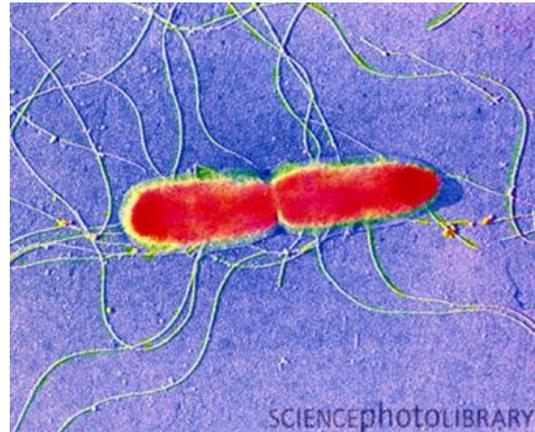


# National Enteric Disease Surveillance: Typhoid and Paratyphoid Fever Surveillance Overview

## Surveillance System Overview: National Typhoid and Paratyphoid Fever Surveillance (NTPFS)

Infection with *Salmonella enterica* serotype Typhi (the causative agent of typhoid fever) causes an estimated 20 million cases of typhoid fever and 200,000 deaths annually worldwide (1). In the United States, typhoid fever is now a rare disease, with about 400 laboratory-confirmed cases reported per year (2). Not all cases are diagnosed; however, the total annual number of *Salmonella* serotype Typhi infections is estimated at 5,750 cases per year, 1,900 of them acquired in the United States (3). Dramatic declines in incidence of and mortality from typhoid fever occurred in the United States after widespread implementation of municipal water and sewage treatment systems in the first half of the 20th century (4). In recent years, most cases in the United States have been associated with foreign travel (5,6,7,8).



Colored transmission electron micrograph of *Salmonella* serotype Typhi

Since 1975, using a standard report form, state and local health officials have reported detailed epidemiologic information, including patient demographic and clinical information, typhoid vaccination status, and travel history, on laboratory-confirmed cases of typhoid fever to the Centers for Disease Control and Prevention (CDC). A case of typhoid fever is defined as an acute illness compatible with typhoid fever in which *Salmonella* serotype Typhi is isolated from a normally sterile site or from stool or urine. Travel-associated typhoid fever is defined as illness in a person who traveled outside of the United States in the 30 days before illness onset, and domestically acquired typhoid fever is defined as illness in a person without such a travel history.

Paratyphoid fever, which is caused by *Salmonella* serotypes Paratyphi A, Paratyphi B<sup>1</sup>, and Paratyphi C, is not nationally notifiable. However, in 2008 the surveillance system was expanded, becoming National Typhoid and Paratyphoid Fever Surveillance, to allow state and local health departments to also report information on cases of paratyphoid fever.

The national typhoid fever and paratyphoid fever surveillance data are dynamic; data from previous years may change as surveillance case reports are added or corrected.

<sup>1</sup> Two distinct pathotypes of *Salmonella* serotype Paratyphi B are recognized; one pathotype is associated with paratyphoid fever and the other is associated with uncomplicated gastroenteritis. The two pathotypes are known to have distinct virulence characteristics, but are currently differentiated based on the ability to ferment tartrate. The paratyphoidal pathotype is unable to ferment tartrate and is designated serotype Paratyphi B; the gastrointestinal pathotype ferments tartrate and is designated serotype Paratyphi B var. L(+) tartrate+.

### **Other sources of national-level typhoid and paratyphoid fever surveillance data**

Several other systems at CDC conduct surveillance for infection with *Salmonella* serotypes Typhi, Paratyphi A, Paratyphi B, and Paratyphi C. The National Notifiable Diseases System (NNDSS) collects and compiles reports of nationally notifiable infectious diseases, including typhoid fever (2). NNDSS collects data from states on both laboratory-confirmed and probable cases of infection (a probable case is defined as a clinically compatible illness in a person with an epidemiological link to a confirmed case). The Laboratory-based Enteric Disease Surveillance (LEDS) system conducts national surveillance for all laboratory-confirmed *Salmonella* infections, including typhoid and paratyphoid fever (12). The National Antimicrobial Resistance Monitoring System (NARMS) monitors antimicrobial resistance among enteric bacteria including all *Salmonella* serotypes from humans (9). Since 1999, NARMS has requested that all serotype Typhi, Paratyphi A, Paratyphi B, and Paratyphi C isolates in the United States be sent to CDC for antimicrobial susceptibility testing. The National Outbreak Surveillance System (NORS) collects reports of foodborne, waterborne, enteric person-to-person, and animal contact-associated disease outbreaks from local, state and territorial public health agencies (10). Since 1996, the Foodborne Diseases Active Surveillance Network (FoodNet) has conducted active, population-based surveillance in ten states for all laboratory-confirmed *Salmonella* infections, as well as other enteric infections transmitted commonly through food (11).

### **References**

1. Crump JA, Luby SP, Mintz ED. The global burden of typhoid fever. *Bull World Health Organ.* 2004;82(5):346–353.
2. Centers for Disease Control and Prevention (CDC). Summary of Notifiable Diseases --- United States, 2009. *MMWR* 2011;58(53):1-100.
3. Scallan E, Hoekstra RM, Angulo FJ, et al. Foodborne illness acquired in the United States – major pathogens. *Emerg Infect Dis.* 2011 Jan;17(1):7-15.
4. Cutler D, Miller G. The role of public health improvements in health advances: the twentieth-century United States. *Demography.* 2005;42(1):1–22.
5. Lynch MF, Blanton EM, Bulens S, et al. Typhoid Fever in the United States, 1999-2006. *JAMA* 2009; 302(8):859-865.
6. Ryan CA, Hargrett-Bean NT, Blake PA. *Salmonella* typhi infections in the United States, 1975-1984: increasing role of foreign travel. *Rev Infect Dis.* 1989;11(1):1–8.
7. Mermin JH, Townes J, Gerber M, et al. Typhoid fever in the United States, 1985-1994: changing risks of international travel and increasing antimicrobial resistance. *Arch Intern Med.* 1998;158(6):633–638.
8. Ackers ML, Puhr ND, Tauxe RV, Mintz ED. Laboratory-based surveillance of *Salmonella* serotype Typhi infections in the United States: antimicrobial resistance on the rise. *JAMA.* 2000;283(20):2668–2673.
9. <http://www.cdc.gov/narms/>
10. <http://www.cdc.gov/outbreaknet/nors/>
11. <http://www.cdc.gov/foodnet>
12. Centers for Disease Control and Prevention (CDC). National *Salmonella* Surveillance Overview. Atlanta, Georgia: US Department of Health and Human Services, CDC, 2011. Available at: [http://www.cdc.gov/nationalsurveillance/PDFs/NationalSalmSurveillOverview\\_508.pdf](http://www.cdc.gov/nationalsurveillance/PDFs/NationalSalmSurveillOverview_508.pdf)

### **Reference Citation**

**Centers for Disease Control and Prevention (CDC). National Typhoid and Paratyphoid Fever Surveillance Overview. Atlanta, Georgia: US Department of Health and Human Services, CDC, 2011.**