

# Retail Surveillance: Preventing Foodborne Illness Risk Factors in Retail Food Store Delis

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## Abstract

Food safety practices in retail food establishments continue to play a critical role in preventing foodborne illness. As part of FDA’s commitment to preventing foodborne illness at retail, we conducted a study investigating the relationship between food safety management systems, certified food protection managers, and food safety behaviors and practices in delis from 2015 to 2016.

The results will show relationships stratified 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 data will be used to establish a baseline measurement upon which to assess trends across two additional data collections, at 3-year intervals, in delis. Collectively, these studies will provide valuable insights that FDA can use to improve retail food safety policy and practices.

## 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).

Retail food stores employ 5 million workers and represent a combined annual sales volume of almost \$800 billion (FMI, 2019). At the time of this data collection, there were approximately 152,741 retail food store establishments in the contiguous U.S. (ESRI, 2014).

According to the Centers for Disease Control and Prevention (CDC), when considering incidents in 2015 and 2016, retail food stores accounted for 23 outbreaks (3%), and 15 outbreaks (2%), respectively, and 572 illnesses (5%), and 239 illnesses (2%), respectively (CDC, 2015; CDC, 2016).

In the 2015-2016 Retail Food Store Deli Data Collection study, the agency investigated the relationship between food safety management systems (FSMS), certified food protection managers (CFPM), and the occurrence of risk factors and food safety behaviors and practices commonly associated with foodborne illness in retail food store delis from 2015 to 2016. Data from this study will provide valuable insights that FDA can use to develop educational resources and guidance to improve food safety practices.

## Materials and Methods

Surveillance data from the CDC have consistently identified major risk factors related to food safety practices within the retail food 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 the risks. These risk factors include:

- Poor personal hygiene
- Improper food holding/time and temperature
- Contaminated equipment/protection from contamination
- Inadequate cooking

This observational study was conducted in randomly selected retail food store delis 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.

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 ready-to-eat 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, ready-to-eat 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

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).

## Results and Discussion

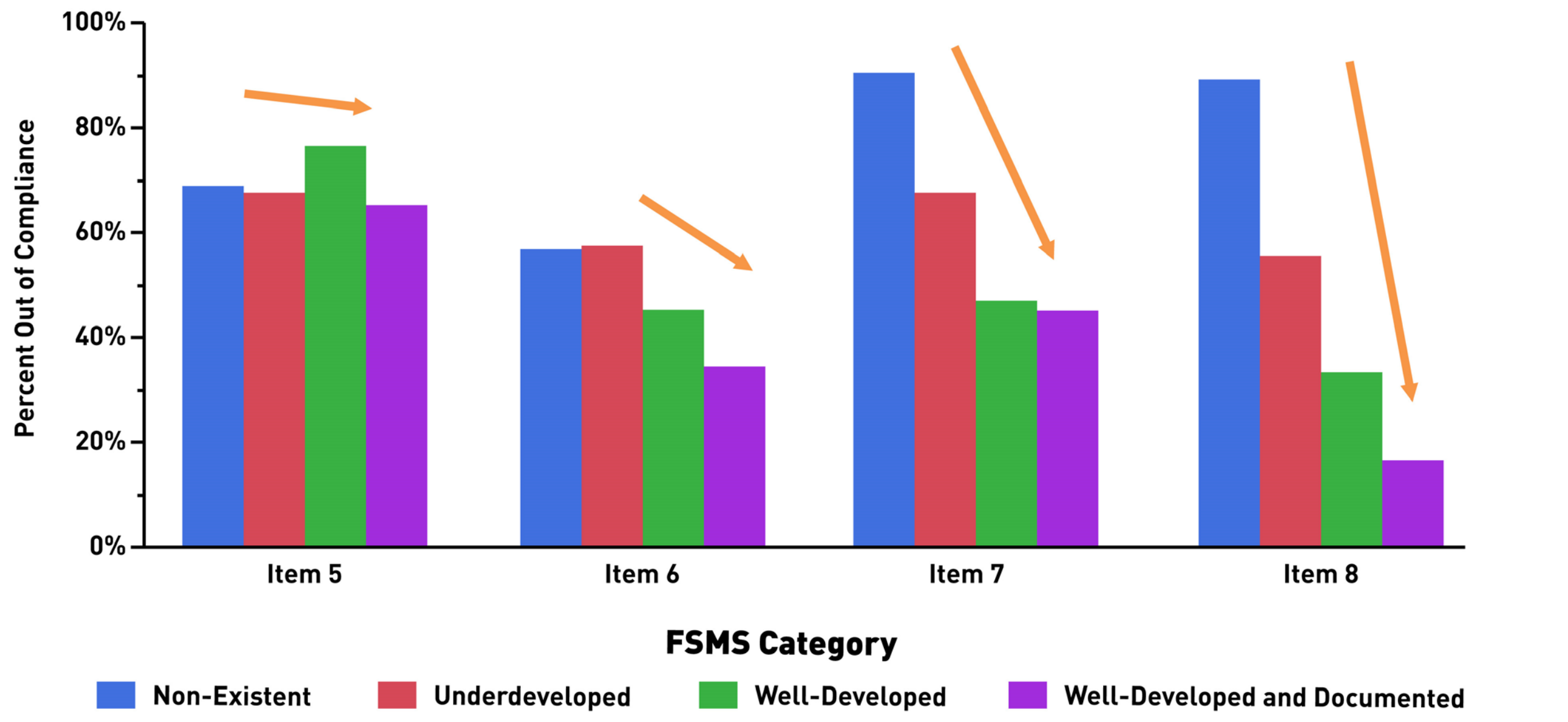
Measuring and reporting on the occurrence of foodborne illness risk factors and food safety behaviors/practices at retail food establishments provide the foundation for identifying where risk-based interventions might have the greatest impact on enhancing public health protection.

Retail food store delis with a CFPM present had fewer primary data items out of compliance than those without a CFPM. Those that had a CFPM who was the person in charge “PIC” 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. The average number of out of compliance items is greatly reduced when there is a well-developed FSMS.

Retail food store delis with well-developed FSMS had less than half as many risk factors and food safety practices that were out of compliance than those with non-existent FSMS.

The risk factor found most out of compliance was Improper Holding Time/Temperature. We analyzed the impact of FSMS on the compliance status of the data items that made up that risk factor. As shown in Figure 1, as FSMS development increased the impact on compliance status of the data items differed.



**Figure 1.** Impact of FSMS development on compliance status of data items.

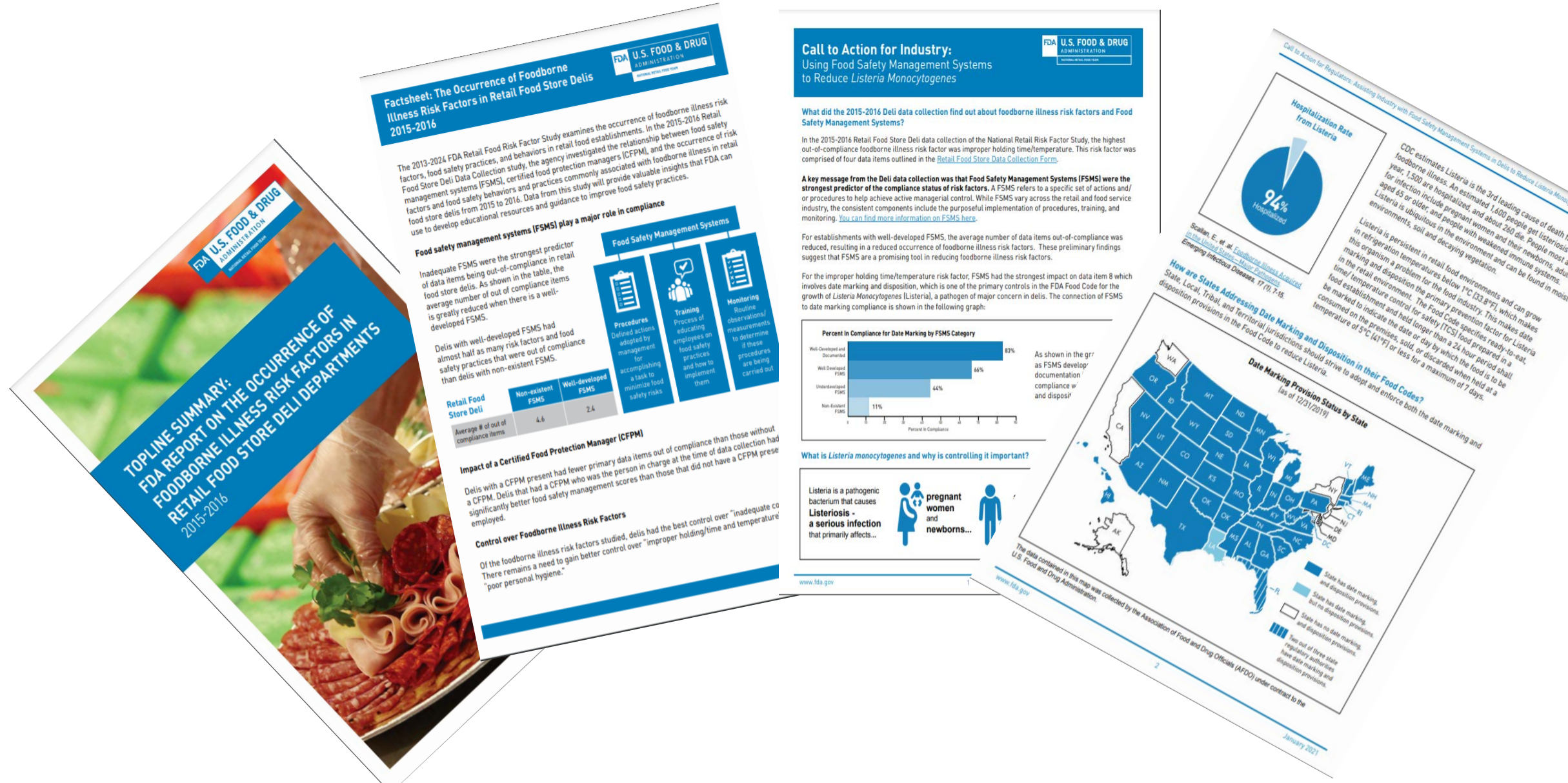
Each of the bars represents the FSMS score/category by data item. Blue is non-existent, red is underdeveloped, green is well developed, and purple is well developed and documented. The arrows in the figure indicate the slope when comparing FSMS category with compliance status of the data item. Each of these slopes are negative, indicating that as the FSMS score improved, the percent out of compliance decreased. This suggests that developing more robust FSMS is a promising intervention to reduce out of compliance risk factors and food safety behaviors.

- For data item 5, cold holding, the difference in compliance status by FSMS category was steady, as shown here by the nearly flat slope of the arrow, meaning we did not see an improvement in compliance for cold holding as FSMS improved. Essentially the FSMS category had no impact on compliance for cold holding.
- For data item 6, hot holding, there was a small improvement in compliance status as the FSMS improved.
- For data item 7, cooling, there was a stronger improvement in compliance as the FSMS improved.
- **For data item 8, date marking/disposition there was the strongest improvement in compliance as the FSMS improved, indicating strong improvement in compliance as FSMS are developed. This meant that based on our data, if we were to suggest improving FSMS to improve compliance status, we would expect the greatest success investing in FSMS for date marking/disposition.**

## Conclusion

After this analysis we decided to ask stakeholders to make interventions based on our data, focusing on the data item that had the highest chance of improvement in compliance if FSMS were developed. This ask was communicated in the form of a call-to-action. (See Figure 2) Each of the outreach materials can be accessed at [www.fda.gov/retailfoodriskfactorstudy](http://www.fda.gov/retailfoodriskfactorstudy).

Materials were developed and communicated to different constituent groups that have responsibilities for preventing foodborne illness at retail. These tailored messages for industry and regulators were indicated as the preferred method of communication in focus groups hosted by USDA FSIS (USDA, 2020).



**Figure 2.** Education and outreach materials for industry and regulators have been developed to assist with improving compliance based on the findings.

**Topline summary**  
Was developed to provide more of the data not included in the technical report. We get requests frequently for all types of data collected in the study, such as temperature observation distribution, and the secondary data items. This summary is an accessible, easily digestible way to provide that data to anyone who wants to take a closer look or draw their own comparisons/do their own independent research.

**Food Safety Management Systems Fact Sheet**  
Explains our evaluation of FSMS, what they are, how they impact foodborne illness risk factors, and what we found in this data collection. It is a two-page document.

**Call to Action for Industry**  
We set up the call-to-action to concisely explain 1) what our data found 2) what listeria is and why it’s important to control it, 3) the benefits of FSMS and how they can help with improving compliance, and 4) a clearing house of resources for industry to develop better FSMS for date marking and disposition. We know many resources exist across the government in many places and it was important to pull them all together.

**Call to Action for Regulators**  
The call to action for regulators is like the call to action for industry but focuses more on what regulations support proper date marking/disposition, and what resources are available for regulators to improve the evaluation of, and better understand the FSMS facilities have in place for date marking. It also has information on how to assist industry in developing better FSMS and explaining the principles behind the requirements and supporting procedures/training/monitoring.

It is our hope that with these four resources for our stakeholders, the risk factor study retail food store deli data from 2015-2016 can be more easily understood, and meaningful steps can be taken to reduce foodborne illness risk factors.

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