

Bad Bug Book

U.S. Food & Drug Administration
Center for Food Safety & Applied Nutrition
Foodborne Pathogenic Microorganisms
and Natural Toxins Handbook



Shigella spp.

CDC/MMWR

NIH/PubMed

1. Name of the Organism:

Shigella spp.
(*Shigella sonnei*, *S. boydii*, *S. flexneri*, and *S. dysenteriae*)

Shigella are [Gram-negative](#), nonmotile, nonsporeforming rod-shaped bacteria. The illness caused by *Shigella* (shigellosis) accounts for less than 10% of the reported outbreaks of foodborne illness in this country. *Shigella* rarely occurs in animals; principally a disease of humans except other primates such as monkeys and chimpanzees. The organism is frequently found in water polluted with human feces.

2. Name of Disease:

Shigellosis (bacillary dysentery).

3. Nature of Disease:

Symptoms -- Abdominal pain; cramps; diarrhea; fever; vomiting; blood, pus, or mucus in stools; tenesmus.

Onset time -- 12 to 50 hours.

Infective dose -- As few as 10 cells depending on age and condition of host. The *Shigella* spp. are highly infectious agents that are transmitted by the fecal-oral route.

The disease is caused when virulent *Shigella* organisms attach to, and penetrate, epithelial cells of the intestinal mucosa. After invasion, they multiply intracellularly, and spread to contiguous epithelial cells resulting in tissue destruction. Some strains produce enterotoxin and Shiga toxin (very much like the verotoxin of [E. coli](#) O157:H7).

4. Diagnosis of Human Illness:

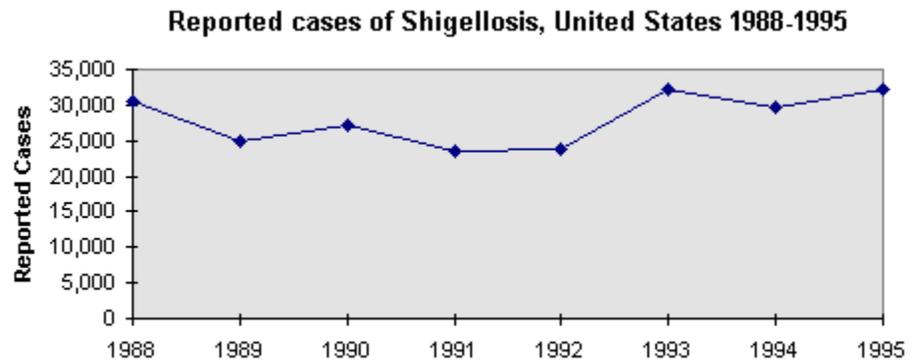
Serological identification of culture isolated from stool.

5. Associated Foods:

Salads (potato, tuna, shrimp, macaroni, and chicken), raw vegetables, milk and dairy products, and poultry. Contamination of these foods is usually through the fecal-oral route. Fecally contaminated water and unsanitary handling by food handlers are the most common causes of contamination.

6. Relative Frequency of Disease:

An estimated 300,000 cases of shigellosis occur annually in the U.S. The number attributable to food is unknown, but given the low infectious dose, it is probably substantial.



Summary of Notifiable Diseases, United States MMWR 44(53): 1996 October 25

7. Complications:

Infections are associated with mucosal ulceration, rectal bleeding, drastic dehydration; fatality may be as high as 10-15% with some strains. [Reiter's disease](#), reactive arthritis, and [hemolytic uremic syndrome](#) are possible sequelae that have been reported in the aftermath of shigellosis.

8. Target Populations:

Infants, the elderly, and the infirm are susceptible to the severest symptoms of disease, but all humans are susceptible to some degree. Shigellosis is a very common malady suffered by individuals with acquired immune deficiency syndrome (AIDS) and [AIDS-related complex](#), as well as non-AIDS homosexual men.

9. Food Analysis:

Organisms are difficult to demonstrate in foods because methods are not developed or are insensitive. A genetic probe to the virulence plasmid has been developed by FDA and is currently under field test. However, the isolation procedures are still poor.

10. Selected Outbreaks:

In 1985, a huge outbreak of foodborne shigellosis occurred in Midland-Odessa, Texas, involving perhaps as many as 5,000 persons. The implicated food was chopped, bagged lettuce, prepared in a central location for a Mexican restaurant chain. FDA research subsequently showed that *S. sonnei*, the isolate from the lettuce, could survive in chopped lettuce under refrigeration, and the lettuce remained fresh and appeared to be quite edible.

In 1985-1986, several outbreaks of shigellosis occurred on college campuses, usually associated with fresh vegetables from the salad bar. Usually an ill food service worker was shown to be the cause.

In 1987, several very large outbreaks of shigellosis (*S. sonnei*) occurred involving thousands of persons, but no specific food vector could be proven.

In 1988, numerous individuals contracted shigellosis from food

consumed aboard Northwest Airlines flights; food on these flights had been prepared in one central commissary. No specific food item was implicated, but various sandwiches were suspected.

****NOTE** - Although all *Shigella* spp. have been implicated in foodborne outbreaks at some time, *S. sonnei* is clearly the leading cause of shigellosis from food. The other species are more closely associated with contaminated water. One in particular, *S. flexneri*, is now thought to be in large part sexually transmitted.

For information on the outbreak of *Shigella* on a cruise ship, see [MMWR 43\(35\):1994 Sep 09](#)

[MMWR 40\(25\):1991 Jun 28](#) reports on a *Shigella dysenteriae* Type 1 outbreak in Guatemala, 1991.

For more information on recent outbreaks see the [Morbidity and Mortality Weekly Reports](#) from CDC.

CDC/MMWR

The CDC/MMWR link will provide a list of Morbidity and Mortality Weekly Reports at CDC relating to this organism or toxin. The date shown is the date the item was posted on the Web, not the date of the MMWR. The summary statement shown are the initial words of the overall document. The specific article of interest may be just one article or item within the overall report.

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January 1992 with periodic updates

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Hypertext last updated by mow/xxz/ear 2000-MAR-08