

Retail Surveillance: Preventing Foodborne Illness Risk Factors in Schools (K-12)

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Abstract

Food safety practices in foodservice and retail food establishments play a critical role in preventing foodborne illness. As part of FDA's commitment to preventing foodborne illness, we conducted a quantitative observational study investigating the relationship between food safety management systems, certified food protection managers, and food safety behaviors and practices in 402 schools (K-12) from 2015-2016.

These previously unreleased data are part of a larger study conducted in four major facility segments of the foodservice and retail food establishment industries (restaurants, healthcare facilities, schools, and retail food stores).

The results will show relationships affected by multiple variables, and the five risk factors identified as contributing to foodborne illness: improper holding temperatures, inadequate cooking, contaminated equipment, food from unsafe sources, and poor personal hygiene.

The FDA previously conducted a 10-year study between 1998-2008 to measure trends in the occurrence of foodborne illness risk factors and food safety behaviors/practices at retail. This study consisted of three data collection periods (1998, 2003, and 2008). The FDA also published a report to summarize trends over that 10-year period.

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 77.7 billion dollars (Scharff, 2012).

According to the Centers for Disease Control and Prevention (CDC), when considering foodborne disease outbreak-associated illnesses, by location of food preparation in 2015 and 2016, schools accounted for 16 outbreaks (2%), and 8 outbreaks (1%), respectively, and 622 illnesses (5%) and 785 illnesses (6%) respectively (CDC, 2015; CDC, 2016).

The purpose of this data collection was to investigate the relationship between Food Safety Management Systems (FSMS), Certified Food Protection Manager (CFPM), and the occurrence of risk factors and food safety behaviors/practices commonly associated with foodborne illness in schools.

Our objectives were to:

- Identify the least and most often occurring foodborne illness risk factor and food safety behaviors/practices in schools within the United States
- Determine the extent to which FSMS and the presence of a CFPM impact the occurrence of food safety behaviors/practices
- Determine whether the occurrence of food safety behaviors/practices in schools differs based on a school status as a risk categorization

Materials and Methods

Surveillance data from the CDC have consistently identified five major risk factors related to food safety practices within the retail and foodservice industry that contribute to foodborne illness. Most regulatory retail food inspection programs throughout the United States monitor these risk factors in their routine inspections, and each necessitates specific food safety behaviors and practices to control risks. These risk factors include:

- Poor personal hygiene
- Contaminated Equipment/Protection from Contamination
- Improper food holding/time and temperature
- Inadequate cooking
- Food obtained from unsafe sources

Ensuring that food is obtained from an approved source is the first line of defense for retail food establishments. FDA's study design did not include this risk factor under the ten primary data items because the agency observed low out-of-compliance percentages in the previous 10-year study. The study consists of a total of nineteen data items, however the focus was on the ten primary data items.

Twenty-three FDA Food Specialist conducted site visits throughout the United States at 402 randomly selected schools to perform the data collection. All specialist received customized training specific to the study data collection protocol and marking instructions for the standardized data collection tool. A Geographic Information System database containing a listing of U.S. schools was used as the establishment inventory. Schools were randomly selected to participate in the study from among all eligible establishments located within a 150-mile radius of the home locations of the twenty-three FDA specialist who conducted the data collection. The specialist conducted unannounced, non-regulatory visits to each school.

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

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

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

Results and Discussion

Measuring and reporting on the occurrence of foodborne illness risk factors and food safety behaviors/practices at retail and foodservice establishments provide the foundation for identifying where risk-based interventions might have the greatest impact on enhancing public health protection.

The occurrence of foodborne illness risk factors and the associated food safety behaviors/practices was studied among 402 schools. Table 2 shows the percentage of schools found out-of-compliance for each risk factor. The two most commonly occurring risk factors found out-of-compliance were improper holding/time and temperature (66.2%) and poor personal Hygiene (57.5%).

Foodborne Illness Risk Factor	Schools (# OUT)	Total Obs. (IN & OUT)	% OUT
Poor Personal Hygiene	231	402	57.5%
Contaminated Equipment	145	402	36.1%
Improper Holding/Time and Temperature	266	402	66.2%
Inadequate Cooking	13	263	4.9%

Table 2. Foodborne Illness Risk Factors Out of Compliance

Data analyses in this study showed the following:

- 65.7% of the schools in this study operated in jurisdictions that required a CFPM and most schools were found to have a CFPM employed and present at the time of data collection.
- Of the food safety behaviors/practices investigated in this study, schools had the best control over the following:
 - Ensuring no bare-hand contact with ready-to-eat foods
 - Cooked foods are reheated to required temperatures
 - Raw animal foods are cooked to required temperatures
- There remains a need to gain better control over the following food safety behaviors and practices:
 - Employee Handwashing (includes both when to wash and how to wash properly)
 - Cold holding of foods requiring refrigeration
 - Foods requiring refrigeration are held at proper temperature
- FSMS were the strongest predictor of data items being out-of-compliance: 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.

Conclusion

Schools have the best control over Inadequate cooking, in addition schools need better control over employee handwashing and holding foods requiring refrigeration at proper temperature (cold holding). The data provides valuable insights that FDA and other agencies can use to improve food safety practices in schools

FDA has developed Retail Food Protection Industry Educational Materials.

These posters/storyboards and videos are designed to enhance food safety training efforts at the retail level by helping food employees understand the important role they play in protecting public health. For example, these posters/storyboards could be posted in food preparation areas where the behavior occurs, used for training, and food safety discussion. During the discussion you can determine whether the employees understood the key message in the poster by asking some focused open-ended questions.

They are available in nine different languages, including Arabic, English, Hindi, Korean, Russian, Simplified Chinese, Traditional Chinese, Spanish, and Vietnamese.

The posters/storyboards and videos are available at: <http://www.fda.gov/foodemployeetraining>
These materials are not copyrighted. You may post these materials on your website and distribute them freely. We kindly ask, however, that you credit FDA when using or posting the materials.

References

1. Scallan E., Hoekstra, R.M., Angulo, F.J., Tauxe, R.V., Widdowson, M.A., Roy, S.L., Jones, J.L., and Griffin, P.M. (2011). Foodborne Illness Acquired in the United States – Major Pathogens. *Emerging Infectious Diseases*, 17(1), 7-15.
2. Scharff, R. (2012). Economic Burden from Health Losses Due to Foodborne Illness in the United States. *Journal of Food Protection*, 75(1), 123-131.
3. Center for Disease Control and Prevention. *Surveillance for Foodborne Disease Outbreaks, United States, 2015 Annual Report*. Retrieved from https://www.cdc.gov/foodsafety/pdfs/2015FoodBorneOutbreaks_508.pdf
4. Center for Disease Control and Prevention. *Surveillance for Foodborne Disease Outbreaks, United States, 2016 Annual Report*. Retrieved from https://www.cdc.gov/fdoss/pdf/2017_FoodBorneOutbreaks_508.pdf
5. Food and Drug Administration (2013). Food Code. Retrieved from <https://www.fda.gov/food/fda-food-code/food-code-2013>
6. FDA Retail Food Risk Factor Study. Retrieved from <https://www.fda.gov/retailfoodriskfactorstudy>



The Food Code is a model code for best practices to ensure the safe handling of food in a retail setting. It has significantly reduced the risk for foodborne illness within retail establishments, thus strengthening consumer confidence in the safety of the food we eat from supermarkets and restaurants.