

## Key Findings

Brucellosis is an infectious disease caused by *Brucella* bacteria, which are often found in animals used to produce food for humans, including cows, sheep, goats, and pigs. Dogs and other animals can also be infected with *Brucella*. People can get brucellosis if they have contact with infected animals or eat or drink raw (unpasteurized) milk and cheese. Brucellosis is typically a flu-like illness but can cause infections in bone and other organs if not treated.

### Brucellosis in California from 2013 through 2019

**Total Cases:** There were a total of 197 brucellosis cases from 2013 through 2019.

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

- **By County:** Only two counties in California (Los Angeles and San Diego) reported at least one case of brucellosis each year during 2013-2019.
- **By Sex:** The average rates for males and females were each less than 1 case per 100,000 people.
- **By Age Group:** Average rates were higher in adults aged 65 to 84 years compared to other age groups, but still less than 1 case per 100,000 people.
- **By Race/Ethnicity:** For cases where race and ethnicity information was available, the highest percentage of cases (about 78%) was in people who reported Hispanic/Latino race/ethnicity.

To help prevent brucellosis, people should avoid eating or drinking dairy products, including milk, cheese, and ice cream, that have not been pasteurized. People should be especially cautious of dairy products that are produced outside the United States. People who work with animals or handle animal tissues, including veterinarians, meat-processing employees, and hunters, should protect themselves by wearing gloves, goggles, and aprons to help prevent bacteria from infected animals from getting into their eyes or a break in their skin.

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

## Background

*Brucella* spp. are uncommon but important bacterial zoonotic pathogens in the United States, causing an estimated 100 to 200 cases of human illness each year. Since 1954, the U.S. Department of Agriculture (USDA) National Brucellosis Eradication Program has significantly reduced the prevalence of *Brucella* in domestic livestock through routine testing, culling, and vaccination. In 2008, USDA declared all 50 states free of bovine brucellosis.<sup>1</sup> However, brucellosis remains endemic and an economically important disease in much of Africa, the Middle East, Central and South America, and Mexico. In these countries, contact through broken skin with infected animal reproductive tissues and fluids, or inhalation of bio-aerosols, can lead to transmission of *Brucella* bacteria, most notably in occupational settings such as livestock ranches, laboratories, slaughterhouses, meat-processing facilities, and veterinary settings. In California, consuming dairy products that are not pasteurized, particularly milk and cheese produced outside the U.S., is the most common route of exposure. Persons who harvest and dress certain wild animals (e.g., feral swine) may also be exposed to *Brucella* spp.<sup>2</sup> Person-to-person transmission is extremely rare.<sup>3</sup> *Brucella* spp. are listed among the U.S. Centers for Disease Control and Prevention (CDC) category B bioterrorism agents.<sup>4</sup>

Brucellosis has a variable and sometimes prolonged incubation period (5 days to 6 months) and often presents as a nonspecific febrile syndrome (acute or insidious onset of fever, night sweats, fatigue, headache, and arthralgia). If treatment is delayed, patients may experience recurrent or “undulant” fevers and possible focal infections in bones, joints, and other tissues.<sup>5, 6</sup>

Animal brucellosis control programs (vaccination and/or test-and-slaughter of infected animals) help to ensure that commercial foods of animal origin remain free of *Brucella* contamination. Avoiding consumption of unpasteurized dairy products (e.g., raw milk or cheese), particularly those products that are produced and imported from outside the United States, is central toward prevention of brucellosis among Californians.<sup>1, 2</sup>

This report describes the epidemiology of confirmed and probable brucellosis cases in California from 2013 through 2019. Incidence rates presented in this report are based on surveillance data and should be considered estimates of true disease incidence. For a complete discussion of the definitions, methods, and limitations associated with this report, please refer to the *Technical Notes*.<sup>7</sup>

## California Reporting Requirements and Surveillance Case Definition

California Code of Regulations (CCR), Title 17, Section 2500 requires health care providers to immediately report known or suspected human cases of brucellosis to their local health jurisdiction.<sup>8</sup> Laboratories must immediately contact the California Department of Public Health (CDPH) Microbial Diseases Laboratory for instructions whenever a clinical specimen for laboratory diagnosis of suspected human brucellosis is received. Per CCR, Title 17, Section 2505, laboratories must report to the local health jurisdiction where the patient resides when laboratory testing yields evidence suggestive of *Brucella* sp.;<sup>9</sup> all clinical specimens provisionally identified as *Brucella* spp. must be confirmed by a public health reference laboratory.<sup>10</sup>

California regulations require cases of brucellosis to be reported to CDPH. During the surveillance period, CDPH defined a confirmed brucellosis case per the CDC/Council of State and Territorial Epidemiologists 2010 case definition as a clinically compatible illness

characterized by acute or insidious onset of fever, and one or more of the following: night sweats, arthralgia, headache, fatigue, anorexia, myalgia, weight loss, arthritis/spondylitis, meningitis, or focal organ involvement (endocarditis, orchitis/epididymitis, hepatomegaly, splenomegaly), along with definitive laboratory evidence of *Brucella* infection. Definitive laboratory evidence of *Brucella* infection included either culture and identification of *Brucella* sp. from clinical specimens, or evidence of a fourfold or greater rise in *Brucella* antibody titer between acute- and convalescent-phase serum specimens obtained greater than or equal to 2 weeks apart. A probable case was defined as clinically compatible illness and either an epidemiologic link to a confirmed case or presumptive laboratory evidence (supportive serology using the agglutination method or detection of *Brucella* DNA by PCR).<sup>11</sup>

## Epidemiology of Brucellosis in California, 2013-2019

CDPH received a total of 197 reported cases of brucellosis with estimated symptom onset dates from 2013 through 2019. The average annual incidence of brucellosis for the surveillance period was 0.1 case per 100,000 population. The greatest number of cases were reported in 2018 (38 cases), and the fewest in 2016 (20 cases) [Figure 1].

Statewide from 2013 through 2019, only Los Angeles (57 cases) and San Diego (13 cases) counties reported at least one case during each year of the surveillance period at an equivalent rate of 1.0 case per year per 100,000 population. Cases from these two counties comprised 35.5% of the total brucellosis cases reported.

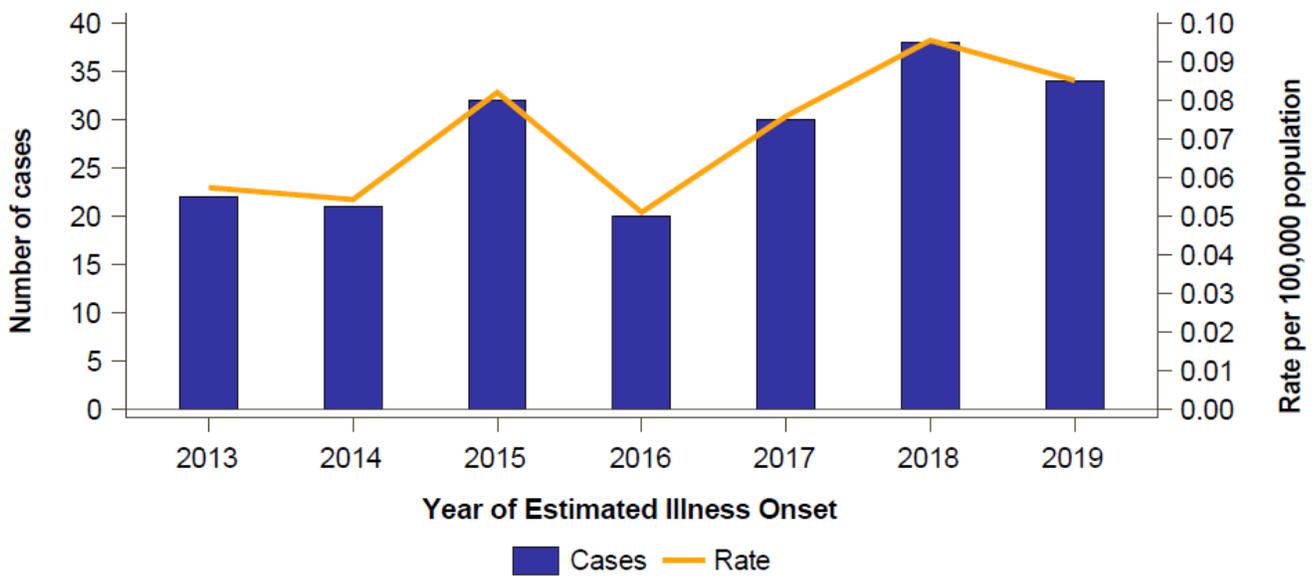
The average annual incidence among males and females was 0.1 per 100,000 population for each group. Of the 197 total cases, 104 (52.8%) were among males and 93 (47.2%) were among females.

Annual incidences were highest among adults aged 75 to 84 years (0.2 per 100,000; 18 cases) and adults aged 65 to 74 years (0.1 per 100,000; 30 cases) compared to other age groups. No cases were reported in children aged less than 1 year [Figure 2].

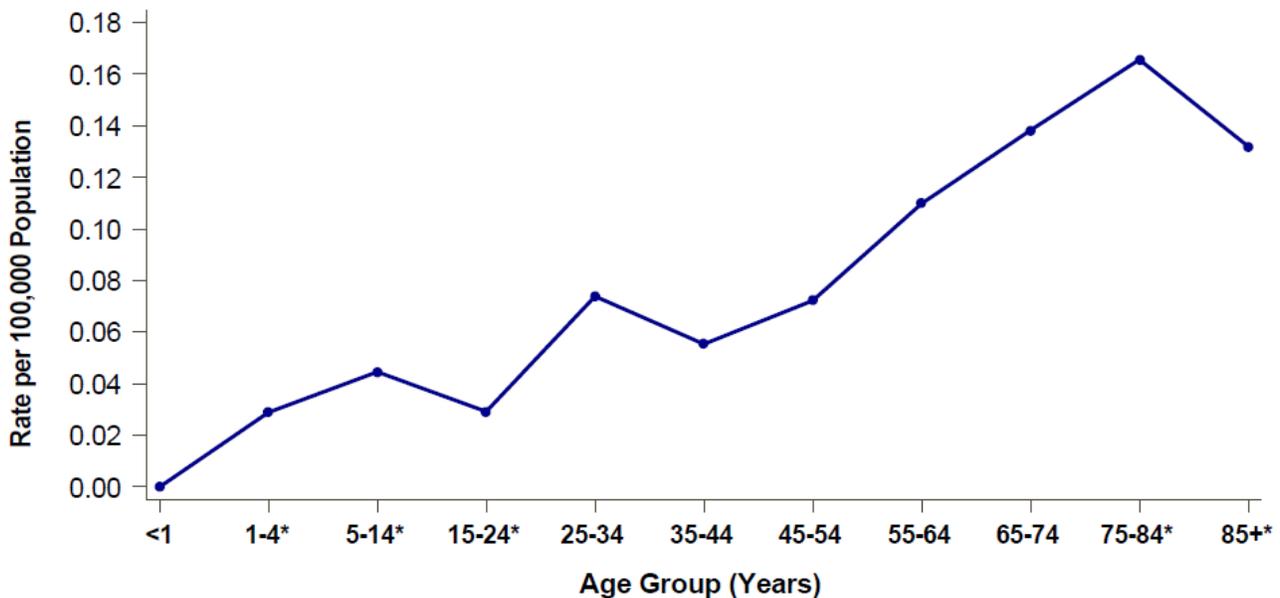
For the 178 brucellosis cases with complete race/ethnicity data, the highest percentage of cases was among those who reported Hispanic/Latino race/ethnicity (77.5%) [Figure 3].

Of the 197 total brucellosis cases reported during the surveillance period, 158 (80.2%) reported consuming any type of dairy product, including milk and/or cheese, during the incubation period. Of these 158 cases, 90 (57.0%) case-patients reported consuming both milk and other dairy products during their incubation periods. Of these 90 cases, 63 (70.0%) case-patients reported consuming pasteurized milk, 18 (20.0%) reported consuming unpasteurized milk, and 9 (10.0%) reported consuming milk of unknown pasteurization. Of the same group of 90 cases, 47 (52.2%) case-patients reported consuming queso fresco and 14 (15.6%) reported consuming soft cheese; dairy products were acquired from outside the U.S. for 45 (50.0%) cases, within California for 36 (40.0%) cases, and from an unknown location for 9 (10.0%) cases. Of the 45 cases that reported acquiring dairy products from outside the U.S., 29 (64.4%) acquired the dairy product from Mexico.

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

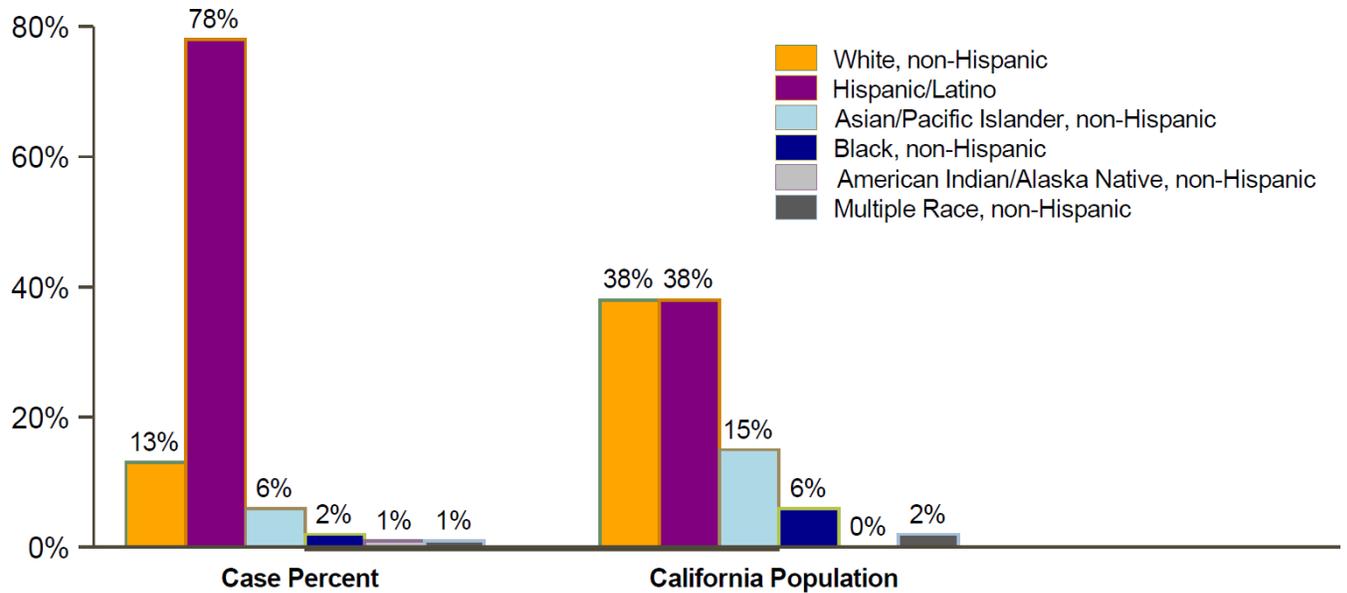


**Figure 2. Brucellosis Average Annual Incidence Rates by Age Group, California, 2013-2019**



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

**Figure 3. Brucellosis Cases and Population by Race/Ethnicity, California, 2013-2019**



6.1% (n=12) of reported incidents of Brucellosis did not identify race/ethnicity and 3.6% (n=7) 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

Brucellosis in California is uncommon and primarily a foodborne disease caused by consuming dairy products, some of which are acquired from outside the U.S., particularly Mexico. Cultural preference for these products has led to *Brucella* infections in California, particularly among Hispanic/Latino residents. Increased public education on the risk of brucellosis should target Hispanic/Mexican-American communities in a language-appropriate and culturally respectful manner.<sup>12</sup>

Most members of the general public can eliminate their risk of brucellosis by selecting and consuming only domestic commercial dairy products that are labelled as pasteurized. Veterinarians and others who have contact with live animals should wear protective clothing, including gloves, gowns, and masks, when they have contact with reproductive tissues and periparturient fluids.

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## References

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- <sup>3</sup> Meltzer E, Sidi Y, Smolen G, Banai M, Bardenstein S, Schwartz E. Sexually transmitted brucellosis in humans. *Clin Infect Dis.* 2010 Jul 15;51(2):e12-5. doi: 10.1086/653608. PMID: 20550455.
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- <sup>6</sup> [Brucellosis. California Department of Public Health website.](#) Updated December 6, 2017. Accessed February 12, 2021. <https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Brucellosis.aspx>
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- <sup>8</sup> [Reportable Diseases and Conditions: Reporting to the Local Health Authority, 17 CCR § 2500 \(2021\).](#) <https://govt.westlaw.com/calregs/Document/I5849DB60A9CD11E0AE80D7A8DD0B623B>
- <sup>9</sup> [Reportable Diseases and Conditions: Notification by Laboratories, 17 CCR § 2505 \(2021\).](#) <https://govt.westlaw.com/calregs/Document/I1947D280662411E384928538D6692020>
- <sup>10</sup> [American Society for Microbiology. Sentinel Level Clinical Laboratory Guidelines for Suspected Agents of Bioterrorism and Emerging Infectious Diseases, \*Brucella\* species.](#) Revised March 2016. Accessed February 25, 2021. <https://asm.org/ASM/media/Policy-and-Advocacy/LRN/Sentinel%20Files/Brucella-2016-March.pdf>
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