Lessons Learned 1996-2006

FoodNet

Foodborne Diseases Active Surveillance Network

www.cdc.gov/foodnet

Lessons Learned:

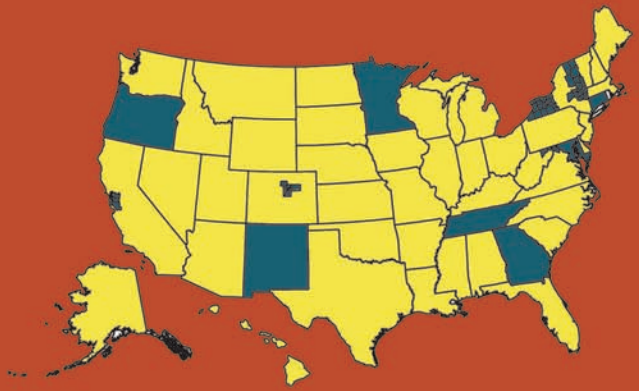
The Results of Ten Years of Active Surveillance on Foodborne Diseases in the United States

FoodNet 1996-2006

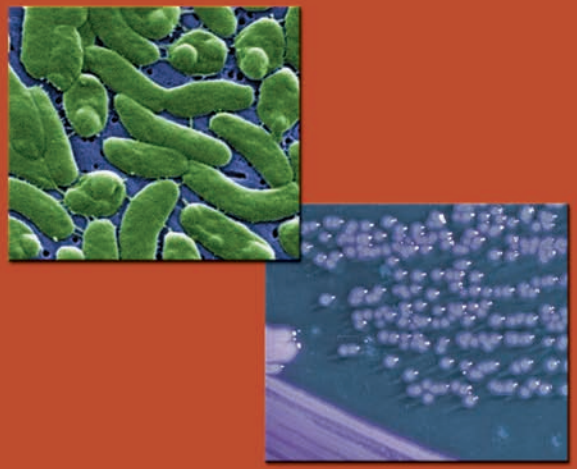
What is FoodNet?

The Foodborne Diseases Active Surveillance Network (FoodNet) is the principal foodborne disease component in the Emerging Infections Program of the Centers for Disease Control and Prevention (CDC). Selected state health departments, the U.S. Department of Agriculture Food Safety Inspection Service,and the U.S. Food and Drug Administration collaborate with CDC on FoodNet.

FoodNet began in 1996 with five sites. Since then, it has expanded to 10 sites (called "catchment areas") — seven states (Connecticut, Georgia, Maryland, Minnesota, New Mexico, Oregon, and Tennessee) and selected counties in three other states (California, Colorado, and New York). These sites cover 44.5 million people or 15% of the U.S. population.



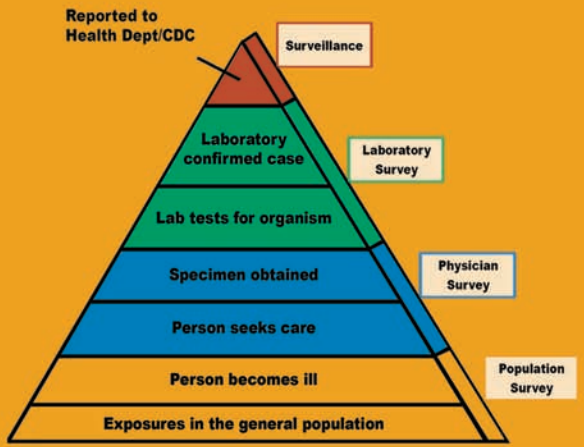
FoodNet provides accurate estimates of foodborne illness in the United States through laboratory-based active surveillance and epidemiologic studies. FoodNet sites conduct surveillance for seven bacteria that cause foodborne illness (*Campylobacter*; *Listeria* monocytogenes; *Salmonella*; *Shigella*; Shiga toxin-producing *Escherichia coli*, including O157; *Vibrio*; and *Yersinia* enterocolitica), two parasitic organisms (*Cyclospora* and *Cryptosporidium*), and one syndrome (hemolytic uremic syndrome).



Active Surveillance

Most foodborne disease surveillance systems are passive. Doctors who treat patients with foodborne illness, and clinical laboratories that identify causes of foodborne illness from samples submitted by doctors, report their findings to local and state health departments. The health departments then report to CDC. Information from this passive method often is incomplete.

To find all pathogens (organisms that cause illness) under surveillance, FoodNet personnel contact about 650 clinical laboratories serving the catchment areas. They are looking for pathogens that each laboratory has confirmed in a resident of the catchment area. Each clinical laboratory is audited at least twice yearly to ensure that FoodNet captures every case.



FoodNet Objective #1

Determine the burden of illness in the United States.

Active surveillance helps find laboratory-confirmed infections. Because cases found through active surveillance are only a fraction of the total number of cases in the population, FoodNet surveys laboratories and people in the catchment areas to estimate the overall health impact to humans of foodborne disease in the community.

Population Survey

FoodNet has conducted five Population Surveys lasting 12 months each (in 1996–97, 1998–99, 2000–01, 2002–03, and 2006–07). These surveys are conducted by telephone of a cross-section of the general population. The purpose is to accurately estimate the number of acute diarrheal illnesses in the United States. By estimating how often ill persons seek medical care and submit a stool culture, FoodNet can determine how often other surveillance systems fail to detect foodborne diseases. Also, FoodNet Population Survey data are used to learn more about how often people eat certain food items.

Laboratory Survey

To understand differences among clinical laboratory practices, three surveys were administered to clinical laboratories serving the FoodNet sites in 1995, 1997, and 2000. The surveys help determine how many cases of foodborne illness go undetected because of laboratory testing practices.

Physician Survey

FoodNet also conducted Physician Surveys in 1996 and 2000. The 1996 survey was used to understand doctor practices in diagnosing acute diarrheal diseases, and the 2000 survey examined the roles of doctors in teaching food safety.

FoodNet Objective #2

Monitor trends in the burden of specific foodborne illnesses over time.

Active surveillance data from FoodNet are used to measure progress toward achieving national food-safety goals.

Healthy People 2010 Objectives

Healthy People 2010 objectives were established for the incidence of laboratory-confirmed infections caused by four pathogens: Campylobacter (12.3 cases per 100,000 people), Shiga toxin-producing E. coli O157 (1.0 cases per 100,000), Listeria (0.25 cases per 100,000), and Salmonella (6.8 cases per 100,000). FoodNet active surveillance data are used to measure progress toward these goals.

Negative Binomial Model

A statistical model was developed to account for the increase in the number of FoodNet sites and in the catchment area since 1996. The model accounts for differences in incidence created by these changes and is used to compare the trends in nine pathogens with a 3-year baseline.

FoodNet Objective #3

Attribute the burden of foodborne illness to specific foods and settings.

FoodNet conducts case-control studies to determine the proportion of foodborne diseases caused by specific foods, food-handling practices, or other exposures.

Campylobacter

In 1998, a 12-month case-control study in the FoodNet sites determined risk factors for sporadic *Campylobacter* infections. Eating chicken or other meats at a restaurant increased a person's risk for *Campylobacter* infection.

Cryptosporidium

During 1999–2001, FoodNet conducted a study to determine the sources and risk factors for *Cryptosporidium* infections. International travel, contact with cattle, contact with children 2–11 years old who had diarrheal illness, and freshwater swimming were associated with infection.

Listeria monocytogenes

FoodNet investigated the sources and risk factors for *Listeria monocytogenes* infection in 2000. *L. monocytogenes* infection was associated with eating melons at a commercial establishment and eating hummus prepared at a commercial establishment.

Salmonella

In 1996, case-control studies were conducted in the FoodNet sites for *Salmonella* Enteritidis, *Salmonella* Heidelberg, and *Salmonella* Typhimurium; and in 2002 for *Salmonella* Enteritidis and *Salmonella* Newport. The 1996 *Salmonella* Enteritidis study showed that eating chicken away from home (for example, at a restaurant) was a risk factor for infection; the *Salmonella* Heidelberg study showed that eating eggs away from home was associated with infection .The *Salmonella* Typhimurium study showed a patient with a multidrug-resistant infection was more likely to have received an antibiotic during the 4 weeks before illness. The 2002 *Salmonella* Enteritidis study showed that international travel, chicken eaten away from home, and undercooked eggs eaten at home were risk factors for infection. The *Salmonella* Newport study showed that eating undercooked ground beef and runny eggs prepared at home were risk factors for multidrug-resistant infection.

E. coli O157

Two *E. coli* O157 case-control studies were conducted in FoodNet sites in 1997 and 1999. Being exposed to a farm or cattle, obtaining beef through a private slaughter arrangement, eating a pink hamburger, eating at a restaurant, and drinking untreated surface water were identified as risk factors for *E. coli* O157 infection.

FoodNet Objective #4

Develop and assess interventions to reduce the burden of foodborne illness.

Information gained through active surveillance and special studies is summarized and shared in order to help identify areas for intervention. Target audiences include public health professionals, regulators, laboratorians, physicians, veterinarians, industry and the general public.

Lessons Highlighted by FoodNet

Lesson: Active surveillance is critical in determining the burden of foodborne illness.

Active surveillance is essential to accurately determining the burden of foodborne illness. It allows for the assessment of trends over time and for tracking progress. The data can be provided to regulatory agencies, industry, and consumer groups for decision making. Before FoodNet, no reliable data existed about the burden of *Campylobacter*, *E. coli* O157, *L. monocytogenes*, *Vibrio*, or *Y. enterocolitica* infections.

Lesson: Clinical laboratories are the foundation of active surveillance.

Clinical laboratories are the foundation of active surveillance for foodborne pathogens in the FoodNet sites. Assessing variations in clinical and laboratory practices is important in interpreting surveillance data.

Lesson: Laboratory-confirmed cases represent only a small fraction of all foodborne illness.

Foodborne infections are an important cause of illness in the community. For example, FoodNet estimates that 38 cases of Salmonella occur in the community for every one laboratory-confirmed case.

Lesson: Case-control studies are useful for determining risk factors for sporadic disease.

Most foodborne infections are sporadic, that is, they occur as individual cases that are not part of recognized outbreaks. FoodNet case-control studies have helped identify the proportion of sporadic foodborne diseases caused by specific foods or by food preparation and handling practices.

For Additional Information:

The FoodNet Annual Report, FoodNet-related MMWR articles, and other FoodNet publications are available on the FoodNet website, http://www.cdc.gov/foodnet.

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