

Key Findings

Legionellosis is an infection caused by *Legionella* bacteria, which naturally live in fresh water sources and can grow and spread in human-made water systems. People can become infected with *Legionella* when they breathe in small droplets of water containing the bacteria. These bacteria can infect the lungs and cause Legionnaires' disease (a severe type of pneumonia or lung infection), or Pontiac fever (a less serious disease). Most healthy people exposed to *Legionella* bacteria do not get sick. People at higher risk of getting legionellosis include older adults, people who smoke, and people with lung disease or other chronic illnesses that weaken the immune system.

Legionellosis in California from 2013 through 2019

Total Cases: There were a total of 3,159 new legionellosis cases from 2013 through 2019, including 2,933 (about 93%) cases of Legionnaires' disease. Of the total cases, 2,991 (about 95%) patients were reported to have been hospitalized, and 319 (about 10%) were reported to have died with legionellosis.

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

- **By County:** The average rate was highest in Los Angeles County, with about 2 cases per 100,000 people. Most cases (about 73%) in California were reported from the Southern California region.
- **By Sex:** The average rate was higher in males than females, but each group had about 1 case per 100,000 people.
- **By Age Group:** The average rates were highest in adults aged 85 years and older (about 7 cases per 100,000 people in this age group) and 75 to 84 years (about 5 cases per 100,000 people in this age group).
- **By Race/Ethnicity:** For cases where race and ethnicity information was available, there were higher percentages of cases in people who reported non-Hispanic White race/ethnicity (about 53%) and non-Hispanic Black race/ethnicity (about 15%) than compared to the percentages of these groups in California.

The best way to prevent legionellosis is for building owners and managers to maintain and keep clean the water systems in buildings, hot tubs, cooling towers, and decorative fountains to prevent *Legionella* bacteria from growing in the water and spraying into the air. People who have a higher risk of getting legionellosis should also avoid risky water exposures, including hot tubs and decorative water fountains.

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

Background

Legionella bacteria cause Legionnaires' disease and Pontiac fever, which are collectively known as legionellosis, but are clinically and epidemiologically distinct syndromes. Pontiac fever is a self-limited, nonpneumonic, influenza-like illness, whereas Legionnaires' disease is a serious bacterial pneumonia with substantial morbidity and mortality.¹ The vast majority of reported legionellosis cases are Legionnaires' disease. Infection occurs via inhalation of aerosolized water or aspiration of water contaminated with *Legionella* bacteria, which commonly grow in freshwater sources and amplify in human-made water systems.² Warm temperatures and biofilms support bacterial growth, and hot tubs, cooling towers, and potable water systems have been implicated exposure sources in legionellosis outbreaks in California.

While most people exposed to *Legionella* do not become ill, risk factors for Legionnaires' disease include advanced age, current or historical smoking, chronic lung disease, and immune system deficiencies due to disease or medication.³ Exposure to hot tubs and a recent overnight stay outside of the home (e.g., in a healthcare facility or hotel) are also considered risk factors for disease; hotels, resorts, hospitals, and long-term care facilities often use complex water systems that can grow and aerosolize *Legionella* and expose vulnerable populations.^{2, 3}

Legionella is an important respiratory bacterial pathogen in the United States. The crude national incidence rate has increased 5.5-fold from 0.42 per 100,000 population in 2000 to 2.29 per 100,000 in 2017.⁴ Nearly 10,000 cases of Legionnaires' disease were reported by health departments in the U.S. in 2018. However, these reported numbers of cases may be underestimates as legionellosis is likely underdiagnosed.⁵ *L. pneumophila* serogroup 1 is the most frequently identified serogroup among reported cases in California (the causative agent in about 95% of California patients). Most cases are currently diagnosed by urine antigen, which is highly specific only for *L. pneumophila* serogroup 1, thus disease caused by other serogroups or species is less likely to be diagnosed.⁶ Though used less commonly for diagnosis, culture methods are critically important for legionellosis surveillance and outbreak investigation; culture methods can detect all species and serogroups, and yield isolates that can be compared to other clinical or environmental samples during outbreak investigations.⁷ In recent years, *Legionella* has been a commonly reported pathogen associated with drinking water outbreaks.^{8, 9}

This report describes the epidemiology of confirmed legionellosis 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*.¹⁰ The epidemiologic description of legionellosis for earlier surveillance periods can be found in the *Epidemiologic Summary of Legionellosis in California, 2001-2008 and 2009-2012*.^{11, 12}

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 legionellosis to their local health department within seven working days of identification or immediately by telephone if an outbreak is suspected.¹³ Per CCR, Title 17, Section 2505, laboratories are required to report laboratory testing results suggestive of

Legionella spp. (antigen or culture) to either the California Reportable Diseases Information Exchange (CalREDIE) via electronic laboratory reporting or the local health department; notification should occur within one working day after the health care provider has been notified.¹⁴

California regulations require cases of legionellosis 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 surveillance case definition of a confirmed case. During the surveillance period (2013-2019), a confirmed case of legionellosis was defined as a case with clinically compatible symptoms that met at least one of the following criteria for laboratory confirmation: by culture, isolation of any *Legionella* organism from respiratory secretions, lung tissue, pleural fluid, or other normally sterile fluid; by detection of *L. pneumophila* serogroup 1 antigen in urine using validated reagents; or by seroconversion, fourfold or greater rise in specific serum antibody titer to *L. pneumophila* serogroup 1 using validated reagents.¹⁵

Epidemiology of Legionellosis in California, 2013-2019

CDPH received reports of 3,159 total cases of legionellosis among case-patients with estimated symptom onset dates from 2013 through 2019, including 2,933 (92.8%) cases classified as Legionnaires' disease. The average annual incidence of legionellosis for the surveillance period was 1.2 per 100,000 population. Average annual incidence rates increased 180% from 2013 (0.5 per 100,000; 204 cases) through 2019 (1.4 per 100,000; 542 cases), with fluctuations over time [Figure 1]. Of the total cases reported during the surveillance period, 2,991 (94.7%) case-patients were reported to have been hospitalized and 319 (10.1%) were reported to have died with legionellosis.

County-specific average annual incidence rates per 100,000 population during 2013-2019 ranged from 0 to 1.6, with the highest average rate in Los Angeles County (1.6 per 100,000; 1,175 cases) [Figure 2]. By region (see *Technical Notes*), average annual incidence rates for the surveillance period were 66.7% higher in Southern California (1.2 per 100,000; 2,297 cases) than in Northern California (0.6 cases; 862 cases). Legionellosis cases in Southern California accounted for 72.7% of all legionellosis cases reported in California during the surveillance period. Overall, average annual incidence rates increased in both Southern and Northern California during the surveillance period; rates increased by 185% in Southern California (from 0.5 to 1.4 per 100,000) and by 183% in Northern California (from 0.3 to 0.9 per 100,000) from 2013 through 2019.

During 2013-2019, the average annual incidence rate was higher among males (1.4 per 100,000; 1,932 cases) than among females (0.9 per 100,000; 1,221 cases); 61.3% of legionellosis case-patients were male and 38.7% were female.

Average annual legionellosis incidence rates increased with increasing age; rates were highest among adults aged 85 years and older (6.6 per 100,000; 348 cases) and 75-84 years (5.3 per 100,000; 576 cases) [Figure 3].

For legionellosis cases with complete race/ethnicity information (see *Technical Notes*), the highest percentage of cases was among those who reported non-Hispanic White race/ethnicity (53.1%). The percentages of cases who reported non-Hispanic White race/ethnicity and non-Hispanic Black race/ethnicity were disproportionately higher than the percentages of the non-

Hispanic White and non-Hispanic Black racial/ethnic populations in California during the same time period (53.1% vs. 38.0%, respectively, for non-Hispanic White race/ethnicity; 14.7% vs. 6.0%, respectively, for non-Hispanic Black race/ethnicity) [Figure 4].

Of the 3,159 total reported cases of legionellosis, 525 (16.6%) case-patients reported spending at least one night away from home in a non-healthcare setting (e.g., hotel, vacation rental, cruise ship, etc.) during the ten days prior to illness onset, and were considered to be travel-associated cases. An additional 103 (3.3%) case-patients reported spending the entire ten days prior to illness onset in a healthcare facility (e.g., hospital, long term care facility, skilled nursing facility, etc.), and were considered to be healthcare-associated cases.

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

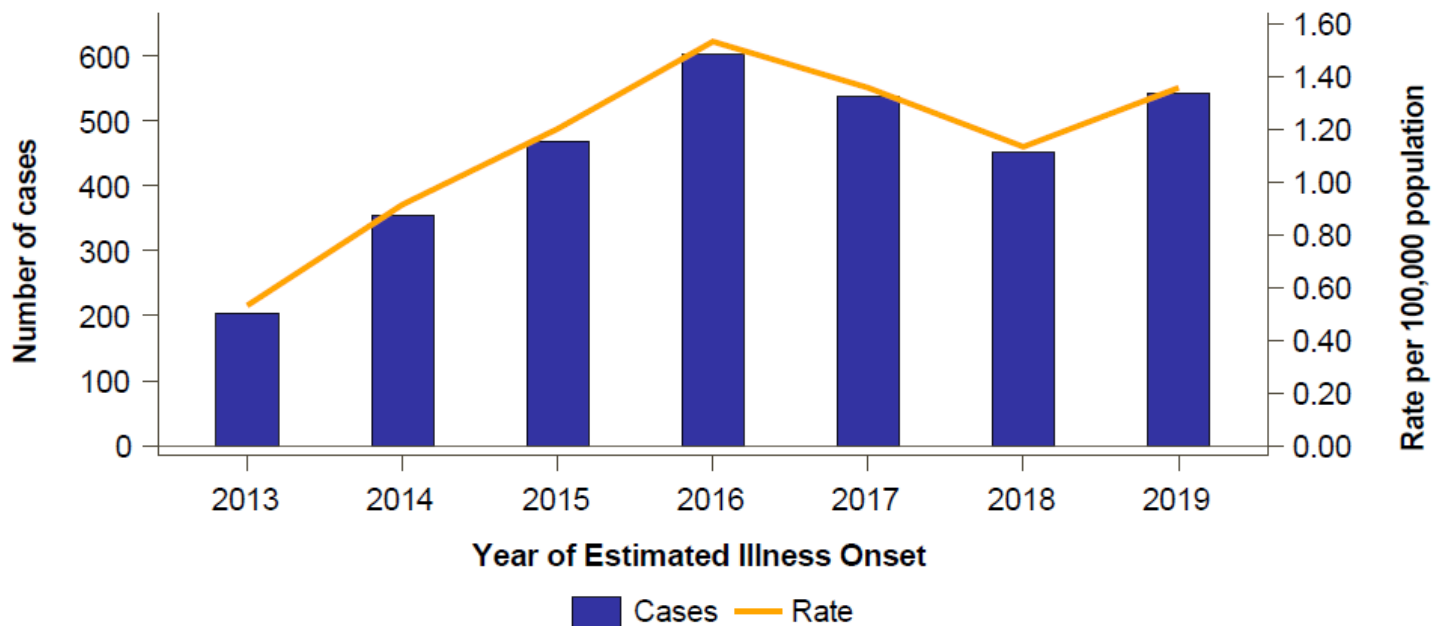


Figure 2. Legionellosis Average Annual Incidence Rates by County, California, 2013-2019

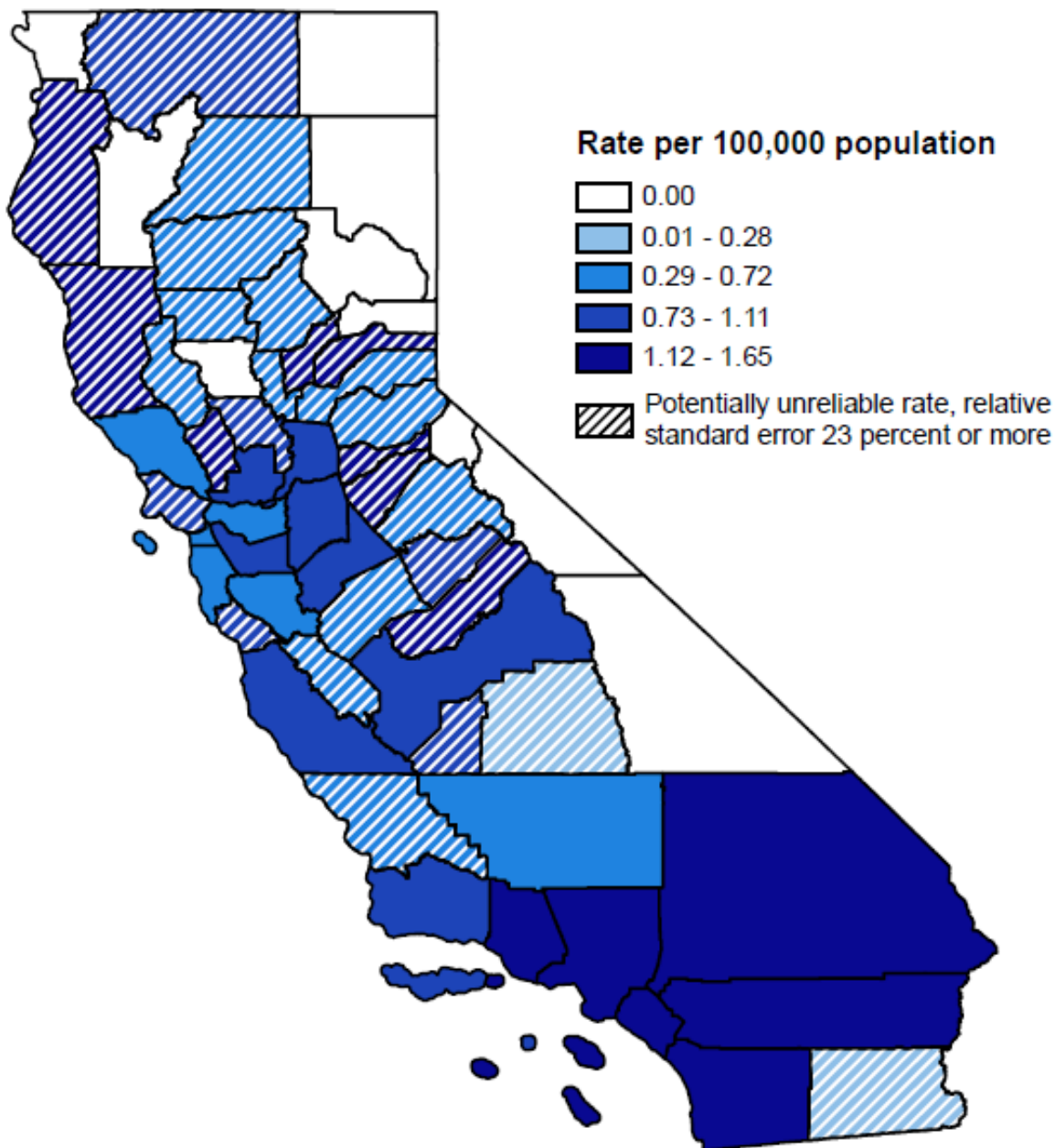
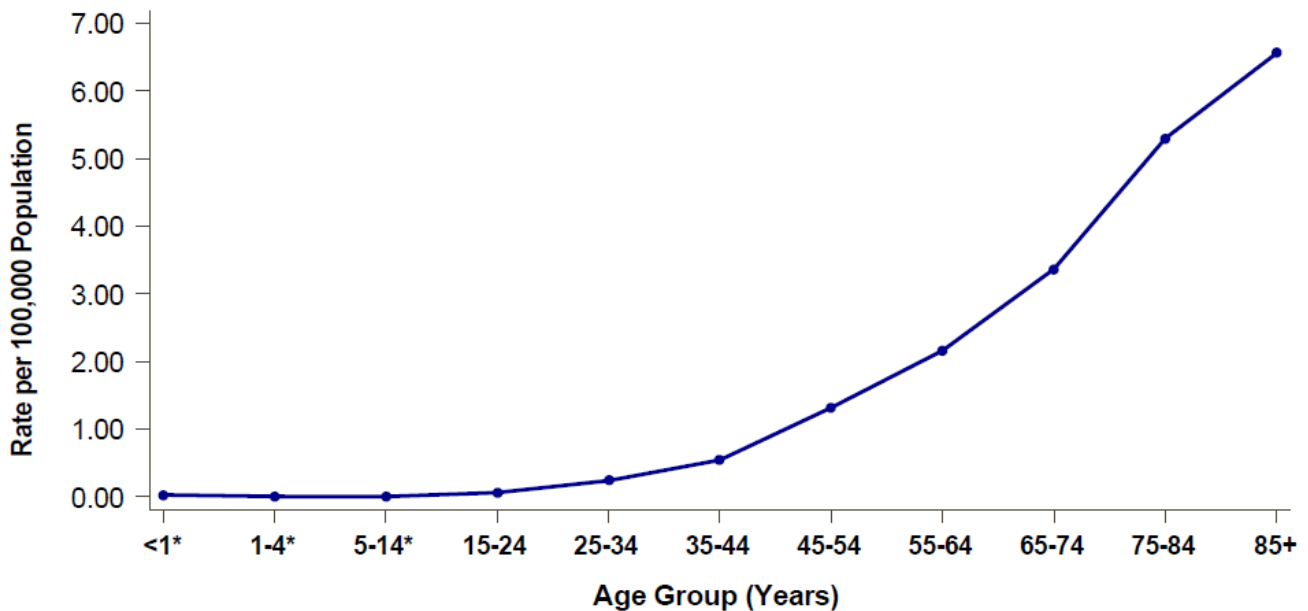
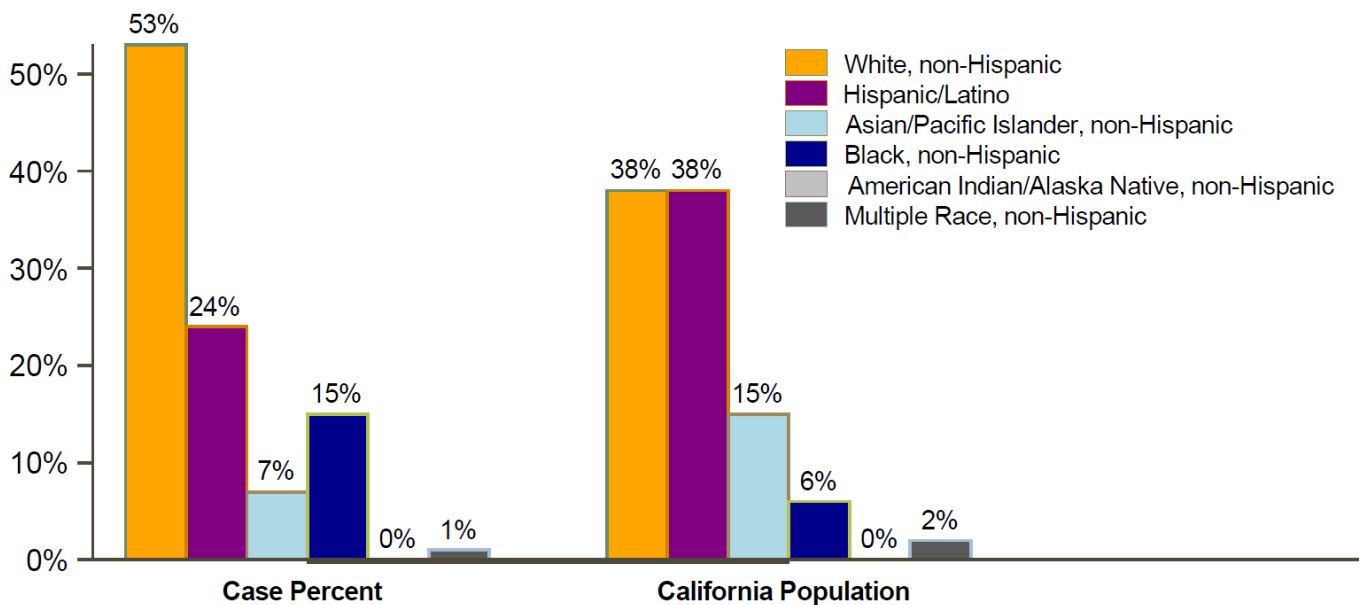


Figure 3. Legionellosis Average Annual Incidence Rates by Age Group, California, 2013-2019



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

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



12.1% (n=383) of reported incidents of Legionellosis did not identify race/ethnicity and 2.1% (n=67) 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

The average annual incidence rate of legionellosis in California increased by 94.9% from the 2009-2012 surveillance period (0.6 per 100,000; 885 total cases) compared to the 2013-2019 surveillance period (1.2 per 100,000; 3,159 total cases).¹² Similar to the 2009-2012 surveillance period, average legionellosis incidence rates increased with increasing age and were highest among adults aged 85 years and older (6.6 per 100,000; 348 cases) for the 2013-2019 surveillance period.¹²

By region, average annual legionellosis rates during 2013-2019 increased in both Northern (0.6 per 100,000) and Southern California (1.2 per 100,000) when compared to the 2009-2012 surveillance period (Northern California: 0.3 per 100,000; Southern California: 0.8 per 100,000). The reason for the increase in average annual legionellosis rates is uncertain but could be due to a combination of factors⁴, including: an aging population; an increase in the number of people with immunocompromising conditions or medications¹⁶; better detection due to increased awareness and testing; aging building infrastructure and plumbing; increased use of water-saving features resulting in temporary or prolonged water stagnation in pipes; an increase in *Legionella* in the environment due to warmer temperatures; and differences in the duration of surveillance periods (4 years in 2009-2012 vs. 7 years in 2013-2019).

The best way to prevent legionellosis is to minimize the growth and spread of *Legionella* in water systems through routine cleaning and maintenance. Building owners and operators can develop water management plans to identify water system areas at increased risk for *Legionella* growth and spread, document plans for routine cleaning and maintenance, establish water system control limits (e.g., temperature and disinfectant levels), and designate corrective actions if control limits are not met.

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