
MMWR. 2010;59:418-422
2 figures, 2 tables omitted

The foodborne diseases active surveillance network (FoodNet) of the Centers for Disease Control and Prevention’s Emerging Infections Program conducts active, population-based surveillance in 10 U.S. states for all laboratory-confirmed cases of infection caused by Campylobacter, Listeria, Salmonella, STEC O157, Shigella, Vibrio, and Yersinia since 1996; Cryptosporidium and Cyclospora since 1997; and STEC non-O157 since 2000. FoodNet personnel regularly contact clinical laboratories to ascertain laboratory-confirmed cases of infection occurring within the surveillance sites. This report describes preliminary surveillance data for 2009 and trends in incidence since 1996. In 2009, a total of 17,468 laboratory-confirmed cases of infection were identified. In comparison with the first 3 years of surveillance (1996-1998), sustained declines in the reported incidence of infections caused by Campylobacter, Listeria, Salmonella, Shiga toxin-producing Escherichia coli (STEC) O157, Shigella, and Yersinia were observed. The incidence of Vibrio infection continued to increase. Compared with the preceding 3 years (2006-2008), significant decreases in the reported incidence of Shigella and STEC O157 infections were observed. For most infections, reported incidence was highest among children aged <4 years; the percentage of persons hospitalized and the case fatality rate (CFR) were highest among persons aged ≥50 years. In 2009, the Healthy People 2010 target of ≥1.0 case per 100,000 population for STEC O157 infection (objective 10-1b) was met. Further collaborative efforts with regulatory agencies and industry are needed to sustain and extend recent declines and to improve prevention of foodborne infections.

Surveillance Methods
FoodNet® is a collaborative program among CDC, 10 state health departments, the U.S. Department of Agriculture’s Food Safety and Inspection Service, and the Food and Drug Administration (FDA). It has conducted active, population-based surveillance for laboratory-confirmed cases of infection caused by Campylobacter, Listeria, Salmonella, STEC O157, Shigella, Vibrio, and Yersinia since 1996; Cryptosporidium and Cyclospora since 1997; and STEC non-O157 since 2000. FoodNet personnel regularly contact clinical laboratories to ascertain laboratory-confirmed cases of infection occurring within the surveillance sites. Hospitalsizations occurring within 7 days of specimen collection date are recorded, as is the patient’s status at hospital discharge or at 7 days after the specimen collection date if not hospitalized. Deaths and hospitalizations are attributed to the pathogen if they occur within 7 days of the specimen collection date, regardless of actual cause.

FoodNet also conducts surveillance for hemolytic uremic syndrome (HUS), a complication of STEC infection characterized by renal failure and microangiopathic hemolytic anemia, through a network of pediatric nephrologists and infection-control practitioners. Hospital discharge data are reviewed to validate HUS diagnoses and verify the presence of diarrhea in the 21 days before HUS onset. This report contains preliminary postdiarrheal HUS data for 2008, rather than for 2009, because additional time is needed to review hospital records.

Incidence rates for 2009 were calculated by dividing the number of laboratory-confirmed infections by U.S. Census Bureau population estimates for 2008. Final incidence rates will be reported when population estimates for 2009 are available. Case fatality rates (CFRs) were calculated by dividing the number of deaths by the number of laboratory-confirmed infections and multiplying by 100.

Surveillance Results
In 2009, a total of 17,468 laboratory-confirmed cases of infection were identified. The number of reported infections and incidence per 100,000 population, by pathogen, were as follows: Salmonella (7,039; 15.19), Campylobacter (6,033; 13.02), Shigella (1,849; 3.99), Cryptosporidium (1,325; 2.86), STEC O157 (459; 0.99), STEC non-O157 (264; 0.57), Vibrio (160; 0.35), Listeria (158; 0.34), Yersinia (150; 0.32), and Cyclospora (31; 0.07). Incidence varied among FoodNet sites. Incidence was highest in children aged <4 years for Salmonella (72.93), Campylobacter (28.70), Shigella (16.61), Cryptosporidium (5.36), STEC O157 (3.84), STEC non-O157 (2.72), and Yersinia (2.36) infections, and in persons aged ≥50 years for Listeria (0.82), Vibrio (0.62), and Cyclospora (0.11) infections.

The percentage of patients hospitalized ranged from 12.9% for Cyclospora infections to 89.2% for Listeria infections. The percentage hospitalized was highest among those aged ≥50 years for STEC O157 (59.4%), Salmonella (45.2%), Yersinia (43.2%), Vibrio (40.7%), STEC non-O157 (34.2%), Shigella (29.4%), Cyclospora (26.7%), Cryptosporidium (24.7%), and Campylobacter (21.3%) infections, and in children aged <4 years for Listeria (94.1%) infections. CFRs ranged from 0.05% for Shigella infections to 12.7% for Listeria infections. The CFR was highest in persons aged ≥50 years for Listeria infections.

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In 2008, FoodNet identified 64 cases of postdiarrheal HUS in persons aged <18 years (0.60 cases per 100,000). Among those, 42 (65.6%) occurred in children aged <5 years (1.40 cases per 100,000).

**Comparison With Previous Years**

A main effects, log-linear Poisson regression model (negative binomial) was used to estimate changes in incidence of infections in 2009 compared with previous years. This model accounts for site-to-site variation and changes in the size of the population under surveillance in FoodNet over time. The average annual incidence during (1) the first 3 years of surveillance (1996-1998) and (2) the preceding 3 years (2006-2008) were used for comparison. The estimated change in incidence between 2009 and the comparison periods was calculated with 95% confidence intervals (CI). For HUS surveillance, the average annual incidence for 2005-2007 was used as the comparison period. Changes over time were not evaluated for STEC non-O157 and *Cyclospora* infections.

In comparison with 1996-1998, rates of infection in 2009 were lower for *Shigella* (55% decrease, CI=37%-68%), *Yersinia* (53% decrease, CI=41%-63%), STEC O157 (41% decrease, CI=27%-52%), *Campylobacter* (30% decrease, CI=24%-35%), *Listeria* (26% decrease, CI=8%-40%), and *Salmonella* (10% decrease CI=3%-16%); rates were higher for *Vibrio* (85% increase, CI=36%-150%). The incidence of infection with *Cryptosporidium* did not change significantly. The incidence of *Vibrio* infection has been increasing since approximately 2001 and the most marked decreases in *Campylobacter, Listeria,* and *Salmonella* infections occurred before 2004. The incidence of STEC O157 infection in 2009 was similar to that in 2004. In comparison with 2006-2008, the rates of *Shigella* (27% decrease, CI=4%-44%) and STEC O157 (25% decrease, CI=10%-37%) infection were significantly lower.

**CDC Editorial Note:** FoodNet surveillance data for 2009 show reductions in the incidence of STEC O157 and *Shigella* infections, but little or no recent progress for other pathogens. Of the four infections with *Healthy People 2010* targets (*Campylobacter, Listeria, Salmonella,* and STEC O157), only the target for STEC O157 was met in 2009. *Salmonella* infections declined slightly in 2009. A modest increase in the incidence of *Listeria* infection is a concern; however, the incidence of *Listeria* infection continues to be substantially lower than at the start of FoodNet surveillance in 1996. Continued increase in the incidence of *Vibrio* infection points to a
need for improved prevention measures. *Shigella* is often transmitted directly from person-to-person, so food safety measures might not relate to the decrease in shigellosis.8

To optimally prevent foodborne illness, the routes of exposure to these pathogens must be understood better so that additional targeted control measures can be developed, even as U.S. food consumption patterns and food industry processes evolve. FoodNet studies have demonstrated associations between illness and consumption of foods such as undercooked ground beef, chicken, and eggs.1 Recent outbreak investigations have identified novel food and nonfood vehicles, including jalapeno peppers,3 peanut butter–containing products,4 raw cookie dough,5 and direct contact with baby chicks, turtles, and African dwarf frogs.6,8

Efforts to reduce contamination of meat, poultry, produce, and other foods are ongoing. Data from the U.S. Department of Agriculture’s Food Safety and Inspection Service (FSIS) initiative to reduce *Salmonella* contamination of meat and poultry during processing show that fewer cultures of raw broiler chicken samples yielded *Salmonella* in 2009 (7.2%) than in 2006 (11.4%).11 In addition, the percentage of broiler chicken slaughter establishments meeting FSIS’s rigorous category 1 *Salmonella* contamination criteria increased from 49% in 2006 to 82% in 2009. Similarly, the recent decrease in STEC O157 infection might reflect, in part, control efforts in ground beef processing and produce growing practices. In 2009, the Food and Drug Administration issued a final regulation on egg safety6 and draft commodity-specific guidance for leafy greens, tomatoes, and melons6 to help identify and implement measures to minimize the risk for microbial contamination throughout the supply chain.

FoodNet surveillance relies on isolation of the pathogen by culture of clinical specimens; therefore, changes in laboratory practices, such as increasing use of nonculture tests for STEC6 and *Campylobacter*, might affect the reported incidence of infection. Monitoring of the use of such tests for STEC suggests that in 2009, the total number of STEC (O157 and non-O157) cases would not have been substantially greater than that reported (CDC, unpublished data, 2010). No data exist regarding the effect of nonculture-based *Campylobacter* testing.

The findings in this report are subject to at least two limitations. First, differences in health-care seeking behaviors among age groups, rather than true differences in the actual incidence of illness, can contribute to the observed differences between age groups.10 In addition, although the FoodNet population is similar demographically to the U.S. population, findings within FoodNet might not be representative of the entire U.S. population.1

To reduce the incidence of foodborne infections further, multifaceted approaches involving public health, regulatory agencies, industry, and consumers are required. More detailed information on food safety issues and practices, including steps consumers can take to protect themselves, is available at http://www.foodsafetyworkinggroup.gov, http://www.foodsafety.gov, and http://www.fightbac.org.

**REFERENCES**


*Additional information about FoodNet is available at http://www.cdc.gov/foodnet.*

†In Connecticut, Georgia, Maryland, Minnesota, New Mexico, Oregon, Tennessee, and in selected counties in California, Colorado, and New York.

‡Additional information about the FDA egg safety regulation (Prevention of *Salmonella* Enteritidis in shell eggs during production, storage, and transportation; final rule—July 9, 2009) is available at http://edocket.access.gpo.gov/2009/pdf/e9-16119.pdf.

§Additional information about the FDA egg safety regulation (Prevention of *Salmonella* Enteritidis in shell eggs during production, storage, and transportation; final rule—July 9, 2009) is available at http://edocket.access.gpo.gov/2009/pdf/e9-16119.pdf.

#The 2009 FDA guides for industry to minimize microbial food safety hazards for leafy greens, tomatoes, and melons are available at http://www.fda.gov/food/guidancecomplianceregulatoryinformation/guidedocuments/default.htm.

**Tick-Borne Encephalitis Among U.S. Travelers to Europe and Asia—2000-2009**

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**Tick-borne encephalitis virus** (TBEV) is the most common arbovirus transmitted by ticks in Europe. Approximately 10,000 cases of tick-borne encephalitis (TBE) are reported annually in Europe and Russia.1 Although TBE is endemic in parts of China, information regarding its incidence is limited.1-2 TBEV is closely related to Powassan virus (POWV), another tick-borne flavivirus that is a rare cause of