Foodborne Disease Active Surveillance Network

FoodNet

2015 Surveillance Report

(Final Data)

Centers for Disease Control and Prevention
National Center for Emerging and Zoonotic Infectious Diseases

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Background

The Foodborne Diseases Active Surveillance Network (FoodNet) tracks important illnesses transmitted commonly by food, generating information used to guide and monitor food safety policy and prevention efforts in the United States. FoodNet contributes to food safety efforts by providing data used to estimate the burden of foodborne illness in the United States, monitoring changes in incidence of specific illnesses over time, attributing illnesses to specific sources and settings, and disseminating information on enteric diseases. Foodnet is a collaborative program of the Centers for Disease Control and Prevention (CDC), 10 state health departments, the United States Department of Agriculture's Food Safety and Inspection Service (USDA-FSIS), and the United States Food and Drug Administration (FDA), FoodNet conducts population-based active surveillance for laboratory-confirmed infections caused by seven bacterial pathogens (*Campylobacter*, *Listeria*, *Salmonella*, Shiga toxin-producing *Escherichia coli* [STEC], *Shigella*, *Vibrio*, and *Yersinia*), two parasitic pathogens (*Cyclospora* and *Cryptosporidium*), and hemolytic uremic syndrome (HUS). This report describes final FoodNet surveillance data for infections caused by *Campylobacter*, *Cryptosporidium*, *Cyclospora*, *Listeria*, *Salmonella*, STEC O157, STEC non-O157, *Shigella*, *Vibrio*, and *Yersinia* for 2015, HUS for 2014, and changes in incidence of these conditions over time.

Starting with two states and 12 counties in 1996, FoodNet's surveillance area (https://www.cdc.gov/foodnet/surveillance-areas.html) has grown to include 15% of the United States population, approximately 48 million people. Since 2004, about 15% area has included the states of Connecticut, Georgia, Maryland, Minnesota, New Mexico, Oregon, Tennessee, and selected counties in California, Colorado, and New York (Table 1).

Methods

Active surveillance for laboratory-confirmed infections

FoodNet has conducted active, population-based surveillance for laboratory-confirmed infections of *Campylobacter*, *Listeria*, *Salmonella*, STEC O157, *Shigella*, *Vibrio*, and *Yersinia* since 1996; *Cryptosporidium* and *Cyclospora* since 1997; and STEC non-O157 since 2000. A laboratory-confirmed infection is defined as isolation from a culture (for bacteria) or identification of a pathogen (for parasites) from a clinical specimen. FoodNet personnel regularly communicate with clinical laboratories serving the surveillance area. Hospitalizations among patients with laboratory-confirmed infections occurring seven days before or after the specimen collection date are recorded. The patient's outcome (dead or alive) is recorded at hospital discharge (or, if the patient was not hospitalized, at seven days after the specimen collection date). This report includes infections that occurred in 2015 and cases of HUS that occurred in 2014; data for this report was extracted from the surveillance database in June 2016. Changes in incidence compared with three time periods, 1996–1998, 2006–2008, and 2012–2014 (2011–2013 for HUS), are provided.

Surveillance for Hemolytic Uremic Syndrome (HUS)

Active surveillance for HUS, a complication of STEC infection characterized by anemia, low platelet count, and kidney failure, was conducted for cases in children younger than 18 years (pediatric cases) through a network of nephrologists and infection control practitioners and review of hospital discharge data. A case of HUS is defined as any illness diagnosed as post-diarrheal HUS by a physician or any hospitalized illness with an ICD-9-CM or ICD-10-CM code specifying HUS, acute renal failure with hemolytic anemia and thrombocytopenia, or thrombotic thrombocytopenic purpura with diarrhea. Incidence of HUS was calculated for 1997–2014.

Surveillance for infections diagnosed by positive culture-independent diagnostic tests (CIDTs)

Clinical laboratories increasingly use CIDTs to diagnose bacterial enteric infections, a trend that is challenging the ability of surveillance systems to identify infections, characterize pathogens, monitor trends, and detect outbreaks. A large proportion of positive CIDT reports were not confirmed by culture, either because the specimen was not cultured or because a culture did not yield the pathogen.

FoodNet began routine surveillance of all reported positive CIDT results without culture confirmation for STEC in 2008, *Campylobacter* in 2009, and for all other FoodNet pathogens in 2011. FoodNet has summarized CIDT data, and it's impact on surveillance, during 2012-2014 (Iwatmoto et al., 2015). FoodNet's 2015 preliminary report (Huang et al., 2016) has more information on the impact of CIDT.

Data Analysis

Population estimates were obtained from the U.S. Census Bureau for the FoodNet surveillance area (U.S. Census Bureau, 2016). Incidence was calculated for each pathogen by dividing the number of laboratory-confirmed infections reported through FoodNet sites in 2015 by U.S. Census Bureau population estimates for FoodNet surveillance areas for 2015 (Table 1). For HUS, incidence was calculated by dividing the number of cases of HUS in each year by the census population estimates for that year. Case fatality rates (CFR) were calculated by dividing the number of deaths for each pathogen by the number of laboratory-confirmed infections and multiplying by 100. Age was grouped into categories <5, 5–9, by intervals of 10 through 79, and ≥80 years.

A main-effects, log-linear Poisson regression model (negative binomial model) with 95% confidence intervals (CIs) was used to estimate changes in incidence from the period 1996–1998 to the year 2015, from 2006–2008 to 2015, and from 2012–2014 to 2015. This model accounts for site-to-site variation and changes in the population size in FoodNet surveillance areas. As a measure of overall change in incidence of infections, data were combined for *Campylobacter*, *Cryptosporidium*, *Listeria*, *Salmonella*, *Shigella*, STEC O157, STEC non-O157, *Vibrio*, and *Yersinia* weighted by incidence of infection for each pathogen. Changes in incidence for STEC non-O157 were not assessed for 2015 compared with 1996–1998 and 2006–2008 because of changes in diagnostic practices, specifically the use of the enzyme immunoassay for Shiga toxins (Gould et al., 2015). An insufficient sample size for infections of *Cyclospora* prevented the assessment of incidence changes from any of the three time periods.

Results

In 2015, FoodNet identified 20,098 laboratory-confirmed infections, as well as 4,598 hospitalizations and 77 deaths related to these infections (Tables 2, 5, 7). The number of infections and incidence rate per 100,000 persons varied by pathogen (Tables 2, 3): *Salmonella* (7,719; 15.74), *Campylobacter* (6,289; 12.82), *Shigella* (2,645; 5.39), *Cryptosporidium* (1,658; 3.38), STEC non-O157 (807; 1.65), STEC O157 (465; 0.95), *Vibrio* (195; 0.40), *Yersinia* (139; 0.28), *Listeria* (116; 0.24), and *Cyclospora* (65; 0.13). Incidence rates were highest in children <5 years compared with other age groups for all pathogens except *Cyclospora*, *Listeria*, and *Vibrio* (Table 4). Compared with all other pathogens, *Listeria* had the highest CFR (12.93 deaths per 100 infections) and the highest percentage of infections hospitalized (95.7%) (Tables 5, 7). The incidence rate per 100,000 was higher among males than females for *Campylobacter* (14.43 compared with 11.25), *Listeria* (0.30 compared with 0.18), *Shigella* (6.08 compared with 4.70), *Vibrio* (0.52 compared with 0.28), and *Cryptosporidium* (3.46 compared with 3.30) (Table 4).

Among 2,767 (40.9%) of Campy isolates in which the state public health laboratory identified the species, the most common were *C. jejuni* (2,437 [88.1%]), *C. coli* (216 [7.8%]), and *C. upsaliensis* (60 [2.2%]) (Table 8). Among 7,220 (93.5%) *Salmonella* isolates serotyped, the most common serotypes were Enteritidis (1,388 [19.2%]), Newport (825 [11.4%]),

and Typhimurium (755 [10.4%]) (Table 9). *Salmonella* serotype Poona became the sixth most common serotype due to a large multistate outbreak associated with cucumbers (Table 9). Among the 1,168 (91.8%) STEC infections with an O serogroup identified, the most common serogroups were O157 (465 [39.8%]), O26 (206 [17.6%]), and O103 (167 [14.3%]) (Table 10). Among the 2,431 (91.9%) *Shigella* isolates with species information, the most common species were *S. sonnei* (2,015 [82.9%]), and *S. flexneri* (410 [16.9%]) (Table 11). Among the 180 (99.4%) *Vibrionaceae* isolates with genus and species information, the most common were *V. parahaemolyticus* (116 [64.4%]), *V. alginolyticus* (27 [15.0%]), and *V. vulnificus* (13 [7.2%]) (Table 12).

Compared with 2012–2014, the incidence of infection was significantly higher in 2015 for STEC non-O157 (41% increase [95% CI=22%–63%]) and *Cryptosporidium* (60% increase [95% CI=22%–111%]); incidence did not change significantly for *Campylobacter*, *Listeria*, *Salmonella*, *Shigella*, STEC O157, *Vibrio*, or *Yersinia* (Table 15). Among the top three *Salmonella* serotypes, incidence of infection was significantly lower for Typhimurium (15% decrease [95% CI=4%–25%]) and unchanged for Enteritidis and Newport. The overall combined estimated incidence of infection for all pathogens tracked did not change significantly in 2015 when compared with 2012–2014.

Compared with 2006–2008, the incidence of infection was significantly higher in 2015 for *Vibrio* (35% increase [95% CI=8%–68%]), and *Cryptosporidium* (81% increase [95% CI=37%–138%]), and significantly lower for STEC O157 (30% decrease [95% CI=16%–42%]); incidence did not change significantly for *Campylobacter*, *Listeria*, *Salmonella*, *Shigella*, or *Yersinia (Table 15)*. Among the top three *Salmonella* serotypes, incidence of infection in 2015 was significantly lower for serotype Typhimurium (33% decrease [95% CI=24%–41%]) and unchanged for Enteritidis and Newport. The overall combined estimated incidence of infection for all pathogens tracked did not change significantly in 2015 when compared with 2006–2008.

Compared with 1996–1998, the incidence of infection was significantly lower in 2015 for *Campylobacter* (26% decrease [95% CI=19%–33%]), *Listeria* (45% decrease [95% CI=28%–57%]), *Shigella* (48% decrease [95% CI=28%–62%]), STEC O157 (44% decrease [95% CI=30%–55%]), and *Yersinia* (59% decrease [95% CI=46%–68%]), and was higher for *Vibrio* (114% increase [95% CI=59%–187%]) and *Cryptosporidium* (68% increase [95% CI=12%–153%]); incidence did not change for *Salmonella*. Among the top three *Salmonella* serotypes, incidence of infection was significantly higher in 2015 for Enteritidis (37% increase [95% CI=14%–65%]) and Newport (76% increase [95% CI=36%–128%]) and significantly lower for Typhimurium (66% decrease [95% CI=60%–70%]). The overall combined estimated incidence of infection for all pathogens tracked was 30% lower in 2015 when compared with 1996–1998 (Table 15).

FoodNet received reports of 61 pediatric HUS cases in 2014. Two children died. Thirty-two (52.5%), cases occurred in children <5 years. Shiga toxin-producing *E.coli* (STEC) infection was confirmed in 42 (68.9%) HUS cases, probable in 9 (14.8%) cases, and suspected in the remaining 10 (16.4%) (Table 16). Among the 42 children with confirmed STEC infection, the O groups isolated were O157 in 37 (88.1%), O121 in 2 (4.8%), O111 in 1 (2.4%), both O157 and O45 in 1 (2.4%), and undetermined in 1 (2.4%). The incidence of pediatric HUS per 100,000 children in 2014 (0.53) was lower than the previous three years (0.79 in 2013, 0.63 in 2012, and 0.62 in 2011) (Figure 4). Compared with 2006–2008, the incidence of HUS in 2014 was significantly lower for all children (32% decrease [95%CI=9%–49%) and for those <5 years (46% decrease [95% CI=21%–63%]); however, no significant change was observed in 2014 compared with 2011–2013. In 2014, there were 98 confirmed *E.coli* O157 infections in children <5 years; 22 (22.4%) developed HUS (Table 16).

Among infections caused by all pathogens, 925 (4.6%) were associated with outbreaks, with most (58.5%) of these were assocaited with foodborne outbreaks (Table 13). *Cyclospora* had the highest proportion of outbreak-associated infections (30.8%). Among 15,934 (79.3%) infections for which patient international travel information was available, a total of 1,803 (11.3%) infections were travel-associated (Table 14).

Infections caused by *Campylobacter*, *Cryptosporidium*, *Cyclospora*, *Salmonella*, STEC O157, STEC non-O157 and *Vibrio* peaked in early July, August, and September. The number of *Listeria*, *Shigella*, and *Yersinia* infections was similar throughout the year (Figures 1, 2, 3).

In 2015, FoodNet received 5,511 CIDT positive reports (Table 17). Among 3,430 positive CIDT reports without culture confirmation, *Campylobacter* accounted for the highest number (2,198 [25.9%]) of positive CIDT reports, followed by *Shigella* (426 [16.7%]), STEC (254 [16.6%]), *Yersinia* (15 [9.7%]), *Salmonella* (531 [5.2%]) and *Vibrio* (9 [4.4%]). Among the total number of CIDT reports, 2,081 (37.7%) were from specimens with pathogen confirmation by culture, 1,314 (23.9%) specimens were culture-negative, and 2,116 (38.5%) specimens were not cultured.

Limitations

The findings in this report are subject to limitations. First, healthcare seeking behaviors and other characteristics of the surveillance area population might not reflect those of the entire United States. Second, many infections transmitted commonly through food (e.g., norovirus infection) are not monitored by FoodNet because these pathogens are not nationally notifiable nor identified routinely in clinical laboratories. Third, the proportion of illnesses transmitted by non-food routes differ by pathogen. The route cannot be determined from individual, sporadic illnesses, and therefore, the data provided in this report do not exclusively relate to infections from food. Fourth, in cases of infection that resulted in death, infection with the enteric pathogen might not have been the primary cause of death. Fifth, annual changes in incidence might reflect either annual variation or sustained trends; additional data are needed to further discern these trends. Finally, the increasing use of CIDT may affect trends in incidence.

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Table 1a. Comparison of FoodNet Surveillance Population to U.S. Population, Overall and by Site—2015

	FoodNet Surveillance Population		U.S. Population	CA*		CO*		CT		GA		MD	
	n	(%)	N	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
Total population	49,037,552		321,418,820	N=3,629,776		N=3,077,326		N=3,590,886		N=10,214,860		N=6,006,401	
AGE													
<5	2,957,613	(14.9)	19,907,281	203,265	(5.6)	191,629	(6.2)	187,620	(5.2)	660,045	(6.5)	369,035	(6.1)
5–9	3,090,638	(15.1)	20,487,176	203,223	(5.6)	202,933	(6.6)	205,776	(5.7)	705,117	(6.9)	374,708	(6.2)
10–19	6,306,844	(15.1)	41,731,233	396,999	(10.9)	394,583	(12.8)	476,078	(13.3)	1,418,744	(13.9)	759,736	(12.6)
20–29	6,798,591	(15.1)	45,200,867	532,096	(14.7)	452,756	(14.7)	467,909	(13.0)	1,451,888	(14.2)	821,815	(13.7)
30–39	6,522,409	(15.5)	42,050,233	574,808	(15.8)	470,899	(15.3)	431,623	(12.0)	1,362,003	(13.3)	798,728	(13.3)
40–49	6,417,743	(15.6)	41,069,042	515,554	(14.2)	421,814	(13.7)	476,624	(13.3)	1,393,741	(13.6)	799,172	(13.3)
50–59	6,860,939	(15.5)	44,142,259	495,528	(13.7)	404,758	(13.2)	553,041	(15.4)	1,362,183	(13.3)	877,441	(14.6)
60–69	5,413,888	(15.4)	35,137,345	380,915	(10.5)	307,220	(10.0)	407,977	(11.4)	1,031,058	(10.1)	649,132	(10.8)
70–79	2,910,801	(14.8)	19,606,882	196,098	(5.4)	145,249	(4.7)	223,175	(6.2)	549,591	(5.4)	344,129	(5.7)
80+	1,758,086	(14.5)	12,086,502	131,290	(3.6)	85,485	(2.8)	161,063	(4.5)	280,490	(2.7)	212,505	(3.5)
SEX													
Female	24,969,675	(15.3)	163,189,523	1,835,759	(50.6)	1,542,371	(50.1)	1,839,139	(51.2)	5,234,978	(51.2)	3,095,316	(51.5)
Male	24,067,877	(15.2)	158,229,297	1,794,017	(49.4)	1,534,955	(49.9)	1,751,747	(48.8)	4,979,882	(48.8)	2,911,085	(48.5)
ETHNICITY													
Hispanic	5,913,852	(10.4)	56,592,793	787,186	(21.7)	686,194	(22.3)	553,781	(15.4)	955,434	(9.4)	572,373	(9.5)
Non-Hispanic	43,123,700	(16.3)	264,826,027	2,842,590	(78.3)	2,391,132	(77.7)	3,037,105	(84.6)	9,259,426	(90.6)	5,434,028	(90.5)
RACE													
Asian/Pacific Islander	2,880,709	(15.4)	18,742,385	1,004,747	(27.7)	139,475	(4.5)	170,283	(4.7)	421,348	(4.1)	398,464	(6.6)
Black	8,003,606	(18.8)	42,632,530	351,228	(9.7)	173,278	(5.6)	418,185	(11.6)	3,240,294	(31.7)	1,829,583	(30.5)
American Indian/ Alaskan Native	604,935	(15.1)	4,010,885	36,550	(1.0)	42,341	(1.4)	19,132	(0.5)	51,405	(0.5)	33,792	(0.6)
Multiple	1,260,531	(15.3)	8,248,411	180,766	(5.0)	91,876	(3.0)	80,452	(2.2)	205,849	(2.0)	162,805	(2.74)
White	36,287,771	(14.6)	247,784,609	2,056,485	(56.7)	2,630,356	(85.5)	2,902,834	(80.8)	6,295,964	(61.6)	3,581,757	(59.6)

* This FoodNet site includes only selected counties; California includes Alameda, San Francisco, and Contra Costa; Colorado includes Adams, Arapahoe, Denver, Douglas, Jefferson, Boulder, and Broomfield.

Continued

Table 1b. Comparison of FoodNet Surveillance Population to U.S. Population, Overall and by Site—2015

	FoodNet Surveillance Population		U.S. Population	MN		NM		NY*		OR		TN	
	n	(%)	N	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
Total population	49,037,552		321,418,820	N=5,489,594		N=2,085,109		N=4,314,324		N=4,028,977		N=6,600,299	
AGE													
<5	2,957,613	(14.9)	19,907,281	350,534	(6.4)	135,024	(6.5)	227,488	(5.3)	230,790	(5.7)	402,183	(6.1)
5–9	3,090,638	(15.1)	20,487,176	360,195	(6.6)	139,940	(6.7)	238,041	(5.5)	242,907	(6.0)	417,798	(6.3)
10–19	6,306,844	(15.1)	41,731,233	715,068	(13.0)	276,621	(13.3)	541,991	(12.6)	486,104	(12.1)	840,920	(12.7)
20–29	6,798,591	(15.1)	45,200,867	728,364	(13.3)	292,415	(14.0)	598,507	(13.9)	543,656	(13.5)	909,185	(13.8)
30–39	6,522,409	(15.5)	42,050,233	731,905	(13.3)	263,136	(12.6)	501,626	(11.6)	548,572	(13.6)	839,109	(12.7)
40–49	6,417,743	(15.6)	41,069,042	674,534	(12.3)	238,295	(11.4)	532,924	(12.4)	508,451	(12.6)	856,634	(13.0)
50–59	6,860,939	(15.5)	44,142,259	786,936	(14.3)	278,722	(13.4)	651,789	(15.1)	536,784	(13.3)	913,757	(13.8)
60–69	5,413,888	(15.4)	35,137,345	601,292	(11.0)	244,741	(11.7)	529,396	(12.3)	504,323	(12.5)	757,834	(11.5)
70–79	2,910,801	(14.8)	19,606,882	322,504	(5.9)	138,342	(6.6)	292,067	(6.8)	269,509	(6.7)	430,137	(6.5)
80+	1,758,086	(14.5)	12,086,502	218,262	(4.0)	77,873	(3.7)	200,495	(4.6)	157,881	(3.9)	232,742	(3.5)
SEX													
Female	24,969,675	(15.3)	163,189,523	2,759,730	(50.3)	1,051,688	(50.4)	2,192,049	(50.8)	2,035,807	(50.5)	3,382,838	(51.3)
Male	24,067,877	(15.2)	158,229,297	2,729,864	(49.7)	1,033,421	(49.6)	2,122,275	(49.2)	1,993,170	(49.5)	3,217,461	(48.7)
ETHNICITY													
Hispanic	5,913,852	(10.4)	56,592,793	284,214	(5.2)	1,001,258	(48.0)	221,003	(5.1)	511,901	(12.7)	340,508	(5.2)
Non-Hispanic	43,123,700	(16.3)	264,826,027	5,205,380	(94.8)	1,083,851	(52.0)	4,093,321	(94.9)	3,517,076	(87.3)	6,259,791	(94.8)
RACE													
Asian/Pacific Islander	2,880,709	(15.4)	18,742,385	271,609	(4.9)	39,418	(1.9)	116,603	(2.7)	195,147	(4.8)	123,615	(1.9)
Black	8,003,606	(18.8)	42,632,530	328,815	(6.0)	53,429	(2.6)	395,393	(9.2)	83,636	(2.1)	1,129,765	(17.1)
American Indian/ Alaskan Native	604,935	(15.1)	4,010,885	73,101	(1.3)	219,237	(10.5)	27,570	(0.6)	72,327	(1.8)	29,480	(0.4)
Multiple	1,260,531	(15.3)	8,248,411	130,563	(2.4)	51,888	(2.5)	89,950	(2.1)	148,181	(3.7)	118,201	(1.8)
White	36,287,771	(14.6)	247,784,609	4,685,506	(85.4)	1,721,137	(82.5)	3,684,808	(85.4)	3,529,686	(87.6)	5,199,238	(78.8)

* This FoodNet site includes only selected counties; New York includes Albany, Allegany, Cattaraugus, Chautauqua, Chemung, Clinton, Columbia, Delaware, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Livingston, Monroe, Montgomery, Niagara, Ontario, Orleans, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, Steuben, Warren, Washington, Wayne, Wyoming, and Yates.

Table 2. Number of Laboratory-confirmed Bacterial and Parasitic Infections, by Site and Pathogen—FoodNet, 2015

	CA*	CO*	CT	GA	MD	MN	NM	NY*	OR	TN	TOTAL
BACTERIAL											
Campylobacter	624	397	703	689	693	925	356	636	855	411	6,289
Listeria	19	5	20	16	13	3	3	15	14	8	116
Salmonella	601	316	450	2,113	935	974	429	486	518	897	7,719
Shigella	299	66	60	1,301	198	292	72	43	106	208	2,645
STEC† 0157	47	38	27	27	24	114	7	27	108	46	465
STEC non-0157	114	71	56	77	53	123	29	58	109	117	807
Vibrio	36	5	31	24	37	20	1	10	25	6	195
Yersinia	13	6	10	19	18	23	3	18	21	8	139
PARASITIC											
Cryptosporidium	63	69	82	406	103	319	54	99	197	266	1,658
Cyclospora	3	3	16	34	3	1	2	2	0	1	65
TOTAL	**1,819**	**976**	**1,455**	**4,706**	**2,077**	**2,794**	**956**	**1,394**	**1,953**	**1,968**	**20,098**

* This FoodNet site includes only selected counties; California includes Alameda, San Francisco, and Contra Costa; Colorado includs Adams, Arapahoe, Denver, Douglas, Jefferson, Boulder, and Broomfield; New York includes Albany, Allegany, Cattaraugus, Chautauqua, Chemung, Clinton, Columbia, Delaware, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Livingston, Monroe, Montgomery, Niagara, Ontario, Orleans, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, Steuben, Warren, Washington, Wayne, Wyoming, and Yates.

† Shiga toxin-producing *Escherichia coli*

Table 3. Incidence* of Bacterial and Parasitic Infections, by Site and Pathogen—FoodNet, 2015

	CA†	CO†	CT	GA	MD	MN	NM	NY†	OR	TN	Overall
BACTERIAL											
Campylobacter	17.19	12.90	19.58	6.75	11.54	16.85	17.07	14.74	21.22	6.23	12.82
Listeria	0.52	0.16	0.56	0.16	0.22	0.05	0.14	0.35	0.35	0.12	0.24
Salmonella	16.56	10.27	12.53	20.69	15.57	17.74	20.57	11.26	12.86	13.59	15.74
Shigella	8.24	2.14	1.67	12.74	3.30	5.32	3.45	1.00	2.63	3.15	5.39
STEC‡ 0157	1.29	1.23	0.75	0.26	0.40	2.08	0.34	0.63	2.68	0.70	0.95
STEC non-0157	3.14	2.31	1.56	0.75	0.88	2.24	1.39	1.34	2.71	1.77	1.65
Vibrio	0.99	0.16	0.86	0.23	0.62	0.36	0.05	0.23	0.62	0.09	0.40
Yersinia	0.36	0.19	0.28	0.19	0.30	0.42	0.14	0.42	0.52	0.12	0.28
PARASITIC											
Cryptosporidium	1.74	2.24	2.28	3.97	1.71	5.81	2.59	2.29	4.89	4.03	3.38
Cyclospora	0.08	0.10	0.45	0.33	0.05	0.02	0.10	0.05	0.00	0.02	0.13
SURVEILLANCE POPULATION	**3,629,776**	**3,077,326**	**3,590,886**	**10,214,860**	**6,006,401**	**5,489,594**	**2,085,109**	**4,314,324**	**4,028,977**	**6,600,299**	**49,037,552**

* Incidence rate per 100,000 population

† This FoodNet site includes only selected counties; California includes Alameda, San Francisco, and Contra Costa; Colorado includes Adams, Arapahoe, Denver, Douglas, Jefferson, Boulder, and Broomfield; New York includes Albany, Allegany, Cattaraugus, Chautauqua, Chemung, Clinton, Columbia, Delaware, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Livingston, Monroe, Montgomery, Niagara, Ontario, Orleans, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, Steuben, Warren, Washington, Wayne, Wyoming, and Yates.

‡ Shiga toxin-producing *Escherichia coli*.

Table 4a. Number and Incidence Rate (IR)* of Infections Caused by FoodNet Pathogens, by Age, Sex, Race, and Ethnicity—2015

	Campylobacter		*Listeria*		*Salmonella*		*Shigella*	
	n	IR	n	IR	n	IR	n	IR
AGE (YEARS)								
<5	616	20.83	8	0.27	1,665	56.30	550	18.60
5–9	253	8.19	0	0.00	552	17.86	547	17.70
10–19	504	7.99	0	0.00	682	10.81	208	3.30
20–29	945	13.90	3	0.04	949	13.96	339	4.99
30–39	815	12.50	2	0.03	728	11.16	328	5.03
40–49	821	12.79	9	0.14	738	11.50	254	3.96
50–59	918	13.38	17	0.25	905	13.19	242	3.53
60–69	803	14.83	20	0.37	740	13.67	118	2.18
70–79	419	14.39	32	1.10	496	17.04	39	1.34
80+	194	11.03	25	1.42	264	15.02	20	1.14
Unknown	1	-	0	-	0	-	0	-
SEX								
Female	2,808	11.25	44	0.18	4,063	16.27	1,173	4.70
Male	3,474	14.43	72	0.30	3,643	15.14	1,464	6.08
Unknown	7	-	0	-	13	-	8	-
ETHNICITY								
Hispanic	662	11.19	12	0.20	864	14.61	449	7.59
Non-Hispanic	4,594	10.65	99	0.23	5929	13.75	1789	4.15
Unknown	1,033	-	5	-	926	-	407	-
RACE								
Asian/Pacific Islander	200	6.94	8	0.28	364	12.64	52	1.81
Black	308	3.85	23	0.29	992	12.39	796	9.95
American Indian/Alaskan Native	86	14.22	1	0.17	77	12.73	24	3.97
Multiple	34	2.70	1	0.08	77	6.11	36	2.86
Other	217	-	6	-	271	-	138	-
White	4,556	12.56	74	0.20	5,255	14.48	1,320	3.64
Unknown	888	-	3	-	683	-	279	-
TOTAL	**6,289**	**12.82**	**116**	**0.24**	**7,719**	**15.74**	**2,645**	**5.39**

† Shiga toxin-producing *Escherichia coli*

Continued

Table 4b. Number and Incidence Rate (IR)*of Infections Caused by FoodNet Pathogens, by Age, Sex, Race, and Ethnicity—2015

	STEC† O157		STEC non-O157		*Vibrio*		*Yersinia*		*Cryptosporidium*		*Cyclospora*	
	n	IR	n	IR	n	IR	n	IR	n	IR	n	IR
AGE (YEARS)												
<5	110	3.72	200	6.76	2	0.07	22	0.74	226	7.64	0	0.00
5–9	74	2.39	63	2.04	12	0.39	5	0.16	141	4.56	0	0.00
10–19	90	1.43	149	2.36	10	0.16	12	0.19	196	3.11	1	0.02
20–29	66	0.97	137	2.02	20	0.29	17	0.25	277	4.07	4	0.06
30–39	33	0.51	66	1.01	36	0.55	10	0.15	261	4.00	11	0.17
40–49	21	0.33	40	0.62	27	0.42	12	0.19	186	2.90	16	0.25
50–59	27	0.39	49	0.71	29	0.42	15	0.22	144	2.10	17	0.25
60–69	21	0.39	52	0.96	30	0.55	17	0.31	108	1.99	9	0.17
70–79	16	0.55	31	1.06	24	0.82	21	0.72	81	2.78	6	0.21
80+	7	0.40	20	1.14	5	0.28	8	0.46	38	2.16	1	0.06
Unknown	0	-	0	-	0	-	0	-	0	-	0	-
SEX												
Female	261	1.05	467	1.87	70	0.28	87	0.35	824	3.30	43	0.17
Male	203	0.84	340	1.41	125	0.52	52	0.22	832	3.46	22	0.09
Unknown	1	-	0	-	0	-	0	-	2	-	0	-
ETHNICITY												
Hispanic	42	0.71	128	2.16	11	0.19	6	0.10	99	1.67	5	0.08
Non-Hispanic	383	0.89	606	1.41	158	0.37	111	0.26	1350	3.13	55	0.13
Unknown	40	-	73	-	26	-	22	-	209	-	5	-
RACE												
Asian/Pacific Islander	31	1.08	11	0.38	7	0.24	7	0.24	29	1.01	1	0.03
Black	28	0.35	45	0.56	10	0.12	11	0.14	213	2.66	2	0.02
American Indian/ Alaskan Native	2	0.33	6	0.99	0	0	2	0.33	10	1.65	0	0.00
Multiple	8	0.63	11	0.87	1	0.08	0	0	8	0.63	0	0.00
Other	14	-	53	-	2	-	4	-	29	-	2	-
White	345	0.95	619	1.71	154	0.42	97	0.27	1222	3.37	58	0.16
Unknown	37	-	62	-	21	-	18	-	147	-	2	-
TOTAL	**465**	**0.95**	**807**	**1.65**	**195**	**0.40**	**139**	**0.28**	**1,658**	**3.38**	**65**	**0.13**

* Incidence rate per 100,000 persons

† Shiga toxin-producing *Escherichia coli*

Table 5. Number and Percentage of Patients Hospitalized, by Pathogen—FoodNet, 2015

	Hospitalized n	Outpatient n	Unknown n	Total Infections n	Hospitalized (%)
BACTERIAL					
Campylobacter	1,087	4,759	443	6,289	(17.3)
Listeria	111	4	1	116	(95.7)
Salmonella	2,104	5,348	267	7,719	(27.3)
Shigella	626	1,923	96	2,645	(23.7)
STEC* O157	179	279	7	465	(38.5)
STEC non-O157	125	665	17	807	(15.5)
Vibrio	48	146	1	195	(24.6)
Yersinia	38	95	6	139	(27.3)
PARASITIC					
Cryptosporidium	276	1,346	36	1,658	(16.6)
Cyclospora	4	60	1	65	(6.2)
TOTAL	**4,598**	**14,625**	**875**	**20,098**	**(22.9)**

* Shiga toxin-producing *Escherichia coli*.

Table 6a. Number and Percentage of Patients Hospitalized, by Age Group and Pathogen—FoodNet, 2015

	< 5 Years				5–9 Years			
	Hospitalized n	Unknown n	Total Infections n	Hospitalized (%)	Hospitalized n	Unknown n	Total Infections n	Hospitalized (%)
BACTERIAL								
Campylobacter	59	50	616	(9.6)	22	25	253	(8.7)
Listeria	8	0	8	(100.0)	0	0	0	(0.00)
Salmonella	340	61	1,665	(20.4)	92	23	552	(16.7)
Shigella	62	17	550	(11.3)	80	18	547	(14.6)
STEC* O157	38	2	110	(34.5)	28	2	74	(37.8)
STEC non-O157	17	4	200	(8.5)	15	0	63	(23.8)
Vibrio	0	0	2	(0.00)	1	0	12	(8.3)
Yersinia	8	0	22	(36.4)	0	0	5	(0.00)
PARASITIC								
Cryptosporidium	19	7	226	(8.4)	16	5	141	(11.3)
Cyclospora	0	0	0	(0.00)	0	0	0	(0.00)
TOTAL	**551**	**141**	**3,399**	**(16.2)**	**254**	**73**	**1,647**	**(15.4)**

* Shiga toxin-producing *Escherichia coli*.

Continued

Table 6b. Number and Percentage of Patients Hospitalized, by Age Group and Pathogen—FoodNet, 2015

	10–19 Years				20–29 Years			
	Hospitalized n	Unknown n	Total Infections n	Hospitalized (%)	Hospitalized n	Unknown n	Total Infections n	Hospitalized (%)
BACTERIAL								
Campylobacter	70	35	504	(13.9)	99	92	945	(10.5)
Listeria	0	0	0	(0.00)	2	1	3	(66.7)
Salmonella	133	21	682	(19.5)	194	39	949	(20.4)
Shigella	51	7	208	(24.5)	101	11	339	(29.8)
STEC* 0157	28	2	90	(31.1)	26	0	66	(39.4)
STEC non-0157	23	4	149	(15.4)	16	5	137	(11.7)
Vibrio	0	0	10	(0.00)	5	0	20	(25.0)
Yersinia	3	0	12	(25)	6	1	17	(35.3)
PARASITIC								
Cryptosporidium	19	2	196	(9.7)	45	3	277	(16.2)
Cyclosporah	0	0	1	(0.00)	1	0	4	(25.0)
TOTAL	**327**	**71**	**1,852**	**(17.7)**	**495**	**152**	**2,757**	**(19.0)**

	30–39 Years				40–49 Years			
	Hospitalized n	Unknown n	Total Infections n	Hospitalized (%)	Hospitalized n	Unknown n	Total Infections n	Hospitalized (%)
BACTERIAL								
Campylobacter	100	77	815	(12.3)	131	61	821	(16.0)
Listeria	2	0	2	(100.0)	9	0	9	(100.0)
Salmonella	159	24	728	(21.8)	198	24	738	(26.8)
Shigella	100	15	328	(30.5)	74	12	254	(29.1)
STEC* 0157	9	0	33	(27.3)	10	0	21	(47.6)
STEC non-0157	9	1	66	(13.6)	9	0	40	(22.5)
Vibrio	2	0	36	(5.6)	2	0	27	(7.4)
Yersinia	2	1	10	(20.0)	1	1	12	(8.3)
PARASITIC								
Cryptosporidium	40	8	261	(15.3)	33	3	186	(17.7)
Cyclospora	1	0	11	(9.1)	0	0	16	(0.0)
TOTAL	**424**	**126**	**2,290**	**(18.5)**	**467**	**101**	**2,124**	**(22)**

* Shiga toxin-producing *Escherichia coli*.

Continued

Table 6c. Number and Percentage of Patients Hospitalized, by Age Group and Pathogen—FoodNet, 2015

	50–59 Years				60–69 Years			
	Hospitalized n	Unknown n	Total Infections n	Hospitalized (%)	Hospitalized n	Unknown n	Total Infections n	Hospitalized (%)
BACTERIAL								
Campylobacter	169	41	918	(18.4)	201	32	803	(25.0)
Listeria	14	0	17	(82.4)	20	0	20	(100.0)
Salmonella	284	28	905	(31.4)	298	22	740	(40.3)
Shigella	87	8	242	(36.0)	43	5	118	(36.4)
STEC* 0157	8	0	27	(29.6)	11	1	21	(52.4)
STEC non-0157	12	1	49	(24.5)	4	0	52	(7.7)
Vibrio	7	0	29	(24.1)	14	0	30	(46.7)
Yersinia	1	1	15	(6.7)	5	1	17	(29.4)
PARASITIC								
Cryptosporidium	34	4	144	(23.6)	21	2	108	(19.4)
Cyclospora	1	0	17	(5.9)	1	1	9	(11.1)
TOTAL	**617**	**83**	**2,363**	**(26.1)**	**618**	**64**	**1,918**	**(32.2)**

	70–79 Years				80+ Years			
	Hospitalized n	Unknown n	Total Infections n	Hospitalized (%)	Hospitalized n	Unknown n	Total Infections n	Hospitalized (%)
BACTERIAL								
Campylobacter	131	25	419	(31.3)	105	5	194	(54.1)
Listeria	32	0	32	(100.0)	25	0	25	(100.0)
Salmonella	252	17	496	(50.8)	154	8	264	(58.3)
Shigella	16	2	39	(41.0)	12	1	20	(60.0)
STEC* 0157	14	0	16	(87.5)	7	0	7	(100.0)
STEC non-0157	12	0	31	(38.7)	9	2	20	(45.0)
Vibrio	12	1	24	(50.0)	5	0	5	(100.0)
Yersinia	8	1	21	(38.1)	4	0	8	(50.0)
PARASITIC								
Cryptosporidium	39	1	81	(48.1)	10	1	38	(26.3)
Cyclospora	0	0	6	(0.0)	0	0	1	(0.0)
TOTAL	**516**	**47**	**1,165**	**(46.2)**	**332**	**17**	**582**	**(57.0)**

* Shiga toxin-producing *Escherichia coli*.

Table 7. Number of Deaths and Case Fatality Rate (CFR), by Pathogen—FoodNet, 2015

	Deaths n	Outcome Unknown† n	Infections n	(CFR)
BACTERIAL				
Campylobacter	13	393	6,289	(0.21)
Listeria	15	2	116	(12.93)
Salmonella	32	142	7,719	(0.41)
Shigella	1	69	2,645	(0.04)
STEC* O157	3	6	465	(0.65)
STEC non-O157	1	5	807	(0.12)
Vibrio	5	4	195	(2.56)
Yersinia	1	5	139	(0.72)
PARASITIC				
Cryptosporidium	6	24	1,658	(0.36)
Cyclospora	0	2	65	(0.00)
TOTAL	**77**	**652**	**20,098**	**(0.38)**

* Shiga toxin-producing *Escherichia coli*.

† Patient's outcome (assessed for non-hospitalized cases before or after seven days of specimen collection date and hospitalized cases at hospital discharge). When patient outcome cannot be determined, sites report outcome as unknown.

Table 8. Number and Percentage of Laboratory-confirmed *Campylobacter* Infections by Species—FoodNet, 2015

Campylobacter Species	Infections	
	n*	(%)
C. jejuni	2,437	(38.8)
C. coli	216	(3.4)
C. upsaliensis	60	(1.0)
C. lari	25	(0.4)
C. fetus	7	(0.1)
C. hyointestinalis	5	(0.1)
C. concisus	4	(0.1)
C. curvus	4	(0.1)
C. ureolyticus	3	(0.0)
C. gracilis	2	(0.0)
C. rectus	2	(0.0)
C. lanienae	1	(0.0)
C. showae	1	(0.0)
Not speciated	3,522	(56.0)
TOTAL	**6,289**	**(100.0)**

* Species represent *Campylobacter* isolates that were speciated at State Public Health Laboratories

Table 9. Number, Percentage, and Incidence Rate (IR) of Laboratory-confirmed *Salmonella* Infections Caused by the Top 20 *Salmonella* Serotypes, by Rank—FoodNet, 2015

Rank		*Salmonella* Serotype	Infections		IR*
2015	2010–2014		n	(%)	
1	1	**Enteritidis**	1,388	(18.0)	2.83
2	3	**Newport**	825	(10.7)	1.68
3	2	**Typhimurium**†	755	(9.8)	1.54
4	4	**Javiana**	575	(7.4)	1.17
5	5	**S. I 4,[5],12:i:-**‡	497	(6.4)	1.01
6	28	**Poona**	198	(2.6)	0.40
7	9	**Muenchen**	181	(2.3)	0.37
8	8	**Saintpaul**	157	(2.0)	0.32
9	6	**Heidelberg**	155	(2.0)	0.32
10	7	**Infantis**	148	(1.9)	0.30
11	10	**Montevideo**	133	(1.7)	0.27
11	14	**Oranienburg**	133	(1.7)	0.27
13	11	**S. I 13,23:b:-**	113	(1.5)	0.23
14	13	**Braenderup**	99	(1.3)	0.20
16	12	**Bareilly**	88	(1.1)	0.18
15	22	**Norwich**	89	(1.2)	0.18
17	16	**Mississippi**	78	(1.0)	0.16
18	15	**Thompson**	71	(0.9)	0.14
19	20	**Berta**	57	(0.7)	0.12
20	21	**Paratyphi B Var. L(+) Tartrate+ (Formerly Java)**	53	(0.7)	0.11
		SUB TOTAL	**5,793**	**(75.0)**	**11.81**
		All other serotyped isolates	1,204	(15.6)	2.46
		Not serotyped isolates	499	(6.5)	1.02
		Partially serotyped isolates	160	(2.1)	0.33
		Rough or nonmotile isolates	63	(0.8)	0.13
		TOTAL	**7,719**	**(100.0)**	**15.74**

* Incidence rate per 100,000 persons

† Typhimurium includes var. 5-(Formerly var. Copenhagen)

‡ Includes *S.* I 4,[5],12:i:- and S. I 4,5,12:i:-

Table 10. Number, Percentage, and Incidence Rate (IR) of Laboratory-confirmed Shiga Toxin-producing *Eschericia Coli* Non-O157 Infections Infections Caused by the Top Ten O Antigens, by Rank—FoodNet, 2015

Rank	STEC* O Antigen	Infections		IR†
		n	(%)	
1	**O 26**	206	(25.5)	0.42
2	**O 103**	167	(20.7)	0.34
3	**O 111**	125	(15.5)	0.25
4	**O 118**	31	(3.8)	0.06
4	**O 121**	30	(3.7)	0.06
6	**O 145**	22	(2.7)	0.04
7	**O 186**	15	(1.9)	0.03
8	**O 45**	13	(1.6)	0.03
9	**O 5**	11	(1.4)	0.02
10	**O 71**	9	(1.1)	0.02
	Undetermined	26	(3.2)	n/a
	Unknown	78	(96.7)	n/a
	All other	74	(9.2)	n/a
	TOTAL	**807**	**(100.0)**	**1.65**

* Shiga toxin-producing Escherichia coli

† Incidence rate per 100,000 persons

Table 11. Number, Percentage, and Incidence Rate (IR) of Laboratory-confirmed Shigella Infections, by Species—FoodNet, 2015

Shigella Species	Infections		IR*
	n	(%)	
S. sonnei	2,015	(76.2)	4.11
S. flexneri	410	(15.5)	0.84
S. boydii	3	(0.1)	0.01
S. dysenteriae	3	(0.1)	0.01
Unknown	2	(0.1)	n/a
Not serotyped	212	(8.0)	n/a
TOTAL	**2,645**	**(100.0)**	**5.39**

* Incidence rate per 100,000 persons

Table 12. Number, Percentage, and Incidence Rate (IR) of Laboratory-confirmed *Vibrionaceae* Infections, by Genus and Species—FoodNet, 2015

Genus and Species	Infections		IR*
	n	(%)	
Vibrio parahaemolyticus	116	(59.5)	0.24
Vibrio alginolyticus	27	(13.8)	0.06
Vibrio vulnificus	13	(6.7)	0.03
Vibrio fluvialis	7	(3.6)	0.01
Grimontia hollisae	6	(3.1)	0.01
Vibrio cholerae unspecified	4	(2.1)	0.01
Vibrio cholerae non-01. non-0139	3	(1.5)	0.01
Vibrio mimicus	3	(1.5)	0.01
Photobacterium damselae	1	(0.5)	0.00
Unknown	1	(0.5)	n/a
Not serotyped	14	(7.2)	n/a
TOTAL	**195**	**(100)**	**0.40**

* Incidence rate per 100,000 persons

Table 13. Number and Percentage of Outbreak-associated Infections, by Pathogen and Outbreak Type—FoodNet, 2015

	Infections Reported	Outbreak-associated Infections		Outbreak-associated Infections By Outbreak Type					
				Foodborne	Waterborne	Animal Contact	Person-to-Person	Environmental Contamination Other Than Food/Water	Indeterminante/Other/Unknown
		n	(%)	n	n	n	n	n	n
BACTERIAL									
Campylobacter	6,289	23	(0.4)	19	0	2	0	0	2
Listeria	116	6	(5.2)	6	0	0	0	0	0
Salmonella	7,719	535	(6.9)	411	0	29	18	0	77
Shigella	2,645	200	(0.6)	16	0	0	133	0	51
STEC* 0157	465	73	(15.7)	38	0	7	27	0	1
STEC non-0157	805	26	(3.2)	23	0	0	1	0	2
Vibrio	195	11	(5.6)	11	0	0	0	0	0
Yersinia	139	2	(1.4)	2	0	0	0	0	0
PARASITIC									
Cryptosporidium	1,658	30	(1.8)	1	10	5	9	0	5
Cyclospora	65	20	(30.8)	14	0	0	0	0	6
TOTAL	**20,098**	**925**	**(4.6)**	**541**	**10**	**43**	**188**	**0**	**144**

* Shiga toxin-producing *Escherichia coli.*

Table 14. Number and Percentage of Infections Associated with International Travel—FoodNet, 2015

	Total Infections Reported	Total Infections with Travel Information		Traveled*		Did Not Travel		Unknown Travel	
	n	n	(%)	n	(%)	n	(%)	n	(%)
BACTERIAL									
Campylobacter	6,289	4,841	(77.0)	686	(14.2)	4,155	(85.8)	1,448	(29.9)
Listeria	116	111	(95.7)	5	(4.5)	106	(95.5)	5	(4.5)
Salmonella	7,719	6,159	(79.8)	694	(11.3)	5,463	(88.7)	1,559	(25.3)
Shigella	2,645	1,943	(73.5)	131	(6.7)	1,811	(93.2)	702	(36.1)
STEC† 0157	465	441	(94.8)	19	(4.3)	422	(95.7)	24	(5.4)
STEC non-0157	807	758	(93.9)	119	(45.7)	639	(84.3)	49	(6.5)
Vibrio	195	163	(83.6)	10	(6.1)	153	(93.9)	32	(19.6)
Yersinia	139	114	(82.0)	3	(2.6)	111	(97.4)	25	(21.9)
PARASITIC									
Cryptosporidium	1,658	1,341	(80.9)	113	(8.4)	1,228	(91.6)	317	(23.6)
Cyclospora	65	63	(96.9)	23	(36.5)	40	(63.5)	2	(3.2)
TOTAL	**20,098**	**15,934**	**(79.3)**	**1,803**	**(11.3)**	**14,128**	**(88.7)**	**4,163**	**(26.1)**

* International travel is defined as before or after 30 days of onset for *Salmonella Typhi*, and *Listeria*, 15 days for *Cryptosporidium* and *Cyclospora*, and seven days for all other pathogens

† Shiga toxin-producing *Escherichia coli*.

Figure 1. Number of *Campylobacter*, *Cryptosporidium*, *Salmonella*, and *Shigella* Infections, by Month—FoodNet, 2015

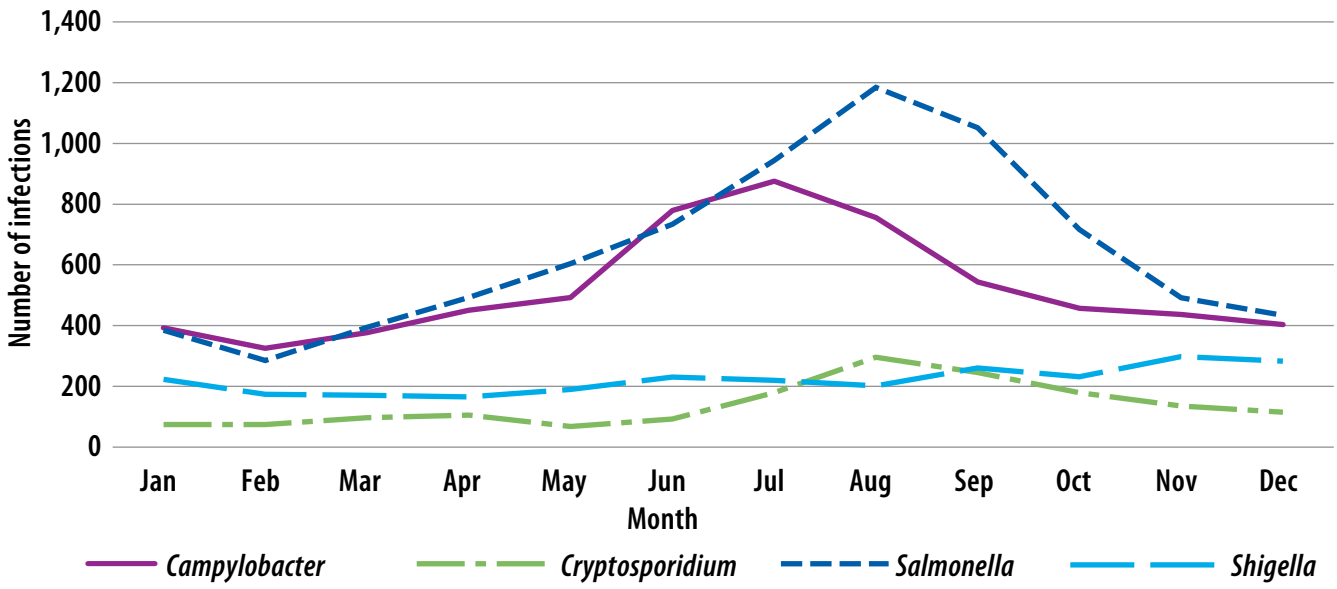


Figure 2. Number of *Cyclospora*, *Listeria*, *Vibrio*, and *Yersinia* Infections, by Month—FoodNet, 2015

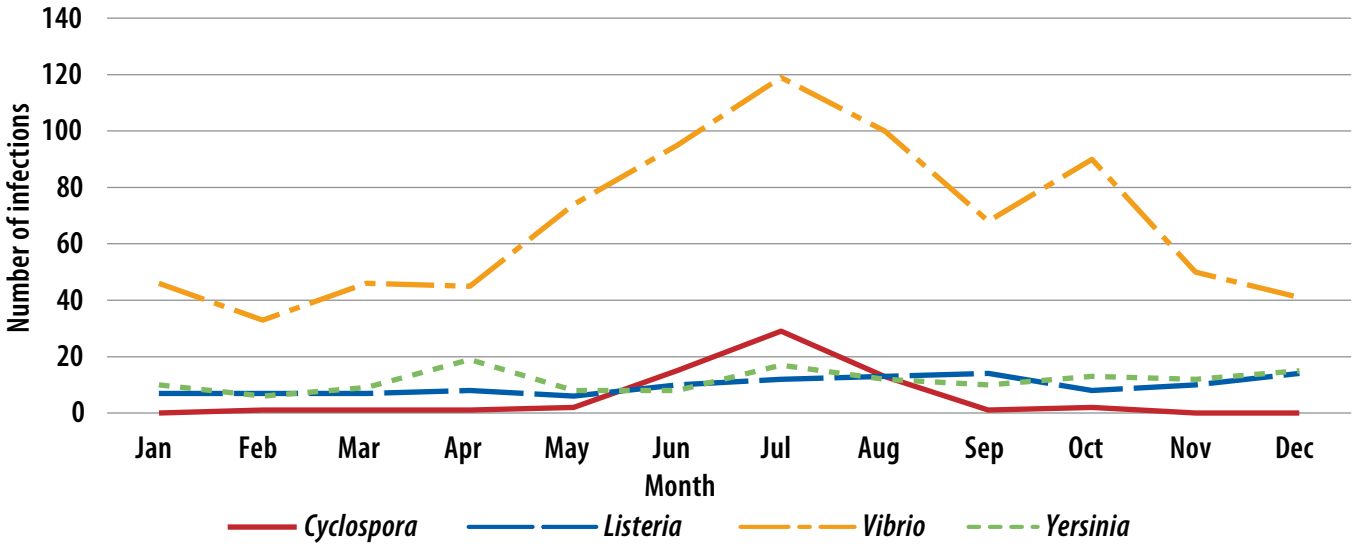
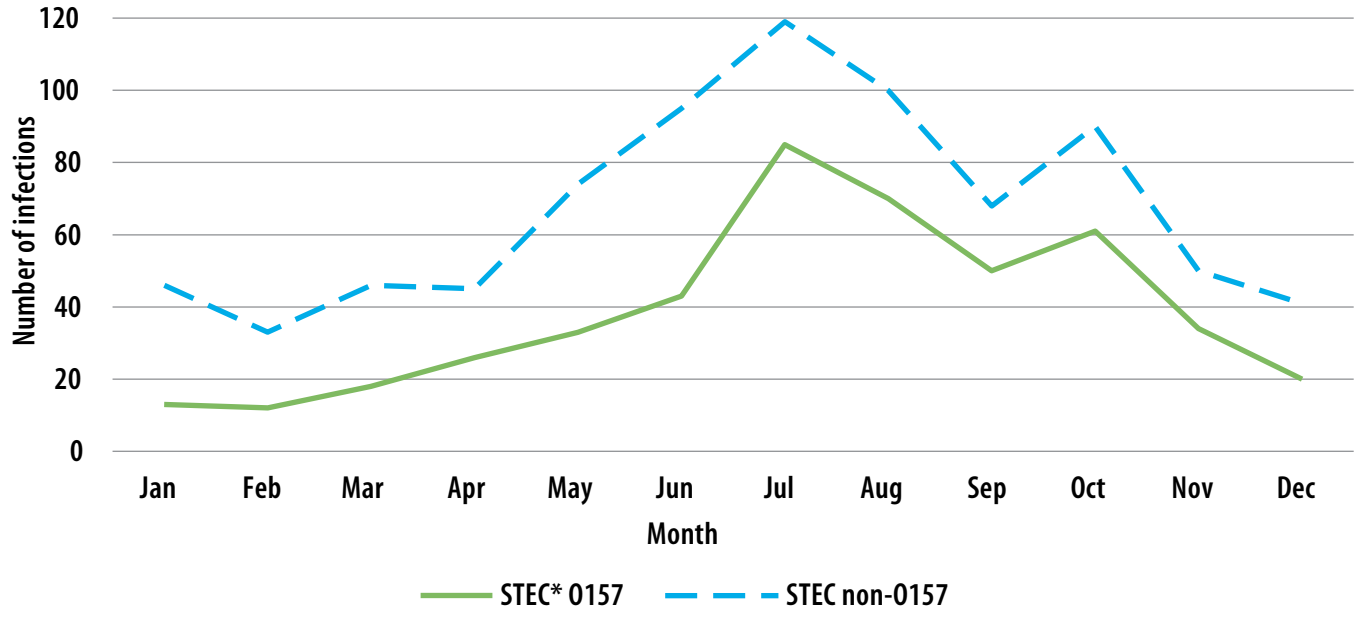


Figure 3. Number of Shiga Toxin-producing *Eschericia coli* O157 and Non-O157 Infections, by Month—FoodNet, 2015



* Shiga toxin-producing Escherichia coli.

Table 15. Percentage* Change in Incidence Rate and Confidence Intervals (CI) of Bacterial and Parasitic Infections in 2015 Compared with Average Annual Incidence Rate for 1996–1998, 2006–2008, and 2011–2014, by Pathogen—FoodNet, 2015

PATHOGEN	1996–1998 Comparison Period		2006–2008 Comparison Period		2012–2014 Comparison Period	
	% Change	(95% CI)	% change	(95% CI)	% change	(95% CI)
BACTERIAL						
Campylobacter	26%↓	(19%↓–33%↓)	8%↑	(0%–17%↑)	4%↓	(11%↓–4%↑)
Listeria	45%↓	(28%↓–57%↓)	12%↓	(30%↓–12%↑)	5%↓	(25%↓–20%↑)
Salmonella	4%↓	(11%↓–4%↑)	3%↑	(3%↓–10%↑)	3%↑	(3%↓–10%↑)
Shigella	48%↓	(28%↓–62%↓)	17%↓	(36%↓–7%↑)	3%↓	(25%↓–26%↑)
STEC† O157	44%↓	(30%↓–55%↓)	30%↓	(16%↓–42%↓)	14%↓	(28%↓–4%↑)
STEC non-O157	n/a	n/a	n/a	n/a	41%↑	(22%↑–63%↑)
Vibrio	114%↑	(59%↑–187%↑)	35%↑	(8%↑–68%↑)	15%↓	(31%↓–5%↑)
Yersinia	59%↓	(46%↓–68%↓)	18%↓	(35%↓–5%↑)	10%↓	(30%↓–14%↑)
PARASITIC						
Cryptosporidium	68%↑	(12%↑–153%↑)	81%↑	(37%↑–138%↑)	60%↑	(22%↑–111%↑)
Cyclospora	n/a	n/a	n/a	n/a	n/a	n/a
2015 OVERALL‡	**30%↓**	**(20%↓–38%↓)**	**4%↓**	**(14%↓–6%↑)**	**7%↓**	**(17%↓–3%↑)**

* Percentage change reported as increase (↑) or as decrease (↓) and shading denotes statistical significance at $p<0.05$ level.

† Shiga toxin-producing *Escherichia coli*.

‡ The measure of overall change in incidence combines data for *Campylobacter*, *Listeria*, *Salmonella*, STEC O157, *Vibrio*, and *Yersinia*, the six key bacterial pathogens for which >50% of illnesses are estimated to be commonly transmitted by food. The model weights by incidence of infection for each pathogen.

Table 16. Summary of Pediatric (<18 Years) Post-diarrheal Hemolytic Uremic Syndrome (HUS) Cases—FoodNet, 2014

	n/N	(%)
Pediatric post-diarrheal HUS cases	61	(100.0)
DEMOGRAPHICS		
Female	36/61	(59.0)
Age group		
<5 years	32/61	(52.5)
5–14 years	27/61	(44.3)
15–17 years	2/61	(3.3)
OUTCOME		
Hospitalization, median days (range)	13 (1–368)	n/a
Death	2/61	(3.3)
SEASONALITY		
Illness onset that began June–September	30/61	(49.2)
STEC CASE CLASSIFICATION*		
Confirmed†	42/61	(68.9)
Probable‡	9/61	(14.8)
Suspected§	10/61	(16.4)
HUS among children <5 yrs with confirmed STEC O157 infection	22/98	(22.4)

* Case classification based on 2014 CSTE case definition of Shiga toxin-producing *Escherichia coli* (STEC): https://wwwn.cdc.gov/nndss/conditions/shiga-toxin-producing-escherichia-coli/case-definition/2014/

† Isolation of E.coli with Shiga toxin production or the presence of Shiga toxin genes, or isolation of *E.coli* O157 that produces the H7 antigen. O Serogroups were O157 (37 patients), O121 (2), O111(1), both O157 and O45 (1), and undetermined (1). Six cases also had elevated antibody titer to E.coli O157 or O111.

‡ Isolation of *E.coli* O157 without H7 antigen or Shiga toxin production (0 patients) or an elevated antibody titer to *E.coli* O157 or O111 without isolation of STEC (9). We did not collect information necessary to classify HUS cases based on epidemiologic relationship to a confirmed or probable case.

§ Identification of Shiga toxin without the isolation of STEC (1 patient) or a pediatric post-diarrheal HUS case without sufficient laboratory evidence for STEC (9).

Figure 4. Incidence of Pediatric Post-diarrheal Hemolytic Uremic Syndrome (HUS)—FoodNet, 1997–2014

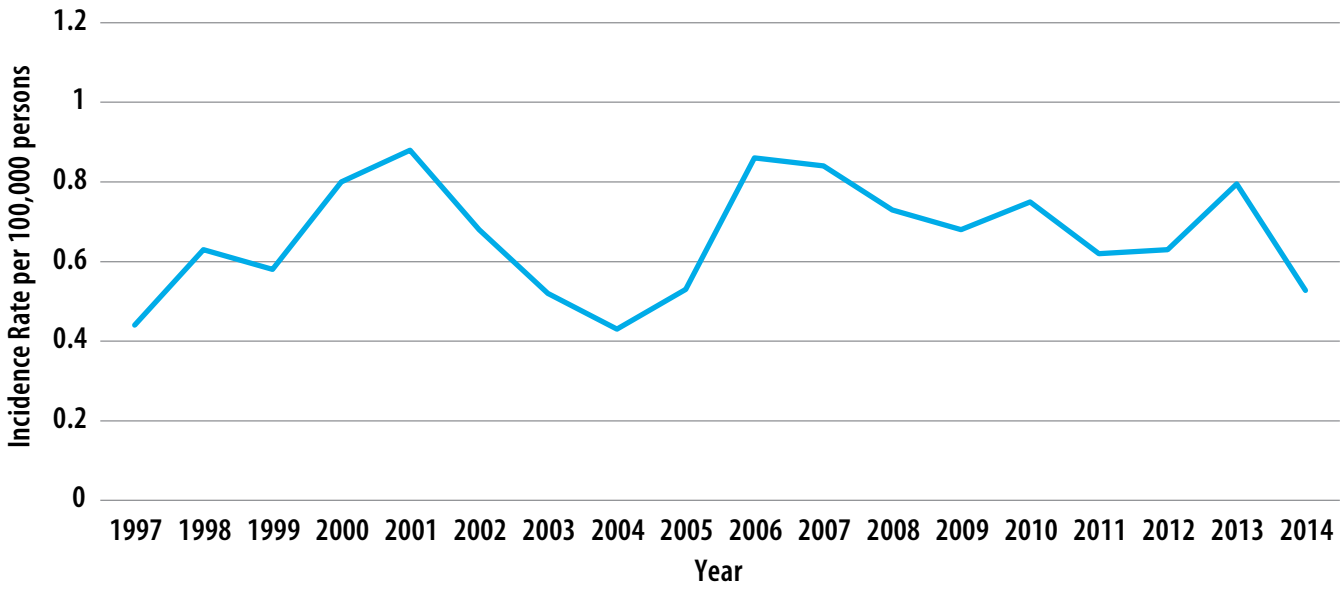


Table 17. Number of Confirmed Infections and Positive Culture-independent Diagnostic Test (CIDT) Reports, by Pathogen, According to Culture Result—FoodNet, 2015

PATHOGEN	Confirmed Infections*		Positive CIDT Reports†			Overall Total
	Culture-positive n (%)	CIDT-positive and Culture Positive n (%)	CIDT-positive and Culture Negative n (%)	CIDT-positive and No Culture n (%)	Total CIDT-positive	
Campylobacter	5,953 (70.1)	336 (4.0)	853 (10.1)	1,345 (15.9)	2,198	8,494
Salmonella	7,340 (90.1)	379 (4.6)	144 (1.8)	282 (3.5)	426	8,145
Shigella	2,513 (79.1)	132 (4.1)	175 (5.5)	356 (11.2)	531	3,176
STEC‡	49 (3.2)	1,230 (80.2)	132 (8.6)	122 (8.0)	254	1,533
Vibrio	193 (94.6)	2 (1.0)	7 (3.4)	2 (1.0)	9	204
Yersinia	137 (89.0)	2 (1.3)	3 (1.9)	12 (7.8)	15	154
Listeria	116 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0	116
TOTAL	**16,301**	**2,081**	**1,314**	**2,116**	**3,430**	**21,835**

*Confirmed infections are defined as culture-confirmed bacterial infections and laboratory-confirmed parasitic infections.

†Positive CIDT reports are defined as the detection of the enteric pathogen, or for STEC, Shiga toxin or the genes that encode a Shiga toxin, in a stool specimen or enrichment broth using a culture-independent diagnostic test. Any positive CIDT result that was confirmed by culture is counted only among the confirmed infections. For STEC, only positive CIDT reports that were confirmed at the state public health laboratory were counted.

‡ Excludes 247 Shiga toxin-positive reports from clinical laboratories that were Shiga toxin–negative at public health laboratory and six positive CIDT reports of detection of O157 antigen without testing for Shiga toxin. Includes reports of three STEC O antigen not tested and four STEC O antigen rough.

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