



# Understanding Foodborne Disease Outbreaks Using Environmental Assessments



Kristin C. Delea,\* Carol A. Selman, and EHS-Net

\*Presenter – Environmental Health Service Branch, National Center for Environmental Health, Centers for Disease Control and Prevention, 4770 Buford Highway, Mailstop F-60, Atlanta GA 30341  
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## Introduction

Foodborne disease surveillance is an essential component of a food safety program (Todd, et al. 1997). Surveillance information is used to determine the need for food-safety actions, which involves planning and implementing programs and assessing the effectiveness of the actions taken (Todd et al., 1997). Foodborne outbreak investigations represent one aspect of the overall foodborne disease surveillance system. The environmental assessments of these investigators provide food safety programs with a significant opportunity to better understand contributing factors and the environmental antecedents central to the occurrence of those factors. While contributing factors such as workers who work while ill, poor hand washing practices and time temperature abuse of foods are sometimes reported to CDC via the Foodborne Disease Outbreak Surveillance System, these factors are not framed in the context within which they occurred. The complexity of food handling processes utilized in an establishment, number of meals served versus number of managers, language abilities of managers and workers, cleaning policies and practices, availability of sick leave, hand sink availability and other characteristics are potential antecedents and provide a meaningful context for contributing factors. A complete picture of the foodservice establishments involved in foodborne outbreaks can help identify those factors that can be routinely monitored by food safety programs to prevent or reduce the risk of foodborne outbreaks associated with food-service establishments. This poster highlights some of the findings of this study related to the characteristics, policies, and practices of foodservice establishments involved in foodborne outbreaks in the EHS-Net catchment area from June 2006 to September 2007. The information collected from these assessments provides a first look at a number of establishment characteristics that are rarely captured in a systematic way or considered as potential antecedents to foodborne outbreaks.

## Purpose

The purpose of this study was to identify contributing factors to foodborne illness outbreaks in food-service establishments (restaurants, delis, schools, etc) and to describe the characteristics, policies, and practices of those establishments via environmental assessments.

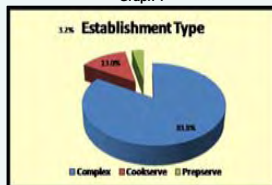
## Methods

The study was conducted by the Environmental Health Specialists Network (EHS-Net), a network of environmental health specialists focused on the investigation of contributing factors to food and waterborne illness. EHS-Net is a collaborative project of the Centers for Disease Control and Prevention (CDC), U.S. Food and Drug Administration, U.S. Department of Agriculture and nine states (CA, CT, GA, IA, MN, NY, OR, RI, TN).

A descriptive study design was used to collect information about contributing factors to foodborne outbreaks in food service establishments and characteristics of those establishments that may be antecedents to outbreaks, such as food handling policies and practices. Data collection for this study was incorporated into foodborne outbreak investigations conducted in the nine EHS-Net states. Data collection was based on an interview with a manager with authority over the kitchen, observations of the kitchen environment, development of a food flow of the suspected or identified vehicle, and where possible, observations of the re-enactment of the food handling practices used for the vehicle. Observations of the kitchen environment represent observations at the time of the investigation and do not necessarily represent conditions prior to exposures. Data was entered into a web-based information system designed specifically for EHS-Net studies. A descriptive analysis of the data set included univariate frequencies and cross-tabulations for selected variables. Future analysis of this dataset will include tests for association using chi-square and t-tests. Future analysis may also involve regression modeling of the data to examine any multivariate relationships and to control for confounding.

## Results

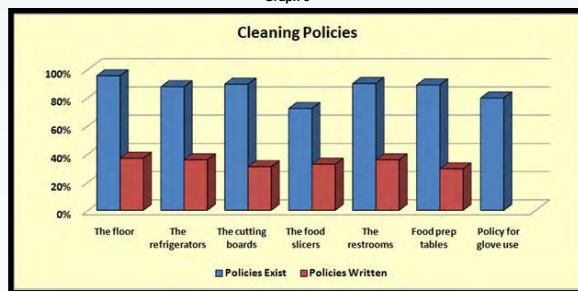
Graph 1



Graph 2



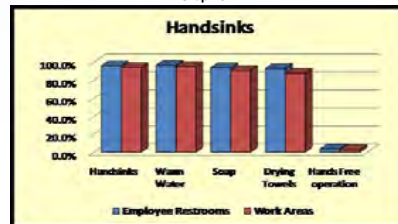
Graph 3



Graph 4



Graph 5



## Results

Between June 2006 and September 2007, 154 environmental assessments were conducted as part of 154 outbreak investigations in the nine EHS-Net states where EHS-Net environmental assessments were conducted. Of those outbreaks with an identified etiology (102/33 (30%) were bacterial and 69 (63%) viral. Some of the reported establishment characteristics and policies are as follows.

- The majority (83.8%) of the foodservice establishments involved in the 154 outbreaks were complex establishments, meaning a complex food handling process is utilized for one or more foods handled in the establishment. Additionally, 13% were cook serve establishments, and 3.2% prep serve. (Graph 1)
- Spanish was the primary language of 58% of food workers but only 41.2% of managers could speak Spanish. (Graph 2)
- Floor cleaning policies existed in 95.4% of establishments involved in outbreaks and 37.4% of those had a written policy for floor cleaning. (Graph 3)
- Fewer policies existed for cleaning of food contact surfaces such as the inside of refrigerators (87.6%) and cutting boards (89.5%). A cleaning policy for food slicers existed in only 72.2% of establishments. In these establishments 32.7% had a written policy for cleaning food slicers. (Graph 3)
- More managers received paid sick leave (66.4%) than workers (34.9%). (Graph 4)
- Establishment physical characteristics potentially related to safe food handling practices such as hand sink availability revealed the majority of establishments had hand sinks in restrooms (96%). Also a majority of establishments had hand sinks available in work areas (94.1%). Hands free operated hand sinks were rare, found in only 3.5% of employee restrooms and 2.8% of work areas. (Graph 5)

## Conclusions

The environmental assessment in a foodborne outbreak investigation is critical to understanding contributing factors and potential antecedents to foodborne illness, yet information regarding potential antecedents is rarely captured. While current foodborne outbreak surveillance data may identify working while ill or poor hand washing practices as factors contributing to outbreaks, information on why these circumstances may have existed is not collected or reported. As a result, any actions taken by a food safety program manager to address food workers working while ill or poor hand washing practices may or may not hit the foodborne disease prevention mark. Information regarding sick leave availability, language barriers, hand sink availability, food handling processes and policies can inform food safety program action or hypothesis generation regarding antecedents that can lead to action. The results presented here represent only a few of the potential antecedents to foodborne outbreaks investigated by EHS-Net states during 2006 and 2007. A systematic collection, analysis, interpretation, and dissemination of environmental data from foodborne disease outbreak investigations can support the overall foodborne disease surveillance system in the United States, strengthening the ability of food-control authorities at all levels of government to formulate food safety action and assess the effectiveness of those actions.

## Reference

Todd ECD, Guzewish JJ, Bryan FL. 1997. Surveillance of foodborne disease IV. Dissemination and uses of surveillance data. J Food Prot. 60(6):715-23

## Acknowledgements

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