

Anatomy of a Foodborne Illness Outbreak Investigation: A Primer



Annually, U.S. food-borne diseases result in 128,000 hospitalizations, 3,000 deaths and an estimated \$152 billion in medical costs and lost productivity.

However, food-borne illness is a preventable public health problem; reducing it by 10 percent would keep about 5 million Americans from getting sick each year.

Efficient disease investigation is the best way to identify the source of an outbreak and prevent its ensuing spread. An outbreak is the occurrence of two or more cases of a similar illness, determined by an investigation, to result from a common exposure. Outbreaks are not limited by geographical boundaries and affect all social classes and age groups.

Findings from 10 Years of Outbreaks by Location

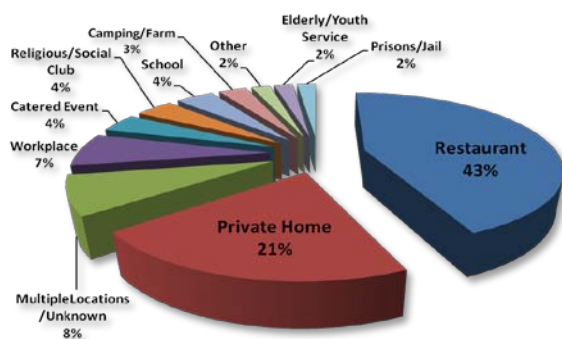


Figure 1. Outbreaks by Location (1998-2007). Source: Center for Science in the Public Interest

State and Local Outbreak Investigations

State and local public health and agricultural agencies are the foundation of the nation's food safety system, with primary responsibility for illness surveillance, outbreak detection and response, food safety regulation, and consumer education and foodservice worker training. Because states are organized differently, the responsibility for outbreak investigation may fall on various agencies or levels of government:

- In a **centralized** organizational structure, a state health agency directly oversees local health departments, and its employees conduct investigations at the local level.
- In a **decentralized** organizational structure, local governments directly operate health departments in their respective jurisdictions. These local health agencies conduct outbreak investigations and can request the involvement of the state health agency if the outbreak is severe, where technical or manpower assistance is needed, or if the outbreak crosses local jurisdictions.
- In a **shared** organizational structure, state and local governments jointly operate local health agencies. State and local agencies share responsibilities for outbreak investigations.

- In states with a **mixed** organizational structure, state health agencies employ a system that incorporates both centralized and decentralized elements. Outbreak investigation responsibilities are unique to each jurisdiction.

Guidelines for Foodborne Disease Outbreak Response

The response and steps to investigate an outbreak varies with the outbreak, surrounding circumstances, agencies involved and available resources. In 2009, the Council to Improve Foodborne Outbreak Response (CIFOR), a multidisciplinary working group of food safety experts, released guidelines to aid government agencies responsible for preventing and managing food-borne disease. The overarching functions and related activities that are common to most outbreak investigations include:

- **Planning and Preparation:** Careful planning and preparation will help investigators identify the source of an outbreak more quickly and implement control measures more efficiently and effectively. Planning and preparation activities include:
 - Identification of the agencies likely to be most involved and their available resources.
 - Establishment and training of a core outbreak response team.
 - Development of standard processes for receiving food-borne illness complaints,

managing records, communication, recovery and follow-up.

- **Surveillance and Outbreak Detection:**

Foodborne disease surveillance generally refers to the routine monitoring in a population of diseases potentially transmitted through food. Laboratory information is critical for disease surveillance. Before an outbreak, laboratory-supported surveillance allows early detection of cases. During an outbreak, a sample of cases should be laboratory confirmed to assess changes in the causative agent and to guide decisions about the allocation of resources. Each state health department reports food-borne illnesses to the Centers of Disease Control and Prevention (CDC). The CDC also coordinates a national network of public health laboratories, called PulseNet, which perform molecular fingerprinting of bacteria to support investigations. Three general surveillance methods are used to detect food-borne disease outbreaks:

- Pathogen-specific surveillance
- Notification/complaint systems
- Syndromic surveillance

Pathogens Causing the Most Deaths Each Year

Pathogen	Estimated annual number of deaths
<i>Salmonella</i> , nontyphoidal	378
<i>Toxoplasma gondii</i>	327
<i>Listeria Monocytogenes</i>	255
<i>Norovirus</i>	149
<i>Campylobacter Spp.</i>	76

Table 1. Top five pathogens causing domestically acquired foodborne illness resulting in death (Source: CDC)

• **Investigation of Clusters and Outbreaks:**

Although different agencies play various roles in the disease outbreak response, standardized outbreak investigation guidelines apply to all jurisdictions. Investigation activities include a range of activities such as interviewing people who have sought medial attention, reviewing medical records, reconstructing food flow scenarios for an implicated meal or food item and identifying factors most likely to have contributed to the outbreak. The outbreak investigation and control team should establish goals and objectives for the investigation. To achieve these goals the team will need to:

- Identify the causative agent
- Identify persons at risk
- Identify mode of transmission and vehicle

- Identify the source of contamination
 - Identify contributing factors
 - Determine potential for ongoing transmission and need for abatement procedures
- **Control Measures:** To prevent further illness in an outbreak, control measures should be initiated as soon as possible, even concurrently with ongoing investigations. The public needs to be notified about food-related hazards, and guidance on protection should be provided in a timely manner. Once a decision is made to remove food from the market, the removal process should be as quick and efficient as possible. If any distributors or retailers refuse to remove the food, issuance of a public health warning and order to require action might be necessary. Rapid response and communication is critical in determining what control measures to implement and when to change an intervention’s focus. Control measures can be categorized as:
- Control of the source (i.e., preventing continued exposure to the original source of the food-borne illness)
 - Control of secondary spread (i.e., preventing secondary transmissions from persons infected through the original source to others)

Large outbreaks commonly cross state lines and can place heavy demands on a state's investigatory and response resources, thereby rendering them unable to meet the challenge alone. Federal agencies provide backup resources when requested, but the efficient handling of ever-changing outbreaks often requires multistate cooperation and adaptability. In addition to sufficient capacity at state and local levels to conduct outbreak investigations, strong federal, state and local collaboration is key to successfully managing and mitigating further risks due to a foodborne outbreak.

Resources

2011 Estimates of Foodborne Illness in the United States. Centers for Disease Control and Prevention. www.cdc.gov/foodborneburden December 2010. Oct. 27, 2011.

All Over the Map. A 10- Year Review of State Outbreak Reporting. Center for Science in the Public Interest. www.cspinet.org/new/pdf/allverthemap.pdf October 2011. Oct. 27, 2011.

Health-Related Costs from Foodborne Illness in the United States. Produce Safety Project. www.producesafetyproject.org March 2010. Oct. 27, 2011.

State Food Safety Resource Survey. Association of Food and Drug Officials. www.afdo.org/resources/stateresourcesurvey.cfm March 2010. Oct. 27, 2011.

Guidelines for Foodborne Disease Outbreak Response. Council to Improve Foodborne Outbreak Response. <http://www.cifor.us> March 2009. Oct. 27, 2011.

Stronger Partnerships for Safer Food. An Agenda for Strengthening State and Local Roles in the Nation's Food Safety System. George Washington University. www.rwjf.org/files/research/20090417foodsafetyfinalreport.pdf April 2009. Oct. 27, 2011.

Anatomy of an Outbreak Investigation: A Primer. Association of State and Territorial Health Officials. <http://www.astho.org/Display/AssetDisplay.aspx?id=593> Oct. 27, 2011.



2231 Crystal Drive, Suite 450
Arlington, VA 22202
www.astho.org

