

Vector-borne diseases

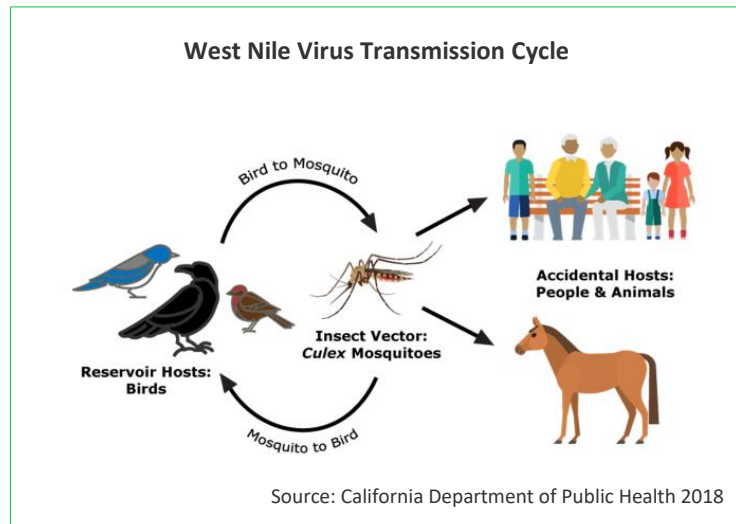
Warming temperatures and changes in precipitation can affect vector-borne disease rates in California



No clear trends are evident in the number of vector-borne disease cases in California. Nevertheless, vector-borne diseases are among the illnesses most closely associated with climate change. Outbreaks are influenced significantly by high and low temperature extremes and precipitation patterns. These affect the distribution and survival of the “vectors” that transmit the disease (usually insects such as mosquitoes and ticks), the abundance of the natural “reservoir hosts” that harbor the disease, and the reproduction rates of

the virus, bacteria or other infectious agent causing the disease. For most Californians, West Nile Virus (WNV) poses the greatest vector-borne threat. This virus is transmitted by a mosquito vector from infected bird “reservoir hosts” to human or domestic animal “accidental hosts” (see diagram).

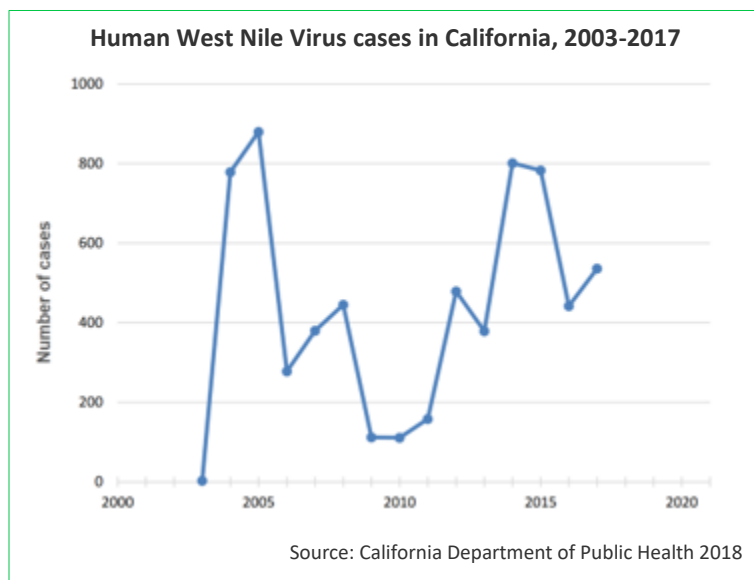
A changing climate can also create favorable conditions for non-native or “invasive” vectors. Two mosquito species native to the tropics have recently been found in several California counties. These mosquitoes have the potential to transmit the Zika, dengue fever, and yellow fever viruses. Health professionals are concerned that these and other invasive vector species may acclimate to California’s warming climate and become widespread across the state.



What does the indicator show?

The graph shows the number of human cases of WNV reported in California each year. First detected in the state in 2003 (when three cases were reported), WNV cases show no clear trend, varying from year to year. The number of cases peaked in 2004-05 and 2014-15.

Health effects from infections include fever, headache, body aches, nausea, vomiting, swollen lymph glands or a skin rash. Since symptoms can be mild or absent in the majority of WNV infections, many cases are undetected and therefore not reported.





Why is this indicator important?

Humans infected with West Nile Virus and other vector-borne diseases can potentially suffer serious health consequences. Neuroinvasive cases of WNV, although rare, can result in encephalitis or meningitis. Another mosquito-borne virus that can cause severe illness in California is the St. Louis encephalitis virus (SLEV). SLEV re-emerged in 2015 after over a decade without detection. SLEV outbreaks have long been associated with elevated temperatures. Climate change is likely to also impact the transmission of tick-borne diseases in California, the most common being Lyme disease.



West Nile Virus mosquito

Photo: CDC

Tracking vector-borne diseases is critical for understanding possible links between disease occurrence and climate trends. Above-normal temperatures are among the most consistent factors associated with WNV outbreaks. WNV transmission increases during mild winters, likely due to larger mosquito and host bird populations. Warmer temperatures may also allow more time for the virus to replicate and increase in number, increasing the potential for disease transmission to people.

Drought is an important predictor of WNV disease cases in California. Record hot temperatures and extended drought may have contributed to the elevated WNV activity in 2014 and 2015. Mosquito populations increase under drought conditions, especially in urban areas, due to stagnation of water in storm water systems that would otherwise be flushed by rainfall. Drought conditions may also force infected birds to move to suburban areas where water is more available and bring these populations into contact with the disease.

In addition to climate change, vector-borne disease transmission can be influenced by many other factors, including how viruses adapt and change, the availability of hosts, changing ecosystems and land use, human behavior such as time spent indoors, and vector control programs. These influences make it difficult to predict how climate change alone will influence future outbreaks of vector-borne diseases.

For more information about this and other climate change indicators, visit:

<https://oehha.ca.gov/climate-change/report/2018-report-indicators-climate-change-california>

