

## Key Findings and Public Health Messages

- The California Department of Public Health (CDPH) received reports of 2,129 cases of cryptosporidiosis with estimated symptom onset dates from 2001 through 2008. This corresponds to an average annual incidence rate of 0.73 per 100,000 Californians.
- Annual cryptosporidiosis incidence rates increased by 30.9 percent from 2001 (0.68 per 100,000) to 2006 (0.89 per 100,000), and then decreased by 21.3 percent from 2006 to 2008 (0.70 per 100,000).
- During the surveillance period, 18 (0.9 percent) cases were reported to have died with cryptosporidiosis.
- Average annual cryptosporidiosis incidence rates during the surveillance period were higher among children 1 to 4 years of age (1.26 per 100,000), and among adults 35 to 44 years of age (1.29 per 100,000).
- The ratio of male to female cases was higher among adults 25 to 54 years of age (2.9:1.0) than among children 1 to 14 years of age (1.4:1.0). Cryptosporidiosis cases occurred more frequently in the months of August and September (30.2 percent of all cases).
- From 2001 through 2008, CDPH received reports of 7 cryptosporidiosis outbreaks involving 395 cases.
- Decreasing human or animal fecal contamination of recreational or drinking water, education on hand hygiene and safe sexual practices, and targeted education of high risk groups likely offer the best opportunities for reducing cryptosporidiosis.

## Background

*Cryptosporidium* species is an important enteric parasitic pathogen in the United States (US), causing an estimated 300,000 infections per year<sup>1</sup>. Leading sources of *Cryptosporidium* infection include direct contact with an infected person or animal, ingestion of water or food contaminated by human or animal feces, and travel to highly-endemic areas. *Cryptosporidium* is resistant to current methods of water purification. In the US, it is the most frequently recognized cause of reported recreational water-associated outbreaks, particularly in disinfected venues, and is a recognized cause of drinking water-associated outbreaks<sup>2</sup>. Outbreaks in child care settings are also commonly reported.

Acute illness, usually gastroenteritis including watery diarrhea, occurs after an incubation period of 1 to 12 days. Symptoms in immunocompetent persons usually last 1 to 2 weeks. Infected persons who are immunodeficient, including those with HIV, may develop chronic, fulminant disease. Chronic intestinal cryptosporidiosis is an AIDS defining condition. Asymptomatic infections in people and animals are a frequent source of *Cryptosporidium* transmission.

We describe here the epidemiology of cryptosporidiosis 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>3</sup>.

## California reporting requirements and surveillance case definition

California Code of Regulations, Title 17, requires health care providers to report suspected cases of cryptosporidiosis to their local health department within one working day of identification or immediately by telephone if an outbreak is suspected. Laboratories must also notify the local health department when laboratory testing yields evidence suggestive of *Cryptosporidia*; notification must occur within one working day after the health care provider has been notified.

Local health officers are required by regulation to report to CDPH cases of cryptosporidiosis. CDPH officially counted cases that satisfied the Centers for Disease Control and Prevention (CDC) surveillance case definition. Although the CDC case definition was revised in 2009, from 2001 through 2008, CDC

defined a confirmed case as one with *Cryptosporidium* oocysts in stool by microscopic examination, or in intestinal fluid or small-bowel biopsy specimens; or oocyst or sporozoite antigens detected by immunodiagnostic methods or by PCR methods when routinely available; or demonstration of reproductive states in tissue preparations. Both symptomatic and asymptomatic laboratory confirmed infections were included among cases.

### Epidemiology of cryptosporidiosis in California

CDPH received reports of 2,129 cases of cryptosporidiosis with estimated symptom onset dates from 2001 through 2008. This corresponds to an average annual incidence rate of 0.73 per 100,000 Californians. Annual cryptosporidiosis incidence rates increased by 30.9 percent from 2001 (0.68 per 100,000) to 2006 (0.89 per 100,000), although year-to-year changes were not uniform [Figure 1]. Incidence rates then decreased by 21.3 percent from 2006 to 2008 (0.70 per 100,000). During the surveillance period, 18 (0.9 percent) cases were reported to have died with cryptosporidiosis.

Average annual cryptosporidiosis incidence rates were higher in children 1 to 4 years of age (1.26 per 100,000), and in adults 35 to 44 years of age (1.29 per 100,000). Adults 35 to 44 years of age comprised 27.8 percent of cases. Incidence rates increased from the combined years of 2001 and 2002 to the combined years 2007 and 2008 for all age groups except children under 1 year of age and adults 35 to 44 years of age [Figure 2]. In this latter age group, incidence rates in men decreased by 54.1 percent (from 2.90 to 1.33 per 100,000) whereas the incidence rate in women increased by 128.6 percent (from 0.28 to 0.64 per 100,000).

The overall ratio of male to female cases was 2.0:1.0 although the ratio was 1.4:1.0 among children 1 to 14 years of age and 2.9:1.0 among adults 25 to 54 years of age. Cryptosporidiosis cases occurred more frequently in the months of August and September (30.2 percent of all cases). This seasonal pattern was evident among cases 1 to 14 years of age (53.7 percent occurred in August and September) and female cases 25 to 54 years of age (29.0 percent) but not in male cases 25 to 54 years of age (19.6 percent).

Incidence rates by race/ethnicity were not calculated due to the substantial portion of missing data (38.9 percent). However, cryptosporidiosis cases with complete data reported White, non-Hispanic race/

Figure 1. California cryptosporidiosis case counts and incidence rates

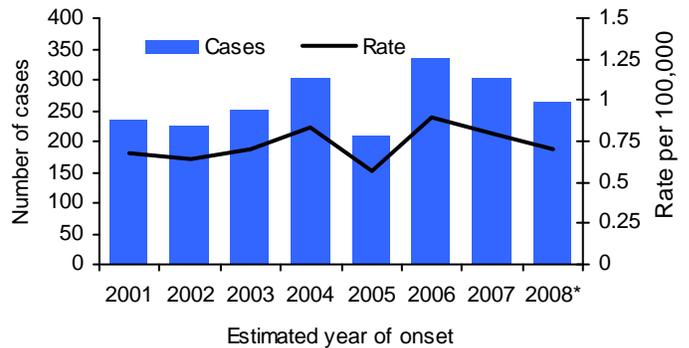


Figure 2. California cryptosporidiosis incidence rates by age and time period

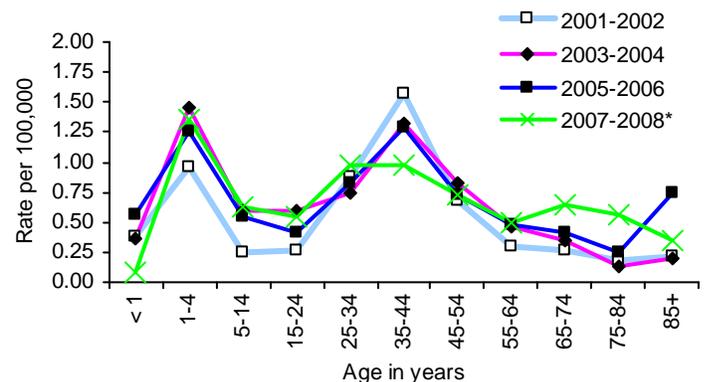
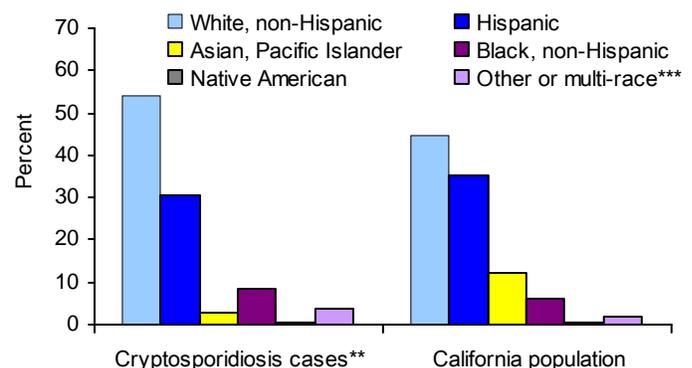


Figure 3. California cryptosporidiosis cases and population by race/ethnicity 2001 - 2008\*



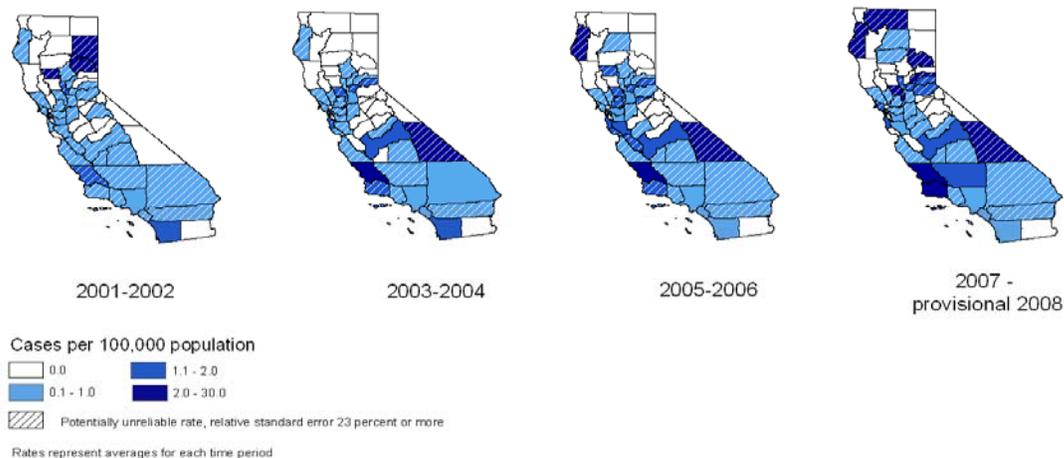
#### Notes for Figures 1-3

\*2008 data are provisional

\*\*Unknowns were excluded

\*\*\*Includes cases who identified 'other' as their race and Californians ('population') who identified more than one race

Figure 4. California county-specific cryptosporidiosis incidence rates



ethnicity more frequently than would be expected based on the overall demographic profile of California [Figure 3].

Average incidence rates for the surveillance period were 1.6 times higher in Northern California (0.93 per 100,000) than in Southern California (0.57 per 100,000). From 2001 to 2008, cryptosporidiosis incidence rates increased by 64.1 percent (from 0.64 to 1.05 per 100,000) in Northern California but decreased by 39.4 percent (from 0.71 to 0.43 per 100,000) in Southern California.

From 2001 through 2008, CDPH received reports of 7 outbreaks of cryptosporidiosis involving 395 cases. One outbreak took place in a child care setting and the remaining 6 took place in recreational water settings. Four (66.7 percent) of 6 recreational water outbreaks had illness onsets in August or September. The largest outbreak occurred in 2004 at a water park and involved 59 culture-confirmed cases and an additional 277 clinically ill persons. Non-laboratory confirmed, clinically ill patients were not included in the official case count as they did not meet the CDC surveillance case definition.

#### Comment

California experienced an increase in cryptosporidiosis incidence rates from 2001 to 2006, followed by a modest decrease thereafter. Similar to national trends, cryptosporidiosis cases in children and women occurred more frequently during warmer months and may be associated with recreational water exposures<sup>2</sup>. Whether recent increases in children and selected adults reflect increases in

disease diagnosis and reporting or disease activity is unclear and requires additional study.

*Cryptosporidium* presents special challenges to public health because of its extreme infectiousness combined with its resistance to chlorine disinfection. Decreasing human or animal fecal contamination of recreational or drinking water, education on hand hygiene and safe sexual practices, and targeted education of high risk groups likely offer the best opportunities for reducing cryptosporidiosis.

#### References and resources

<sup>1</sup>Mead PS, Slutsker L, Dietz V et al. Food-related illness and death in the United States. *Emerg Infect Dis* 1999;5:607-25.

<http://www.cdc.gov/ncidod/eid/Vol5no5/pdf/mead.pdf>

<sup>2</sup>Centers for Disease Control and Prevention. Cryptosporidiosis surveillance - United States, 2003-2005. *MMWR* 2007;56(SS-7):1-10.

<sup>3</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>

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