

Key Findings and Public Health Messages

- The California Department of Public Health (CDPH) received reports of 35,885 cases of non-typhoidal salmonellosis with estimated symptom onset dates from 2001 through 2008.
- Salmonellosis incidence rates increased by 9.1 percent from 2001 (12.1 per 100,000) to 2008 (13.2 per 100,000).
- During the surveillance period, 167 (0.5 percent) reported cases died with salmonellosis. Case fatality rates were 6.7 times higher in cases \geq 65 years of age (2.0 percent) compared to cases $<$ 65 years of age (0.3 percent).
- Average annual incidence rates were higher among children under 1 year of age (63.4 per 100,000) and 1 to 4 years of age (37.4 per 100,000). From 2001 to 2008, incidence rates increased by 52.8 percent among children 1 to 4 years of age (from 35.6 to 54.4 per 100,000).
- From 2001 through 2008, CDPH received reports of 146 (125 confirmed, 21 suspected) outbreaks of foodborne salmonellosis involving 3,422 cases.
- Preventing contamination during the production and processing of human foods, including fresh fruits and vegetables, combined with consumer education may provide the best opportunities for preventing and controlling salmonellosis.

Background

Salmonella is among the most commonly reported enteric bacterial pathogens in the United States, causing an estimated 1.4 million infections, 16,000 hospitalizations, and 550 deaths each year¹. Consuming foods directly or indirectly contaminated by infected animals is the leading source of *Salmonella* infections. However, exposure to ill persons or infected animals and their environments (notably turtles and other reptiles and petting zoo or farm animals) may also result in infection. The most frequent *Salmonella* serovars isolated from human cases nationally have included *S. Enteritidis*, *S. Typhimurium*, *S. Newport*, *S. Heidelberg*, and *S. Javiana*. Non-typhoidal *Salmonella* is a commonly identified etiology in foodborne disease outbreaks, though most salmonellosis cases are reported as sporadic. The national *Healthy People 2010* target objective for salmonellosis is no more than 6.8 new cases per 100,000 population.

Acute illness, usually gastroenteritis, occurs after an incubation of 12 to 72 hours, and lasts 4 to 7 days; treatment with antibiotics is not generally recommended. Rarely, complications such as septicemia, arthritis, meningitis, or pneumonia may occur, especially among immunocompromised persons and those in the extremes of age. The recent emergence of *Salmonella* serovars with resistance to first-line antibiotics could limit effective therapeutic options in the future.

We describe here the epidemiology of salmonellosis 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 Notes².

California reporting requirements and surveillance case definition

California Code of Regulations, Title 17, requires health care providers to report suspected cases of salmonellosis to their local health department within one working day of identification or immediately by telephone if an outbreak is suspected. A culture of the organism upon which the diagnosis of salmonellosis was established must be submitted to the local public health laboratory and then onto the State Microbial Diseases Laboratory for definitive identification and serotyping.

Local health officers are required by regulation to report to CDPH cases of salmonellosis. California

regulations require that any illness in which organisms of the genus *Salmonella* (except the typhoid bacillus) have been isolated from feces, blood, urine or pathological material be reported as a *Salmonella* infection. CDPH officially counted such cases including asymptomatic and extraintestinal infections.

Epidemiology of salmonellosis in California

CDPH received reports of 35,885 cases of non-typhoidal salmonellosis with estimated symptom onset dates from 2001 through 2008. Incidence rates increased by 9.1 percent from 2001 (12.1 per 100,000) to 2008 (13.2 per 100,000) [Figure 1]. During the surveillance period, 167 (0.5 percent) cases were reported to have died with salmonellosis during the surveillance period. Case fatality rates were 6.7 times higher in cases \geq 65 years of age (2.0 percent) compared to cases $<$ 65 years of age (0.3 percent).

Average annual salmonellosis incidence rates for the surveillance period were higher among children under 1 year of age (63.4 per 100,000), 1 to 4 years of age (37.4 per 100,000), and 5 to 14 years of age (12.5 per 100,000) followed by adults 65 years of age or older (11.5 per 100,000). From 2001 to 2008, annual incidence rates increased by 52.8 percent among children 1 to 4 years of age (from 35.6 to 54.4 per 100,000) which was largely driven by an outbreak of *S. Javiana* in Los Angeles County in late 2008. In contrast, incidence rates decreased by 6.9 percent among children under 1 year of age from the combined years of 2001 and 2002 (66.7 per 100,000) to the combined years of 2007 and 2008 (62.1 per 100,000) [Figure 2]. The ratio of male to female cases was 1.0:1.0. Incidence rates by race/ethnicity were not calculated due to the substantial portion of missing data (27.3 percent). However, salmonellosis cases with complete data reported Hispanic ethnicity more frequently than would be expected based on the overall demographic profile of California [Figure 3].

Fifty (86.2 percent) of 58 counties reported average annual salmonellosis incidence rates for the surveillance period that were above the *Health People 2010* objective. Average annual incidence rates for the surveillance period were higher in Northern California (13.5 per 100,000) than Southern California (11.3 per 100,000). However, from 2001 to 2008, Southern California rates increased by 21.8 percent (from 10.1 to 12.3 per 100,000) whereas Northern California rates

Figure 1. California salmonellosis case counts and incidence rates

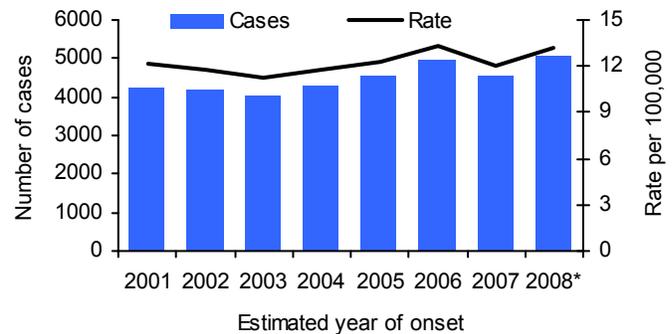


Figure 2. California salmonellosis incidence rates by age and time period

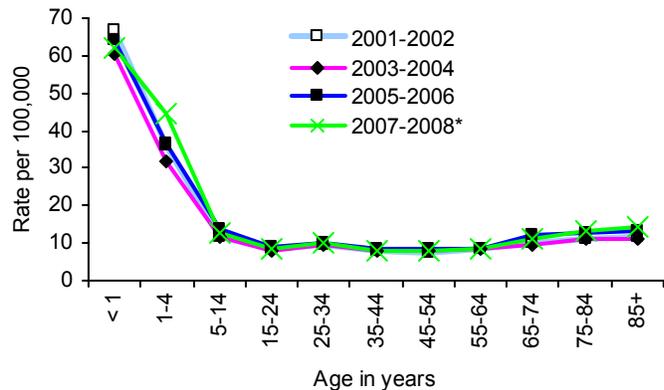
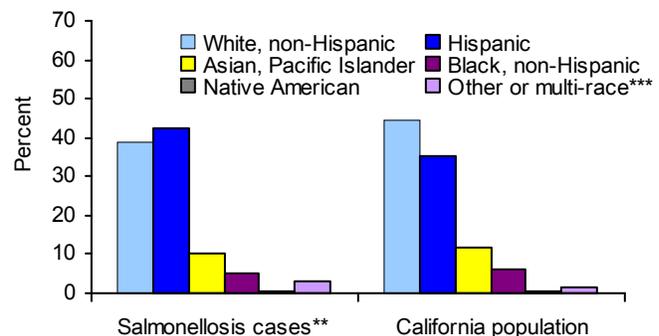


Figure 3. California salmonellosis cases and population by race/ethnicity 2001 - 2008*



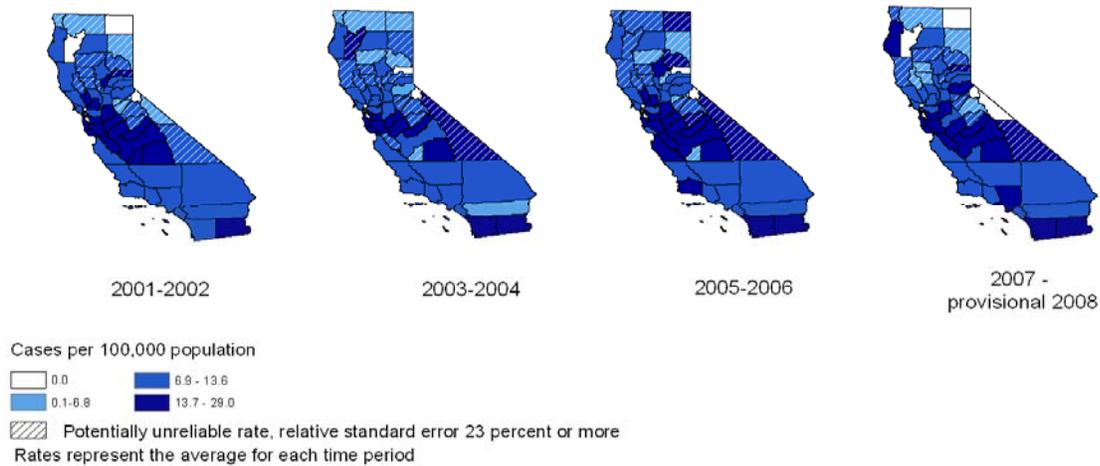
Notes for Figures 1-3

*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 salmonellosis incidence rates



decreased by 9.7 percent (from 14.5 to 13.1 per 100,000). County-specific incidence rates for each two-year interval of the surveillance period ranged from 0 to 29.0 per 100,000 persons [Figure 4].

From 2001 through 2008, CDPH received reports of 146 (125 confirmed, 21 suspected) outbreaks of foodborne salmonellosis involving 3,422 cases. The most common serovars reported among outbreaks were *S. Enteritidis* (26), *S. Typhimurium* (20), *S. Heidelberg* (15), and *S. Newport* (12). While the majority of outbreaks involved a single county, 12 (8.2 percent) involved exposures and cases in more than 1 county and an additional 9 (6.2 percent) involved exposures and cases in more than 1 state. Among 56 (38.4 percent) outbreaks with a confirmed vehicle, the most common types of foods implicated were fruits and vegetables (12, 21.4 percent) and poultry (10, 17.9 percent).

Comment

Similar to national data³, the average annual incidence rate for salmonellosis in California during the surveillance period was nearly twice the national *Health People 2010* target objective (6.8 per 100,000). And, as reported nationally³, the declines in salmonellosis incidence rates in California that occurred from 1996 to 1999 (from 20 to 13 cases per 100,000 persons) appear to have plateaued. Why rates have leveled off is unclear and remains the subject of continued national attention and research.

Preventing contamination during the production and

processing of human foods, including fresh fruits and vegetables, combined with consumer education may provide the best opportunities for preventing and controlling salmonellosis.

References and resources

¹Mead 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>

²Epidemiologic Summaries of Selected General Communicable Diseases in California, 2001-2008: Technical Notes

<http://www.cdph.ca.gov/data/statistics/Documents/technicalnotes-episummary-aug2409.pdf>

³Centers for Disease Control and Prevention. Preliminary FoodNet data on the incidence of infection with pathogens transmitted commonly through food --- 10 states, 2008. *MMWR* 2009;58(13):333-7.

<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5813a2.htm>

California Department of Public Health salmonellosis information web page

<http://www.cdph.ca.gov/HealthInfo/discond/Pages/Salmonellosis.aspx>

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