



United States Department of Agriculture  
Food Safety and Inspection Service

**FAX**

**To:**

Tom Freedman

**Fax #:**

456-7431

**Subject:**

**Date:**

**Pages:** including this cover sheet.

**COMMENTS:**

Latest Version

Revised

From the desk of .....

Thomas J. Billy  
Administrator  
331-E Jamie L. Whitten Building  
Washington, DC 20250

202-720-7025  
or 720-8217  
Fax 205-0158



---

## *Report to Congress*

---

# FoodNet: An Active Surveillance System for Bacterial Foodborne Diseases in the United States

Food Safety and Inspection Service  
United States Department of Agriculture  
Washington, DC

April, 1998

---

# ***Contents***

---

|                                    | Page No. |
|------------------------------------|----------|
| <b>I. Preface</b>                  | <b>1</b> |
| <b>II. Overview of FoodNet</b>     | <b>2</b> |
| <b>III. Foodborne Illness Data</b> | <b>7</b> |

## **Tables**

Table 1: Percent Pathogen by Site

Table 2: Percent Site by Pathogen

Table 3: Cases per 100,000 by Pathogen for all Sites  
(1996 vs. 1997)

Table 4: Pathogen by Month -- All Sites

Table 5: Age Distribution by Pathogen for all Sites

Table 6: Sex Distribution by Pathogen for all Sites

Table 7: Patient Outcome by Pathogen for all Sites

## ***Preface***

---

The U.S. Department of Agriculture has been directed by Congress to provide an annual report on the incidence of foodborne illness in the United States. This report is to be submitted to the House and Senate Committees on Appropriations.

This report includes a description of the Foodborne Diseases Active Surveillance Network (FoodNet) and data on the incidence of foodborne illness for calendar year 1997. Data already collected are being analyzed by The Centers for Disease Control and Prevention and the seven surveillance sites.

Questions about this report or about FSIS may be directed to the Food Safety and Inspection Service, U.S. Department of Agriculture, Washington, D.C. 20250.

# ***Overview of FoodNet***

---

The Food Safety and Inspection Service (FSIS) of the U. S. Department of Agriculture (USDA) administers a comprehensive system of inspection laws to ensure that meat, poultry, and egg products moving in interstate and foreign commerce for use as human food are safe, wholesome, and accurately labeled.

Over the past decade, foodborne illnesses caused by bacterial contamination have heightened concern about the safety of food. The Centers for Disease Control and Prevention (CDC) has identified bacterial pathogens as the most common cause of foodborne illnesses because they can be easily transmitted and multiply rapidly in food, thus making them difficult to control. CDC has targeted seven bacterial foodborne pathogens (*Campylobacter*, *E. coli* O157:H7, *Listeria*, *Salmonella*, *Shigella*, *Vibrio*, and *Yersinia*) as those of greatest concern to public health. Government economists have estimated that foodborne illnesses cost billions of dollars each year in lost productivity and medical care. However, an accurate picture of both the number and causes of foodborne illnesses in the United States is unknown.

In July 1995, as part of the federal government's campaign to improve the safety of the nation's food supply, FSIS began a collaborative project with CDC and the Food and Drug Administration, known originally as the Sentinel Site Study and more recently as the Foodborne Diseases Active Surveillance Network or FoodNet, to collect more precise information on the incidence of foodborne disease in the United States. This project includes direct working links with state and local health departments at seven selected sites nationwide as a means of obtaining the most complete and current data about foodborne illness possible. This study, which is expected to continue for several years, will provide much-needed baseline data regarding the incidence of foodborne illness in the United States which is attributable to the consumption of meat, poultry, and other food products.

## ***Background***

Bacterial foodborne diseases are currently reported to local and state health departments and CDC through passive surveillance systems. As with all passive systems, cases are frequently under-reported. In fact, only 1% to 5% of foodborne disease cases are believed to be reported to CDC through passive surveillance systems.

In July 1994, the USDA Pathogen Reduction Task Force recommended that FSIS work with CDC on research and surveillance activities that will better characterize risks for foodborne pathogens. This recommendation echoed a National Academy of Sciences recommendation for more community-based surveillance of foodborne disease. To improve data on the incidence and causes of foodborne illness, FDA, FSIS and CDC have established seven sites to study the epidemiologic association between sporadic cases of foodborne illness and the preparation and consumption of meat, poultry, and egg products. The seven selected sites are Northern California, Oregon, Minnesota, Connecticut, and counties in northern Georgia, eastern Maryland, and western New York.

### ***Objectives***

The major objectives of FoodNet are to:

- ▶ determine the yearly incidence of illness due to seven bacterial foodborne pathogens (i.e., *Campylobacter*, *E. coli* O157:H7, *Listeria*, *Salmonella*, *Shigella*, *Vibrio*, and *Yersinia*);
- ▶ develop a network to collaboratively respond to emerging foodborne diseases;
- ▶ determine the proportion of foodborne disease cases attributed to specific food commodities; and
- ▶ determine whether federal interventions (such as HACCP) are having a measurable effect on the incidence of foodborne illness attributable to consumption of meat, poultry, and other foods.

### ***Scope and Duration of Study***

FoodNet is a comprehensive effort to track major pathogens that cause sporadic foodborne illness, and to explore what associations may exist between cases and the types of food products consumed.

For the project to be most successful, data must be collected over a number of years in order to chart trends and evaluate the effectiveness of control strategies. FoodNet will also be used as a national "laboratory" for surveillance strategies which will be useful in all states to more precisely determine the extent and causes of foodborne illness.

## **Components of FoodNet**

- ▶ **Active Surveillance:** The purpose of this survey is to determine in each site the actual number of laboratory-confirmed cases of illness caused by the seven targeted bacteria and, as of 1997, two targeted parasites.
  - **Bacterial:** In 1997, the total population under surveillance was 15.9 million persons (using 1996 Census data). Culture-confirmed cases for the five sites total 8,031. The Tables in the last section provide detailed information about these cases.
  - **Parasitic:** In 1997, data collection began in four sites for illnesses caused by the parasites *Cryptosporidium* and *Cyclospora*. The total population under surveillance was 20.9 million persons (using 1996 Census data). A total of 517 cases were found. Beginning in January 1998, all sites will survey for these parasites.
- ▶ **Laboratory Survey:** The primary purpose of this survey is to determine whether or not laboratories within the site boundaries are performing cultures for foodborne pathogens. A baseline survey of 230 clinical labs which perform stool cultures in the sites was completed in late 1995. This survey demonstrated that all 230 labs in the five sites routinely culture for *Salmonella* and *Shigella*, 95% for *Campylobacter*, 48% for *E. coli* O157, 30% for *Yersinia*, and 19% for *Vibrio*. The survey was repeated in 1997 to determine the total number of bacterial stool cultures performed, including those that did and did not yield a pathogen, to collect specific information on *Campylobacter* isolation techniques, and to collect information regarding testing for *Cryptosporidium* and *Cyclospora*. Analysis is being conducted by CDC.
- ▶ **Physician Survey:** The primary purpose of this survey is to determine whether or not physicians who see patients for diarrheal complaints are referring them for laboratory analysis. A total of 5074 surveys were mailed to physicians in non-surgical specialties in five sites in 1996; 2939 (58%) were returned. In 1997, the survey was conducted in Maryland and New York, the two newest sites. Analysis is being conducted by CDC. Stool culturing practices were not influenced by the increased trend of cost containment in medical care.

► **Population Survey:** An outside contractor, Macro International, performs this survey for FoodNet. All residents of the catchment area, including children, are eligible. The primary purpose of this survey is to determine population behavior in the site areas, particularly regarding what foods are consumed and high-risk food consumption and preparation practices. The first full year of data collection was completed in June 1997. A total of 12,209 interviews were conducted. Preliminary analysis at CDC indicates 11% of persons interviewed had a diarrheal illness in the previous 4 weeks, which represents 1.4 diarrheal episodes per person per year. Eight percent of those with a diarrheal illness sought medical care. The second year of data collection began in February 1998.

► **Case-Control Studies:** The primary purpose of these studies is to identify patient behavior, food preparation practices, and food consumption preferences which are strongly associated with illness due to one of the specific bacterial pathogens just prior to becoming ill.

**- *E. coli* O157:H7**

The first year of the *E. coli* O157:H7 study was completed in May, 1997. Data are being analyzed at CDC and the Minnesota Department of Health. Two hundred cases and 380 age-matched controls were interviewed.

Preliminary analysis by the Minnesota Department of Health (Heidi Kassenborg) indicates that consumption of pink hamburgers or pink ground beef and visiting a farm are risk factors for sporadic infection from *E. coli* O157:H7.

**- *Salmonella***

The *Salmonella* serogroups B & D (which includes *S. Enteritidis* and *S. Typhimurium* DT 104) case-control study began in April 1996 in three sites and in August 1996 in two sites, and ended 12 months later in all sites. Data are being analyzed at CDC. Four hundred eighty-three cases and 916 age-matched controls were interviewed.



### **- *Campylobacter***

In 1997, it was decided to add a case-control study for *Campylobacter* which was found to be the most frequent cause of illness in all sites. The questionnaire was developed in 1997 and the study began in January 1998 in four sites, February 1998 in one site, and March 1998 in two sites.

### ***Future Plans***

#### **Plan for 1998:**

Counties in New York (Genesee, Livingston, Monroe, Ontario, Orleans, Wayne, and Yates) and Maryland (Ann Arundel, Baltimore, Carroll, Harford, Howard, and Baltimore City) will join FoodNet as fully participating sites. An invitation will be presented to all remaining state public health departments in the United States to be considered as the eighth site. Selection of this eighth site will be made in the fall of 1998, and participation will begin in 1999.

#### **Plan for 1999:**

The eighth site will begin to participate in FoodNet. Case-control studies for additional pathogens such as *Listeria* and *Cryptosporidium* will begin. Additional studies for the Physician survey and Laboratory survey will be performed to validate collected data. The Laboratory survey will be repeated. The FoodNet population under surveillance will increase to 24,979,368 with the addition of statewide surveillance in Georgia and the Albany, NY metropolitan area. The addition of the eighth site will increase the population under surveillance as well.

# Foodborne Illness Data

---

The following information represents findings from the second year of data collection. It is important to note, however, that the tables and charts that follow are based solely on the number of laboratory-confirmed actual cases in the sites.

## *Population in sites (based on 1996 Census data):*

|              | 1996              | 1997              |
|--------------|-------------------|-------------------|
| California:  | 2,063,454         | 2,063,454         |
| Connecticut: | 1,626,366         | 2,460,127         |
| Georgia      | 2,729,783         | 3,541,230         |
| Minnesota    | 4,657,758         | 4,657,758         |
| Oregon       | <u>3,203,735</u>  | <u>3,203,735</u>  |
| <b>TOTAL</b> | <b>14,281,096</b> | <b>15,926,304</b> |

The total United States population is 265,189,612.

These population totals are based on 1996 Census data. Connecticut includes the addition of Fairfield county. Georgia includes the addition of 12 counties.

## *Active Cases:*

There were 8,031 laboratory-confirmed diarrheal cases in 1997 that were attributable to the seven targeted bacterial pathogens (i.e., *Campylobacter*, *E. coli* O157:H7, *Listeria*, *Salmonella*, *Shigella*, *Vibrio*, and *Yersinia*). This represents an increase of 709 cases (9.6%) over the 7,322 final case figure for 1996. However, the population figure also increased by 1,645,208 (11%). So, a comparison of cases for 1996 and 1997 shows that the rate of cases per 100,000 persons changed from 51.3 to 50.4. (Table 3)

## *Most frequently isolated pathogen:*

For the second year, *Campylobacter* is the most frequently isolated foodborne bacterium (49.4%); *Salmonella* is second (27.4%); *Shigella* is third (15.7%); *E. coli* O157:H7 is fourth (4.2%); *Yersinia* is fifth (1.7%); *Listeria* is sixth (1%); *Vibrio* is last (0.6%).

**Table 1: Percent Pathogen by Site**  
**From January 1, 1997 to December 31, 1997**

|             |         | Pathogen                   |                         |                 |                         |                 |               |                 |       |
|-------------|---------|----------------------------|-------------------------|-----------------|-------------------------|-----------------|---------------|-----------------|-------|
| Site        |         | <i>Campylo-<br/>bacter</i> | <i>E. coli<br/>0157</i> | <i>Listeria</i> | <i>Salmon-<br/>ella</i> | <i>Shigella</i> | <i>Vibrio</i> | <i>Yersinia</i> | Total |
| California  | Cases   | 1,032                      | 19                      | 13              | 370                     | 291             | 30            | 34              | 1,789 |
|             | Percent | 57.7%                      | 1.1%                    | 0.7%            | 20.7%                   | 16.3%           | 1.7%          | 1.9%            | 100%  |
| Connecticut | Cases   | 528                        | 34                      | 12              | 412                     | 77              | 4             | 15              | 1,082 |
|             | Percent | 48.8%                      | 3.1%                    | 1.1%            | 38.1%                   | 7.1%            | 0.4%          | 1.4%            | 100%  |
| Georgia     | Cases   | 493                        | 8                       | 20              | 473                     | 574             | 2             | 43              | 1,613 |
|             | Percent | 30.6%                      | 0.5%                    | 1.2%            | 29.3%                   | 35.6%           | 0.1%          | 2.7%            | 100%  |
| Minnesota   | Cases   | 1,176                      | 199                     | 18              | 619                     | 138             | 2             | 31              | 2,183 |
|             | Percent | 53.9%                      | 9.1%                    | 0.8%            | 28.4%                   | 6.3%            | 0.1%          | 1.4%            | 100%  |
| Oregon      | Cases   | 737                        | 80                      | 13              | 330                     | 177             | 12            | 15              | 1,364 |
|             | Percent | 54.0%                      | 5.9%                    | 1.0%            | 24.2%                   | 13.0%           | 0.9%          | 1.1%            | 100%  |
| Total       | Cases   | 3,966                      | 340                     | 76              | 2,204                   | 1,257           | 50            | 138             | 8,031 |
|             | Percent | 49.4%                      | 4.2%                    | 0.9%            | 27.4%                   | 15.7%           | 0.6%          | 1.7%            | 100%  |

This table shows the number of actual cases of illness caused by each pathogen in each site. Note that *Campylobacter* is the most frequently found pathogen.

**Table 2: Percent Site by Pathogen**  
**From January 1, 1997 to December 31, 1997**

| <b>Pathogen</b>      |                | <b>CA</b>    | <b>CT</b>    | <b>GA</b>    | <b>MN</b>    | <b>OR</b>    | <b>Total</b>  |
|----------------------|----------------|--------------|--------------|--------------|--------------|--------------|---------------|
| <i>Campylobacter</i> | <b>Cases</b>   | <b>1,032</b> | <b>528</b>   | <b>493</b>   | <b>1,176</b> | <b>737</b>   | <b>3,966</b>  |
|                      | <b>Percent</b> | <b>26.0%</b> | <b>13.3%</b> | <b>12.4%</b> | <b>29.7%</b> | <b>18.6%</b> | <b>100.0%</b> |
| <i>E. coli</i> O157  | <b>Cases</b>   | <b>19</b>    | <b>34</b>    | <b>8</b>     | <b>199</b>   | <b>80</b>    | <b>340</b>    |
|                      | <b>Percent</b> | <b>5.6%</b>  | <b>10.0%</b> | <b>2.4%</b>  | <b>58.5%</b> | <b>23.5%</b> | <b>100.0%</b> |
| <i>Listeria</i>      | <b>Cases</b>   | <b>13</b>    | <b>12</b>    | <b>20</b>    | <b>18</b>    | <b>13</b>    | <b>76</b>     |
|                      | <b>Percent</b> | <b>17.1%</b> | <b>15.8%</b> | <b>26.3%</b> | <b>23.7%</b> | <b>17.1%</b> | <b>100.0%</b> |
| <i>Salmonella</i>    | <b>Cases</b>   | <b>370</b>   | <b>412</b>   | <b>473</b>   | <b>619</b>   | <b>330</b>   | <b>2,204</b>  |
|                      | <b>Percent</b> | <b>16.8%</b> | <b>18.7%</b> | <b>21.5%</b> | <b>28.1%</b> | <b>15.0%</b> | <b>100.0%</b> |
| <i>Shigella</i>      | <b>Cases</b>   | <b>291</b>   | <b>77</b>    | <b>574</b>   | <b>138</b>   | <b>177</b>   | <b>1,257</b>  |
|                      | <b>Percent</b> | <b>23.2%</b> | <b>6.1%</b>  | <b>45.7%</b> | <b>11.0%</b> | <b>14.1%</b> | <b>100.0%</b> |
| <i>Vibrio</i>        | <b>Cases</b>   | <b>30</b>    | <b>4</b>     | <b>2</b>     | <b>2</b>     | <b>12</b>    | <b>50</b>     |
|                      | <b>Percent</b> | <b>60.0%</b> | <b>8.0%</b>  | <b>4.0%</b>  | <b>4.0%</b>  | <b>24.0%</b> | <b>100.0%</b> |
| <i>Yersinia</i>      | <b>Cases</b>   | <b>34</b>    | <b>15</b>    | <b>43</b>    | <b>31</b>    | <b>15</b>    | <b>138</b>    |
|                      | <b>Percent</b> | <b>24.6%</b> | <b>10.9%</b> | <b>31.2%</b> | <b>22.5%</b> | <b>10.9%</b> | <b>100.0%</b> |
| <b>Total</b>         | <b>Cases</b>   | <b>1,789</b> | <b>1,082</b> | <b>1,613</b> | <b>2,183</b> | <b>1,364</b> | <b>8,031</b>  |
|                      | <b>Percent</b> | <b>22.3%</b> | <b>13.5%</b> | <b>20.1%</b> | <b>27.2%</b> | <b>17.0%</b> | <b>100.0%</b> |

Table 3: Cases per 100,000 by Pathogen for All Sites

| Pathogen             | 1996*            |              | 1997             |              |
|----------------------|------------------|--------------|------------------|--------------|
|                      | Rate per 100,000 | Total        | Rate per 100,000 | Total        |
| <i>Campylobacter</i> | 23.5             | 3,359        | 24.9             | 3,966        |
| <i>E. coli</i> O157  | 2.7              | 388          | 2.1              | 340          |
| <i>Listeria</i>      | 0.4              | 64           | 0.5              | 76           |
| <i>Salmonella</i>    | 14.5             | 2,069        | 13.8             | 2,204        |
| <i>Shigella</i>      | 8.9              | 1,272        | 7.9              | 1,257        |
| <i>Vibrio</i>        | 0.1              | 21           | 0.3              | 50           |
| <i>Yersinia</i>      | 1.0              | 149          | 0.9              | 138          |
| <b>Total</b>         | <b>51.3</b>      | <b>7,322</b> | <b>50.4</b>      | <b>8,031</b> |

\*Figures represent final 1996 data.

Table 4: Pathogen by Month—All Sites  
From January 1, 1997 to December 31, 1997

| Pathogen             | Month      |            |            |            |            |            |            |            |            |            |            |            | Total        |
|----------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|--------------|
|                      | JAN        | FEB        | MAR        | APR        | MAY        | JUN        | JUL        | AUG        | SEP        | OCT        | NOV        | DEC        |              |
| <i>Campylobacter</i> | 256        | 209        | 250        | 272        | 337        | 497        | 483        | 420        | 372        | 371        | 265        | 234        | 3,966        |
| <i>E. coli</i> O157  | 10         | 11         | 15         | 8          | 18         | 41         | 92         | 44         | 49         | 24         | 15         | 13         | 340          |
| <i>Listeria</i>      | 3          | 4          | 3          | 6          | 5          | 7          | 11         | 8          | 12         | 7          | 4          | 6          | 76           |
| <i>Salmonella</i>    | 171        | 123        | 135        | 209        | 172        | 201        | 235        | 265        | 253        | 176        | 131        | 133        | 2,204        |
| <i>Shigella</i>      | 81         | 76         | 74         | 104        | 88         | 106        | 112        | 171        | 134        | 108        | 97         | 106        | 1,257        |
| <i>Vibrio</i>        | 0          | 0          | 2          | 1          | 1          | 4          | 11         | 18         | 7          | 3          | 2          | 1          | 50           |
| <i>Yersinia</i>      | 18         | 11         | 8          | 12         | 15         | 7          | 8          | 10         | 11         | 6          | 8          | 24         | 138          |
| <b>Total</b>         | <b>539</b> | <b>434</b> | <b>487</b> | <b>612</b> | <b>636</b> | <b>863</b> | <b>952</b> | <b>936</b> | <b>838</b> | <b>695</b> | <b>522</b> | <b>517</b> | <b>8,031</b> |

This table shows the number of actual cases for all sites for each month in 1997.  
Note that July has the greatest number of cases, as was the case in 1996.

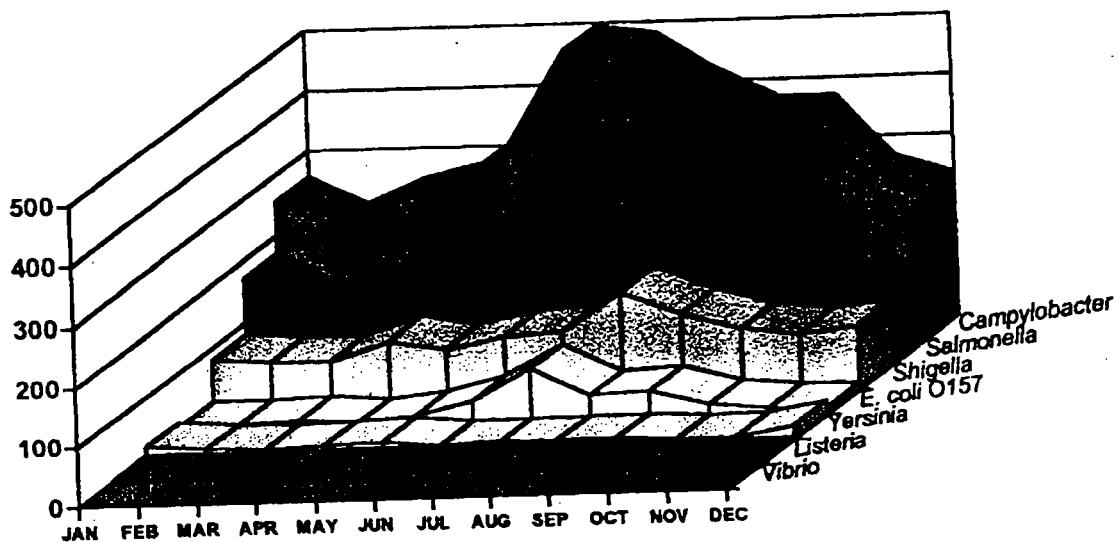


Chart 1: Pathogen by Month—All Sites

Table 5: Age Distribution by Pathogen for All Sites  
From January 1, 1997 to December 31, 1997

| Pathogen             |         | UNK  | 0<1   | 1<10  | 10<20 | 20<30 | 30<40 | 40<50 | 50<60 | 60+   | Total  |
|----------------------|---------|------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| <i>Campylobacter</i> | Cases   | 4    | 123   | 628   | 309   | 694   | 824   | 579   | 373   | 432   | 3,968  |
|                      | Percent | 0.1% | 3.1%  | 15.8% | 7.8%  | 17.5% | 20.8% | 14.6% | 9.4%  | 10.9% | 100.0% |
| <i>E. coli 0157</i>  | Cases   | 0    | 10    | 154   | 54    | 30    | 18    | 12    | 24    | 38    | 340    |
|                      | Percent | 0.0% | 2.9%  | 45.3% | 15.9% | 8.8%  | 5.3%  | 3.5%  | 7.1%  | 11.2% | 100.0% |
| <i>Listeria</i>      | Cases   | 0    | 5     | 2     | 1     | 3     | 9     | 6     | 8     | 42    | 76     |
|                      | Percent | 0.0% | 6.6%  | 2.6%  | 1.3%  | 3.9%  | 11.8% | 7.9%  | 10.5% | 55.3% | 100.0% |
| <i>Salmonella</i>    | Cases   | 2    | 244   | 534   | 217   | 300   | 313   | 232   | 134   | 228   | 2,204  |
|                      | Percent | 0.1% | 11.1% | 24.2% | 9.8%  | 13.6% | 14.2% | 10.5% | 6.1%  | 10.3% | 100.0% |
| <i>Shigella</i>      | Cases   | 3    | 29    | 587   | 74    | 162   | 211   | 102   | 56    | 33    | 1,257  |
|                      | Percent | 0.2% | 2.3%  | 46.7% | 5.9%  | 12.9% | 16.8% | 8.1%  | 4.5%  | 2.6%  | 100.0% |
| <i>Vibrio</i>        | Cases   | 0    | 0     | 0     | 0     | 16    | 18    | 4     | 4     | 8     | 50     |
|                      | Percent | 0.0% | 0.0%  | 0.0%  | 0.0%  | 32.0% | 36.0% | 8.0%  | 8.0%  | 16.0% | 100.0% |
| <i>Yersinia</i>      | Cases   | 0    | 56    | 29    | 7     | 7     | 13    | 10    | 5     | 11    | 138    |
|                      | Percent | 0.0% | 40.6% | 21.0% | 5.1%  | 5.1%  | 9.4%  | 7.2%  | 3.6%  | 8.0%  | 100.0% |
| <b>Total</b>         | Cases   | 9    | 467   | 1,934 | 662   | 1,212 | 1,406 | 945   | 604   | 792   | 8,031  |
|                      | Percent | 0.1% | 5.8%  | 24.1% | 8.2%  | 15.1% | 17.5% | 11.8% | 7.5%  | 9.9%  | 100.0% |

This table shows the number of cases by age group. As in 1996, the greatest number of cases involves children between the ages of 1 and 10 years.

Table 6: Sex Distribution by Pathogen for All Sites  
From January 1, 1997 to December 31, 1997

| Pathogen             |         | Male  | Female | Total  |
|----------------------|---------|-------|--------|--------|
| <i>Campylobacter</i> | Cases   | 1779  | 2177   | 3956   |
|                      | Percent | 45.0% | 55.0%  | 100.0% |
| <i>E. coli</i> 0157  | Cases   | 178   | 162    | 340    |
|                      | Percent | 52.4% | 47.6%  | 100.0% |
| <i>Listeria</i>      | Cases   | 35    | 41     | 76     |
|                      | Percent | 46.1% | 53.9%  | 100.0% |
| <i>Salmonella</i>    | Cases   | 1092  | 1108   | 2200   |
|                      | Percent | 49.6% | 50.4%  | 100.0% |
| <i>Shigella</i>      | Cases   | 607   | 647    | 1254   |
|                      | Percent | 48.4% | 51.6%  | 100.0% |
| <i>Vibrio</i>        | Cases   | 19    | 31     | 50     |
|                      | Percent | 38.0% | 62.0%  | 100.0% |
| <i>Yersinia</i>      | Cases   | 74    | 63     | 137    |
|                      | Percent | 54.0% | 46.0%  | 100.0% |
| Total                | Cases   | 3784  | 4229   | 8013   |
|                      | Percent | 47.2% | 52.8%  | 100.0% |

This table shows the number of cases by sex. There are 18 cases where sex is unknown.



Table 7: Patient Outcome by Pathogen for All Sites  
From January 1, 1997 to December 31, 1997

| Pathogen             |         | Alive | Unknown | Dead  | Total  |
|----------------------|---------|-------|---------|-------|--------|
| <i>Campylobacter</i> | Cases   | 3060  | 905     | 1     | 3966   |
|                      | Percent | 77.2% | 22.8%   | 0.0%  | 100.0% |
| <i>E. coli</i> 0157  | Cases   | 331   | 5       | 4     | 340    |
|                      | Percent | 97.4% | 1.5%    | 1.2%  | 100.0% |
| <i>Listeria</i>      | Cases   | 58    | 3       | 15    | 76     |
|                      | Percent | 76.3% | 4.0%    | 19.7% | 100.0% |
| <i>Salmonella</i>    | Cases   | 1855  | 337     | 12    | 2204   |
|                      | Percent | 84.2% | 15.3%   | 0.5%  | 100.0% |
| <i>Shigella</i>      | Cases   | 1002  | 254     | 1     | 1257   |
|                      | Percent | 79.7% | 20.2%   | 0.1%  | 100.0% |
| <i>Vibrio</i>        | Cases   | 29    | 21      | 0     | 50     |
|                      | Percent | 58.0% | 42.0%   | 0.0%  | 100.0% |
| <i>Yersinia</i>      | Cases   | 112   | 26      | 0     | 138    |
|                      | Percent | 81.2% | 18.8%   | 0.0%  | 100.0% |
| <b>Total</b>         | Cases   | 6447  | 1551    | 33    | 8031   |
|                      | Percent | 79.4% | 20.1%   | 0.5%  | 100%   |

This table shows the number of known deaths of patients who tested positive for one of the seven targeted pathogens. Note that these deaths may or may not have been caused by the pathogen, but may be attributable to an underlying illness. Further case control study is warranted.

# **The Foodborne Diseases Active Surveillance Network FoodNet**

## **Background:**

The United States Department of Agriculture (USDA), the Food and Drug Administration (FDA), and the Centers for Disease Control and Prevention (CDC) are collaborating with state health departments and local investigators at seven locations across the country in an unprecedented effort to identify more accurately the incidence of foodborne illness in the United States. This active surveillance system, known as FoodNet, provides information on the occurrence of individual cases of foodborne illnesses and outbreaks of foodborne illness for the first time. As part of my Administration's commitment to modernize and strengthen the food safety system, we are using highly sophisticated techniques, like DNA fingerprinting, which can detect and identify pathogens that cause illness. Over time, this collaborative project will be used to identify the foods associated with illness and to monitor the effectiveness of food safety programs in reducing foodborne illness. The data obtained through FoodNet has already identified foodborne outbreaks linked to *Salmonella* infections caused by contaminated alfalfa sprouts and two outbreaks of *E.coli* O157 infections linked to contaminated lettuce and apple cider. Tom, please check this with HHS—I am sure this is accurate—and it would be good for the President to show accomplishments that have already taken place with FoodNet data.....

## **The Future of our food safety system**

- We have built a solid foundation, ensuring the health of America's families. Clearly we must do more. In my budget currently before Congress, I have requested new funds as part of the 1999 National Food Safety Initiative to further build the capabilities and coverage of FoodNet and improve the monitoring of threats to our food supply. With these additional public health investments, we are saying loud and clear that we will use the world's best science to improve the safety of our food supply.

04/16/98 THU 16:28 FAX 2022607425 OASH 001

Office of the Assistant Secretary for Health  
and  
Surgeon General  
Office of Public Health and Science  
Department of Health and Human Services

---

200 Independence Ave., S.W., Rm 716G  
Washington, D.C. 20201  
Phone: (202) 690-7694  
Fax: (202) 690-6960

FAX TRANSMISSION COVER SHEET

---

Date: 4-16-98  
To: Thomas Freedman  
Fax: 456-7431  
Re: (see ATTACHED)  
From: Jim O'Hara

Please call me ASAP.  
Thanks.

APR-18-98 15:56 From: CDC EXEC SEC

NOTE TO: JAMES O'HARA  
DEPUTY ASSISTANT SECRETARY FOR HEALTH  
OFFICE OF PUBLIC HEALTH AND SCIENCE

SUBJECT: FoodNet Report from CDC

In response to your request, attached is the two-page document, "Highlights of CDC Surveillance Activities for the Food Safety Initiative in 1997 - FoodNet," which summarizes active surveillance data and other studies from FoodNet sites for calendar year 1997. FoodNet is part of CDC's program to identify and prevent foodborne illness. This report contains few numerical data, but verbally describes the epidemiologic findings of FoodNet, and attempts to put those findings within the context of CDC's overall efforts to establish a national early warning system, improve our quantitative understanding of foodborne disease, and create a platform for responding to food safety emergencies and evaluating prevention strategies.

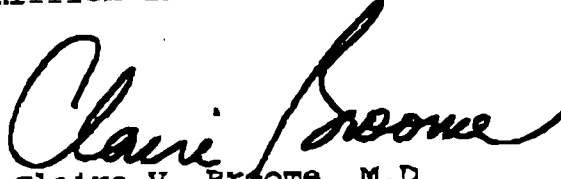
The active, laboratory-based surveillance component of FoodNet provides for accurate tracking of the incidence of specified intestinal pathogens that are often foodborne. During 1997, the surveillance year covered by this report, data were collected on seven bacterial pathogens and two parasitic pathogens in five active surveillance sites. In 1998, the two newest sites began surveillance activities. In future years, additional intestinal pathogens will be included. When these surveillance data are combined with information from population-based surveys, estimates can be made of the undiagnosed illnesses that must have occurred within the areas under surveillance. These estimates can then be extrapolated to the Nation as a whole, providing estimates of the national occurrence of infections with the pathogens under surveillance. With case-control studies of specific pathogens, the relative importance of various food items and other non-food sources in causing these infections can be determined.

When a sufficient number of bacterial, parasitic, and viral pathogens is under surveillance and the risk factors for these infections have been evaluated by case-control studies, FoodNet will provide a basis for more accurately estimating the national burden of foodborne disease. Until then, it will generate less public confusion to continue to use the estimates of foodborne

APR-16-98 15:58 From: CDC EXEC SEC

Page 2 - Note to Mr. James O'Hara

illness provided in the May 1997 Report to the President--as many as 9000 deaths and 6.5 to 33 million illnesses annually.



Claire V. Broome, M.D.  
Acting Director

Attachment

APR-16-98 16:07 From: CDC EXEC SEC

## **Highlights of CDC Surveillance Activities for the Food Safety Initiative in 1997 - FoodNet**

Foodborne infections are an important public health challenge and the Centers for Disease Control and Prevention (CDC) is actively involved in improving food safety. Foodborne diseases are common, with an estimated 6-33 million cases occurring each year in the United States. CDC's principle role in the interagency national Food Safety Initiative launched this year has been to enhance surveillance for and investigation of infections that are usually foodborne. These efforts will provide crucial data to identify control points, focus future prevention strategies and decision-making within food safety regulatory agencies, measure changes in the burden of disease, and improve the national early warning system for food safety emergencies.

One major effort is the collaborative Foodborne Diseases Active Surveillance Network (FoodNet) that CDC conducts with States and other Federal agencies. Through active surveillance and additional studies, FoodNet measures the burden and sources of specific diseases that are usually foodborne in the United States. FoodNet will track and interpret trends in these diseases over time, and will include additional studies of emerging causes of foodborne diseases. FoodNet is a sentinel network that can rapidly respond to new and emerging foodborne pathogens. FoodNet and other efforts at CDC augment, but do not replace, longstanding activities at CDC and in States to identify, control, and prevent foodborne disease hazards.

Through active surveillance and additional studies, FoodNet is providing better scientific data on the burden and sources of specific illnesses that are usually foodborne, and is tracking trends in these diseases over time. Enhanced surveillance and investigation are an integral part of developing and evaluating new prevention and control strategies that can improve the safety of our food and the public's health.

The following are key findings of 1997 CDC FoodNet surveillance activities:

- The overall burden of diarrheal disease is great. FoodNet estimates that 360 million cases of diarrheal illness occur per year, leading to about 28 million medical consultations. Further studies will define the causes and impact of these illnesses and the proportion of them that may be related to food.
- In 1997, FoodNet tracked infections caused by seven bacterial pathogens and began to track two parasitic

## **Highlights of CDC Surveillance Activities for the Food Safety Initiative in 1997 - FoodNet**

Foodborne infections are an important public health challenge and the Centers for Disease Control and Prevention (CDC) is actively involved in improving food safety. Foodborne diseases are common, with an estimated 6-33 million cases occurring each year in the United States. CDC's principle role in the interagency national Food Safety Initiative launched this year has been to enhance surveillance for and investigation of infections that are usually foodborne. These efforts will provide crucial data to identify control points, focus future prevention strategies and decision-making within food safety regulatory agencies, measure changes in the burden of disease, and improve the national early warning system for food safety emergencies.

One major effort is the collaborative Foodborne Diseases Active Surveillance Network (FoodNet) that CDC conducts with States and other Federal agencies. Through active surveillance and additional studies, FoodNet measures the burden and sources of specific diseases that are usually foodborne in the United States. FoodNet will track and interpret trends in these diseases over time, and will include additional studies of emerging causes of foodborne diseases. FoodNet is a sentinel network that can rapidly respond to new and emerging foodborne pathogens. FoodNet and other efforts at CDC augment, but do not replace, longstanding activities at CDC and in States to identify, control, and prevent foodborne disease hazards.

Through active surveillance and additional studies, FoodNet is providing better scientific data on the burden and sources of specific illnesses that are usually foodborne, and is tracking trends in these diseases over time. Enhanced surveillance and investigation are an integral part of developing and evaluating new prevention and control strategies that can improve the safety of our food and the public's health.

The following are key findings of 1997 CDC FoodNet surveillance activities:

- The overall burden of diarrheal disease is great. FoodNet estimates that 360 million cases of diarrheal illness occur per year, leading to about 28 million medical consultations. Further studies will define the causes and impact of these illnesses and the proportion of them that may be related to food.
- In 1997, FoodNet tracked infections caused by seven bacterial pathogens and began to track two parasitic

APR-16-98 15:57 From: CDC EXEC SEC

pathogens. Among the agents under surveillance, the bacterium, *Campylobacter*, was the most frequently diagnosed even though outbreaks caused by this agent are rare. A study of *Campylobacter* infections now underway will identify control points and direct future prevention strategies. Based on these surveillance findings, the USDA Agricultural Research Service is augmenting research into possible prevention strategies for *Campylobacter*.

- FoodNet showed that *Escherichia coli* O157:H7 infections were more common in northern states, and that undercooked ground beef was the principal food source of *E. coli* O157:H7 infections. In a change from previous investigations, hamburgers eaten at fast-food restaurants were not associated with infection, suggesting that recent changes in that industry may have decreased *E. coli* O157:H7 infections from that source. Expanded efforts to reduce contamination of meat and to promote thorough cooking of hamburgers can further reduce the number of these infections. A second study is now planned to explore other potential control points.
- Ongoing FoodNet surveillance will be used to document the effectiveness of new food safety control measures, such as the USDA Pathogen Reduction and Hazard Analysis and Critical Control Points (HACCP) Rule, in decreasing cases of major foodborne diseases in the United States each year.
- Hospitalization associated with foodborne diseases is an important public health burden. In FoodNet sites, *Listeria* infections had the highest hospitalization rate. Because of this, FoodNet will conduct additional studies of *Listeria* infections to identify food sources and potential control points.
- In the summer of 1997, an outbreak of *Vibrio parahaemolyticus* infections in the western United States was identified by FoodNet and state-based surveillance, and was associated with consumption of raw oysters. As a result, public health officials closed oyster beds in Washington State and warned the public about the risk associated with those shellfish, thus preventing further human illness. In the future, surveillance of seafood-associated infections can be used to document the effect of FDA seafood safety programs.



APR-16-98 15:57 From: CDC EXEC SEC

# CDC'S Emerging Infections Program

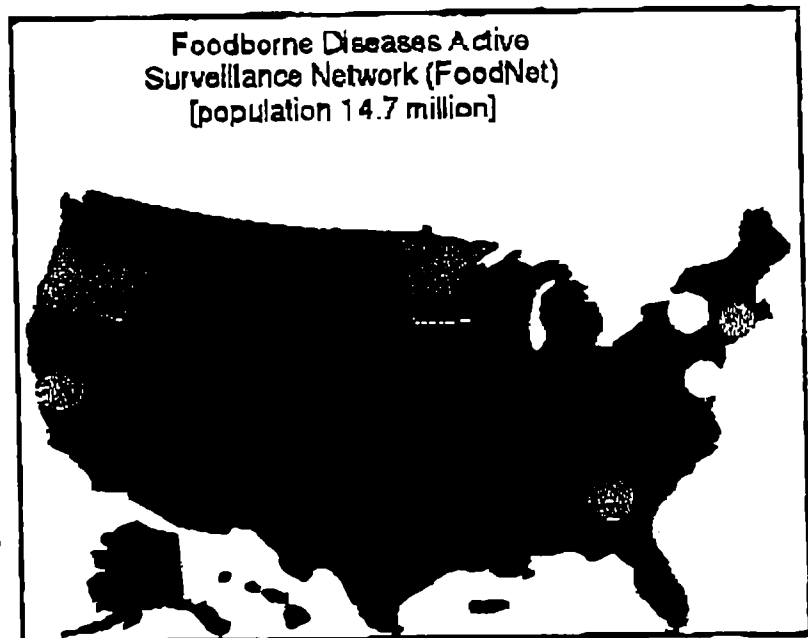
## CDC/USDA/FDA Foodborne Diseases Active Surveillance Network (FoodNet)

### What is CDC's Emerging Infections Program?

In the early 1990s, the National Academy of Science's Institute of Medicine published a report which emphasized the ongoing threat of emerging infectious diseases (1), and the Centers for Disease Control and Prevention (CDC) developed a strategy to respond to this threat (2). A central feature of this strategy was the establishment of the Emerging Infections Program (EIP) in seven sites across the United States (California, Connecticut, Georgia, New York, Maryland, Minnesota, and Oregon). The goals of the EIP network are to improve national surveillance for new and emerging infectious diseases, conduct applied epidemiologic and laboratory research, develop prevention and control measures, and strengthen the national public health infrastructure.

### What is FoodNet?

The Foodborne Diseases Active Surveillance Network (FoodNet) is the foodborne disease component of CDC's Emerging Infections Program. FoodNet is a collaborative project among CDC, the seven EIP sites, the U.S. Department of Agriculture (USDA), and the U.S. Food and Drug Administration (FDA) that consists of active surveillance for foodborne diseases and related epidemiologic studies designed to help public health officials better understand the epidemiology of foodborne diseases in the United States. Foodborne diseases include infections caused by *Salmonella*, *Shigella*, *Campylobacter*, *Escherichia coli* O157, *Listeria*, *Yersinia*, and *Vibrio* bacteria. FoodNet was established in 1995 in five locations: Minnesota, Oregon, and selected counties in Georgia, California, and Connecticut. The total population of these sites, or catchment areas, is 14.7 million people, or 6% of the population of the United States. FoodNet will be expanded to selected counties in Maryland and New York in 1997. FoodNet provides a network for responding to new and emerging foodborne diseases of national importance, monitoring the burden of foodborne diseases, and identifying the source of specific foodborne diseases.



### FoodNet goals:

- Describe the epidemiology of new and emerging bacterial, parasitic, and viral foodborne pathogens.
- Estimate the frequency and severity of foodborne diseases that occur in the United States per year.
- Determine how much foodborne illness results from eating specific foods, such as meat, poultry, and eggs.

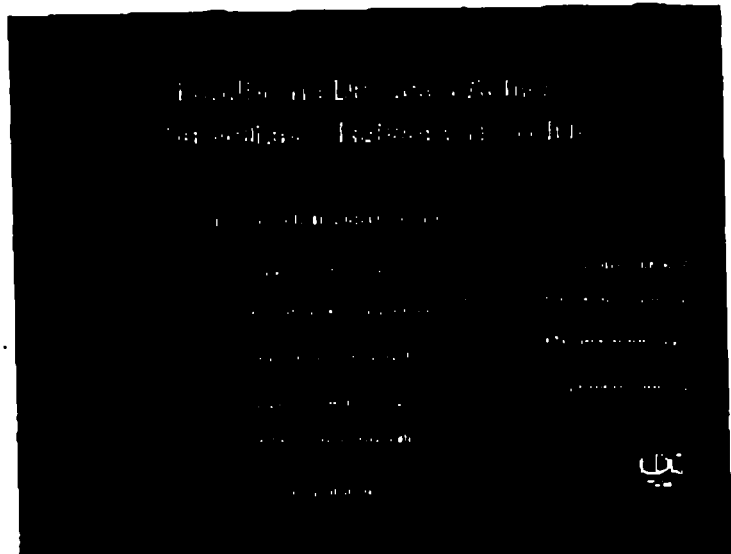
APR-16-98 15:58 From: CDC EXEC SEC

## Why is FoodNet important to public health?

Foodborne diseases are common; an estimated 6-33 million cases occur each year in the United States. Although most of these infections cause mild illness, severe infections and serious complications do occur. The public health challenges of foodborne diseases are changing rapidly; in recent years, new and emerging foodborne pathogens have been described and changes in food production have led to new food safety concerns. Foodborne diseases have been associated with many different foods, including some previously thought to be safe, such as eggs and fruit juice, both of which have transmitted *Salmonella* during recent outbreaks. Public health officials in the seven EIP sites are monitoring foodborne diseases, conducting epidemiologic and laboratory studies of these diseases, and respond to new challenges from these diseases. Information gained through this network will lead to new interventions and prevention strategies for addressing the public health problem of foodborne diseases.

## How is the FoodNet different from other foodborne disease surveillance?

Current "passive" surveillance systems rely upon reporting of foodborne diseases by clinical microbiology laboratories to state health departments, which in turn report to CDC. Although foodborne diseases are extremely common, only a fraction of these illnesses are routinely reported to CDC via these surveillance systems. This is because a complex chain of events must occur before such a case is reported, and a break at any linkage along the chain will result in a case not being reported (Figure 1). The FoodNet is an "active" surveillance system, meaning public health officials frequently contact microbiology laboratory directors to find new cases of foodborne diseases and report these cases electronically to CDC. In addition, the FoodNet is designed to monitor each of the events that occurs along the foodborne diseases pyramid and thereby allow more accurate and precise estimates and interpretation of the burden of foodborne diseases over time. Because most foodborne infections cause diarrheal illness, FoodNet focuses these efforts on persons who have a diarrheal illness.



[Click to View Full Screen](#)

Figure 1. The burden of illness pyramid.

Passive surveillance data represent only the tip of the iceberg. For a bacterial infection to be included in the passive surveillance system, it must pass through the following steps; a person becomes ill with a diarrheal disease, the patient must go to a doctor, the doctor must order a bacterial stool culture, the assigned microbiology laboratory must culture for this organism and report the infection to the state health department; the state health department in turn must report the infection to CDC. This passive surveillance system is the means by which the number of cases of foodborne illness is currently determined at CDC; if any step does not occur, foodborne illness is not reported. FoodNet is designed to collect information along each step of this pyramid.

## FoodNet Has 5 Components:

- Active laboratory-based surveillance
- Survey of clinical laboratories
- Survey of physicians
- Survey of the population
- Case-control studies



## Active laboratory-based surveillance

The core of FoodNet is population-based active surveillance at over 300 clinical microbiology laboratories that test stool samples in the seven participating sites. In active surveillance, the laboratories in the catchment areas are contacted regularly by collaborative FoodNet investigators to collect information on all of the laboratory-confirmed cases of diarrheal illness. Since January 1996, information has been collected on every laboratory-diagnosed case of *Salmonella*, *Shigella*, *Campylobacter*, *Escherichia coli* O157, *Listeria*, *Yersinia*, and *Vibrio* infection among residents of the catchment areas of the five original sites; this information is transmitted electronically to CDC. The result is a comprehensive and timely database of foodborne illness in a well-defined population.



## Survey of clinical laboratories

In October 1995, collaborative FoodNet investigators conducted a baseline laboratory survey of all microbiological laboratories in the five original catchment areas to determine which pathogens are included in routine bacterial stool cultures, which tests must be specifically requested by the physician, and what specific techniques are used to isolate the pathogens. A baseline survey will be conducted in the two new sites, and a follow-up survey to assess any recent changes in laboratory practices will be conducted in the original sites in 1997. Practices in clinical laboratories have been found to vary; some laboratories look for a wider variety of bacteria than others. The methods used to collect and examine specimens are being investigated because these can influence whether the laboratory finds disease-causing bacteria.

## Survey of physicians



To obtain information on physician stool culturing practices, collaborative FoodNet investigators mailed a survey questionnaire to 5,000 physicians during 1996. Analysis of these data is ongoing. Because laboratories test stool specimens from a patient only upon the request of a physician or other health care provider, it is important to measure how often and under what circumstances physicians order these tests. As changes occur in the way health care is provided in the United States, stool culturing practices may also change over time. The practices of physicians who send stool samples to laboratories within the catchment areas will be monitored by surveys and validation studies.



## Survey of the population

Collaborative FoodNet investigators contact randomly selected residents of a catchment area and ask if the person has had a recent diarrheal illness, whether he or she sought treatment for the illness, and whether he or she had consumed certain foods known to have caused outbreaks of foodborne illness. During 1996, 750 residents of the catchment areas were interviewed by telephone each month (9,000/year). Because many people who become ill with diarrhea do not see a physician, little is known about the number of cases of diarrhea in the general population and how often persons with diarrhea seek medical care. The population survey is an essential part of active surveillance for foodborne illness because it allows for an estimate of the population who seeks medical care when affected by diarrheal illness.

## Case-control Studies

In 1996, the FoodNet began case-control studies of *E. coli* O157 and *Salmonella* serogroup B and D infections. More than 60% of *Salmonella* infections in the United States are caused by serogroup B and D *Salmonella*. These large case-control studies will provide new and more precise information about which food items or other exposures may cause these diseases. To allow the most precise classification of the isolates from the patients in these studies, the *Salmonella* and *E. coli* O157:H7 laboratory specimens from these patients are sent from FoodNet sites to CDC for further study, including antibiotic resistance testing, phage typing, and molecular subtyping.

## Accomplishments

Since becoming operational on January 1, 1996, CDC's EIP FoodNet has begun tracking the rates of foodborne diseases. Even in the first year of data collection, numerous interesting patterns and outbreaks have been detected through the FoodNet. Surprisingly high isolation rates for *Yersinia enterocolitica* have been detected in Georgia, and *Campylobacter* in California. An outbreak of *Salmonella* infections caused by contaminated alfalfa sprouts was detected in Oregon. Two outbreaks of *E. coli* O157:H7 infections were detected in Connecticut, one due to lettuce and one due to apple cider. The FoodNet has also provided the infrastructure for conducting active surveillance for new and emerging diseases. When an association between bovine spongiform encephalopathy in cattle and variant-Creutzfeldt Jacob disease in humans was suspected in the United Kingdom, EIP personnel conducted surveillance for this rare human disease. EIP personnel also collaborated in the investigation of a multistate outbreak of *Cyclospora* infections associated with consumption of raspberries from Guatemala.

## Future FoodNet projects

- Several projects in 1997 will focus on *Campylobacter*, including a case-control study to determine the risk factors for infection and determination of antibiotic resistance patterns among *Campylobacter* strains.
- Collaborative FoodNet investigators will establish active surveillance for hemolytic uremic syndrome (HUS), a serious complication of *E. coli* O157:H7 infection.

## References

1. Institute of Medicine. *Emerging Infections, Microbial Threats to Health in the United States*. Washington DC: National Academy Press, 1992.
2. Centers for Disease Control and Prevention. *Addressing Emerging Infectious Disease Threats to Health: A Prevention Strategy for the United States*. Atlanta: United States Department of Health and Human Services, 1994.

---

National Center for Infectious Diseases  
Centers for Disease Control and Prevention  
Atlanta, GA

URL: <http://www.cdc.gov/ncidod/foodnet/foodnet.htm>

**DRAFT**

## *Report to Congress*

*radio address*

*→ Tim*

*→ 5 yrs. - 10 yrs.  
→ 15/100 - 2nd yr.*

*→ 1000*

*Declines  
except  
compliance*

*Suspension*

# **Food Net: An Active Surveillance System for Bacterial Foodborne Diseases in the United States**

*May 1997*

*→ M. Isenst  
→ Force 6*

*mid April*

*Report to  
POPS*

*Force 6.*

**Food Safety and Inspection Service  
United States Department of Agriculture  
Washington, DC**

**April, 1998**

**DRAFT**

---

# ***Contents***

---

|                                    | Page No. |
|------------------------------------|----------|
| <b>I. Preface</b>                  | <b>1</b> |
| <b>II. Overview of FoodNet</b>     | <b>2</b> |
| <b>III. Foodborne Illness Data</b> | <b>7</b> |

## **Tables and Charts**

Table 1: Percent Pathogen by Site

Table 2: Percent Site by Pathogen

Table 3: Cases per 100,000 by Pathogen for all Sites  
(1996 vs. 1997)

Table 4: Pathogen by Month -- All Sites

Chart 1: Pathogen by Month -- All Sites

Table 5: Age Distribution by Pathogen for all Sites

Table 6: Sex Distribution by Pathogen for all Sites

Table 7: *Salmonella* Typhimurium and Enteritidis Serotype by Site

Table 8: Patient Outcome by Pathogen for all Sites

## ***Preface***

---

The U.S. Department of Agriculture has been directed by Congress to provide an annual report on the incidence of foodborne illness in the United States. This report is to be submitted to the House and Senate Committees on Appropriations.

This report includes a description of the Foodborne Diseases Active Surveillance Network (FoodNet) and foodborne illness data for calendar year 1997.

Questions about this report or about FSIS may be directed to the Food Safety and Inspection Service, U.S. Department of Agriculture, Washington, D.C. 20250.

# ***Overview of FoodNet***

---

The Food Safety and Inspection Service (FSIS) of the U. S. Department of Agriculture (USDA) administers a comprehensive system of inspection laws to ensure that meat, poultry, and egg products moving in interstate and foreign commerce for use as human food are safe, wholesome, and accurately labeled.

Over the past decade, foodborne illnesses caused by bacterial contamination have heightened concern about the safety of food. The Centers for Disease Control and Prevention (CDC) has identified bacterial pathogens as the most common cause of foodborne illnesses because they can be easily transmitted and multiply rapidly in food, thus making them difficult to control. CDC has targeted seven bacterial foodborne pathogens (*Campylobacter*, *E. coli* O157:H7, *Listeria*, *Salmonella*, *Shigella*, *Vibrio*, and *Yersinia*) as those of greatest concern to public health. Government economists have estimated that foodborne illnesses cost billions of dollars each year in lost productivity and medical care. However, an accurate picture of both the number and causes of foodborne illnesses in the United States is unknown.

In July 1995, as part of the federal government's campaign to improve the safety of the nation's food supply, FSIS began a collaborative project with CDC and the Food and Drug Administration, known originally as the Sentinel Site Study and more recently as the Foodborne Diseases Active Surveillance Network or FoodNet, to collect more precise information on the incidence of foodborne disease in the United States. This project includes direct working links with state and local health departments at seven selected sites nationwide as a means of obtaining the most complete and current foodborne illness data available. This study, which is expected to continue for several years, will provide much-needed baseline data regarding the incidence of foodborne illness in the United States which is attributable to consumption of meat, poultry, and other food products.

## ***Background***

Bacterial foodborne diseases are currently reported to local and state health departments and CDC through passive surveillance systems. As with all passive systems, cases are frequently unreported. In fact, only 1% to 5% of foodborne disease cases are believed to be reported to CDC.



In July 1994, the USDA Pathogen Reduction Task Force recommended that FSIS work with CDC on research and surveillance activities that will better characterize risks for foodborne pathogens. This recommendation echoed a National Academy of Sciences recommendation for more community-based surveillance of foodborne disease. To improve data on the incidence and causes of foodborne illness, FSIS and CDC have established seven foodborne illness sites to study the epidemiological links among outbreaks of foodborne illness and to explore what relationships may exist between outbreaks and the types of meat, poultry, and egg products consumed. The selected sites are Northern California, Oregon, the Minneapolis/St. Paul metropolitan area, the metropolitan Atlanta area, Connecticut, counties in Maryland and upstate New York.

### *Objectives*

The major objectives of FoodNet are to:

- ▶ determine the yearly incidence of diarrheal illness due to bacterial foodborne pathogens (i.e., *Campylobacter*, *E. coli* O157:H7, *Listeria*, *Salmonella*, *Shigella*, *Vibrio*, and *Yersinia*);
- ▶ develop a network to collaboratively respond to emerging foodborne diseases;
- ▶ determine the proportion of foodborne disease cases attributed to specific commodities; and
- ▶ determine whether federal interventions are having a measurable effect on the incidence of foodborne illness attributable to consumption of meat, poultry, and other foods.

### *Scope and Duration of Study*

FoodNet is a comprehensive effort to track major pathogens that cause foodborne illness, to examine the epidemiological links among outbreaks of foodborne illness, and to explore what relationships may exist between outbreaks and the types of food products consumed.

Active surveillance data will be collected on reported illnesses associated with the seven bacterial pathogens targeted by CDC. Collected data will be used to identify emerging

pathogens and monitor illness incidence. The results will be used to help monitor the effectiveness of new food safety programs aimed at reducing the levels of these pathogens in meat, poultry, and other foods.

For the project to be successful, data must be collected over a number of years to chart national trends and consider the effectiveness of control strategies. It is hoped that the success of FoodNet will prompt the future collection of such data in state health departments all over the country so that a truly accurate picture of the extent and causes of foodborne illness will be achieved.

### *Components of FoodNet*

- ▶ **Active Surveillance:** The purpose of this survey is to determine in each site the actual number of laboratory-confirmed cases of illness caused by the seven targeted bacteria and, as of 1997, two targeted parasites.
  - **Bacterial:** In 1997, the total population under surveillance was 15.9 million persons. Culture-confirmed cases for the five sites total 7933. The Tables in the last section provide detailed information about these cases.
  - **Parasitic:** In 1997, data collection began in four sites for illnesses caused by the parasites *Cryptosporidium* and *Cyclospora*. A total of 464 cases were found. Beginning in January 1998, all sites will survey for these parasites.
- ▶ **Laboratory Survey:** The primary purpose of this survey is to determine whether or not laboratories within the site boundaries are performing cultures for foodborne pathogens. A baseline survey of 230 clinical labs which perform stool cultures in the sites was completed in late 1995. This survey demonstrated that all 230 labs in the five sites routinely culture for *Salmonella* and *Shigella*, 95% for *Campylobacter*, 48% for *E. coli* O157, 30% for *Yersinia*, and 19% for *Vibrio*. The survey was repeated in 1997 to determine the total number of bacterial stool cultures performed, including those that did and did not yield a pathogen, to collect specific information on *Campylobacter* isolation techniques, and to collect information regarding testing for *Cryptosporidium* and *Cyclospora*. Analysis is being conducted by CDC.

- ▶ **Physician Survey:** The primary purpose of this survey is to determine whether or not physicians who see patients for diarrheal complaints are referring them for laboratory analysis. A total of 5074 surveys were mailed to physicians in non-surgical specialties in five sites in 1996; 2939 (58%) were returned. In 1997, the survey was conducted in Maryland and New York, the two newest sites. Analysis is being conducted by CDC.
- ▶ **Population Survey:** An outside contractor, Macro International, performs this survey for FoodNet. Both adult and pediatric surveys are being used. The primary purpose of this survey is to determine population behavior in the site areas, particularly regarding what foods are consumed and how food is handled and prepared. The first full year of data collection was completed in June 1997. A total of 12,209 interviews were conducted. Preliminary analysis at CDC indicates 11% of persons interviewed had a diarrheal illness in the previous 4 weeks, which represents 1.3 diarrheal episodes per person per year. The second year of data collection began in February 1998.
- ▶ **Case-Control Studies:** The primary purpose of these studies is to determine patient behavior and food consumption just prior to becoming ill.

**- *E. coli* O157:H7**

The first year of the *E. coli* O157:H7 study was completed in May, 1997. It has not resumed. Data is being analyzed at CDC and the Minnesota Department of Health.

Accordlyt  
CDC

Preliminary analysis indicates that consumption of pink hamburgers or pink ground beef and living on or visiting a farm are risk factors for sporadic infection. Ref. CDC

**- *Salmonella***

The *Salmonella* serogroup B & D study began in April 1996 in three sites and in August 1996 in two sites and ended 12 months later in all sites. It has not resumed. Data is being analyzed at CDC.

### **- *Campylobacter***

In 1997, it was decided to add a case-control study for *Campylobacter* which was found to be the most frequent cause of illness in all sites. The questionnaire was developed in 1997 and the study began in January 1998 in four sites, February 1998 in one site, and March 1998 in two sites.

### ***Future Plans***

#### **Plan for 1998:**

Counties in New York (Genesee, Livingston, Monroe, Ontario, Orleans, Wayne, and Yates) and Maryland (Ann Arundel, Baltimore, Carroll, Harford, Howard, and Baltimore City) will join FoodNet as fully participating sites. An invitation will be presented to all remaining state public health departments to join as the eighth site. Selection of this eighth site will be made in the fall of 1998, and participation will begin in 1999.

#### **Plan for 1999:**

The eighth site will begin to participate in FoodNet. Case-control studies for additional pathogens such as *Listeria* and *Cryptosporidium* will begin. Validation studies for the Physician survey and Laboratory survey will be performed to validate collected data. The Laboratory survey will be repeated. The FoodNet population under surveillance will increase to 24,979,368 with the addition of statewide surveillance in Georgia and the Albany, NY metropolitan area. The addition of the eighth site will increase the population as well.

**DRAFT****Foodborne Illness Data**

The following information represents findings from the second year of data collection. It is important to note, however, that the tables and charts that follow are based solely on the number of laboratory-confirmed actual cases in the sites. No analysis of the probable causes of the illnesses is presented; only the pathogen found in each patient.

***Population in sites (based on 1996 Census data):***

|              | 1996              | 1997              |
|--------------|-------------------|-------------------|
| California:  | 2,063,454         | 2,063,454         |
| Connecticut: | 1,626,366         | 2,460,127         |
| Georgia      | 2,729,783         | 3,541,230         |
| Minnesota    | 4,657,758         | 4,657,758         |
| Oregon       | <u>3,203,735</u>  | <u>3,203,735</u>  |
| <b>TOTAL</b> | <b>14,281,096</b> | <b>15,926,304</b> |

The total United States population is 263,552,678.

These population totals are based on 1996 Census data. Connecticut includes the addition of Fairfield county. Georgia includes the addition of 12 counties.

***Active Cases:***

There were 7,933 laboratory-confirmed diarrheal cases in 1997 that were attributable to the seven targeted bacterial pathogens (i.e., *Campylobacter*, *E. coli* O157:H7, *Listeria*, *Salmonella*, *Shigella*, *Vibrio*, and *Yersinia*). This represents an increase of 611 cases (8%) over the 7,322 final case figure for 1996. However, the population figure also increased by 1,645,208 (11%). A comparison of cases per 100,000 population for 1996 and 1997 shows that the prevalence of cases decreased from 51.3% to 49.7% (Table 3)

***Most frequently isolated pathogen:***

For the second year, *Campylobacter* is the most frequently isolated bacterium from persons with diarrhea (45.8%); *Salmonella* is second (26.9%); *Shigella* is third (14.7%); *E. coli* O157:H7 is fourth (4.1%); *Yersinia* is fifth (1.6%); *Listeria* is sixth (.8%); *Vibrio* is last (.6%).

Table 1: Percent Pathogen by Site  
From January 1, 1997 to December 31, 1997

| Site        |         | Pathogen             |                        |                 |                   |                 |               |                 | Total |
|-------------|---------|----------------------|------------------------|-----------------|-------------------|-----------------|---------------|-----------------|-------|
|             |         | <i>Campylobacter</i> | <i>E. coli</i><br>O157 | <i>Listeria</i> | <i>Salmonella</i> | <i>Shigella</i> | <i>Vibrio</i> | <i>Yersinia</i> |       |
| California  | Cases   | 1,001                | 19                     | 13              | 380               | 291             | 30            | 33              | 1,767 |
|             | Percent | 56.6%                | 1.1%                   | 0.7%            | 21.5%             | 16.5%           | 1.7%          | 1.9%            | 100%  |
| Connecticut | Cases   | 477                  | 34                     | 7               | 430               | 77              | 4             | 12              | 1,041 |
|             | Percent | 45.8%                | 3.3%                   | 0.7%            | 41.3%             | 7.4%            | 0.4%          | 1.2%            | 100%  |
| Georgia     | Cases   | 469                  | 8                      | 20              | 457               | 549             | 1             | 44              | 1,548 |
|             | Percent | 30.3%                | 0.5%                   | 1.3%            | 29.5%             | 35.5%           | 0.1%          | 2.8%            | 100%  |
| Minnesota   | Cases   | 1,179                | 202                    | 18              | 636               | 138             | 2             | 31              | 2,206 |
|             | Percent | 53.4%                | 9.2%                   | 0.8%            | 28.8%             | 6.3%            | 0.1%          | 1.4%            | 100%  |
| Oregon      | Cases   | 719                  | 80                     | 11              | 356               | 178             | 12            | 15              | 1,371 |
|             | Percent | 52.4%                | 5.8%                   | 0.8%            | 26.0%             | 13.0%           | 0.9%          | 1.1%            | 100%  |
| Total       | Cases   | 3,845                | 343                    | 69              | 2,259             | 1,233           | 49            | 135             | 7,933 |
|             | Percent | 48.5%                | 4.3%                   | 0.9%            | 28.5%             | 15.5%           | 0.6%          | 1.7%            | 100%  |

This table shows the number of actual cases of illness caused by each pathogen in each site. Note ~~the~~ *Campylobacter* is the most frequently found pathogen.

*that*

**Table 2: Percent Site by Pathogen**  
**From January 1, 1997 to December 31, 1997**

| <b>Pathogen</b>      |                | <b>CA</b> | <b>CT</b> | <b>GA</b> | <b>MN</b> | <b>OR</b> | <b>Total</b> |
|----------------------|----------------|-----------|-----------|-----------|-----------|-----------|--------------|
| <i>Campylobacter</i> | <b>Cases</b>   | 1,001     | 477       | 469       | 1,179     | 719       | 3,845        |
|                      | <b>Percent</b> | 26.0%     | 12.4%     | 12.2%     | 30.7%     | 18.7%     | 100.0%       |
| <i>E. coli O157</i>  | <b>Cases</b>   | 19        | 34        | 8         | 202       | 80        | 343          |
|                      | <b>Percent</b> | 5.5%      | 9.9%      | 2.3%      | 58.9%     | 23.3%     | 100.0%       |
| <i>Listeria</i>      | <b>Cases</b>   | 13        | 7         | 20        | 18        | 11        | 69           |
|                      | <b>Percent</b> | 18.8%     | 10.1%     | 29.0%     | 26.1%     | 15.9%     | 100.0%       |
| <i>Salmonella</i>    | <b>Cases</b>   | 380       | 430       | 457       | 636       | 356       | 2,259        |
|                      | <b>Percent</b> | 16.8%     | 19.0%     | 20.2%     | 28.2%     | 15.8%     | 100.0%       |
| <i>Shigella</i>      | <b>Cases</b>   | 291       | 77        | 549       | 138       | 178       | 1,233        |
|                      | <b>Percent</b> | 23.6%     | 6.2%      | 44.5%     | 11.2%     | 14.4%     | 100.0%       |
| <i>Vibrio</i>        | <b>Cases</b>   | 30        | 4         | 1         | 2         | 12        | 49           |
|                      | <b>Percent</b> | 61.2%     | 8.2%      | 2.0%      | 4.1%      | 24.5%     | 100.0%       |
| <i>Yersinia</i>      | <b>Cases</b>   | 33        | 12        | 44        | 31        | 15        | 135          |
|                      | <b>Percent</b> | 24.4%     | 8.9%      | 32.6%     | 23.0%     | 11.1%     | 100.0%       |
| <b>Total</b>         | <b>Cases</b>   | 1,767     | 1,041     | 1,548     | 2,206     | 1,371     | 7,933        |
|                      | <b>Percent</b> | 22.3%     | 13.1%     | 19.5%     | 27.8%     | 17.3%     | 100.0%       |

Table 3: Cases per 100,000 by Pathogen for All Sites

| Pathogen             | 1996*               |              | 1997                |              |
|----------------------|---------------------|--------------|---------------------|--------------|
|                      | Rate per<br>100,000 | Total        | Rate per<br>100,000 | Total        |
| <i>Campylobacter</i> | 23.5                | 3,359        | 24.1                | 3,845        |
| <i>E. coli</i> O157  | 2.7                 | 388          | 2.2                 | 343          |
| <i>Listeria</i>      | 0.4                 | 64           | 0.4                 | 69           |
| <i>Salmonella</i>    | 14.5                | 2,069        | 14.2                | 2,259        |
| <i>Shigella</i>      | 8.9                 | 1,272        | 7.7                 | 1,233        |
| <i>Vibrio</i>        | 0.1                 | 21           | 0.3                 | 49           |
| <i>Yersinia</i>      | 1.0                 | 149          | 0.8                 | 135          |
| <b>Total</b>         | <b>51.3</b>         | <b>7,322</b> | <b>49.7</b>         | <b>7,933</b> |

\*Figures represent final 1996 data.



**Table 4: Pathogen by Month—All Sites**  
**From January 1, 1997 to December 31, 1997**

| Pathogen             | Month      |            |            |            |            |            |            |            |            |            |            |            | Total        |
|----------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|--------------|
|                      | JAN        | FEB        | MAR        | APR        | MAY        | JUN        | JUL        | AUG        | SEP        | OCT        | NOV        | DEC        |              |
| <i>Campylobacter</i> | 255        | 210        | 249        | 271        | 335        | 497        | 470        | 407        | 384        | 358        | 234        | 195        | 3,845        |
| <i>E. coli O157</i>  | 11         | 11         | 15         | 8          | 18         | 41         | 93         | 45         | 49         | 24         | 15         | 13         | 343          |
| <i>Listeria</i>      | 3          | 4          | 3          | 5          | 5          | 6          | 11         | 8          | 9          | 7          | 3          | 5          | 69           |
| <i>Salmonella</i>    | 179        | 135        | 146        | 216        | 172        | 207        | 245        | 267        | 255        | 183        | 129        | 125        | 2,259        |
| <i>Shigella</i>      | 80         | 78         | 74         | 103        | 88         | 109        | 113        | 171        | 134        | 101        | 90         | 92         | 1,233        |
| <i>Vibrio</i>        | 0          | 0          | 2          | 1          | 1          | 4          | 10         | 18         | 7          | 3          | 2          | 1          | 49           |
| <i>Yersinia</i>      | 17         | 11         | 9          | 11         | 15         | 7          | 8          | 9          | 11         | 6          | 8          | 23         | 135          |
| <b>Total</b>         | <b>545</b> | <b>449</b> | <b>498</b> | <b>615</b> | <b>634</b> | <b>871</b> | <b>950</b> | <b>925</b> | <b>829</b> | <b>682</b> | <b>481</b> | <b>454</b> | <b>7,933</b> |

This table shows the number of actual cases for all sites for each month in 1997.

Note that July has the greatest number of cases.

Table 5: Age Distribution by Pathogen for All Sites  
From January 1, 1997 to December 31, 1997

| Pathogen             |         | UNK  | 0-<1  | 1-<10 | 10-<20 | 20-<30 | 30-<40 | 40-<50 | 50-<60 | 60+   | Total  |
|----------------------|---------|------|-------|-------|--------|--------|--------|--------|--------|-------|--------|
| <i>Campylobacter</i> | Cases   | 8    | 120   | 613   | 300    | 672    | 798    | 558    | 358    | 418   | 3845   |
|                      | Percent | 0.2% | 3.1%  | 15.9% | 7.8%   | 17.5%  | 20.8%  | 14.5%  | 9.3%   | 10.9% | 100.0% |
| <i>E. coli</i> 0157  | Cases   | 0    | 10    | 156   | 55     | 30     | 18     | 12     | 24     | 38    | 343    |
|                      | Percent | 0.0% | 2.9%  | 45.5% | 16.0%  | 8.7%   | 5.2%   | 3.5%   | 7.0%   | 11.1% | 100.0% |
| <i>Listeria</i>      | Cases   | 0    | 4     | 2     | 1      | 2      | 9      | 5      | 7      | 39    | 69     |
|                      | Percent | 0.0% | 5.8%  | 2.9%  | 1.4%   | 2.9%   | 13.0%  | 7.2%   | 10.1%  | 56.5% | 100.0% |
| <i>Salmonella</i>    | Cases   | 5    | 277   | 537   | 217    | 297    | 315    | 241    | 139    | 231   | 2259   |
|                      | Percent | 0.2% | 12.3% | 23.8% | 9.6%   | 13.1%  | 13.9%  | 10.7%  | 6.2%   | 10.2% | 100.0% |
| <i>Shigella</i>      | Cases   | 4    | 27    | 578   | 74     | 155    | 208    | 100    | 54     | 33    | 1233   |
|                      | Percent | 0.3% | 2.2%  | 46.9% | 6.0%   | 12.6%  | 16.9%  | 8.1%   | 4.4%   | 2.7%  | 100.0% |
| <i>Vibrio</i>        | Cases   | 0    | 0     | 0     | 0      | 15     | 18     | 4      | 4      | 8     | 49     |
|                      | Percent | 0.0% | 0.0%  | 0.0%  | 0.0%   | 30.6%  | 36.7%  | 8.2%   | 8.2%   | 16.3% | 100.0% |
| <i>Yersinia</i>      | Cases   | 0    | 56    | 28    | 7      | 7      | 12     | 10     | 5      | 10    | 135    |
|                      | Percent | 0.0% | 41.5% | 20.7% | 5.2%   | 5.2%   | 8.9%   | 7.4%   | 3.7%   | 7.4%  | 100.0% |
| <b>Total</b>         | Cases   | 17   | 494   | 1914  | 654    | 1178   | 1378   | 930    | 591    | 777   | 7933   |
|                      | Percent | 0.2% | 6.2%  | 24.1% | 8.2%   | 14.8%  | 17.4%  | 11.7%  | 7.4%   | 9.8%  | 100.0% |

This table shows the number of cases by age group. The greatest number of cases involves children between the ages of 1 and 10 years.

**Table 6: Sex Distribution by Pathogen for All Sites  
From January 1, 1997 to December 31, 1997**

| <b>Pathogen</b>      |         | <b>Male</b> | <b>Female</b> | <b>Total</b> |
|----------------------|---------|-------------|---------------|--------------|
| <i>Campylobacter</i> | Cases   | 2112        | 1723          | 3835         |
|                      | Percent | 55.1%       | 44.9%         | 100.0%       |
| <i>E. coli</i> 0157  | Cases   | 163         | 180           | 343          |
|                      | Percent | 47.5%       | 52.5%         | 100.0%       |
| <i>Listeria</i>      | Cases   | 38          | 31            | 69           |
|                      | Percent | 55.1%       | 44.9%         | 100.0%       |
| <i>Salmonella</i>    | Cases   | 1138        | 1117          | 2255         |
|                      | Percent | 50.5%       | 49.5%         | 100.0%       |
| <i>Shigella</i>      | Cases   | 637         | 593           | 1230         |
|                      | Percent | 51.8%       | 48.2%         | 100.0%       |
| <i>Vibrio</i>        | Cases   | 31          | 18            | 49           |
|                      | Percent | 63.3%       | 36.7%         | 100.0%       |
| <i>Yersinia</i>      | Cases   | 61          | 73            | 134          |
|                      | Percent | 45.5%       | 54.5%         | 100.0%       |
| <b>Total</b>         | Cases   | 4180        | 3735          | 7915         |
|                      | Percent | 53%         | 47%           | 100%         |

This table shows the number of cases by sex. There are 18 cases where sex is unknown.

**Table 7: *Salmonella* Typhimurium and Enteritidis Serotypes by Site  
From January 1, 1997 to December 31, 1997**

| <b>Serotype</b>    | <b>Site</b> |            |            |            |            | <b>Total</b> |
|--------------------|-------------|------------|------------|------------|------------|--------------|
|                    | <b>CA</b>   | <b>CT</b>  | <b>GA</b>  | <b>MN</b>  | <b>OR</b>  |              |
| <b>Typhimurium</b> | <b>86</b>   | <b>116</b> | <b>152</b> | <b>179</b> | <b>113</b> | <b>646</b>   |
| <b>Enteritidis</b> | <b>32</b>   | <b>142</b> | <b>23</b>  | <b>122</b> | <b>38</b>  | <b>357</b>   |

There were 2,259 cases attributable to *Salmonella*. The most frequently occurring Serotypes were Typhimurium and Enteritidis.