Interagency Food Safety Analytics Collaboration (IFSAC)
Research Brief

Comparing Characteristics of Sporadic and Outbreak-Associated Foodborne Illnesses, United States, 2004–2011

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Key Findings

Scientists from the Interagency Food Safety Analytics Collaboration (IFSAC)[2] compared the characteristics of outbreak and sporadic (non-outbreak) human illnesses for *Salmonella*, *Escherichia coli* (*E. coli*) O157, *Listeria monocytogenes*, and *Campylobacter*. These comparisons used data from the Centers for Disease Control and Prevention's (CDC) Foodborne Diseases Active Surveillance Network (FoodNet). The analyses help assess the usefulness of outbreak data in estimating which major food categories are most often linked to foodborne illnesses.[3] IFSAC identified *Salmonella*, *E.coli* O157, *Listeria monocytogenes*, and *Campylobacter* as high-priority pathogens because they are spread commonly through food and cause severe illness, and because focused efforts to reduce these bacteria could be very effective.

The results of the analysis provide evidence that:

- *Campylobacter*, *Listeria monocytogenes*, and *E. coli* O157 outbreak illnesses are not significantly different from sporadic illnesses with respect to patients' illness severity, gender, and age.
- *Salmonella* outbreak illnesses are not significantly different from sporadic illnesses with respect to illness severity and gender. The percentages of outbreak and sporadic illnesses that occur among older children and adults are also similar. However, the percentage of outbreak illnesses in the youngest age category (0-3 years) was substantially lower compared with the other age groups.

FoodNet data include only a portion of reported U.S. illnesses (about 15% of the U.S. population); therefore, the number of outbreaks and illnesses available for analysis was limited. For example, fewer *Campylobacter* illnesses were associated with outbreaks compared with the other three pathogens, which limits the strength of conclusions about *Campylobacter* attribution.

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[2]IFSAC was created in 2011 by three federal agencies – the U.S. Centers for Disease Control and Prevention (CDC), the U.S. Food and Drug Administration (FDA), and the Food Safety and Inspection Service (FSIS) of the U.S. Department of Agriculture (USDA). IFSAC works to improve coordination of federal food safety analytic efforts and address cross-cutting priorities for food safety data collection, analysis, and use.

[3]Researchers compared demographic, clinical, geographic, and temporal characteristics of outbreak and sporadic (non-outbreak) illnesses among laboratory confirmed *Campylobacter*, *E. coli* O157, *Listeria monocytogenes*, and *Salmonella* infections ascertained by the FoodNet surveillance system between 2004 and 2011. Analyses were first completed using Random Forest and boosted tree analyses to gauge the relative importance of key factors in distinguishing between outbreak and sporadic cases. Second, logistic regression modeling was used to examine all main effects and interactions among the model parameters.

The research findings are important because they indicate that, with the exception of *Salmonella* illnesses among children younger than three years, it is reasonable to use outbreak data to estimate which foods are most often linked to foodborne illnesses. Analyses, such as this study, help us better understand the relationship between sporadic foodborne illnesses and those that are identified as a part of an outbreak. Such analyses are essential to advancing scientific progress in this field.

Summary by pathogen of illness counts included in analysis of FoodNet data (2004–2011)

Pathogen	Outbreak cases	Sporadic cases	Outbreak fraction
Campylobacter	195	42,744	0.5%
E. coli 0157	730	3,117	19.0%
Listeria monocytogenes	56	1,024	5.2%
Salmonella	3,161	50,690	5.9%

For more information, please contact IFSAC@fda.hhs.gov.