



Report to Congress

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

Food Safety and Inspection Service
United States Department of Agriculture
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Contents

	Page No.
I. Preface	1
II. Overview of FoodNet	2
III. Foodborne Illness Data	7

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	

DRAFT

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 about foodborne illnesses 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.

DRAFT

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.

DRAFT

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.

DRAFT

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

DRAFT

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>
TOTAL	14,281,096	15,926,304

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

DRAFT

Pathogen

Site		<i>Campylo- bacter</i>	<i>E. coli 0157</i>	<i>Listeria</i>	<i>Salmon- ella</i>	<i>Shigella</i>	<i>Vibrlo</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.

DRAFT

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

Pathogen		CA	CT	GA	MN	OR	Total
<i>Campylobacter</i>	Cases	1,032	528	493	1,176	737	3,966
	Percent	26.0%	13.3%	12.4%	29.7%	18.6%	100.0%
<i>E. coli</i> O157	Cases	19	34	8	199	80	340
	Percent	5.6%	10.0%	2.4%	58.5%	23.5%	100.0%
<i>Listeria</i>	Cases	13	12	20	18	13	76
	Percent	17.1%	15.8%	26.3%	23.7%	17.1%	100.0%
<i>Salmonella</i>	Cases	370	412	473	619	330	2,204
	Percent	16.8%	18.7%	21.5%	28.1%	15.0%	100.0%
<i>Shigella</i>	Cases	291	77	574	138	177	1,257
	Percent	23.2%	6.1%	45.7%	11.0%	14.1%	100.0%
<i>Vibrio</i>	Cases	30	4	2	2	12	50
	Percent	60.0%	8.0%	4.0%	4.0%	24.0%	100.0%
<i>Yersinia</i>	Cases	34	15	43	31	15	138
	Percent	24.6%	10.9%	31.2%	22.5%	10.8%	100.0%
Total	Cases	1,789	1,082	1,613	2,183	1,364	8,031
	Percent	22.3%	13.5%	20.1%	27.2%	17.0%	100.0%

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

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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
Total	51.3	7,322	50.4	8,031

*Figures represent final 1996 data.

DRAFT

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
Total	539	434	487	612	636	863	952	936	838	695	522	517	8,031

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

DRAFT

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	3,966
	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%
Total	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. 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

DRAFT

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.

Food safety

F.D.A. Issues Rules to Make Produce Safer

WASHINGTON, April 11 (AP) — The Food and Drug Administration has issued voluntary guidelines to reduce bacteria in fruit and vegetables by improving agricultural and processing practices, from disposal of manure to hand-washing.

"No farmer or business person wants an outbreak from their product," Joe Levitt, director of the agency's food safety programs, said on Friday. "These are important prevention techniques that will really help."

The rise in illnesses from microbes like *E. coli* and salmonella, which can be found on produce and other foods, has several causes: Health-conscious Americans are eating more fruits and vegetables, but modern processing and shipping operations mean that produce frequently changes hands and comes from around the world. Sanitation practices are not consistent.

In addition, more virulent strains of bacteria continue to appear, challenging weaker immune systems of the elderly, the young and people with diseases like AIDS.

"Most of the calories in a healthy diet should come from fruits, vegetables and grain products," said Donna E. Shalala, the Secretary of Health and Human Services. "That recommendation makes it even more critical for government and industry to work together to insure that fresh produce is wholesome and safe."

Mr. Levitt said the standards were developed after hearings that included farm and processing interests and should not be impossible to carry out. Once the guidelines become final, agents in local Agriculture Department offices will help put them in place.

Farm groups reacted cautiously, saying that many of the guidelines are already in place at the state level and that they could be a precursor to new requirements.

"There's a feeling out there that this is just one step away from regulation," said Louie Brown, national affairs director of the California Farm Bureau.

The F.D.A., Mr. Brown added, might be better served by focusing Federal efforts on educating consumers and restaurant workers about the proper washing and handling of produce.

The F.D.A. will accept public comments on the guidelines before issuing a final version this fall. After that, the Government plans to offer grants and technical assistance to growers and processors.