Key Findings and Public Health Messages

- The California Department of Public Health (CDPH) received reports of 4,186 cases of shigellosis with estimated illness onset dates from 2009 through 2012. This corresponds to an average annual incidence rate of 2.8 cases per 100,000.
- Shigellosis incidence rates remained stable during this period, ranging from 2.8 per 100,000 in 2009 to 2.9 per 100,000 in 2012.
- Average annual shigellosis incidence rates were highest among children 1–4 years of age (9.0 per 100,000) and 5–14 years of age (3.9 per 100,000), followed by adults 35–44 years of age (2.9 per 100,000).
- From 2009 through 2012, 13 outbreaks of shigellosis were reported: 3 foodborne outbreaks with unknown or suspected food source and 10 outbreaks of unknown source, 9 of which had day care/ preschool/elementary school settings.
- Of reported cases with known species (74.8 percent), *S. sonnei* (66.4 percent), and *S. flexneri* (31.5 percent) infections were most common.
- Public health measures such as early diagnosis and reporting of cases, education on hand hygiene, and targeted education for high-risk groups likely offer the best opportunities for reducing disease transmission.

Background

Shigella is a commonly reported enteric bacterial pathogen in the United States (US), estimated to cause nearly half a million illnesses, with more than 5,400 hospitalizations, and 38 deaths each year[1]. *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 and drinking or recreational water, and sexual contact (especially among men who have sex with men). *Shigella* species include *S. dysenteriae*, *S. flexneri*, *S. boydii* and *S. sonnei*. *Shigella sonnei* is predominant in industrialized countries whereas *S. flexneri* is predominant in developing countries[2,3].

Acute illness, usually gastroenteritis, occurs after an incubation period of 1 to 3 days. The severity of shigellosis varies by patient age and by infecting species and 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. Postinfectious arthritis is a rare complication of *Shigella* infection, especially with *S. flexneri* infection. Populations at increased risk of infection include young children, men who have sex with men, persons with human immunodeficiency virus (HIV) infection[4,5], and international travelers. Although most shigellosis appears to be sporadic cases, large outbreaks of *Shigella* have occurred, particularly in crowded settings where personal hygiene may be difficult, such as custodial institutions and child

care facilities. Pointsource outbreaks due to contaminated food or water have also occurred.

Recently, the US Centers for Disease Control and Prevention (CDC) has declared antibiotic-resistant *Shigella* a public health threat in the United States that requires a multi-pronged approach to reduce spread[6]. Increasing numbers of *Shigella* isolates have demonstrated resistance to antimicrobial agents, including ciprofloxacin. This has been associated with both international travel and domestic acquisition[6,7,8,9.]

We describe here the epidemiology of shigellosis case-patients in California with estimated illness onset from January 2009 through December 2012 reported to CDPH by December 4, 2014. Data for 2012 are provisional and may differ from data in future publications. The epidemiologic description of shigellosis for the 2001-2008 surveillance period can be found in the *Epidemiologic Summary of Shigellosis in California, 2001-2008*[10]. For a complete discussion of the definitions, methods, and limitations associated with this report, please refer to Technical Notes[11].

California reporting requirements and surveillance case definition

California Code of Regulations Title 17 requires health care providers to report suspected cases of shigellosis to their local health department within one working day of identification or immediately by telephone if an outbreak is suspected. Clinical and reference laboratories are also required to report either to the California Reportable Disease Information Exchange (CalREDIE) (via electronic laboratory reporting) or to the local health department when laboratory testing yields evidence suggestive of *Shigella*; reporting must occur within one working day after the health care provider has been notified.

Local health officers are required by California regulation to report to CDPH cases of shigellosis. CDPH officially counted cases that satisfied the CDC surveillance case definition, including both confirmed and probable case classifications. During the surveillance period, CDC defined a confirmed case as one with *Shigella* isolated from a clinical specimen, including asymptomatic and extra-intestinal infections. A probable case was one with clinically compatible illness and an established epidemiologic link to a laboratory-confirmed case, or a member of a risk group defined by public health authorities during an outbreak.

Epidemiology of shigellosis in California

CDPH received reports of 4,186 cases of shigellosis with estimated illness onset dates from 2009 through 2012. This corresponds to an average annual incidence rate of 2.8 cases per 100,000. Incidence rates remained stable during this period, ranging from 2.8 per 100,000 (1,055 case-patients) in 2009 to 2.9 per 100,000 (1,096 case-patients) in 2012 [Figure 1]. During the surveillance period, 8 (0.2 percent) case-patients were reported to have died.

Annual shigellosis incidence rates for the surveillance period were highest among children 1–4 years of age (9.0 per 100,000) and 5-14 years of age (3.9 per 100,000), followed by adults 35-44 years of age (2.9 per 100,000) [Figure 2]. Incidence rates by race/ethnicity were not calculated due to the substantial portion of missing data (17.5 percent). However, shigellosis cases with complete data reported Hispanic ethnicity more frequently than would be expected based on the overall demographic profile of California [Figure 3].

The average annual incidence rate for the surveillance period was 6.5 percent higher in Northern California (2.9 per 100,000) than in Southern California (2.7 per 100,000). County-specific incidence rates for the report period ranged from 0 to 14.9 county-specific shigellosis incidence rates, 2009–2012 per 100,000 residents [Figure 4]. The highest rates occurred in Imperial (year 2010: 28.1 per 100,000) and San Francisco (year 2012: 17.6 per 100,000) counties.

From 2009 through 2012, CDPH received reports of 13 outbreaks of shigellosis: 3 foodborne outbreaks with unknown or suspected food source and 10 outbreaks of unknown source, 9 of which had day care/ preschool/elementary school settings.

From 2009 through 2012, 3,132 (74.8 percent) cases had a *Shigella* isolate with the species identified and reported. Among these, *S. sonnei* (2,081; 66.4 percent), and *S. flexneri* (987; 31.5 percent) infections comprised of the majority of the reported casepatients. Median age of *S. sonnei* case-patients was 26 years and infections were slightly higher among males than females (male to female ratio: 1.3:1.0), whereas *S. flexneri* case-patients' median age was 33 and their male to female ratio was 2.2:1.0. This is consistent with national findings, where *S. sonnei* (71.7 percent), and *S. flexneri* (18.4 percent) were also the most common species identified and reported in the U.S.[2].

Figure 1. California shigellosis case counts and incidence rates by estimated illness onset, 2001–2012

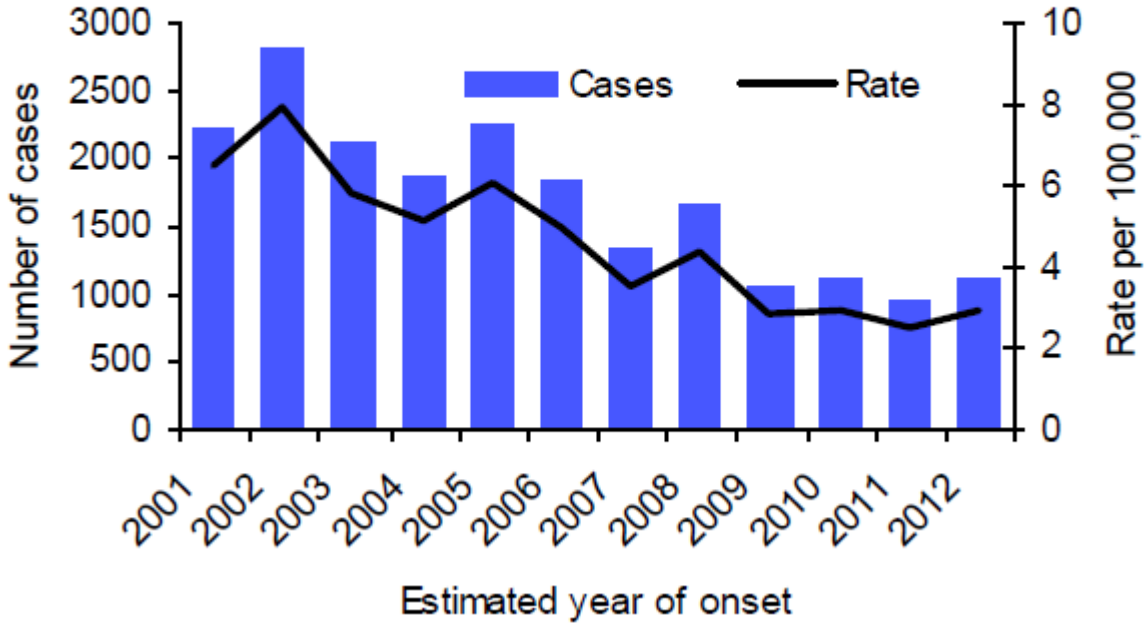


Figure 2. California shigellosis incidence rates by age group and time period, 2009–2012

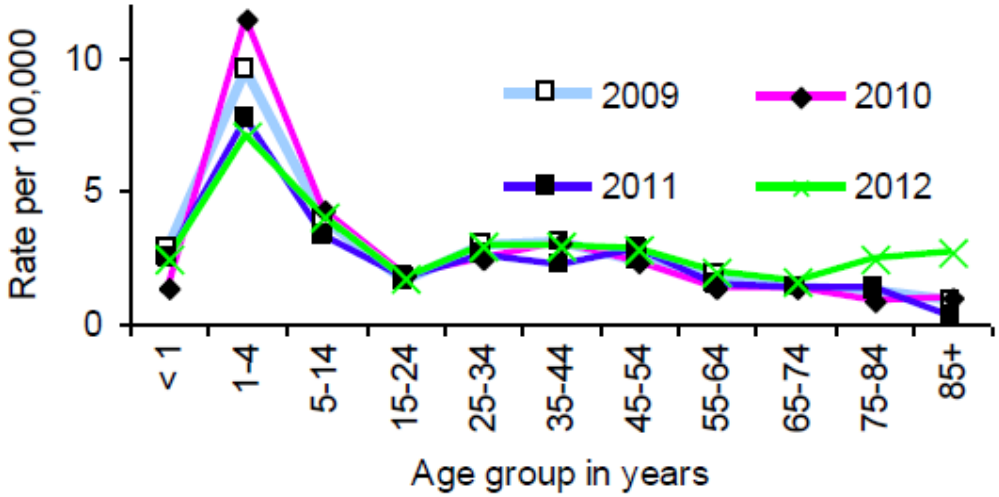
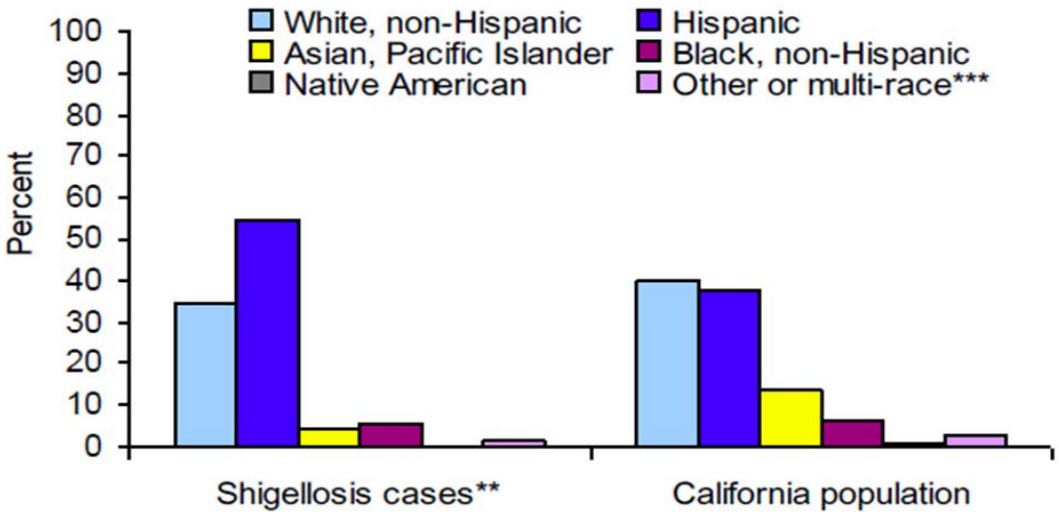


Figure 3. California shigellosis cases and population by race/ethnicity, 2009- 2012*



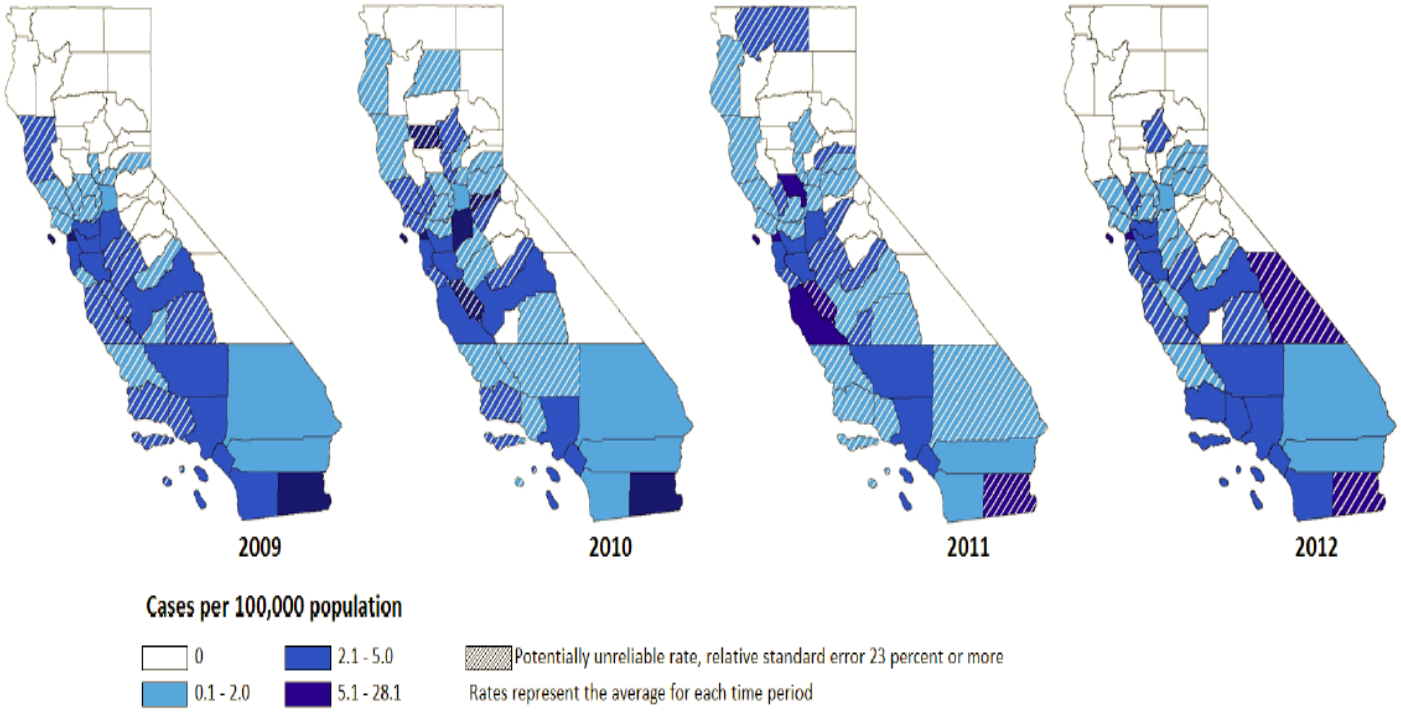
Notes for Figures 1-3

*2012 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 shigellosis incidence rates, 2009–2012



Comment

Incidence was relatively constant during the 2009– 2012 surveillance period. *S. sonnei* and *S. flexneri* were the most frequently identified species and were associated with different epidemiologic characteristics. Age group, race/ethnicity, and gender epidemiologic profiles of incident cases with estimated onset dates from 2009 through 2012 remained fairly consistent with those with estimated illness onset dates from 2001 through 2008, as previously described[10]. Public health measures such as early diagnosis and 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.

References and additional resources

1 Scallan, E, Hoekstra RM, Angulo FJ, Tauxe RV, Widdowson MA, Roy SL, et al. Foodborne illness acquired in the United States---major pathogens. Emerg Infect Dis 2011; 17(1): 7-15.

2 CDC *Shigella*-Shigellosis information web page
http://www.cdc.gov/*Shigella*/

3 California Department of Public Health shigellosis information web page
http://www.cdph.ca.gov/HealthInfo/discond/Pages/Shigellosis.aspx

4 Aragón TJ, Vugia DJ, Shallow S,

Samuel MC, et al. Case-control study of shigellosis in San Francisco: the role of sexual transmission and HIV infection. Clin Infect Dis 2007;44:327-34.

5 Centers for Disease Control and Prevention. *Shigella sonnei* outbreak among men who have sex with men - San Francisco, California, 2000-2001. Morb Mort Week Rep 2001;50(42):922-6.

6 Centers for Disease Control and Prevention. Antibiotic Resistance Threats in the United States, 2013. http://www.cdc.gov/drugresistance/pdf/ar-threats-2013-508.pdf

7 CDC: *Shigella* Infections becoming Resistant to Recommended Antibiotic http://www.foodsafetynews.com/2015/04/shigella- infections-resistant-to-recommended-antibioticincreasing-in-the-u-s/#.VYydxo3JCUk

8 Importation and Domestic Transmission of *Shigella sonnei* Resistant to Ciprofloxacin—Unites States, May 2014-February 2015 http://www.cdc.gov/mmwr/preview/mmwrhtml/ mm6412a2.htm

9 Notes from the Field: Outbreak of Infections Caused by *Shigella sonnei* with Decreased Susceptibility to Azithromycin—Los Angeles, California, 2012 http://www.cdc.gov/mmwr/preview/mmwrhtml/ mm6209a4.htm

10 Epidemiologic Summary of Shigellosis in California, 2001–2008 http://www.cdph.ca.gov/programs/sss/Documents/Epi- Summaries-CA-2001-2008-083111.pdf#page=63

11 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 TechnicalNotes01-08and09-12.pdf

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Last updated 8/6/2015