Key Findings and Public Health Messages

- The California Department of Public Health (CDPH) received reports of 1,537 cases of confirmed and probable cryptosporidiosis with estimated symptom onset dates from 2009 through 2012. This corresponds to an average annual incidence rate of 1.0 case per 100,000 Californians.
- Annual cryptosporidiosis incidence rates for each of the four years of 2009 through 2012 was higher than annual rates in the previous years of 2001 through 2008. The annual incidence rate peaked at 1.2 per 100,000 (463 case-patients) in 2009 and declined to 0.9 per 100,000 (351 case-patients) in 2012.
- Average annual cryptosporidiosis incidence rates during the surveillance period were highest among seniors 85 years and older (1.4 per 100,000), adults 35-44 years of age (1.2 per 100,000), and children 1–4 years of age (1.1 per 100,000).
- Incidence rates for males (1.03 per 100,000) and females (1.01 per 100,000) were similar. Females 65-74 years of age had the highest incidence rate (1.7 per 100,000), nearly twice that of males of the same age group.
- Cryptosporidiosis cases occurred more frequently in summer months of July and August (26 percent of all cases).
- During 2009-2012, one waterborne outbreak of cryptosporidiosis was reported with two confirmed case- patients exposed to a swimming pool in a rehabilitation facility.
- 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

Cryptosporidiosis is a worldwide diarrheal disease caused by intestinal infection with the microscopic parasite *Cryptosporidium.* The US Centers for Disease Control and Prevention (CDC) estimated that *Cryptosporidium* species cause 748,000 infections per year in the US[1,2]. Leading causes of *Cryptosporidium* infection include ingestion of untreated drinking water, contact with livestock, international travel to endemic areas, and contact with infected persons. In the US, it is the most frequently recognized cause of reported recreational water-associated outbreaks and is a recognized cause of drinking water and foodborne-associated outbreaks. Asymptomatic infections in people and animals are a frequent source of *Cryptosporidium* transmission[1].

Symptoms of cryptosporidiosis include diarrhea, stomach cramps, nausea, and dehydration, which can lead to weight loss. Illness begins 2 to 10 days after exposure and can last 1 to 2 weeks, although people with weakened immune systems may develop serious, chronic, and sometimes fatal illness[3]. On the other hand, some infections are asymptomatic.

This report describes the epidemiology of confirmed and probable cryptosporidiosis infections in California with estimated onset dates from January 1, 2009 through December 31, 2012 reported by April 2015. For a complete discussion of the definitions, methods, and limitations associated with this report, please refer to the *Technical Notes*[4]. The epidemiologic description of cryptosporidiosis for the 2001-2008 surveillance period can be found in the

Epidemiologic Summary of Cryptosporidiosis in California, 2001-2008[5].

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 are also required to report laboratory testing results suggestive of *Cryptosporidia* 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.

Local health officers are required by regulation to report cases of cryptosporidiosis to CDPH, following the CDC/Council of State and Territorial Epidemiologists' (CSTE) surveillance case definition. The CDC/CSTE case definition was revised in 2009 and underwent minor revisions in 2011 and 2012 (For information on revisions see CSTE surveillance case definitions[6]). The 2012 case definitions for confirmed and probable cases are as follows:

Confirmed: a case diagnosed with *Cryptosporidium* spp. infection based on evidence of *Cryptosporidium* organisms or DNA in stool, intestinal fluid, tissue samples, biopsy specimens, or other biological sample by certain laboratory methods with a high positive predictive value (e.g., direct fluorescent antibody [DFA] test, polymerase chain reaction [PCR], enzyme immunoassay [EIA], OR light microscopy of stained specimens).

Probable: a case diagnosed with *Cryptosporidium* spp. only by antigen screening test method, such as immunochromatographic card/rapid card test; or a laboratory test of unknown method; OR a case of gastrointestinal illness characterized by diarrhea and one or more of the following: diarrhea duration of 72 hours or more, abdominal cramping, vomiting, or anorexia that is epidemiologically linked to a confirmed case of *Cryptosporidium* spp. infection[6].

Epidemiology of cryptosporidiosis in California

CDPH received reports of 1,537 cases of confirmed and probable cryptosporidiosis with estimated symptom onset dates from 2009 through 2012. This corresponds to an average annual incidence rate of 1.0 per 100,000 Californians. Annual cryptosporidiosis incidence rates for each of the four years of 2009 through 2012 were higher than annual rates in the previous years of 2001 through 2008. The annual incidence rate peaked at 1.2 per 100,000 (463 case-patients) in 2009 and declined to 0.9 per 100,000 (351 case-patients) in 2012 [Figure 1]. During the surveillance period, 2 cases (0.1 percent) were reported to have died with cryptosporidiosis.

During 2009-2012, the average annual cryptosporidiosis incidence rate was highest among seniors 85 years and older (1.4 per 100,000), with an incidence rate 2.8 times that of the 5-14 years age group (0.5 per 100,000), the group with the lowest rate. Children 1–4 (1.1 per 100,000) and adults 35-44 (1.2 per 100,000) years of age also had higher rates compared to other age groups.

Incidence rates for males (1.03 per 100,000) and females (1.01 per 100,000) were similar. Females 65-74 years of age had the highest incidence rate (1.7 per 100,000), nearly twice that of males of the same age group. Cryptosporidiosis cases occurred more frequently in warmer months, with July and August accounting for 26 percent of all cases. This seasonal pattern was generally evident among all age groups and genders. Incidence rates by race/ethnicity were not calculated due to the substantial portion of

missing data (47 percent). However, cryptosporidiosis cases with complete data indicate the proportion of cases in which White, non-Hispanic race/ethnicity was reported was larger than the proportion of White, non-Hispanic residents in California [Figure 3].

Average incidence rates for the surveillance period were 2.6 times higher in Northern California (1.6 per 100,000) than in Southern California (0.6 per 100,000). From 2009 to 2012, cryptosporidiosis incidence rates decreased by 40 percent (from 2.2 to 1.3 per 100,000) in Northern California but increased by 19 percent (from 0.55 to 0.65 per 100,000) in Southern California.

From 2009 through 2012, CDPH received a report of one waterborne outbreak of cryptosporidiosis involving two confirmed case-patients exposed to a swimming pool in a rehabilitation facility.

Figure 1. California cryptosporidiosis case counts and incidence rates, 2001-2012

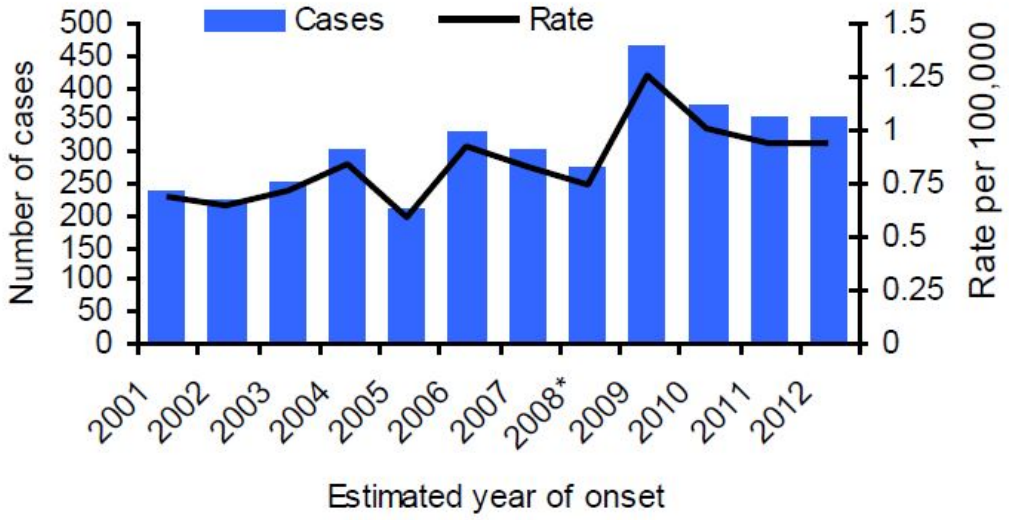


Figure 2. California cryptosporidiosis incidence rates by age and year, 2009-2012

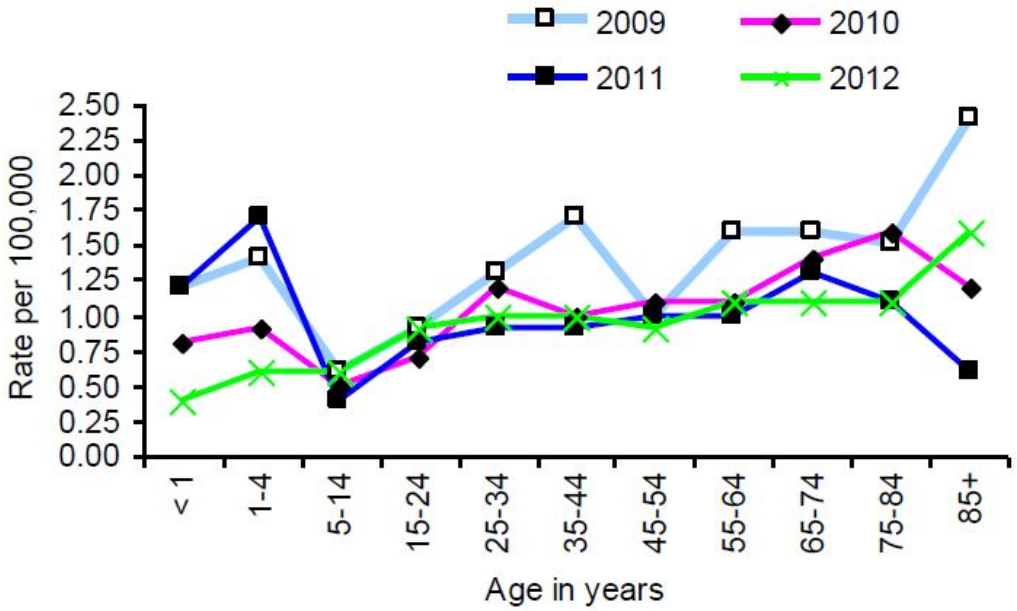
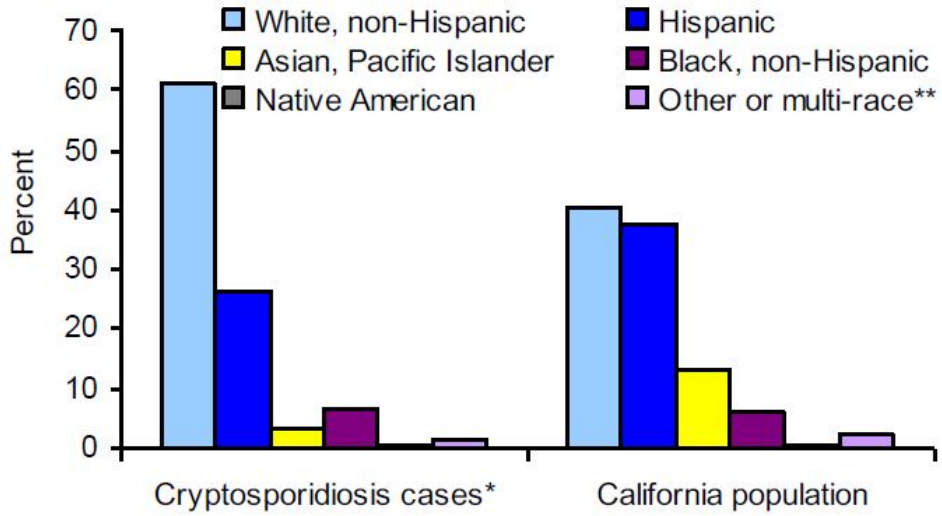


Figure 3. California cryptosporidiosis cases and population by race/ethnicity*, 2009- 2012

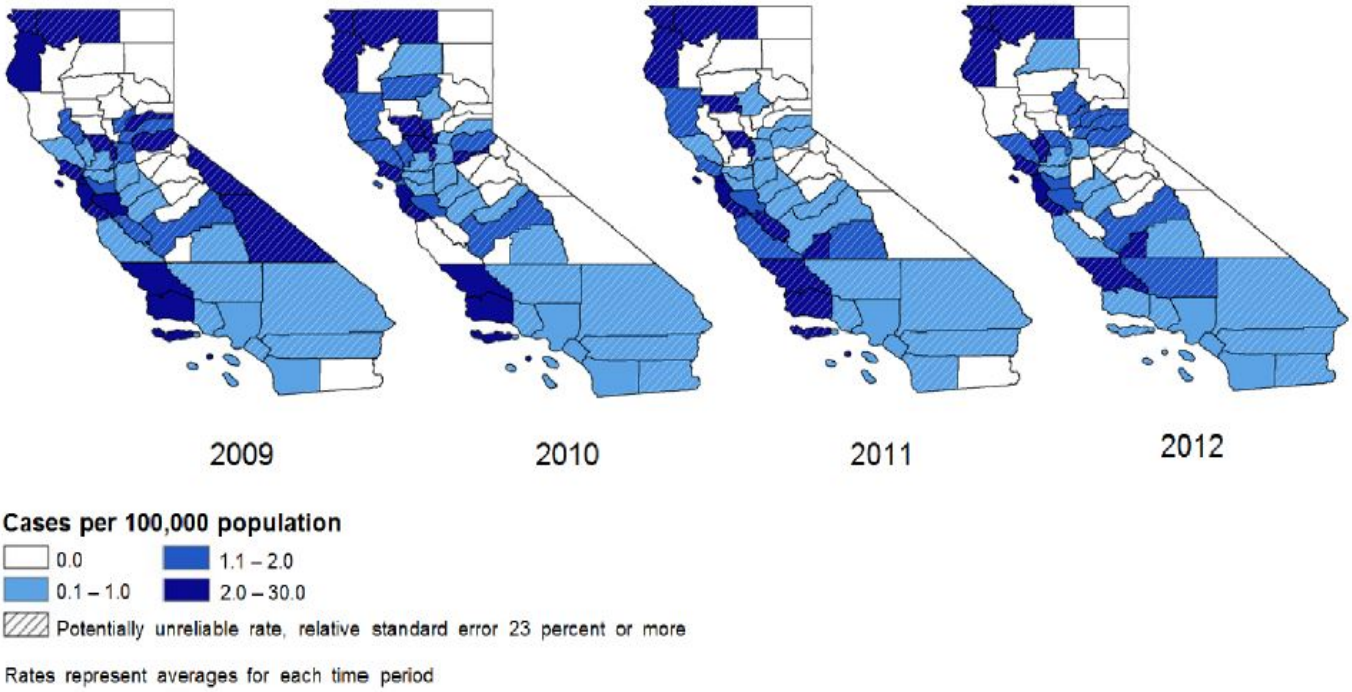


Notes for Figures 1-3

*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



Comment

Annual cryptosporidiosis incidence rates for each of the four years of 2009 through 2012 were higher than annual rates in the previous years of 2001-2008, with a pick-up in 2009 followed by a modest decrease thereafter. An increasing number of tests with high positive-predictive value are available, and since 2012 these tests have been used to distinguish confirmed and probable cases. However, probable and confirmed cases were combined for the purpose of this report, so these changes in testing and case definitions are less likely to affect the apparent trends among these data.

Similar to national trends, cryptosporidiosis incidence rates were highest among young children and seniors. Cases occurred more frequently during warmer months and may be associated with recreational water exposures[1]. Age group, race/ethnicity, gender, and county epidemiologic profiles of incident cases remained fairly consistent between those with onset dates from 2009 through 2012 and those with onset between 2001 through 2008[4].

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

References and resources

[1]Centers for Disease Control and Prevention. Cryptosporidiosis surveillance - United States, 2011-2012. MMWR 2015;64(SS03):1- 14.

[2]Scallan E, Hoekstra RM, Angulo FJ, et al. Foodborne illness acquired in the United States—major pathogens. Emerg Infect Dis 2011;17:7–15.

[3]Centers for Disease Control and Prevention. (2015). Parasites - Cryptosporidium (also known as "Crypto") - Illness & Symptoms.

Retrieved from http://www.cdc.gov/parasites/crypto/illness.html

[4] Epidemiologic Summaries of Selected General Communicable Diseases in California, 2001 - 2008 and 2009 - 2012: Technical Notes http://www.cdph.ca.gov/programs/sss/Documents/TechnicalNotes01-08and09-12.pdf

[5] Epidemiologic Summary of Cryptosporidiosis in California, 2001 – 2008.http://www.cdph.ca.gov/data/statistics/Pages/EpiSummariesCDsCA-01-08.aspx

[6] National Notifiable Diseases Surveillance System (NNDSS), Cryptosporidiosis (Cryptosporidium spp.) 2012 Case Definition. http://wwwn.cdc.gov/nndss/conditions/cryptosporidiosis/case-definition/2012/

Last updated: 1/25/2016

Prepared by Ryan Beal, Farzaneh Tabnak, Sarah Lewis, and Duc Vugia, Infectious Diseases Branch