Epidemiologic Summary of Shigellosis in California, 2013 - 2019

Key Findings

Shigellosis is an infection caused by *Shigella* bacteria. The most common symptoms of shigellosis include diarrhea, stomach pain and cramps, fever, and a strong urge to pass stool (poop). People get shigellosis when they put something in their mouths or swallow something that has come into contact with the stool of a person who is sick with shigellosis. *Shigella* germs are very contagious, meaning they can easily spread from person to person. Anyone can get shigellosis, but young children, people with weakened immune systems, and men who have sex with men are more likely to get sick.

Shigellosis in California from 2013 through 2019

Total Cases: There were a total of 16,513 new shigellosis cases from 2013 through 2019. This is an average of 2,359 cases each year.

Rate: The average annual rate of new shigellosis cases during 2013-2019 was about 6 cases per 100,000 people in California.

- **By County**: The average rate was highest in San Francisco County (about 24 cases per 100,000 people). By region, rates were almost twice as high in Southern California (about 7 cases per 100,000 people) than in Northern California (about 4 cases per 100,000 people).
- **By Sex:** The average rate was higher in males (about 7 cases per 100,000 people) than in females (about 4 cases per 100,000 people) for each year during 2013-2019.
- **By Age Group**: The average rate was highest in children aged 1 to 4 years, with about 10 cases per 100,000 children in this age group.
- **By Race/Ethnicity**: For cases where race and ethnicity information was available, the highest percentage of cases (about 44%) was in people who reported Hispanic/Latino race/ethnicity.
- **By Month**: Most shigellosis cases (about 55%) occurred in July through November.

The best way to prevent shigellosis and prevent the spread of germs is to wash your hands with soap and water after using the toilet, before preparing food and eating, and after changing a diaper. If you are sick with diarrhea from shigellosis, do not prepare or share food with others, and stay home from school or healthcare, food service, or childcare jobs until you are better. Do not have sex of any kind with someone who currently has diarrhea from shigellosis or has had shigellosis in the past few weeks.

For more information about shigellosis in California, please visit the CDPH Shigellosis webpage. For details about key infectious diseases in California, please visit the CDPH Surveillance and Statistics Section webpage.

Background

Shigellosis is an intestinal infection caused by highly-infectious *Shigella*, a commonly reported enteric bacterial pathogen estimated to cause about 450,000 cases of shigellosis each year in the United States.[1] *Shigella* species include *S. sonnei, S. flexneri, S. boydii,* and *S. dysenteriae*; *S. sonnei* is the most common species in the U.S followed by *S. flexneri; S. dysenteriae* and *S. boydii* are rare in the U.S.[2, 3] *Shigella* infection is restricted to humans and is predominantly transmitted from person to person through direct or indirect fecal-oral contact. Other sources of infection include ingestion of contaminated food, drinking of recreational water, and sexual contact (especially among men who have sex with men).[1]

Acute illness, usually gastroenteritis, occurs after an incubation period of 1 to 2 days.[4] The severity of shigellosis varies by patient age and by infecting species and is characterized by diarrhea, fever, nausea, cramps, and tenesmus. *S. dysenteriae* is associated with the most severe illnesses, whereas most people with *S. sonnei* infection have self-limited illness.[3] Postinfectious arthritis is a rare complication of *Shigella* infection, especially with *S. flexneri* infection.[1] Populations at increased risk of infection include young children, men who have sex with men, persons with human immunodeficiency virus (HIV) infection, and international travelers. Large outbreaks of shigellosis have occurred, particularly in crowded settings, such as childcare settings, among small social communities, and among persons experiencing homelessness.[5] Point source outbreaks due to contaminated food or water have also occurred.

An estimated 77,000 drug-resistant *Shigella* infections occur each year in the U.S.; the U.S. Centers for Disease Control and Prevention (CDC) has declared antibiotic-resistant *Shigella* a serious public health threat, as resistant *Shigella* infections have increased notably since 2013.[6, 7] Increasing numbers of *Shigella* isolates have demonstrated resistance or decreased susceptibility to antimicrobial agents, including ciprofloxacin and azithromycin. This has been associated with both international travel and domestic acquisition.[8, 9, 10]

This report describes the epidemiology of confirmed and probable shigellosis 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*.[11] The epidemiologic description of shigellosis for earlier surveillance periods can be found in the *Epidemiologic Summary of Shigellosis in California, 2001-2008 and 2009-2012*.[12, 13]

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 *Shigella* infection to their local health department within one working day of identification or immediately by telephone if an outbreak is suspected.[14] Per CCR, Title 17, Section 2505, laboratories are required to report laboratory testing results suggestive of *Shigella s*pecies 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 of the laboratory testing result.[15]

California regulations require cases of shigellosis to be reported to the California Department of Public Health (CDPH). CDPH counted cases that satisfied the CDC/Council of State and Territorial Epidemiologists (CSTE) surveillance case definition of a confirmed or probable case. From 2013-2016, a confirmed case of shigellosis was defined as an infection in which *Shigella* spp. was isolated from a clinical specimen. A probable case of shigellosis was defined as a clinically compatible case epidemiologically linked to a confirmed case or a member of a risk group defined by public health authorities during an outbreak.[16] In 2017, the CSTE case definition for probable cases changed to include an infection in which *Shigella* spp. or *Shigella/*enteroinvasive *E. coli* (EIEC) was detected in a clinical specimen using culture-independent diagnostic testing (CIDT), or a case with clinically compatible illness and an established epidemiologic link to a laboratory-confirmed or laboratory-probable case; the criteria for a confirmed case did not change in 2017.[17]

Epidemiology of Shigellosis in California, 2013-2019

CDPH received reports of 16,513 total cases of shigellosis with estimated symptom onset dates from 2013 through 2019. This corresponds to an average of 2,359 cases each year and an average annual incidence rate of 6.0 cases per 100,000 population. Incidence rates increased from 2013 (2.8 per 100,000; 1,075 cases) to 2019 (8.6 per 100,000; 3,430 cases), with fluctuations over time [Figure 1]. The highest incidence rate occurred in 2018 (8.6 per 100,000; 3,440 cases).

During the surveillance period, *S. sonnei* (Serogroup D) was the most common species identified as the cause of shigellosis (5,928 cases; 35.9%), followed by *S. flexneri* (Serogroup B) (3,007 cases; 18.2%), *S. boydii* (Serogroup C) (80 cases; 0.5%), and *S. dysenteriae* (Serogroup A) (39 cases, 0.2%). There were 7,459 (45.2%) shigellosis cases that did not have an indicated species.

County-specific average annual incidence rates per 100,000 population during 2013-2019 ranged from 0 to 23.6, with the highest average annual rate in San Francisco County (23.6 cases per 100,000; 1,442 total cases), followed by Imperial County (16.1 cases per 100,000; 210 total cases), and Stanislaus County (8.5 cases per 100,000; 325 total cases) [Figure 2]. By region (see *Technical Notes*), average annual incidence rates for the surveillance period were 1.8 times higher in Southern California (6.5 per 100,000; 9,002 cases) than in Northern California (3.6 per 100,000; 7,511 cases). Shigellosis cases in Southern California accounted for 54.5% of all shigellosis cases reported in California during the surveillance period.

From 2013 through 2019, average annual incidence rates were 1.6 times higher among males (7.3 per 100,000; 10,028 cases) than among females (4.5 per 100,000; 6,209 cases); 61.8% of case-patients were male and 38.2% were female.

Average annual shigellosis incidence rates during the surveillance period were highest in children aged 1 to 4 years (9.7 per 100,000; 1,343 cases), followed by adults aged 25 to 34 years (8.1 per 100,000; 3,061 cases) and 45 to 54 years (7.3 per 100,000; 2,643 cases) [Figure 3].

For shigellosis cases with complete race/ethnicity information (see *Technical Notes*), the highest percentage of cases was among those who reported Hispanic/Latino race/ethnicity (44.3%), which was higher than the percentage of the Hispanic/Latino racial/ethnic population in California during the same time period (44.3% vs. 38.5%, respectively) [Figure 4].

Shigellosis cases have been reported year-round, but the highest number of cases during 2013-2019 occurred from July to November (54.5%; 9,001 cases) [Figure 5].

From 2013 through 2019, CDPH received reports of 19 foodborne outbreaks of shigellosis: 16 with an undetermined food source, and 3 with a known or suspected food source. The largest foodborne outbreak during this time period occurred in 2015 in Santa Clara County; 188 cases were associated with consumption of food at a restaurant, but a definitive source was not determined. Person-to-person transmission in certain settings, such as in daycare or among persons experiencing homelessness, were recognized during the surveillance period. [8, 18] However, due to the inherent difficulties in defining outbreaks in these settings, especially as secondary and tertiary spread is known to occur, these outbreaks were not systematically tracked.

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

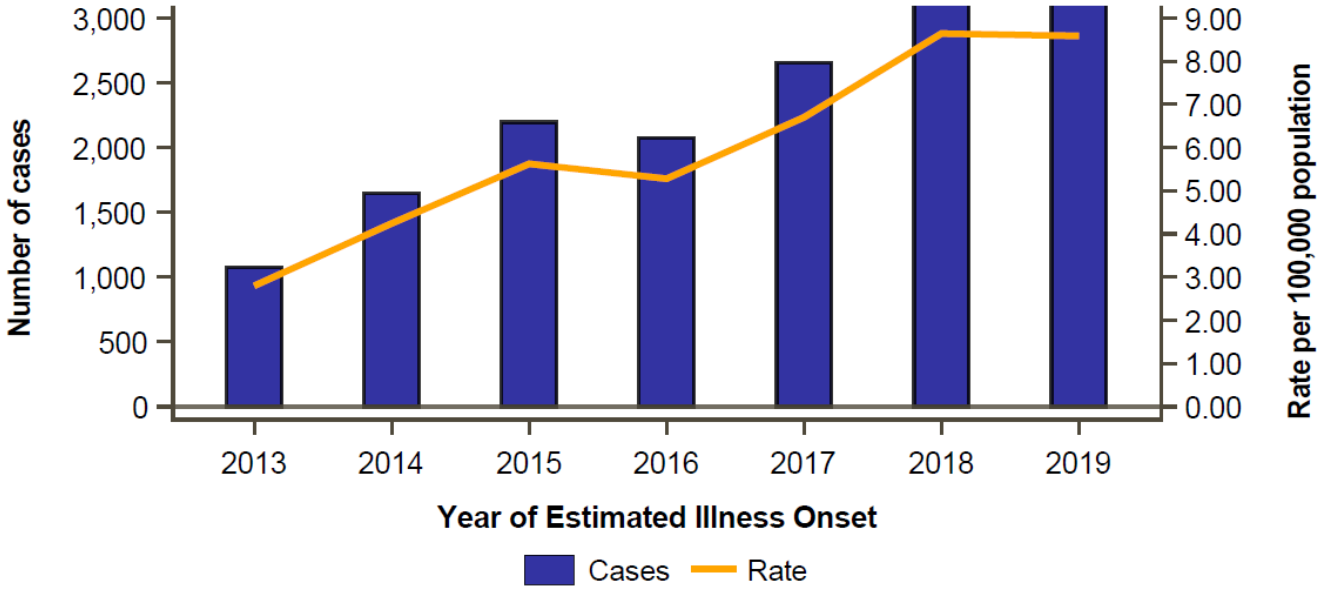


Figure 2. Shigellosis Average Annual Incidence Rates by County, California, 2013-2019

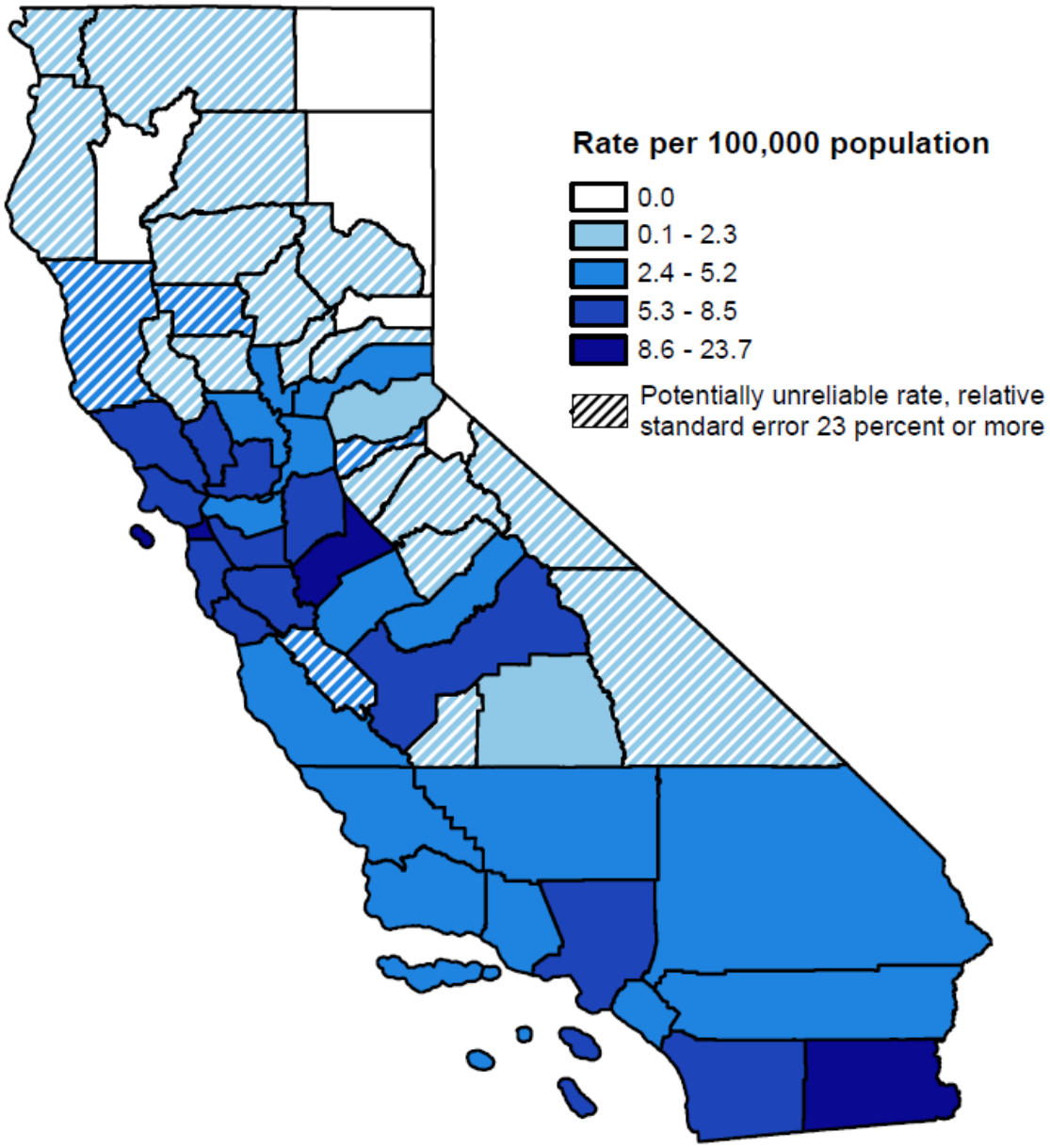


Figure 3. Shigellosis Incidence Rates by Age Group and Year of Estimated Illness Onset, California, 2013-2019

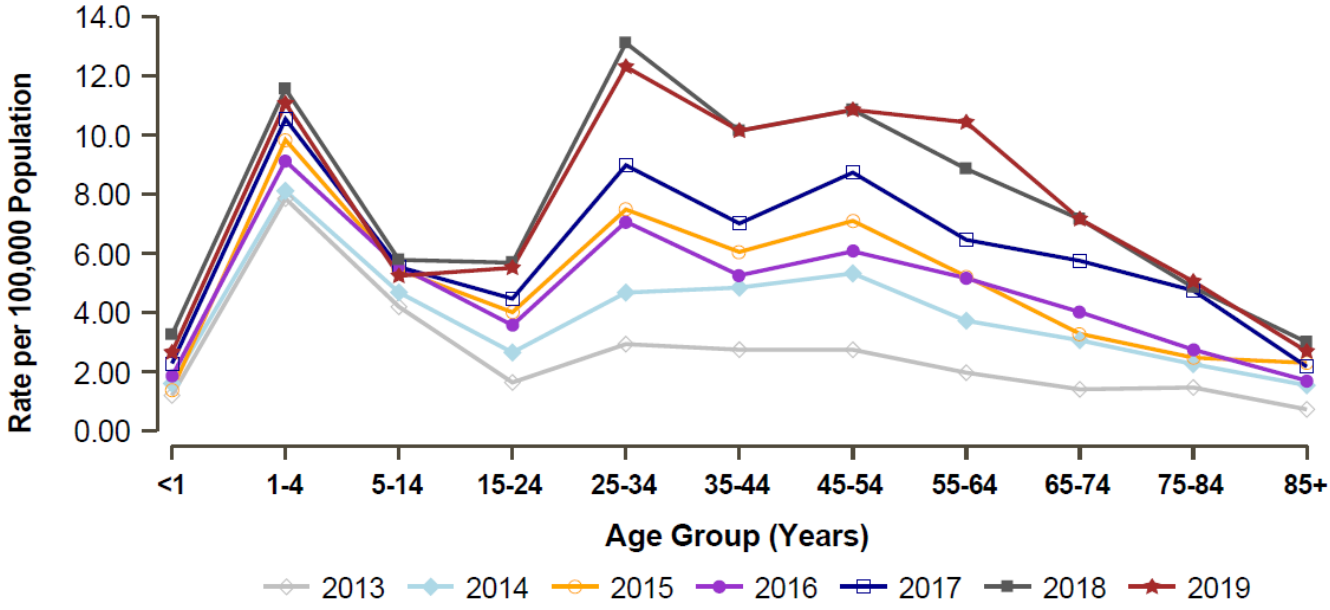
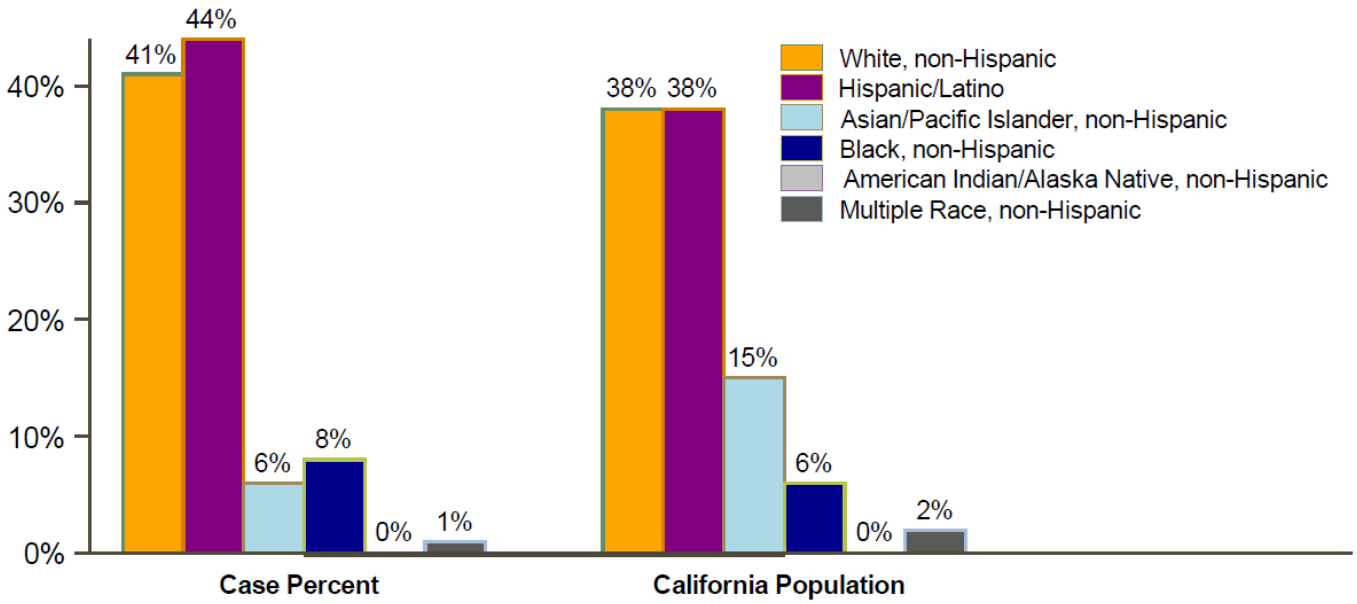
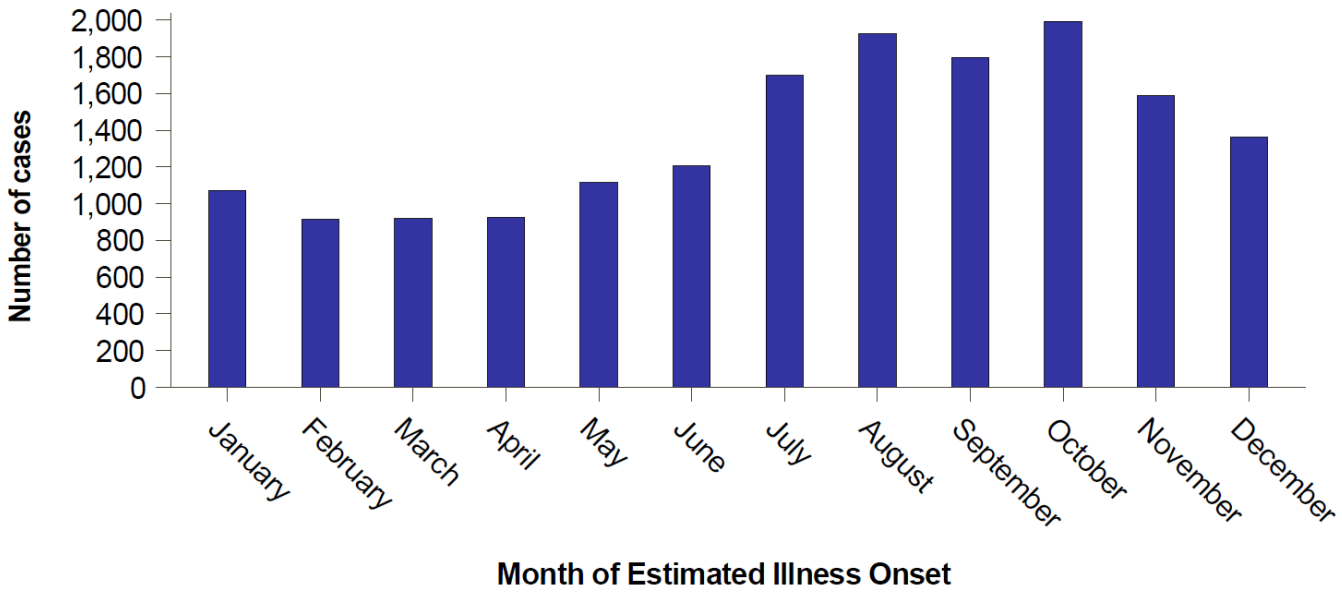


Figure 4. Shigellosis Cases and Population by Race/Ethnicity, California, 2013-2019



10.9% (n=1807) of reported incidents of Shigellosis did not identify race/ethnicity and 3.5% (n=583) 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.

Figure 5. Shigellosis Cases by Month of Estimated Illness Onset, California, 2013-2019



Comments

Detailed case report forms are not required for reporting shigellosis cases to CDPH, thus additional data on exposures were only available for 33% of total shigellosis cases. As such, data on exposures are not further described in this report due to missing data.

Overall, average annual incidence rates of shigellosis in California increased during the 2013-2019 surveillance period (6.0 cases per 100,000 population; 16,513 total cases) compared to the 2009-2012 surveillance period (2.8 cases per 100,000 population; 4,186 cases).[13] In addition, the change in the surveillance case definition in 2017 for probable cases contributed to increasing case counts during the 2013-2019 surveillance period. Similar to the 2009-2012 surveillance period, average shigellosis incidence was highest among children aged 1 to 4 years during the 2013-2019 surveillance period (9.7 per 100,000; 1,343 cases).

For the 2009-2012 surveillance period, average annual incidence rates were slightly higher in Northern California (2.9 per 100,000) than in Southern California (2.7 per 100,000).[13] However, for the 2013-2019 surveillance period, average annual incidence rates were almost twice as high in Southern California (6.5 per 100,000) than in Northern California (3.6 per 100,000).

Of the shigellosis cases with complete race/ethnicity information during the 2009-2012 surveillance period, cases reported Hispanic/Latino race/ethnicity disproportionately more often than would be expected based on the overall demographic profile of California during that time period (54.8% of cases vs. 38.1% of population).[13] This disproportionate difference was reduced but still observed for cases that reported Hispanic/Latino race/ethnicity during the 2013-2019 surveillance period (44.3% of cases vs. 38.5% of California population).

In 2014, the first occurrence of Shiga toxin (Stx)-producing *S. sonnei* was detected in California. Other than in 2014-2015, when clusters of cases were identified in San Diego, San Joaquin, and Stanislaus counties, cases of Stx-producing *Shigella* infections have occurred

sporadically and are not considered to have affected the general increase in reported shigellosis. Confirmed cases of Stx-producing *Shigella* are reported as shigellosis cases and are not counted as Stx-producing *Escherichia coli*.[19]

Public health measures such as reporting of cases, education on hand hygiene (washing hands with soap and water for everyone, particularly in group settings such as childcare facilities), and targeted education for high-risk groups likely offer the best opportunities for reducing disease transmission. Given the increased rates of drug-resistant shigellosis, healthcare providers should request antimicrobial susceptibility testing and select an appropriate antibiotic based on the susceptibility profile if treatment is indicated.

To prevent shigellosis, proper hand hygiene is imperative, especially after using the toilet, before preparing food and eating, and after changing diapers. Persons experiencing diarrhea should not prepare or share food with others, and should stay home from school or healthcare, food service, or childcare jobs until symptoms resolve. Sexual activity with persons who have diarrhea or who recently recovered from shigellosis should be avoided.

Prepared by Inderbir Sohi, Yanyi Djamba, Katherine Lamba, Akiko Kimura, Allyx Nicolici, and Duc Vugia — Infectious Diseases Branch, November 2021

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