## Foodborne Diseases Active Surveillance Network FoodNet 2013 Surveillance Report

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National Center for Emerging and Zoonotic Infectious Diseases Division of Foodborne, Waterborne, and Environmental Diseases



This report summarizes FoodNet surveillance data for bacterial and parasitic pathogens for 2013, changes in incidence since 1996-1998, 2006-08, and 2010-12, and other FoodNet activities in 2013.

### **Cases of infection and incidence**

In 2013, FoodNet identified 19,162 laboratory-confirmed cases of infection, 4,276 hospitalizations, and 88 deaths.

Number of cases of bacterial and parasitic infection, hospitalization, and death, by pathogen—FoodNet, 2013

Dathanan	Cases		Hospitalizations		Deaths	
Pathogen	n	Incidence	n	(%)	n	(%)
Campylobacter	6,622	13.73	1,028	(16)	11	(0.2)
Listeria	123	0.25	112	(91)	27	(22)
Salmonella	7,307	15.15	2,029	(28)	30	(0.4)
Shigella	2,331	4.83	460	(20)	3	(0.1)
STEC <sup>†</sup> O157	555	1.15	211	(38)	2	(0.4)
STEC non-O157	571	1.18	76	(13)	2	(0.4)
Vibrio	249	0.52	61	(24)	5	(2)
Yersinia	173	0.36	56	(32)	4	(2)
Cryptosporidium	1,217	2.52	241	(20)	4	(0.3)
Cyclospora	14	0.03	2	(14)	0	(0.0)
Total	19,162		4,276		88	

### What is FoodNet?

The Foodborne Diseases Active Surveillance Network (FoodNet) is a collaborative program of the Centers for Disease Control and Prevention (CDC), 10 state health departments, the U.S. Department of Agriculture's Food Safety and Inspection Service (USDA-FSIS), and the Food and Drug Administration (FDA).

FoodNet determines the number of laboratory-confirmed infections caused by selected pathogens transmitted commonly by food, monitors changes in their incidence, collects information about the sources of infection, and disseminates information to provide a foundation for food safety policy and prevention efforts.

www.cdc.gov/foodnet

\*Per 100,000 population +Shiga toxin-producing Escherichia coli

- The incidence of infection and the numbers of hospitalizations and deaths were highest for Salmonella.
- Percentages of hospitalizations and deaths were highest for Listeria.
- Incidences of all infections were highest among children <5 years except for *Listeria, Vibrio,* and *Cyclospora,* which were highest among people ≥65 years.
- Overall, the highest percentages of hospitalizations and deaths were among people ≥65 years.

### **Changes in incidence**

Compared with 2010-2012, the 2013 incidence was significantly:

- Lower for Salmonella
- Higher for Vibrio

Compared with 2006-2008, the 2013 incidence was significantly:

Higher for
 Campylobacter
 and Vibrio

Percentage change and in incidence of bacterial and parasitic infections in 2013 compared with average annual incidence for 2006-2008 and 2010-2012, by pathogen – FoodNet, 2013

Pathogen	Percentage change in 2013 compared with					
	1996-1998 <sup>*</sup>	2006-2008	2010-2012			
Campylobacter	23%↓	12%↑	1%个			
Listeria	40%↓	3%↓	4%↓			
Salmonella	10%↓	4%↓	10%↓			
Shigella	51%↓	20%↓	13%个			
STEC <sup>†</sup> O157	29%↓	9%↓	16%个			
STEC non-O157	.*	-	10%个			
Vibrio	173%个	78%个	34%个			
Yersinia	48%↓	2%个	8%个			
Cryptosporidium	16%个	20%个	6%个			
Cyclospora	-	-	-			
2013 Overall <sup>§</sup>	20%↓	8%个	4%个			

\*Percentage change reported as increase ( $\uparrow$ ) or as decrease ( $\downarrow$ ) and shading denotes statistical significance n at p<0.05 level; +Shiga toxin-producing *Escherichia coli*; +Changes over time not evaluated. \*The measure of overall trends in incidence combines data for *Campylobacter, Listeria, Salmonella,* STEC 0157, *Vibrio,* and *Yersinia,* the six key bacterial pathogens for which >50% of illnesses are estimated to be transmitted by food. The model weights by incidence of infection for each pathogen.

### Hemolytic Uremic Syndrome (HUS)

In 2012, the most recent year for which complete data are available, FoodNet identified 70 pediatric post-diarrheal HUS cases, including 1 death. Of these cases, 43 (61%) occurred in children <5 years.

FoodNet staff conduct active surveillance for physician-diagnosed postdiarrheal HUS for children <18 years. Through a network of nephrologists and infection preventionists, FoodNet staff review hospital discharge data on children. FoodNet passively collects information on adults.

### What is HUS?

Hemolytic uremic syndrome (HUS) is a complication of STEC infection characterized by anemia, low platelet count, and kidney failure. Most cases are diagnosed about 7 days after a severe STEC diarrheal illness.

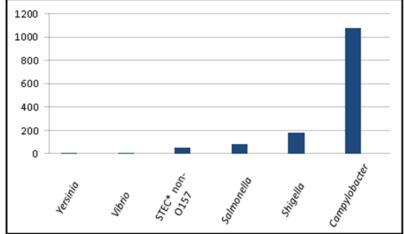
### **Other FoodNet activities**

### Surveillance for reports of positive culture-independent diagnostic tests (CIDTs)

In 2013, FoodNet collected 1,442 reports of positive CIDTs that were not confirmed by culture.

Clinical laboratories increasingly use CIDTs to diagnose bacterial enteric infections, a trend that will challenge the ability of surveillance systems to identify cases, characterize pathogens, monitor trends, and detect outbreaks.

FoodNet began routine, ongoing surveillance of all reports of positive CIDTs without culture confirmation (either because a culture did not yield the pathogen or because the specimen was not cultured) for STEC in 2008, *Campylobacter* in 2009, and all other FoodNet pathogens in 2011.



### Reports of positive CIDTs in 2013, by pathogen – FoodNet, 2013

\*STEC = Shiga toxin-producing Escherichia coli

### Special studies

In 2013, FoodNet published results from a study that showed that patients with multidrug-resistant nontyphoidal *Salmonella* infections were more likely to be hospitalized than patients with susceptible infections. Since 1996, FoodNet has conducted more than 20 research studies to expand our knowledge of risk factors for, and clinical characteristics of, intestinal pathogens.

### Publications

In 2013, CDC summarized and used FoodNet data to

- Publish 11 peer-reviewed journal articles,
- Present 7 abstracts at scientific conferences,
- Monitor progress toward CDC's Healthy People 2020 national health objectives,
- Describe the preliminary 2013 data in the Morbidity and Mortality Weekly Report, and
- Provide incidence data for a Health and Human Services high priority goal to decrease *Salmonella* serotype Enteritidis infections.

### Most foodborne illnesses can be prevented.

Since FoodNet began in 1996, some progress has been made in decreasing food contamination and reducing illness caused by foodborne pathogens. More work is needed. Surveillance data provides information for food safety policy and prevention efforts.

### Access FoodNet publications:

www.cdc.gov/foodnet/publications

Campylobacter causes about 1.3 million illnesses and 120 deaths in the United States every year. Most of these infections are not laboratory-confirmed.

www.cdc.gov/nczved/divisions/dfbmd/diseases/campylobacter

Cases of infection reported to FoodNet\*: 6,622 Hospitalizations: 1,028 Deaths: 11 Incidence rate: 13.7 per 100,000 people

### Groups with highest incidence

- Age: <5 years
- Sex: male
- Race: white, Indian/Native Alaskan, Asian/Pacific Islander
- Ethnicity: Hispanic

### Isolates with species information: 2,676 (40%)

- C. jejuni: 2,389 (89%)
- C. coli: 211 (8%)
- *C. upsaliensis*: 55 (2%)
- All other: 21 (1%)

### Significant changes in incidence rate

- 13% higher than in 2006—2008
- 23% lower than in 1996—1998

### **International travel**

• Cases with infection likely acquired abroad: 15% (655 of 4,451 cases with travel information)

### Outbreaks

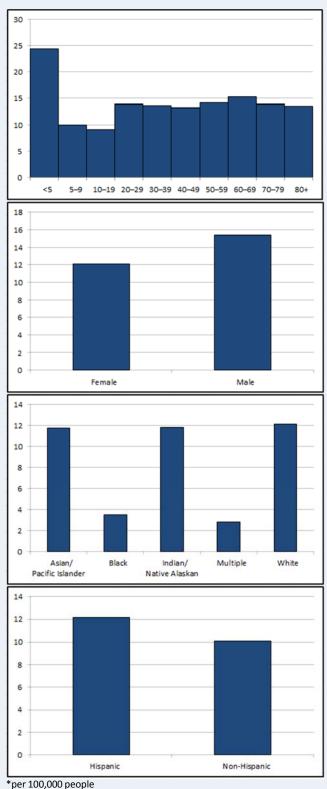
• Cases associated with an outbreak: <1%

### Seasonality

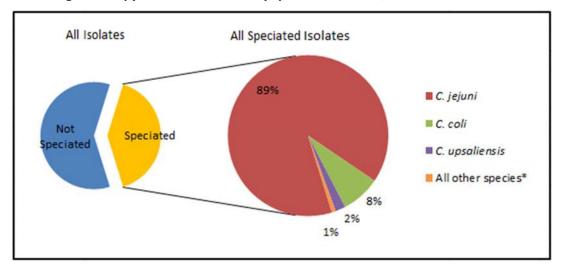
• Month with most cases: July

\*FoodNet determined the number of laboratoryconfirmed infections caused by selected pathogens transmitted commonly by food. FoodNet collected data from 15% of the US population. For more information: www.cdc.gov/foodnet.

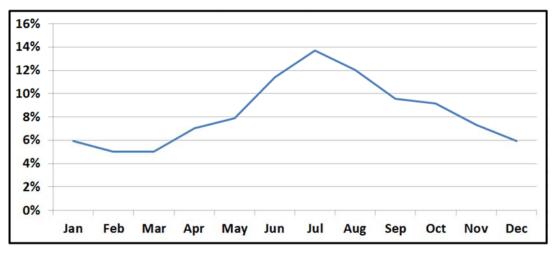


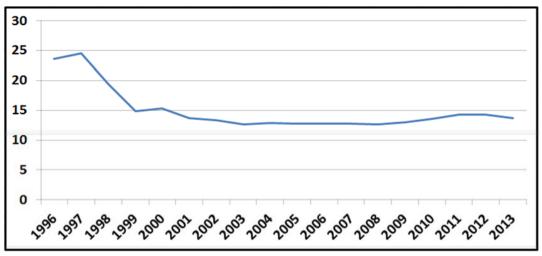


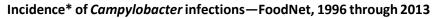
Percentage of Campylobacter infections by species—FoodNet, 2013



### Percentage of Campylobacter infections by month—FoodNet, 2013







*Cryptosporidium* causes about 750,000 illnesses and 46 deaths in the United States every year. Most of these infections are not laboratory-confirmed.

www.cdc.gov/parasites/crypto

Cases of infection reported to FoodNet\*: 1,217 Hospitalizations: 241 Deaths: 4 Incidence rate: 2.5 per 100,000 people

### Groups with highest incidence

- Age: <5 years
- Race: white
- Ethnicity: non-Hispanic

#### International travel

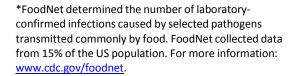
• Cases with infection likely acquired abroad: 10% (88 of 918 cases with travel information)

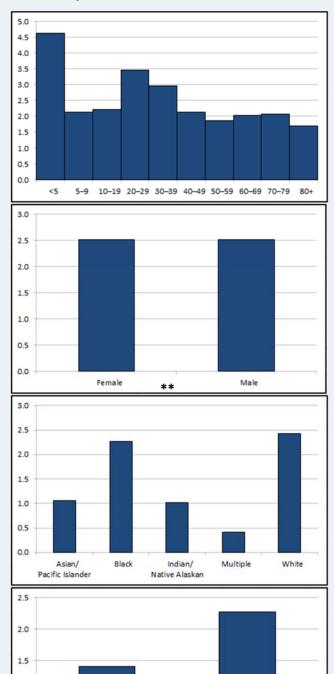
#### Outbreaks

• Cases associated with an outbreak: 4%

#### Seasonality

Month with most cases: August





### Incidence\* of *Cryptosporidium* infections by age, sex, race, and ethnicity—FoodNet, 2013

\*per 100,000 people

Hispanic

Non-Hispanic

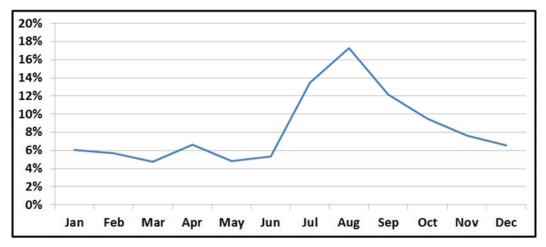
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0.5

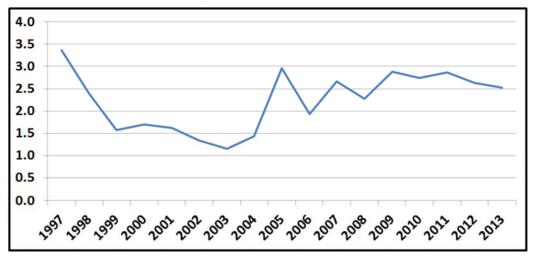
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## FoodNet 2013 Annual Report CRYPTOSPORIDIUM

Percentage of Cryptosporidium infections by month—FoodNet, 2013



Incidence\* of Cryptosporidium infections—FoodNet, 1997 through 2013



### FoodNet 2013 Annual Report **CYCLOSPORA**

#### Cyclospora cayetanensis causes about 20,000 illnesses in the United States every year. Most of these infections are not laboratory-confirmed.

www.cdc.gov/parasites/cyclosporiasis

Cases of infection reported to FoodNet\*: 14 **Hospitalizations:** 2 Deaths: 0 Incidence rate: 0.03 per 100,000 people

### Groups with highest incidence

- Age: 70-79 years
- Sex: female
- Race: white •
- Ethnicity: non-Hispanic •

#### International travel

Cases with infection likely acquired abroad: 14% • (2 of 14 cases with travel information)

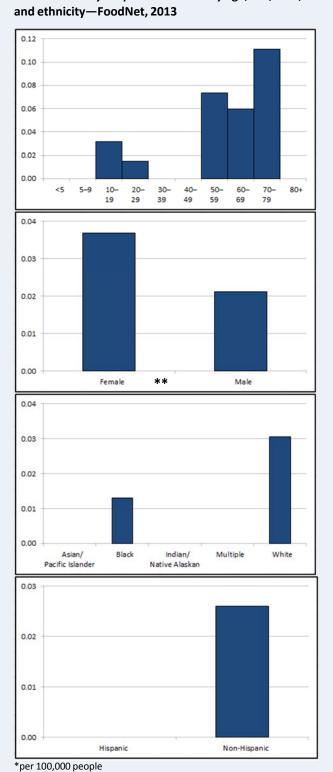
#### **Outbreaks**

• Cases associated with an outbreak: 14%

#### Seasonality

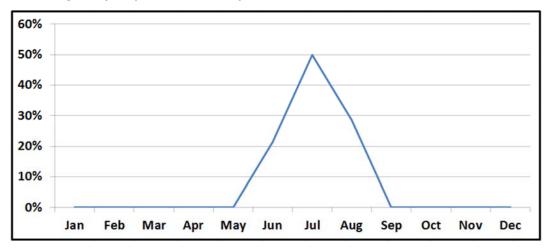
Month with most cases: August •

\*FoodNet determined the number of laboratoryconfirmed infections caused by selected pathogens transmitted commonly by food. FoodNet collected data from 15% of the US population. For more information: www.cdc.gov/foodnet.

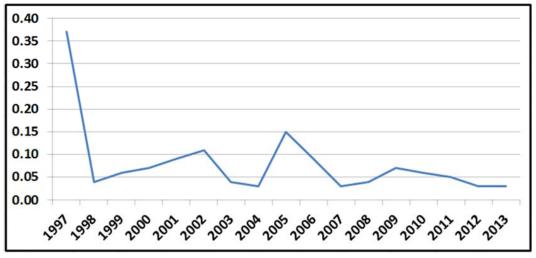


### Incidence\* of Cyclospora infections by age, sex, race,

Percentage of Cyclospora infections by month—FoodNet, 2013







### FoodNet 2013 Annual Report LISTERIA

*Listeria monocytogenes* causes about 1,600 illnesses and 260 deaths in the United States every year. Some of these infections are not laboratory-confirmed.

Pregnant women are among the most affected groups; infections during pregnancy can lead to adverse fetal outcomes.

www.cdc.gov/listeria

### Cases of infection reported to FoodNet\*: 123 Hospitalizations: 112 Deaths: 27 Incidence rate: 0.3 per 100,000 people Pregnancy-associated cases (women and infants): 15 Fetal outcome: 3 abortions or stillbirths

### Groups with highest incidence

- Age: 80+ years
- Sex: male
- Race: Asian/Pacific Islander
- Ethnicity: non-Hispanic

### Significant changes in incidence rate

• 40% lower than in 1996—1998

### International travel

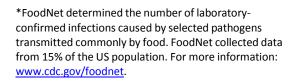
• Cases with infection likely acquired abroad: 2% (2 of 107 cases with travel information)

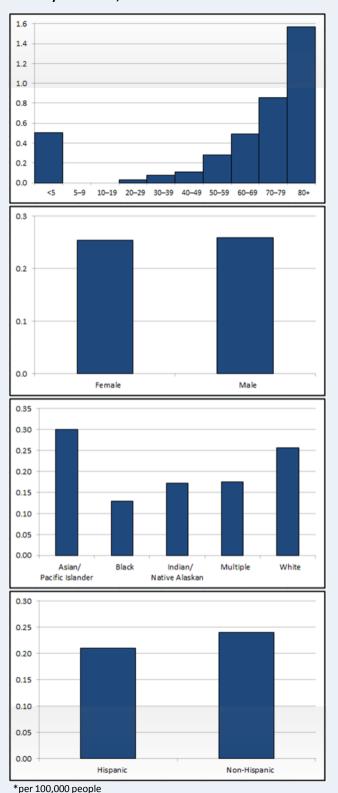
### Outbreaks

• Cases associated with an outbreak: 7%

### Seasonality

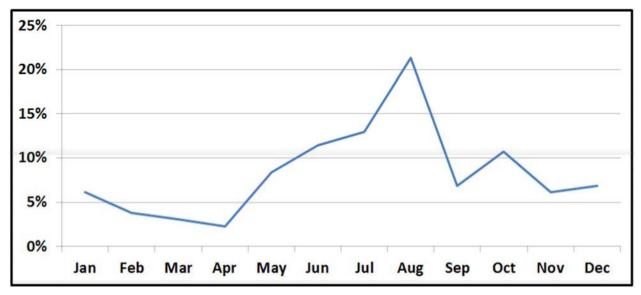
• Month with most cases: August



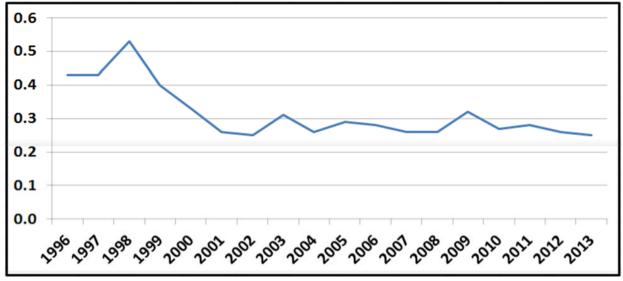


### Incidence<sup>\*</sup> of *Listeria* infections by age, sex, race, and ethnicity—FoodNet, 2013

Percentage of Listeria infections by month—FoodNet, 2013



Incidence\* of Listeria infections—FoodNet, 1996 through 2013



Salmonella causes about 1.2 illnesses and 450 deaths in the United States every year. Most of these infections are not laboratory-confirmed.

Approximately 2,000 different Salmonella serotypes cause human disease.

www.cdc.gov/salmonella

Cases of infection reported to FoodNet\*: 7,307 Hospitalizations: 2,029 Deaths: 30 Incidence rate: 15.2 per 100,000 people

### Groups with highest incidence

- Age: <5 years
- Sex: female
- Race: Asian/Pacific Islander
- Ethnicity: Hispanic

### Isolates with serotype information: 6,750 (92%)

- Enteritidis: 1,285 (19%)
- Typhimurium: 938 (14%)
- Newport: 711 (11%)
- Javiana: 650 (10%)
- I 4,[5],12,i-: 438 (6%)
- Heidelberg: 210 (3%)
- All other: 2,545 (38%)

### Significant changes in incidence rate

- 10% lower than in 2010—2012
- 10% lower than in 1996—1998

### **International travel**

• Cases with infection likely acquired abroad: 9% (465 of 5,458 cases with travel information)

### Outbreaks

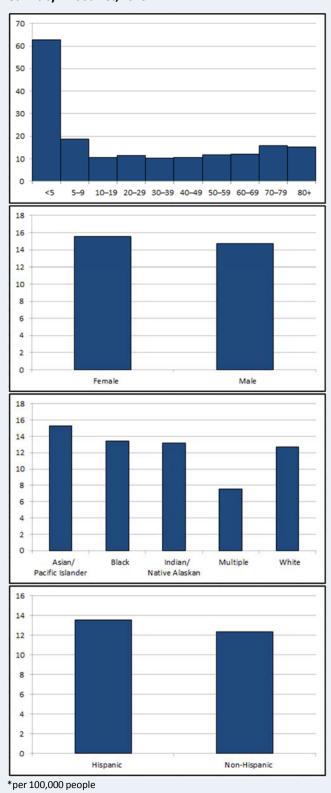
• Cases associated with an outbreak: 6%

### Seasonality

• Month with most cases: August

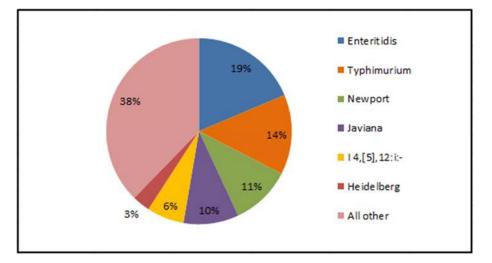
\*FoodNet determined the number of laboratoryconfirmed infections caused by selected pathogens transmitted commonly by food. FoodNet collected data from 15% of the US population. For more information: www.cdc.gov/foodnet.



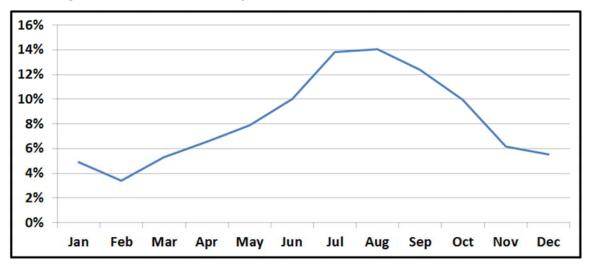


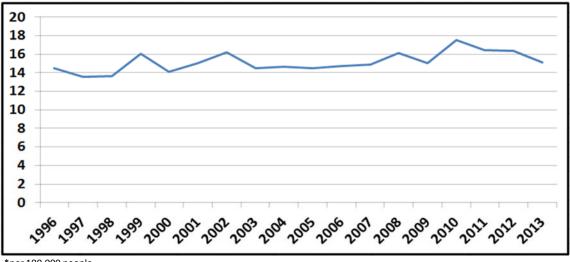
### SALMONELLA

Percentage of serotyped *Salmonella* infections by serotype —FoodNet, 2013



Percentage of Salmonella infections by month—FoodNet, 2013





Incidence\* of Salmonella infections—FoodNet, 1996 through 2013

### FoodNet 2013 Annual Report SHIGELLA

Shigella causes about 500,000 illnesses and 40 deaths in the United States every year. Most of these infections are not laboratory-confirmed.

www.cdc.gov/shigella

Cases of infection reported to FoodNet\*: 2,331 Hospitalizations: 460 Deaths: 3 Incidence rate: 4.8 per 100,000 people

### Groups with highest incidence

- Age: <5 years
- Sex: male
- Race: black
- Ethnicity: Hispanic

### Isolates with species information: 2,185 (94%)

- *S. sonnei*: 1,786 (82%)
- S. flexneri: 383 (18%)
- *S. boydii*: 14 (1%)
- *S. dysenteriae*: 2 (<1%)

### Significant changes in incidence rate

• 51% lower than in 1996—1998

### International travel

• Cases with infection likely acquired abroad: 7% (126 of 1,908 cases with travel information)

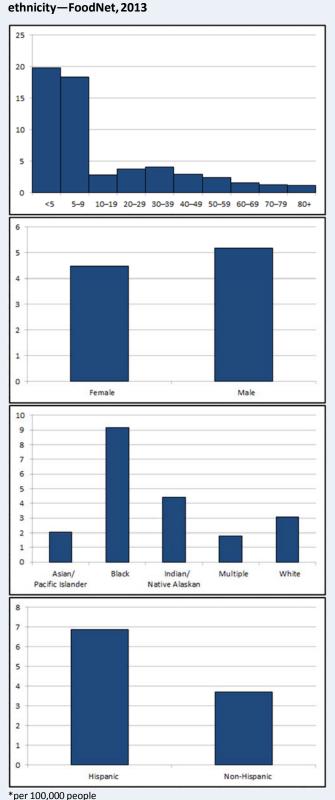
### Outbreaks

• Cases associated with an outbreak: 7%

### Seasonality

• Month with most cases: November

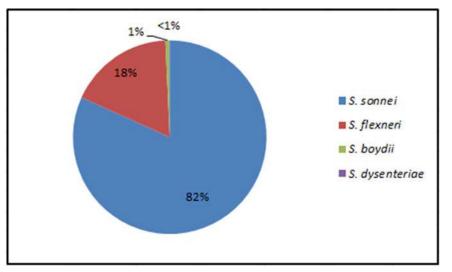
\*FoodNet determined the number of laboratoryconfirmed infections caused by selected pathogens transmitted commonly by food. FoodNet collected data from 15% of the US population. For more information: www.cdc.gov/foodnet.



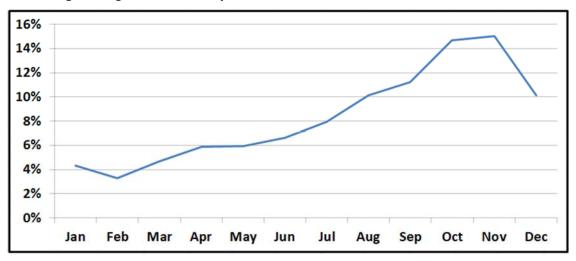
Incidence\* of *Shigella* infections by age, sex, race, and ethnicity—FoodNet, 2013

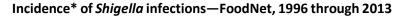
SHIGELLA

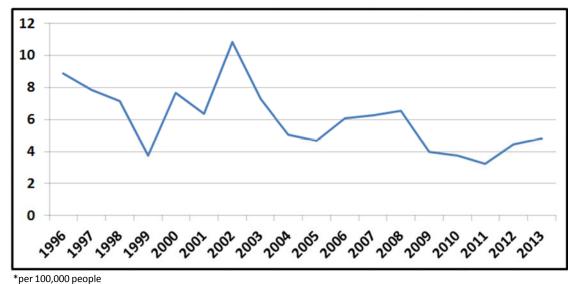
Percentage of speciated Shigella infection by species—FoodNet, 2013



Percentage of Shigella infections by month—FoodNet, 2013







### FoodNet 2013 Annual Report SHIGA TOXIN-PRODUCING ESCHERICHIA COLI (STEC)

STEC causes about 265,000 total infections in the United States each year. Most of these infections are not laboratoryconfirmed. About 8% of people who are diagnosed with STEC O157 infection develop a potentially life-threatening complication known as hemolytic uremic syndrome (HUS).

www.cdc.gov/ecoli

0.0

\*per 100,000 people

Hispanic

Non-Hispanic

### **STEC 0157**

### Cases of infection reported to FoodNet\*: 555 Hospitalizations: 211

Deaths: 2

•

Incidence rate: 1.15 per 100,000 people

### Groups with highest incidence

- Age: <5 years Sex: female •
- Race: White
  - Ethnicity: non-Hispanic

### Significant changes in incidence rate

29% lower than in 1996-1998

### International travel

Cases with infection likely acquired abroad: 4% (20 of 520 of cases with travel information)

### **Outbreaks**

Cases associated with an outbreak: 17% •

### Seasonality

• Month with most cases: August

### STEC non-O157

### Cases of infection reported to FoodNet\*: 571 Hospitalizations: 76 Deaths: 2 Incidence rate: 1.18 per 100,000 people

### Groups with highest incidence

- Age: <5 years
  - Race: White
- Sex: female •
  - **Ethnicity: Hispanic** ٠

### International travel

Cases with infection likely acquired abroad: 16% • (82 of 526 cases with travel information)

### **Outbreaks**

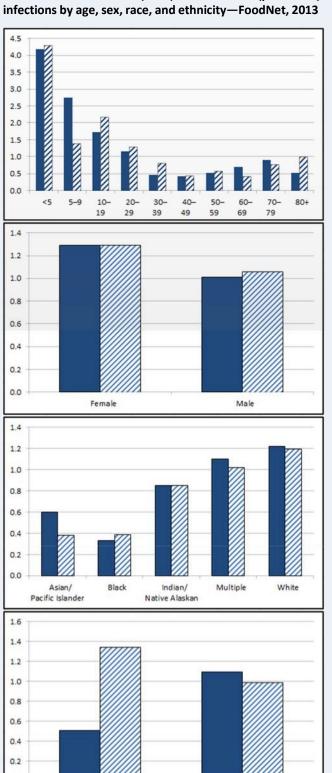
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• Cases associated with an outbreak: 3%

### Seasonality

Month with most cases: August

\*FoodNet determined the number of laboratory-confirmed infections caused by selected pathogens transmitted commonly by food. FoodNet collected data from 15% of the US population. For more information: www.cdc.gov/foodnet.



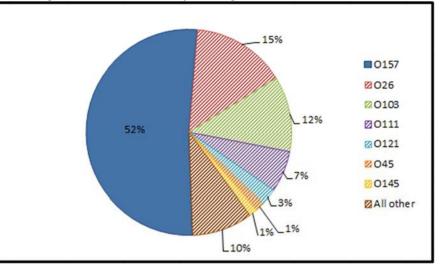
### Incidence\* of STEC O157 (solid) and non-O157 (patterned)

### FoodNet 2013 Annual Report SHIGA TOXIN-PRODUCING ESCHERICHIA COLI (STEC)

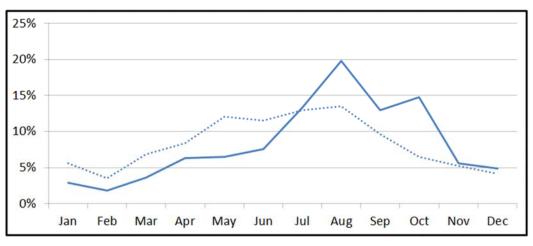
**Isolates with O Antigen information:** 1,070 (95%)

- O157: 555 (52%)
- O26: 159 (15%)
- 0103:127 (12%)
- 0111: 70 (7%)
- 0121: 28 (3%)
- O45: 15 (1%)
- 0145: 14 (1%)
- All other: 102 (10%)

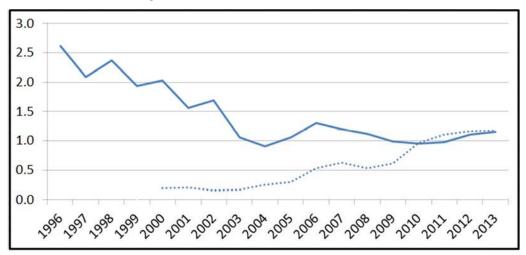
Percentage of STEC Infections by O Antigen — FoodNet, 2013



Percentage of STEC O157 (solid) and Non-O157 (dotted) infections by month —FoodNet, 2013



Incidence\* of STEC O157 (solid) and Non-O157<sup>+</sup> (dotted) infections, —FoodNet, 1996 through 2013



\*per 100,000 people; †Non-O157 data not collected until 2000

### FoodNet 2013 Annual Report VIBRIO

### *Vibrio* causes about 80,000 illnesses and 100 deaths in the United States every year. Most of these infections are not laboratory-confirmed.

#### www.cdc.gov/vibrio

Cases of infection reported to FoodNet\*: 249 Hospitalizations: 61 Deaths: 5 Incidence rate: 0.5 per 100,000 people

#### Groups with highest incidence

- Age: 80+ years
- Sex: male
- Race: white
- Ethnicity: non-Hispanic

#### Isolates with species information: 243 (98%)

- V. parahaemolyticus: 147 (61%)
- V. alginolyticus: 30 (12%)
- V. vulnificus: 22 (9%)
- V. fluvialis: 16 (7%)
- V. cholerae non-O1, non-O139: 10 (4%)
- All other: 18 (7%)

### Significant changes in incidence rate

- 34% higher than in 2010—2012
- 78% higher than in 2006—2008
- 173% higher than in 1996—1998

#### International travel

 Cases with infection likely acquired abroad: 9% (21 of 227 cases with travel information)

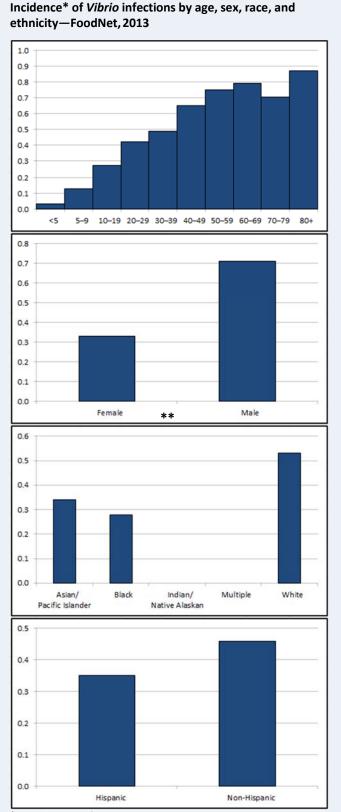
#### Outbreaks

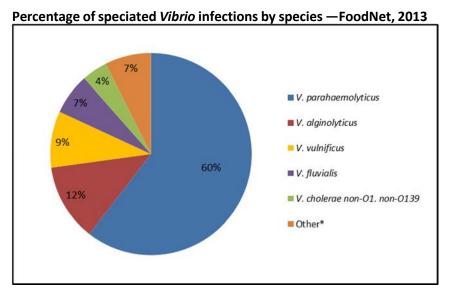
Cases associated with an outbreak: 9%

#### Seasonality

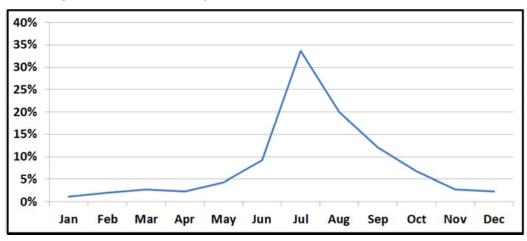
• Month with most cases: July

\*FoodNet determined the number of laboratoryconfirmed infections caused by selected pathogens transmitted commonly by food. FoodNet collected data from 15% of the US population. For more information: www.cdc.gov/foodnet.

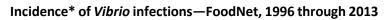


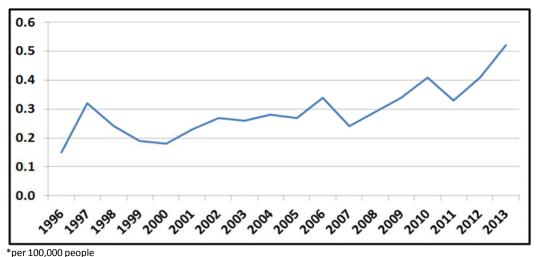


\*V. mimicus, Grimontia hollisae, V. cholerae non-01, Photobacterium damselae, V. metschnikovii, V. cholerae 01, V. cholerae unspecified.



Percentage of Vibrio infections by month—FoodNet, 2013





### FoodNet 2013 Annual Report YERSINIA

Yersinia causes about 115,000 illnesses and over 30 deaths in the United States every year. Most of these infections are not laboratory-confirmed.

www.cdc.gov/nczved/divisions/dfbmd/diseases/yersinia

Cases of infection reported to FoodNet\*: 173 Hospitalizations: 56 Deaths: 4 Incidence rate: 0.4 per 100,000 people

### Groups with highest incidence

- Age: <5
- Sex: female
- Race: Asian/Pacific Islander
- Ethnicity: Hispanic

### Significant changes in incidence rate

• 48% lower than in 1996—1998

### International travel

• Cases with infection likely acquired abroad: 4% (6 of 136 cases with travel information)

### Outbreaks

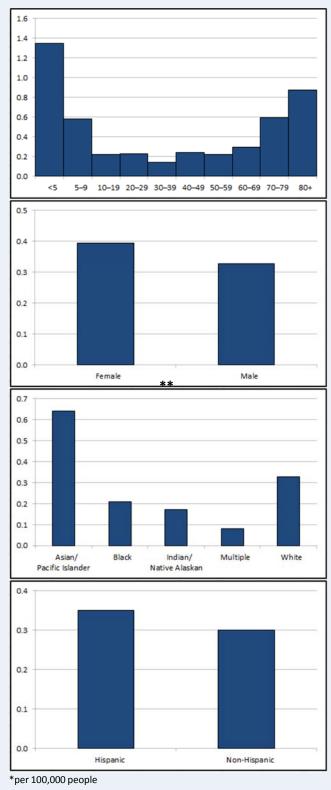
• Cases associated with an outbreak: 3%

### Seasonality

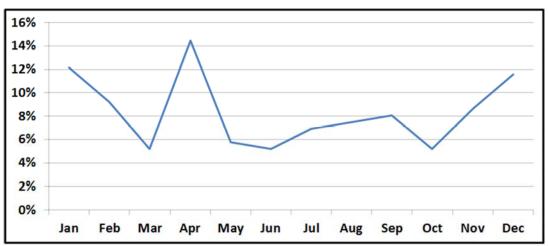
• Month with most cases: April

\*FoodNet determined the number of laboratoryconfirmed infections caused by selected pathogens transmitted commonly by food. FoodNet collected data from 15% of the US population. For more information: www.cdc.gov/foodnet.

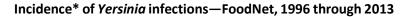


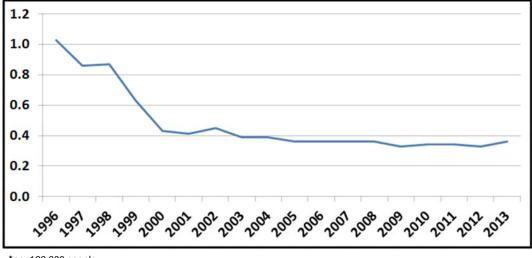


### FoodNet 2013 Annual Report YERSINIA



Percentage of *Yersinia* infections by month—FoodNet, 2013





### HUS 2012 Annual Report (FoodNet) PEDIATRIC POST-DIARRHEAL HEMOLYTIC UREMIC SYNDROME (HUS)

HUS is a life-threatening condition characterized by anemia, low platelet count, and kidney failure.

### Cases reported to FoodNet\*: 70 Cases <5 years: 43

Deaths: 1

Median Age (range): 4.5 years (4 months-14 years)

Female: 36 (51%)

Median days hospitalized (range): 12 (2-63)

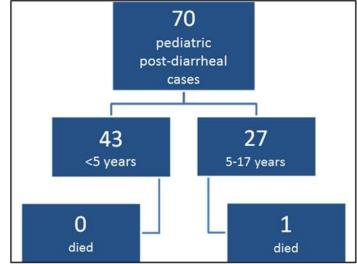
### Seasonality

• 81% of cases occurred April through September

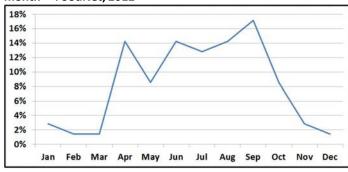
### **HUS Etiology**

- 60 (86% of 70) cases had evidence of Shiga toxin-producing *Escherichia coli* (STEC) infection
  - 52 (87% of 60) cases had STEC isolated, of the following serogroups
    - 48 O157
    - 2 0145
    - 1 0141
    - 10175
  - 8 (13% of 60) cases had O157 antibodies detected by serology
- Percentage of children with STEC O157 isolated in 2012 who developed HUS: 19% (27/144)

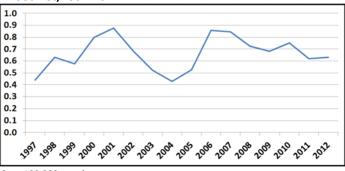
### Pediatric post-diarrheal HUS cases and deaths, by age group—FoodNet, 2012



### Percentage of pediatric post-diarrheal HUS cases by month —FoodNet, 2012



#### Incidence\* of pediatric post-diarrheal HUS –FoodNet, 1997-2012



\*per 100,000 people

\*FoodNet staff conducted active surveillance for physiciandiagnosed post-diarrheal HUS through a network of nephrologists and infection preventionists, and reviewed hospital discharge data for children <18 years. FoodNet collected data from 15% of the US population. For more information: www.cdc.gov/foodnet.