

## Key Findings and Public Health Messages

- The California Department of Public Health (CDPH) received reports of 828 cases of non-cholera vibriosis with estimated symptom onset dates from 2001 through 2008. This corresponds to an average incidence rate of 0.28 cases per 100,000 Californians.
- Although non-cholera vibriosis incidence rates increased from 2001 (0.22 per 100,000) to 2008 (0.28 per 100,000), the highest annual rates were reported in 2004 (0.40 per 100,000) and 2006 (0.47 per 100,000).
- During the surveillance period, the highest average incidence rate of non-cholera vibriosis occurred among adults 55 to 64 years of age (0.46 per 100,000). Average incidence rates were 2.3 times higher in men (0.39 per 100,000) compared to women (0.17 per 100,000).
- The highest reported average incidence rates for the surveillance period were reported by the San Francisco Bay Area (0.56 per 100,000), San Diego (0.53 per 100,000), and Sacramento Metro (0.34 per 100,000) regions.
- From 2001 through 2008, CDPH received reports of 6 confirmed and 6 suspected outbreaks of foodborne non-cholera vibriosis involving a total of 93 cases. Consumption of raw or undercooked oysters and mussels was the most frequently implicated exposure.
- Ensuring that shellfish beds are routinely monitored, seafood products are handled safely during and after harvest, and that consumers are educated about the risks of consuming raw or undercooked seafood may provide the best opportunities for reducing non-cholera vibriosis.

## Background

Non-*cholera Vibrio* species are uncommon but important enteric bacterial pathogens, causing an estimated 8,000 infections, 185 hospitalizations, and 57 deaths in the United States (US) each year<sup>1</sup>. *Vibrio* species are natural inhabitants of marine coastal and estuarine environments, and their populations increase dramatically during the warm summer months. In the US, *V. parahaemolyticus* is the most commonly reported *Vibrio* infection, but *V. vulnificus* is associated with severe morbidity and mortality. Consuming raw, undercooked, or cross-contaminated seafood, especially shellfish, is the most common cause of non-cholera vibriosis, but exposing wounds to contaminated warm seawater can also cause skin or soft tissue *Vibrio* infection. There is no national *Healthy People 2010* target objective for non-cholera vibriosis.

*V. parahaemolyticus* infection causes acute gastroenteritis with fever that usually occurs after an incubation period of 24 hours. Symptoms usually last 1 to 7 days and are often self-limited. In contrast, *V. vulnificus* causes septicemia in persons with immunocompromising conditions, chronic liver disease, and alcoholism. Fifty percent of such patients with septicemia die, and the case-fatality rate exceeds 90% among patients who become hypotensive.

We describe here the epidemiology of non-cholera vibriosis 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>2</sup>.

## California reporting requirements and surveillance case definition

California Code of Regulations, Title 17, requires health care providers to report suspected cases of *Vibrio* infection 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 notify the local health department when laboratory testing yields evidence suggestive of *Vibrio* species; notification should 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 non-cholera vibriosis. CDPH officially counted cases that satisfied the current

Centers for Disease Control and Prevention (CDC) surveillance case definition, including both confirmed and probable classifications. During the surveillance period, CDC defined a confirmed case as one with isolation of *Vibrio spp.* other than toxigenic *Vibrio cholerae* O1 or O139 from a clinical specimen. A probable case had clinically-compatible symptomatic illness and an epidemiologic link to a confirmed case.

### Epidemiology of non-cholera vibriosis in California

CDPH received reports of 828 cases of non-cholera vibriosis with estimated symptom onset dates from 2001 through 2008. This corresponds to an average incidence rate of 0.28 cases per 100,000 Californians. Non-cholera vibriosis incidence rates increased from 2001 (0.22 per 100,000) to 2008 (0.28 per 100,000) although the highest annual rates occurred in 2004 (0.40 per 100,000) and 2006 (0.47 per 100,000) [Figure 1]. During the surveillance period, most reported cases were *V. parahaemolyticus*. Only 2 to 5 cases of *V. vulnificus* were reported each year except in 2001, when 13 cases of *V. vulnificus* were reported. During the surveillance period, 14 (1.7 percent of all) cases were reported to have died with non-cholera vibriosis. Among these 14 cases, 7 (50.0 percent) were *V. vulnificus*, 4 (28.6 percent) were *V. cholerae* non-O1 or non-O139, and 3 (21.4 percent) were *V. parahaemolyticus*.

The average non-cholera vibriosis incidence rate during the surveillance period was highest among adults 55 to 64 years of age (0.46 per 100,000) [Figure 2]. The ratio of male to female cases was 2.3:1 and average incidence rates were 2.3 times higher in men (0.39 per 100,000) compared to women (0.17 per 100,000). Incidence rates by race/ethnicity were not calculated due to the substantial portion (28.3 percent) of missing data. However, non-cholera vibriosis cases with complete information reported White non-Hispanic race/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 (0.36 per 100,000) than in Southern California (0.22 per 100,000). However, from 2001 to 2008, rates for Southern California increased by 71.4 percent (from 0.14 to 0.24 per 100,000) whereas rates for Northern California increased by 29.2 percent (from

Figure 1. California non-cholera vibriosis case counts and incidence rates

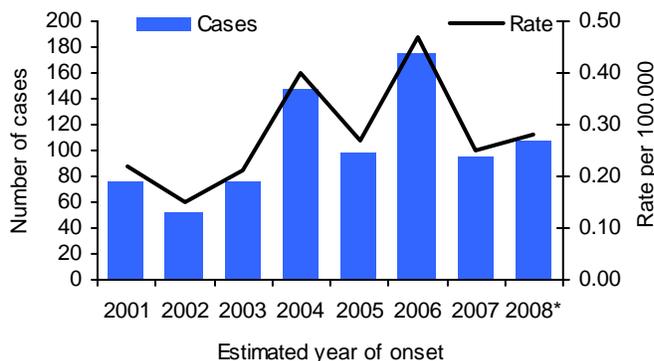


Figure 2. California non-cholera vibriosis by incidence rates by age and time period

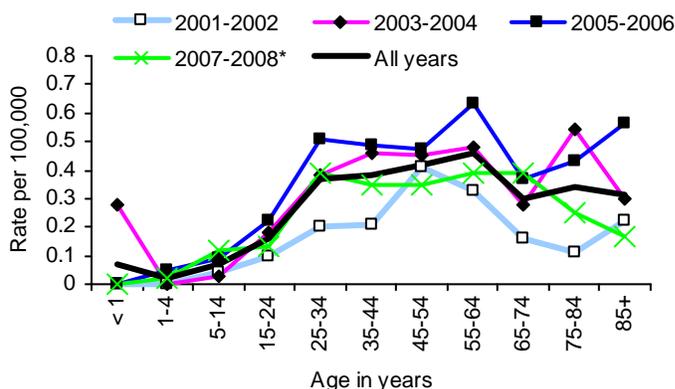
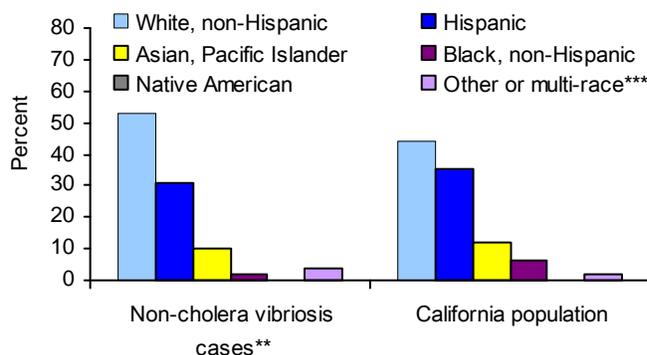


Figure 3. California non-cholera vibriosis cases and population by race/ethnicity 2001 - 2008\*



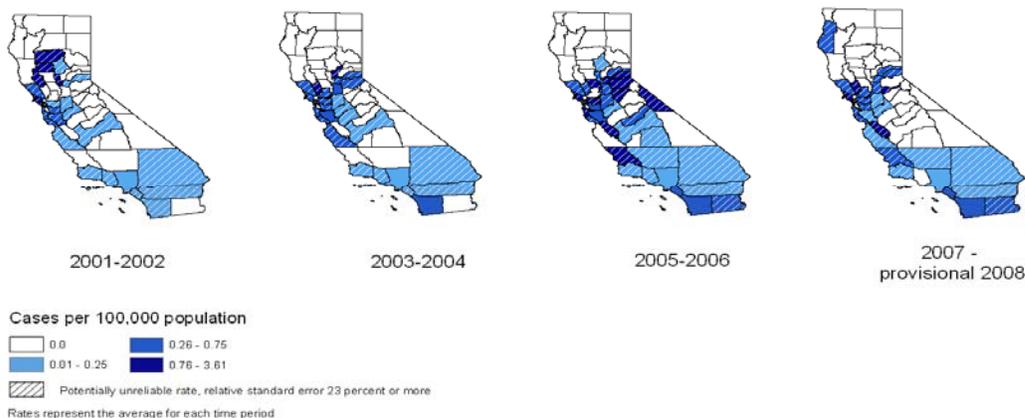
#### Notes for Figures 1-3

\*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 non-cholera vibriosis incidence rates



0.24 to 0.31 per 100,000). In Northern California, the highest incidence rate (0.51 per 100,000) occurred in 2005 and 2006. The 3 geographic regions of California with the highest rates for the surveillance period were the San Francisco Bay Area (0.56 per 100,000), San Diego (0.53 per 100,000), and Sacramento Metro (0.34 per 100,000) [Figure 4].

From 2001 through 2008, CDPH received reports of 6 confirmed and 6 suspected foodborne outbreaks of non-cholera vibriosis, involving 93 cases. Consumption of raw or undercooked oysters and mussels was the most frequently implicated exposure. The largest outbreak occurred in 2006, involved 27 persons with *V. parahaemolyticus* infections, and was associated with consumption of raw oysters.

### Comment

During the surveillance period, the highest annual number of non-cholera vibriosis cases (176) was reported in 2006; most were due to *V. parahaemolyticus*. California experienced its highest incidence rates of the surveillance period in 2004 and 2006 and its largest outbreak in 2006. In 2006, at least three other states (New York, Oregon and Washington) also reported several large clusters of *V. parahaemolyticus* cases<sup>3</sup>. Traceback investigation linked contaminated oysters and clams that had been consumed by patients to harvest beds in Washington state and British Columbia. Previous non-cholera vibriosis outbreaks have coincided with large increases in sporadic cases nationally, and it is unclear whether the increase in sporadic cases in California in 2006 was related to these national clusters. In 2006, some shellfish harvest areas in Washington that were associated with outbreak

cases had demonstrated acceptable *Vibrio* levels by routine testing<sup>3</sup>. Because *Vibrio* species multiply very rapidly and can reach infectious levels in seafood after harvest, shellfish bed monitoring is important but not sufficient to prevent illness<sup>3</sup>.

Nevertheless, ensuring that shellfish beds are routinely monitored, seafood products are handled safely during and after harvest, and educating consumers about the risks of consuming raw or undercooked seafood may provide the best opportunities for reducing non-cholera vibriosis. Physicians should maintain a high index of suspicion in persons with gastroenteritis and a history of raw seafood consumption. Physicians suspecting vibriosis should also notify the laboratory of their suspicions so that the appropriate selective medium can be used to isolate the organism.

### 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>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>

<sup>3</sup>Centers for Disease Control and Prevention. *Vibrio parahaemolyticus* infectious associated with consumption of raw shellfish - three states, 2006. *MMWR* 2006;55:854-6.

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