

Key Findings

Dengue is an infectious disease caused by any one of four dengue viruses that are spread from the bite of an infected mosquito. The mosquitoes that can spread dengue viruses, *Aedes aegypti* and *Aedes albopictus*, have invaded [many areas of California](#). At this time, *Aedes* mosquitoes in California are not known to be infected with dengue, and locally acquired cases of dengue have not been reported. So far in California, cases of dengue have been reported only in people who were infected while traveling outside of California. Dengue occurs in many tropical and subtropical areas of the world, including Africa, Asia, the Middle East, Central and South America, as well as some areas of the United States and U.S. territories.

Dengue in California from 2013 through 2019

Total Cases: There were a total of 1,101 new dengue cases from 2013 through 2019.

Rate: The average annual rate of new dengue cases during 2013-2019 was less than 1 case per 100,000 people in California.

- **By County:** There were 11 California counties that reported at least 1 case of dengue each year during 2013-2019, with an average rate of about 1 case per 100,000 people.
- **By Sex:** The average rates for males and females were each less than 1 case per 100,000 people.
- **By Age Group:** The average rates were highest in adults aged 35 to 44 years, but rates were less than 1 case per 100,000 people.
- **By Race/Ethnicity:** For cases where race and ethnicity information was available, the highest percentages of cases were in people who reported Hispanic/Latino race/ethnicity (about 38%) and non-Hispanic Asian/Pacific Islander race/ethnicity (about 34%).

To help prevent dengue, which can be life-threatening in severe cases, people who travel to areas where dengue is common should take steps to prevent mosquito bites. Important prevention steps include using mosquito repellent on clothes and exposed skin, sleeping under a mosquito bed net, and keeping mosquitoes out of living spaces by using window and door screens. After returning from an area where dengue is common, people should continue to use mosquito repellent for three weeks to prevent spreading dengue to mosquitoes around their home.

For more information about dengue in California, please visit the [CDPH Dengue webpage](#). For details about key infectious diseases in California, please visit the [CDPH Surveillance and Statistics Section webpage](#).

Background

Dengue is a viral infection that is caused by any one of four related dengue viruses (DENV-1, DENV-2, DENV-3, and DENV-4) and is primarily transmitted through bites from infected mosquitoes, specifically *Aedes aegypti* and *Aedes albopictus*. These mosquitoes are not native to California but have been detected in multiple counties throughout the state.¹ Dengue is not transmitted from person to person. Around 40% of the world's population, which equates to around 3 billion people, live in an area where there is risk of dengue; this includes countries in Africa, Asia, the Middle East, Central and South America, and the Pacific Islands, as well as parts of the United States and U.S. territories, including Florida, Hawaii, Texas, and Puerto Rico.² Globally, up to 400 million people are infected with dengue annually and approximately 100 million people become sick from infection.³ In California, dengue infections have been reported only in people who were infected while traveling outside of California.¹

About 1 in 4 people who are infected with dengue will develop symptoms, which can be either mild or severe. Symptoms of mild dengue can be confused with other illnesses and include fever, nausea and vomiting, aches and pains, or a rash. Symptoms usually last 2-7 days, and most patients recover within a week. There is no specific antiviral therapy to treat dengue infection, but symptoms can be treated with increased fluid intake, rest, and acetaminophen to control fever and pain (aspirin or ibuprofen should *not* be taken). Dengue may become severe for about 5% of individuals that have the virus, resulting in shock, internal bleeding, and potentially death. Severe dengue is a medical emergency. The warning signs for severe dengue include stomach pain, bleeding from the nose or gums, and vomiting and tiredness; symptoms of severe dengue typically begin 1-2 days after fever has subsided. Individuals most at risk for severe dengue include those who have previously had dengue in the past, as well as infants and pregnant women.⁴

This report describes the epidemiology of confirmed and probable dengue cases in California from 2013 through 2019. Due to multiple factors that can contribute to underreporting, data in this report are likely underestimates of actual disease incidence. For a complete discussion of the definitions, methods, and limitations associated with this report, please refer to the *Technical Notes*.⁵

California Reporting Requirements and Surveillance Case Definition

California Code of Regulations (CCR), Title 17, Section 2500 requires health care providers to report suspected cases of dengue to their local health department within one working day of identification by electronic transmission, fax, or telephone, if an outbreak is suspected.⁶ Per CCR, Title 17, Section 2505, laboratories are required to report laboratory testing results suggestive of dengue virus infection to either the California Reportable Disease Information Exchange (CalREDIE) via electronic laboratory reporting or the local health department; reporting must occur within one working day after the health care provider has been notified.⁷

California regulations require cases of dengue to be reported to the California Department of Public Health (CDPH). CDPH counted cases that satisfied the U.S. Centers for Disease Control and Prevention/Council of State and Territorial Epidemiologists case definition of a confirmed and probable case. Prior to 2015 during the surveillance period (2013-2019), the surveillance case definition for dengue included three subtypes: dengue fever, dengue hemorrhagic fever, and dengue shock syndrome. A confirmed case of dengue was defined as a clinically compatible

case of one of the three dengue subtypes with confirmatory laboratory results. Confirmatory laboratory results included: (i) isolation of dengue virus from or demonstration of specific arboviral antigen or genomic sequences in tissue, blood, cerebrospinal fluid (CSF), or other body fluid by polymerase chain reaction (PCR) test, immunofluorescence or immunohistochemistry, or (ii) seroconversion from negative for dengue virus-specific serum Immunoglobulin M (IgM) antibody in an acute phase (≤ 5 days after symptom onset) specimen to positive for dengue-specific serum IgM antibodies in a convalescent-phase specimen collected ≥ 5 days after symptom onset, or (iii) demonstration of a ≥ 4 -fold rise in reciprocal Immunoglobulin G (IgG) antibody titer or Hemagglutination inhibition titer to dengue virus antigens in paired acute and convalescent serum samples, or (iv) demonstration of a ≥ 4 -fold rise in PRNT (plaque reduction neutralization test) end point titer (as expressed by the reciprocal of the last serum dilution showing a 90% reduction in plaque counts compared to the virus infected control) between dengue viruses and other flaviviruses tested in a convalescent serum sample, or (v) virus-specific IgM antibodies demonstrated in CSF. A probable case was defined as a clinically compatible case of one of the three dengue subtypes with laboratory results indicative of presumptive infection, defined as dengue-specific IgM antibodies present in serum with a positive/negative ratio equal or greater than 2.0.⁸

Beginning in 2015, the subtypes for dengue were modified to include dengue, dengue-like illness, and severe dengue. A confirmed case of dengue was defined as a clinically compatible case of dengue, dengue-like illness, or severe dengue with confirmatory laboratory results. Confirmatory laboratory results included: (i) detection of DENV nucleic acid in serum, plasma, blood, CSF, other body fluid or tissue by validated reverse transcriptase-PCR, or (ii) detection of DENV antigens in tissue by a validated immunofluorescence or immunohistochemistry assay, or (iii) detection in serum or plasma of DENV NS1 antigen by a validated immunoassay, or (iv) cell culture isolation of DENV from a serum, plasma, or CSF specimen, or (v) detection of IgM anti-DENV by validated immunoassay in a serum specimen or CSF in a person living in a dengue endemic or non-endemic area of the United States without evidence of other flavivirus transmission (e.g., WNV, SLEV, or recent vaccination against a flavivirus [e.g., YFV, JEV]), or (vi) detection of IgM anti-DENV in a serum specimen or CSF by validated immunoassay in a traveler returning from a dengue endemic area without ongoing transmission of another flavivirus (e.g., WNV, JEV, YFV), clinical evidence of co-infection with one of these flaviviruses, or recent vaccination against a flavivirus (e.g., YFV, JEV); or (vii) IgM anti-DENV seroconversion by validated immunoassay in acute (i.e., collected < 5 days of illness onset) and convalescent (i.e., collected > 5 days after illness onset) serum specimens; or (viii) IgG anti-DENV seroconversion or ≥ 4 -fold rise in titer by a validated immunoassay in serum specimens collected > 2 weeks apart, and confirmed by a neutralization test (e.g., PRNT) with a > 4 -fold higher end point titer as compared to other flaviviruses tested. A probable case was defined as a clinically compatible case of one of the three dengue subtypes with laboratory results indicative of probable infection, which included (1) detection of IgM anti-DENV by validated immunoassay in a serum specimen or CSF in a person living in a dengue endemic or non-endemic area of the United States with evidence of other flavivirus transmission (e.g., WNV, SLEV), or recent vaccination against a flavivirus (e.g., YFV, JEV), or (2) detection of IgM anti-DENV in a serum specimen or CSF by validated immunoassay in a traveler returning from a dengue endemic area with ongoing transmission.⁸

Epidemiology of Dengue in California, 2013-2019

CDPH received reports of 1,101 total cases of dengue with estimated symptom onset dates from 2013 through 2019. The overall average annual incidence of dengue during 2013-2019

was 0.4 per 100,000 population [Figure 1].

To date, no locally acquired cases of dengue have been reported in California. Of the 968 case-patients with a reported travel destination during the surveillance period, 446 (47.0%) reported travel to Asia, 224 (23.6%) reported travel to parts of North America (Mexico and U.S.), 133 (14.0%) reported travel to Central America, and 165 (17.0%) reported travel to other parts of the world.

Statewide from 2013 through 2019, 11 counties reported at least 1 case for each year of the surveillance period: Alameda, Contra Costa, Los Angeles, Orange, Riverside, Sacramento, San Diego, San Francisco, San Mateo, Santa Clara, and Yolo counties. Cases from these 11 counties made up 79.7% of the total dengue cases reported. Among these 11 counties, the average annual incidence rate of the seven years was highest in Santa Clara (1.0 per 100,000; 132 cases), San Mateo (1.0 per 100,000; 51 cases), and Alameda (0.9 per 100,000; 104 cases) counties [Figure 2].

The average annual incidence rate by sex was 0.4 per 100,000 population for both males and females during the surveillance period. Of the 1,098 total cases reported with complete sex data, 568 (51.7%) were among females and 530 (48.3%) were among males.

By age group, the average annual incidence rates were highest among adults aged 35-44 years (0.6 per 100,000; 213 cases) and 25-34 years (0.5 per 100,000; 197 cases). The average annual incidence rate was lowest among infants under one year of age (0.03 per 100,000; 1 case) [Figure 3].

For the 772 dengue cases with complete race/ethnicity data, the highest percentages of cases were among those who reported Hispanic/Latino race/ethnicity (38.2%) and non-Hispanic Asian/Pacific Islander race/ethnicity (33.7%) [Figure 4].

Figure 1. Dengue Cases and Incidence Rates by Year of Estimated Illness Onset, California, 2013-2019

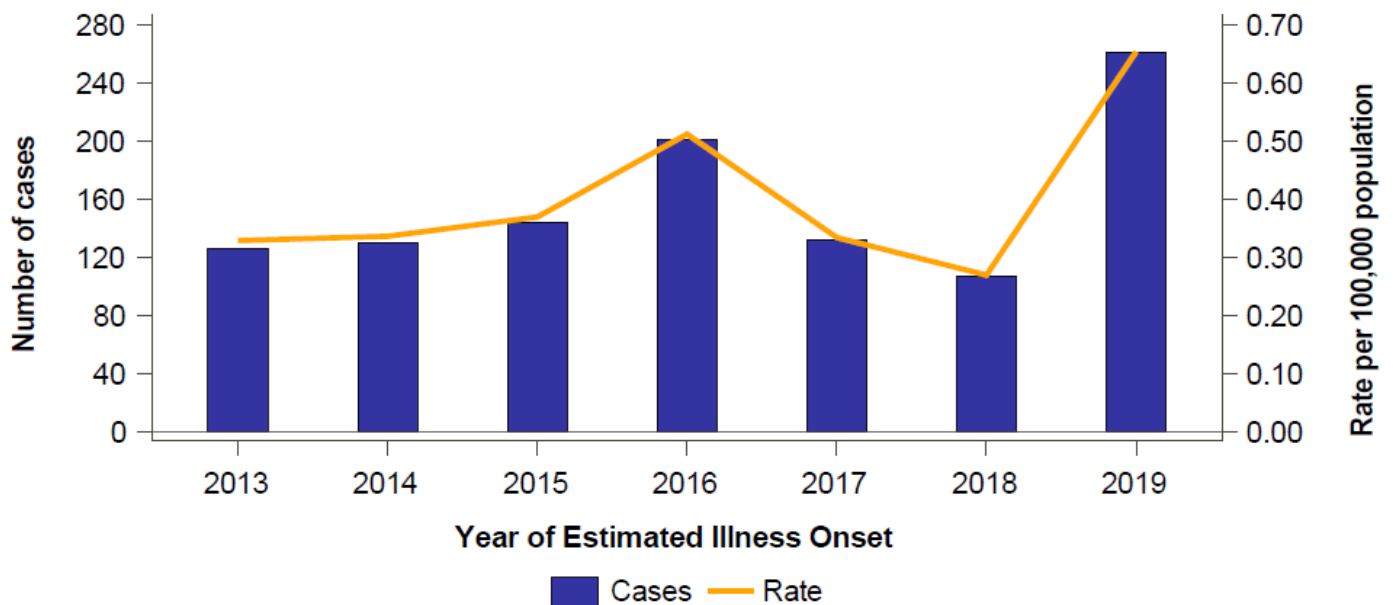


Figure 2. Dengue Average Annual Incidence Rates by County, California, 2013-2019

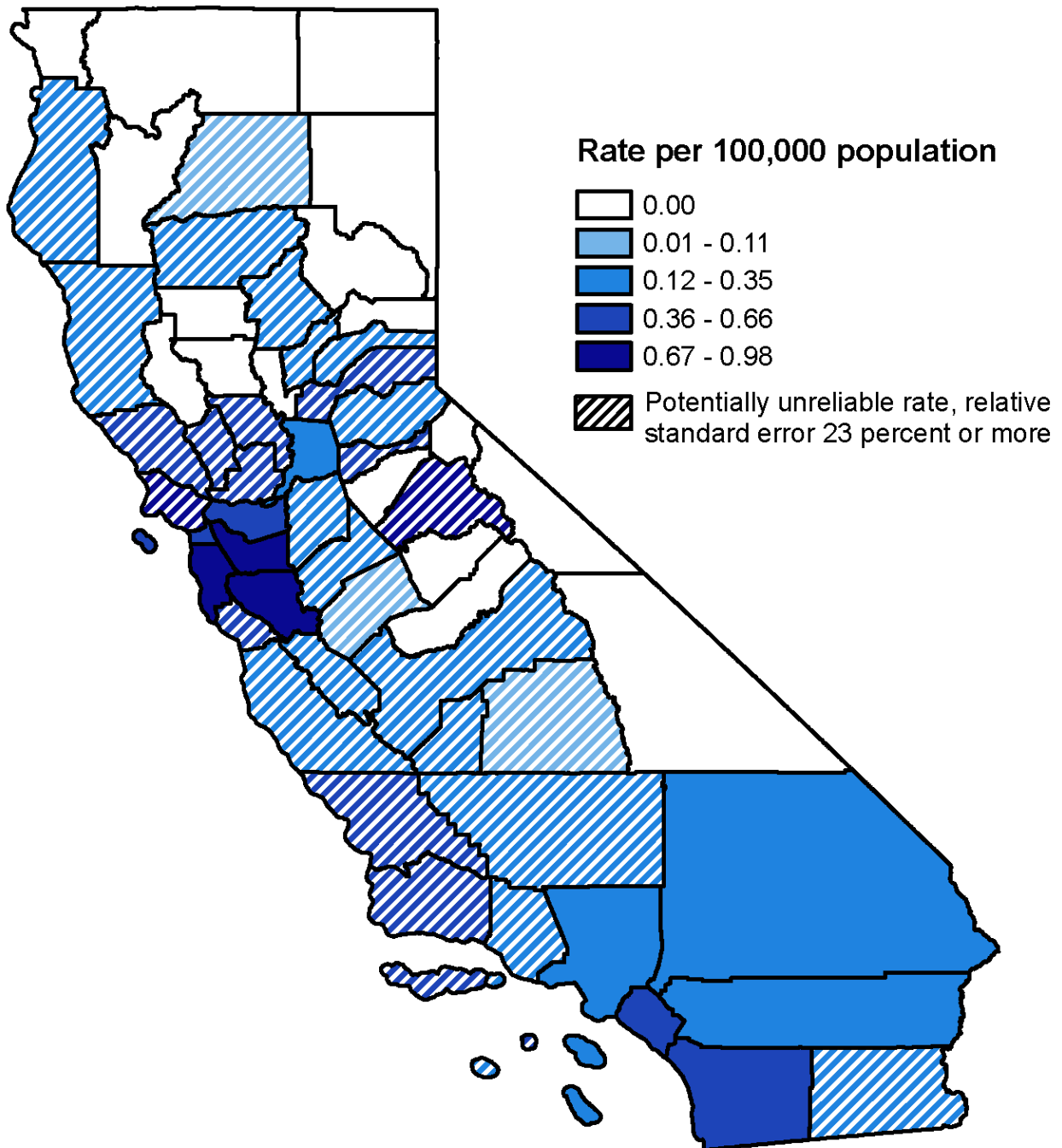
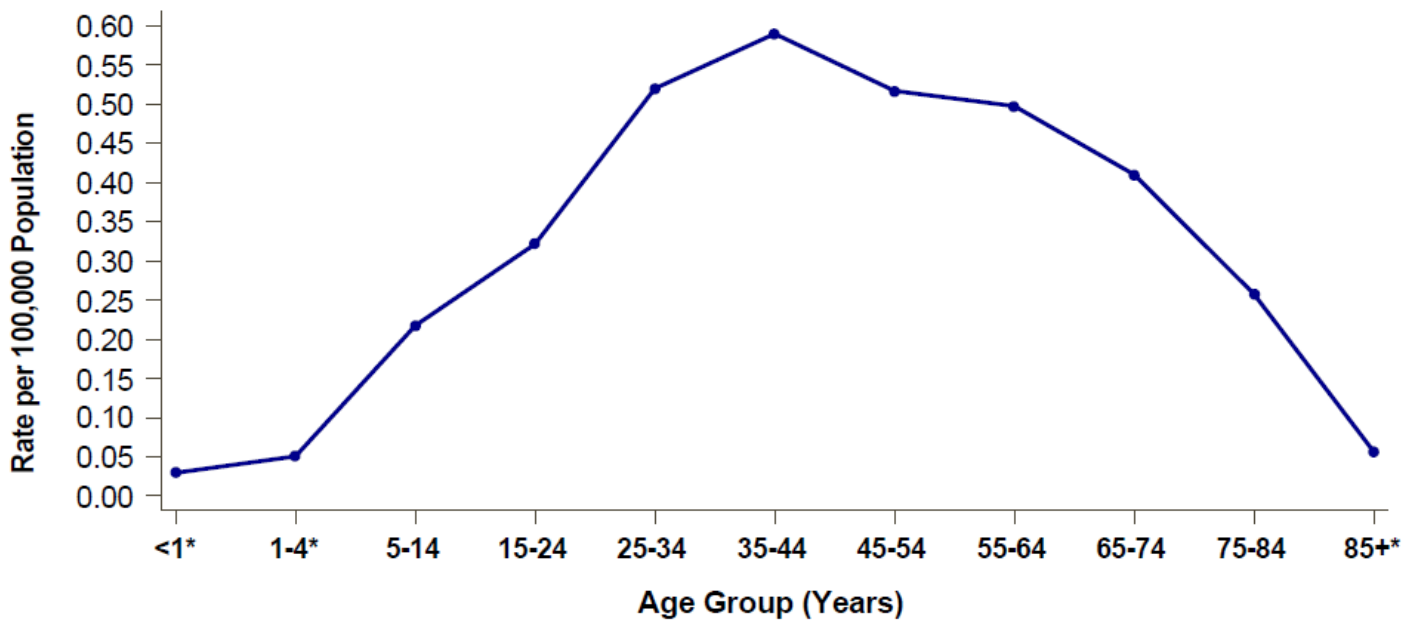
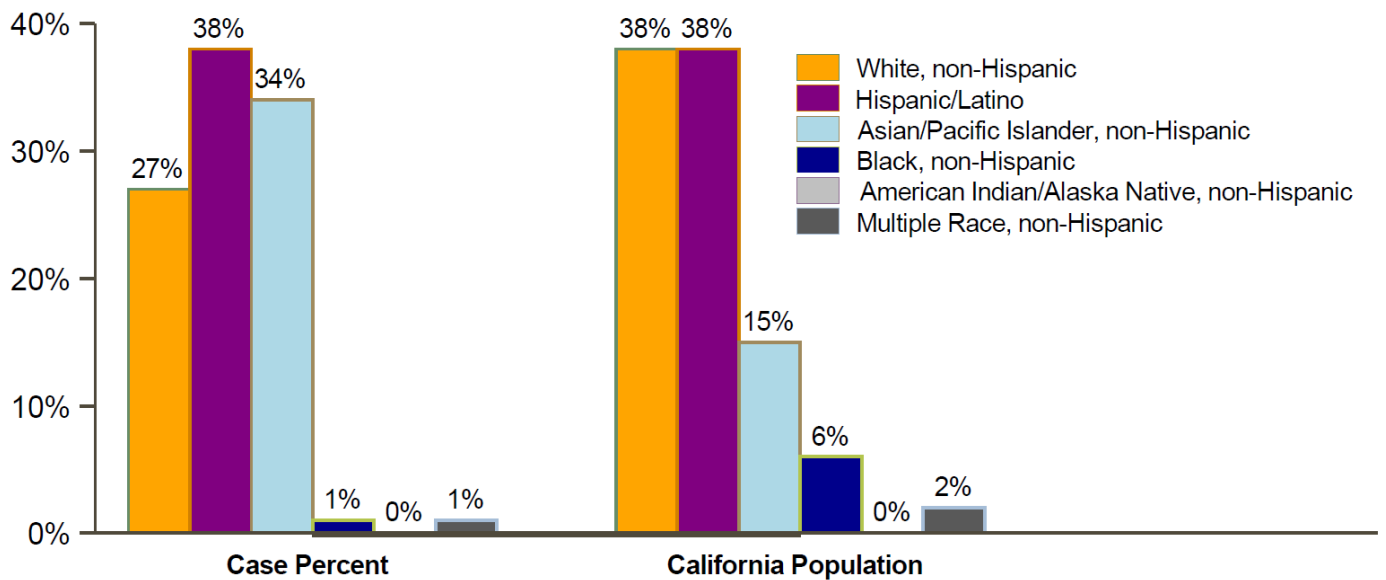


Figure 3. Dengue Average Annual Incidence Rates by Age Group, California, 2013-2019



*Potentially unreliable rate: relative standard error 23 percent or more.

Figure 4. Dengue Cases and Population by Race/Ethnicity, California, 2013-2019



27.2% (n=300) of reported incidents of Dengue Virus Infection did not identify race/ethnicity and 2.6% (n=29) of incidents identified as 'Other' race/ethnicity and are not included in the Case Percent calculation. Information presented with a large percentage of missing data should be interpreted with caution.

Comments

Dengue can be life-threatening in severe cases. Persons who travel to areas with risk of dengue should take precautions to prevent mosquito bites by using mosquito repellent on clothes and exposed skin, sleeping under a mosquito bed net, and keeping mosquitoes out of living spaces by using window and door screens. After returning from travel to an area with risk of dengue, persons should continue to use mosquito repellent for three weeks to prevent spreading dengue virus to mosquitoes around their home.

References

- ¹ [Dengue. California Department of Public Health website](https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Dengue.aspx). Updated October 9, 2020. Accessed November 30, 2020. <https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Dengue.aspx>
- ² [Areas with Risk of Dengue. U.S. Centers for Disease Control and Prevention website](https://www.cdc.gov/dengue/areaswithrisk/index.html). Updated September 26, 2019. Accessed November 30, 2020. <https://www.cdc.gov/dengue/areaswithrisk/index.html>
- ³ [About Dengue: What You Need to Know. U.S. Centers for Disease Control and Prevention website](https://www.cdc.gov/dengue/about/index.html). Updated May 3, 2019. Accessed November 30, 2020. <https://www.cdc.gov/dengue/about/index.html>
- ⁴ [Dengue Symptoms and Treatment. U.S. Centers for Disease Control and Prevention website](https://www.cdc.gov/dengue/symptoms/index.html). November 23, 2020. Accessed November 30, 2020. <https://www.cdc.gov/dengue/symptoms/index.html>
- ⁵ State of California, Department of Public Health. [Technical notes. In: *Epidemiologic Summaries of Selected Communicable Diseases in California, 2013-2019*](https://www.cdph.ca.gov/Programs/CID/DCDC/CDPH%20Document%20Library/EpiSummariesTechnicalNotes2013-2019.pdf). Sacramento, CA; 2021. Accessed December 30, 2021. <https://www.cdph.ca.gov/Programs/CID/DCDC/CDPH%20Document%20Library/EpiSummariesTechnicalNotes2013-2019.pdf>
- ⁶ [Reportable Diseases and Conditions: Reporting to the Local Health Authority, 17 CCR § 2500 \(2021\)](https://govt.westlaw.com/calregs/Document/I5849DB60A9CD11E0AE80D7A8DD0B623B). <https://govt.westlaw.com/calregs/Document/I5849DB60A9CD11E0AE80D7A8DD0B623B>
- ⁷ [Reportable Conditions: Notification by Laboratories, 17 CCR § 2505 \(2021\)](https://govt.westlaw.com/calregs/Document/I1947D280662411E384928538D6692020). <https://govt.westlaw.com/calregs/Document/I1947D280662411E384928538D6692020>
- ⁸ [Dengue Virus Infections, Case Definitions, 2010 & 2015](https://www.cdc.gov/nndss/conditions/dengue-virus-infections/case-definition/2015/). National Notifiable Diseases Surveillance System, U.S. Centers for Disease Control and Prevention website. Accessed November 30, 2020. <https://ndc.services.cdc.gov/case-definitions/dengue-virus-infections-2010/>; <https://www.cdc.gov/nndss/conditions/dengue-virus-infections/case-definition/2015/>