3535
- oil of lemon eucalyptus (OLE)
- Para-menthane-diol (PMD)
- 2-undecanone—A plant-derived ingredient

Travel

Destination and activities may determine the proper protection against mosquito bites. The Centers for Disease Control and Prevention (CDC) has a site that provides details on the types of vaccines and precautions to take based on the destination and can be accessed here

<https://wwwnc.cdc.gov/travel/destinations/list>

While more common in tropical regions, Dengue, chikungunya, and Zika viruses have occasionally been transmitted locally in U.S. states like Florida, Texas, and Hawaii.² Travel at the national level should also be assessed and proper precautions should be taken, especially if traveling during peak mosquito season when these vectors are most active.

When traveling nationally or internationally:

- Plan ahead and research travel destination
- Pack insect repellent and permethrin-treated protective clothing
- Search for vaccines for mosquito-borne disease prior to traveling or consult with your medical care provider
- Book lodging with screens or air conditioning OR pack a permethrin-treated mosquito net to use while sleeping
- Upon return from travels, monitor for symptoms and prevent mosquito bites at home for 3 weeks

Vaccines

Preventing mosquito bites is critically important in the United States due to the public health threats posed by mosquito-borne diseases, many of which have no specific treatment or vaccine. Currently, there is no widely available vaccine for WNV or Zika viruses in the U.S. The best way to prevent illnesses from mosquito bites is to protect yourself and your

family from bites. Prevention relies heavily on personal protection and community vector control. The U.S. Food and Drug Administration (FDA) approved Ixchiq, the first chikungunya vaccine, in November 2023.⁶ However, caution is advised and consulting a medical provider prior to receiving the vaccine is highly encouraged.⁶

Reporting

The list of reportable communicable diseases and reporting forms can be found at:

<http://tinyurl.com/WashoeDiseaseReporting>

Report communicable diseases to Northern Nevada Public Health. To report a communicable disease, please call 775-328-2447 or fax your report to the NNPH at 775-328-3764.

Acknowledgement

Thank you to all health care providers, infection control practitioners, laboratory staff, as well as schools and daycares for their reporting and collaboration to make this work possible.

References

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