

## Key Findings and Public Health Messages

- The California Department of Public Health (CDPH) received 660 reports of Lyme disease with estimated symptom onset dates from 2001 through 2008. This corresponded to an average annual incidence rate of 0.23 cases per 100,000 Californians.
- Counties of the north coast and the western Sierra Nevada reported the highest county-specific average annual incidence rates.
- Avoiding exposure to vector ticks provides the best opportunity for preventing and controlling Lyme disease. If potential exposure is unavoidable, important risk reduction measures include using both protective clothing and tick repellents, checking the entire body for ticks daily, and prompt removal of attached ticks.

## Background

Lyme disease is caused by the bacteria *Borrelia burgdorferi* which is transmitted to humans by the bite of an infected tick. Lyme disease is the most common tick-borne infection in North America, with nearly 20,000 cases reported in the United States (US) in 2006<sup>1</sup>. Over 90 percent of cases occur in the northeastern, mid Atlantic, and upper mid western states.

The most common initial sign of Lyme disease is a red, expanding rash (erythema migrans) that appears 3 to 30 days after the bite of an infected tick. If not treated, patients can develop neurologic conditions or cardiac abnormalities during the next few weeks, or more severe central nervous and musculoskeletal disease up to several months later. Lyme disease is diagnosed based on symptoms, physical findings (e.g., erythema migrans), history of engaging in outdoor activity during the incubation period in areas where vector ticks are known to occur, and supportive laboratory testing. Most cases of Lyme disease can be

treated successfully with oral or intravenous antibiotics.

We describe here the epidemiology of Lyme disease in California from 2001 through 2008. Data for 2008 are provisional and may differ from data in future publications. For a complete discussion of the definitions, methods, and limitations associated with this report, please refer to Technical Notes<sup>2</sup>.

## California reporting requirements and surveillance case definitions

California Code of Regulations, Title 17, requires health care providers to report suspected cases of Lyme disease to their local health department within 7 working days of identification or immediately by telephone if an outbreak is suspected. Starting in 2005, laboratories must report to the local health department when laboratory testing yields evidence suggestive of *B. burgdorferi* infection; notification must occur within one working day after the health care provider has been notified.

California regulations also require local health officers to report to CDPH cases of Lyme disease. CDPH officially counted cases that satisfied the Centers for Disease Control and Prevention (CDC) surveillance case definition. From 2001 through 2007, CDC defined a confirmed case as (i) physician diagnosed erythema migrans of at least 5 cm diameter or (ii) at least 1 objective late manifestation (i.e., musculoskeletal, cardiovascular, or neurological) and either isolation of *B. burgdorferi* from a clinical specimen or demonstration of diagnostic levels of immunoglobulin (Ig) M or IgG antibodies to *B. burgdorferi* in serum or cerebrospinal fluid (CSF). A two-test approach (a sensitive enzyme immunoassay or immunofluorescence antibody assay followed by a Western blot) was recommended but not required. In 2008, CDC defined a confirmed case as: (i) physician diagnosed erythema migrans with either a known exposure or laboratory evidence of infection or (ii) at least 1 objective late manifestation and laboratory evidence of infection. In 2008, laboratory evidence of infection included: (1) a positive culture of *B. burgdorferi* or (2) two-tiered testing interpreted using established criteria or (3) single-tier IgG immunoblot seropositivity interpreted using established criteria.

## Epidemiology of Lyme disease in California

CDPH received 660 reports of Lyme disease with estimated symptom onset dates from 2001 through 2008. This corresponded to an average annual incidence rate of 0.23 cases per 100,000

Californians. Rates remained relatively level from 2001 to 2008 with the exception of a temporary decrease in 2004 (to 0.14 per 100,000) [Figure 1].

Average annual incidence rates for the surveillance period were highest among persons 45 to 54 years of age (0.32 per 100,000), 55 to 64 years of age (0.30 per 100,000), and 65 to 74 years of age (0.31 per 100,000). The ratio of male to female cases was 1.0:1.0. Rates by race/ethnicity were not calculated due to the substantial portion of missing data (24.4 percent). However, Lyme disease cases with complete data reported White non-Hispanic race/ethnicity (85.2 percent) more frequently than would be expected (44.5 percent) based on the overall demographic profile of California.

Trinity, Mendocino, Humboldt, Mono, Sierra, and Nevada Counties reported the highest average rates during the surveillance period [Figure 3]. Of 393 cases for whom likely location of exposure was reported, 178 (45.3%) were likely exposed outside California in another state or country. A total of 308 (46.7 percent) cases had estimated onsets during the months of June through August.

**Comment**

The western black-legged tick, the main Lyme disease vector in the western US, has been found in many wooded and grassy areas in California. People are most commonly exposed to the Lyme disease agent by the immature nymphal tick which is active in the spring and early summer; an average of 5-15% of nymphal western black-legged ticks in California are infected with *B. burgdorferi*. Lyme disease prevention is best effected by avoiding areas where ticks occur, or if potential exposure is unavoidable, using both protective clothing and tick repellents, checking the entire body for ticks daily, and promptly removing attached ticks<sup>3</sup>.

**References and resources**

- <sup>1</sup> CDC. Surveillance for Lyme Disease - United States, 1992-2006. MMWR 2008;57:1-9.
- <sup>2</sup>Epidemiologic Summaries of Selected General Communicable Diseases in California, 2001-2008: Technical Notes  
<http://www.cdph.ca.gov/data/statistics/Documents/technicalnotes-episummary-aug2409.pdf>
- <sup>3</sup>CDPH Lyme disease information webpage:  
<http://www.cdph.ca.gov/HealthInfo/discond/Pages/LymeDisease.aspx>

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Prepared by Kate Cummings, MPH, and the Vector-borne Disease Section, Infectious Diseases Branch

Figure 1. California Lyme disease case counts and incidence rates

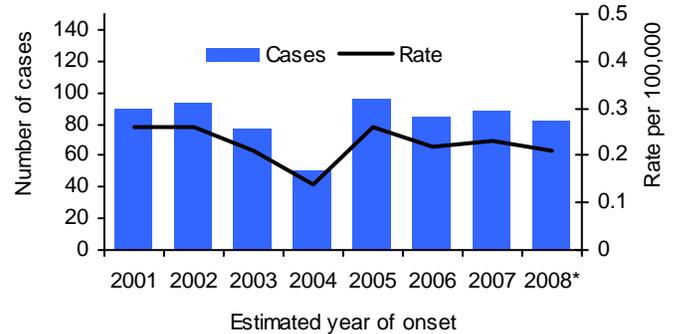


Figure 2. California Lyme disease incidence rates by age, 2001 - 2008\*

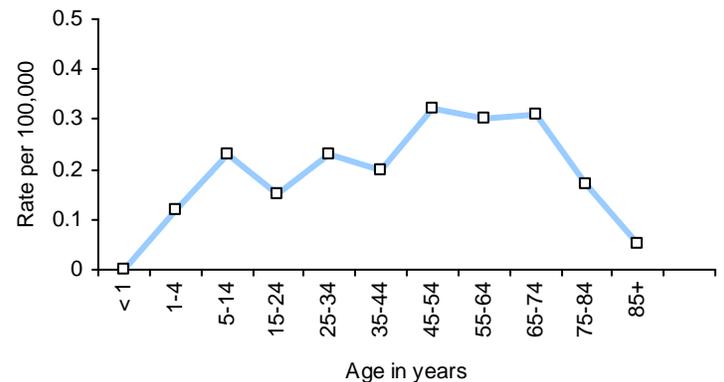
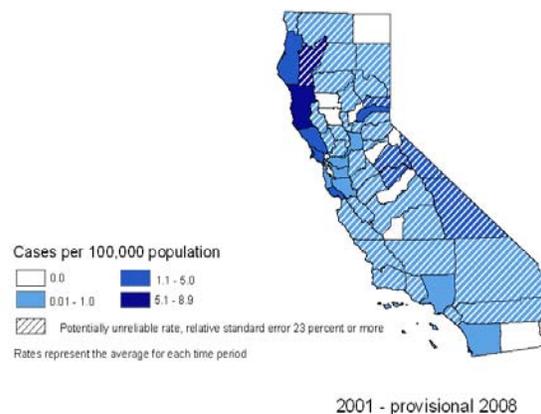


Figure 3. California county-specific Lyme disease incidence rates, 2001 - 2008\*



Notes for Figures 1-2  
\*2008 data are provisional