

# Retail Surveillance: Preventing Foodborne Illness Risk Factors in Restaurants

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## Abstract

In the United States, restaurants are the most common setting for foodborne illness outbreaks (64%) (CDC, 2017). Most foodborne Norovirus outbreaks linked to food establishments are traced to contamination of ready-to-eat (RTE) food items. Food can be contaminated with Norovirus via contact with feces or contaminated water, vomit or water contaminated with vomit, aerosols generated by infected people, soiled materials, or soiled hands.

This poster includes the background, design, and results of data collection on the occurrence of foodborne illness risk factors in the United States in fast food and full-service and from 2017-2018. It is the second of three data collection periods for this retail sector within the FDA's current 10-year study on trends in the occurrence of foodborne illness risk factors and food safety behaviors/practices in food service facilities.

Of the foodborne illness risk factors investigated in this study, inadequate cooking was best controlled. The two most commonly occurring out-of-compliance risk factors were improper holding time/temperature and poor personal hygiene. Food Safety Management Systems (FSMS) were the strongest predictor of the compliance status of data items. Establishments with well-developed FSMS had significantly fewer out-of-compliance food safety behaviors/practices than did those with "less developed" FSMS.

These findings suggest that well-developed and documented FSMS are a useful tool in reducing the occurrence of foodborne illness risk factors. Tracking the occurrence of foodborne illness risk factors provides a consistent means of monitoring food safety efforts and determining trends over time.

Measuring and reporting on the occurrence of foodborne illness risk factors and food safety behaviors/practices at retail food establishments provide the foundation for identifying where risk-based interventions might have the greatest impact on enhancing public health protection. The FDA promotes and conducts research designed to inform the application of science-based food safety principles in retail and food service settings to minimize the incidence of foodborne illness. Research results support developing and delivering scientifically based guidance, training, program evaluation, and technical assistance to retail food regulatory agencies and the industries they regulate.

## Introduction

Foodborne illness remains a major public health concern in the United States. Foodborne diseases cause approximately 48 million illnesses, 128,000 hospitalizations, and 3,000 deaths each year (Scallan et al., 2011). The annual economic burden from health losses due to foodborne illness is estimated at 90.2 billion dollars (Scharff, 2018).

The restaurant industry is a major driver of food service and food safety in the United States. Consumer demand for food away from home has led to increased spending in both fast food and full-service restaurants (Powell, Nguyen, & Han, 2012; Stewart, Blisard, Bhuyan, & Nayga Jr., 2004). Along with this high demand comes the need for careful attention to food safety practices and behaviors that minimize the incidence of foodborne illness in these locations.

The FDA is conducting a new 10-year study to investigate the relationship between FSMS, CFPM, and the occurrence of risk factors and food safety behaviors/practices commonly associated with foodborne illness at retail. This is the second of three data collections in the restaurant segment of the industry for this study.

The objectives of this study are to:

- Identify the least and most often occurring foodborne illness risk factors and food safety behaviors/practices in retail food establishments within the United States.
- Determine the extent to which FSMS and the presence of a CFPM impact the occurrence of foodborne illness risk factors and food safety behaviors/practices; and
- Determine whether the occurrence of foodborne illness risk factors and food safety behaviors/practices in retail food establishments differs based on an establishment's risk categorization and status as a single-unit or multiple-unit operation (e.g., restaurants that are part of an operation with two or more units).

## Materials and Methods

This observational study was conducted in restaurants throughout the United States. Trained data collectors observed and recorded the food safety practices of retail food management and staff using a standardized data collection tool during normal business hours.

Restaurants were randomly selected to participate in the study from among all eligible establishments located within a 150-mile radius from the home locations of the 22 FDA Regional Retail Food Specialists (specialists) performing the data collection. (Figure 1)

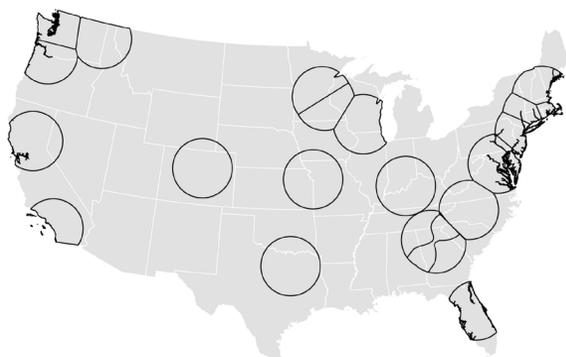


Figure 1. Study Selection Areas within a 150-mile Radius from 22 Specialists' Locations

The purpose of each restaurant data collection during the current 10-year study period is to investigate the relationship between food safety management systems (FSMS), certified food protection managers (CFPMs), and the occurrence of risk factors and food safety behaviors/practices commonly associated with foodborne illness in restaurants.

FSMS refers to a specific set of actions (e.g., procedures, training, and monitoring) to help achieve active managerial control. While FSMS procedures vary across the retail and food service industry, purposeful implementation of those procedures, training, and monitoring are consistent components of FSMS. A CFPM is an individual who has shown proficiency in food safety information by passing a test that is part of an accredited program (FDA, 2013a). Research has shown that the presence of a CFPM is associated with improved inspection scores (Cates et al., 2008; Brown et al., 2014).

The FDA CFSAN Biostatistics Branch determined that a minimum of 384 data collections of each restaurant facility type was needed during the initial and subsequent data collection periods. This sample size provides sufficient observations to be 95% confident that compliance percentages reported are within 5% of their actual occurrence. For this study, the sample size achieved was 430 data collections in full-service restaurants and 421 in fast food restaurants.

This study focuses on observation and/or measurement of food safety practices/behaviors associated with the occurrence of foodborne illness risk factors. Four foodborne illness risk factors, comprising specific food safety behaviors (data items), were used as the key indicators for FDA's statistical analysis for this study. Data items in this study are based on FDA Food Code recommendations and are designed to control food safety behaviors/practices. Table 1 presents the 10 data items and their associated risk factors.

Foodborne Illness Risk Factor	Associated Primary Data Item Numbers and Description
Poor Personal Hygiene	<ul style="list-style-type: none"> <li>Data Item #1 – Employees practice proper handwashing.</li> <li>Data Item #2 – Employees do not contact RTE foods with bare hands.</li> </ul>
Contaminated Equipment/Protection from Contamination	<ul style="list-style-type: none"> <li>Data Item #3 – Food is protected from cross contamination during storage, preparation, and display.</li> <li>Data Item #4 – Food contact surfaces are properly cleaned and sanitized.</li> </ul>
Improper Holding Time/Temperature	<ul style="list-style-type: none"> <li>Data Item #5 – Foods requiring refrigeration are held at the proper temperature.</li> <li>Data Item #6 – Foods displayed or stored hot are held at the proper temperature.</li> <li>Data Item #7 – Foods are cooled properly.</li> <li>Data Item #8 – Refrigerated, RTE foods are properly date marked and discarded within 7 days of preparation or opening.</li> </ul>
Inadequate Cooking	<ul style="list-style-type: none"> <li>Data Item #9 – Raw animal foods are cooked to required temperatures.</li> <li>Data Item #10 – Cooked foods are reheated to required temperatures.</li> </ul>

Table 1. Foodborne Illness Risk Factors and the Associated Primary Data Items Examined in the Study

## Results and Discussion

Restaurants with a CFPM present had fewer primary data items out of compliance than those without a CFPM. Restaurants that had a CFPM who was the person in charge at the time of data collection had significantly better food safety management scores than those that did not have a CFPM present or employed.

Inadequate FSMS were the strongest predictor of data items being out-of-compliance in both fast food and full-service restaurants. As shown in tables 2 and 3, the average number of out of compliance items is greatly reduced when there is a well-developed FSMS. This is true for both fast food restaurants and full-service restaurants. Restaurants with well-developed FSMS had less than half as many risk factors and food safety practices that were out of compliance than restaurants with non-existent FSMS.

Fast Food Restaurants	Non-existent FSMS	Well-developed FSMS
Average # of out of compliance items	4.5	1.5

Table 2. Average number of primary data items out of compliance by FSMS development status for fast food restaurants.

Full-Service Restaurants	Non-existent FSMS	Well-developed FSMS
Average # of out of compliance items	5.3	2.2

Table 3. Average number of primary data items out of compliance by FSMS development status for full-service restaurants.

Restaurants were found to have the best control over two food safety behaviors/practices:

- Ensuring no bare hand contact with ready-to-eat foods
- Cooking raw animal-derived foods (meat, poultry, eggs) to their required temperatures

Three food safety behaviors/practices were identified as needing the most improvement:

- Cold holding of foods requiring refrigeration:
- Employee Handwashing (includes both when to wash and how to wash properly):
- Foods are cooled properly

## Conclusion

Restaurants that had a CFPM who was the person in charge at the time of data collection had significantly better FSMS scores than those restaurants that did not have a CFPM present or employed. FSMS were the strongest predictor of data items being out-of-compliance in both fast food and full-service restaurants: those with well-developed food safety management systems had significantly fewer food safety behaviors/practices out-of-compliance than did those with less developed food safety management systems.

The data will be used assess trends for control of risk factors in future studies. Data from this study will provide valuable insights that FDA can use to develop policy, educational resources, and guidance to improve retail food safety practices.

For more information regarding the FDA Report on the Occurrence of Foodborne Illness Risk Factors in Fast Food and Full-Service Restaurants, please visit: <https://www.fda.gov/food/retail-food-protection/retail-food-risk-factor-study>

## References

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