Farmers market vendors need training to improve food-safety practices

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The researchers assessed food safety behaviors at Pennsylvania farmers markets using direct concealed observations and state sanitarian observations, and checked select samples of leafy green produce and meat obtained from vendors for the presence of hygiene indicators such as fecal coliforms, Listeria, and*E. coli*. Credit: Joshua Scheinberg

Many vendors at farmers markets take inadequate precautions to prevent the spread of foodborne illness, and they should be trained to reduce food-safety risks, according to Penn State researchers who completed the final phase of an innovative five-year study.

Using a comprehensive three-way approach, the research assessed food safety behaviors at Pennsylvania farmers markets using direct concealed observations, state sanitarian observations, and self-reported vendor surveys. The results revealed key distinctions between observed vendor food-handling practices—by both researchers and state sanitarians—and vendor self-reported practices.

The findings, which were published today (Nov. 1) in *Food Protection Trends*, suggest that Pennsylvania would greatly benefit from a customized food-safety training program offered to farmers market vendors to address the identified issues and regulatory requirements for selling safe foods in Pennsylvania.

"We found that our direct field observations and inspector findings were very similar, yet very different from what most vendors said they were doing—their self-reported behaviors," said Cathy Cutter, professor of food science in the Penn State College of Agricultural Sciences, whose research group conducted the study. "There was a chasm, if you will, between what we and the inspectors saw, and what vendors reported they were doing," added Cutter, who is also assistant director of food safety and quality programs for Penn State Extension. "The vendors think they are doing a good job, when in reality they are not. We are not sure why there were such discrepancies. Nevertheless, they need to do better."

Specifically, vendors were found to demonstrate insufficient or high-risk behaviors in the areas of hand washing, personal hygiene and cross-contamination. Notably, researchers found that the use of disposable gloves at Pennsylvania farmers markets remains low, even among

vendors who sell unpackaged, ready-to-eat foods.

According to the US Department of Agriculture, there are about 8,500 farmers markets in the US and while most all of them sell fresh produce like this, 40 percent of them are selling prepared foods, 66 percent meat or poultry and 16 percent fish or seafood. Credit: Joshua Scheinberg

Direct concealed observations conducted by the researchers found less than 24 percent of the vendors had disposable gloves present at vending stands, despite the fact that a majority of surveyed vendors sold raw or temperature-control-for-safety foods, such as meat and seafood, as well as ready-to-eat foods at the same stand. And within the group of vendors observed to be using disposable gloves, slightly less than half used them

improperly.

The handling of money and unpackaged foods without changing gloves in between tasks was the most common improper glove-use behavior seen by both researchers and Pennsylvania state sanitarians.

"These results suggest that there is a general lack of understanding among vendors about when to use disposable gloves, when to change gloves, and what kinds of behaviors are unacceptable while wearing gloves," said lead researcher Joshua Scheinberg, now director of food safety and quality assurance with Godshall's Quality Meats in Telford, Pennsylvania. The research was his doctoral thesis.

Having evolved since the colonial era, farmers markets have replaced Old-World-style markets, with more than 8,500 U.S. farmers markets in operation today. As farmers markets have increased in size, scope and complexity, so have the potential food-safety risks. According to the U.S. Department of Agriculture, 40 percent of farmers markets are selling prepared foods, 66 percent meat or poultry, and 16 percent fish or seafood.

"These significant changes in the kinds of foods sold at farmers markets present new food-safety challenges and implications," Scheinberg said. "As a result, several studies have revealed high-risk food-safety factors unique to farmers markets and farmers market vendors. We also saw problems."

Direct field observations and inspector findings were very similar, yet very different from what most vendors said they were doing -- their self-reported behavior. The vendors think they are doing a good job, according to researchers, when in reality they are not. Credit: Joshua Scheinberg

In the study, researchers checked select samples of leafy green produce and meat obtained from farmers markets in Pennsylvania for the presence of hygiene indicators—coliforms, fecal coliforms, Listeria, and *E. coli*—and found cause for concern. *E. coli* was present in 40 percent—20 of 50—of beef samples and 18 percent—9 of 50—of pork samples, and in 28 percent—15 of 54—of kale samples, 29 percent—15 of 52—of lettuce samples, and 17 percent —8 of 46—of spinach

samples. They found Listeria in 8 percent—4 of 50—of beef samples, 2 percent—1 of 54—of kale samples, 4 percent—2 of 52—of lettuce samples, and 7 percent—3 of 46—of spinach samples.

A previous phase of the research created an app for smartphones to be used in place of the traditional clipboards to improve the quality of data collection related to food-safety observations. Because smartphones are so ubiquitous, and text messaging and social media activities so common in public places, no one questions what anyone does with their phone. That pervasiveness allows a phone application to be used in direct, concealed observations without alerting the people being observed.

Food-safety practices used by food handlers are often monitored for research, inspection and regulatory purposes. However, if surveillance is not concealed, it can result in unintended behavioral changes, according to Scheinberg. Those changes—known as the Hawthorne Effect—can render such observations meaningless.

Also, in a subsequent phase of the study, researchers developed a curriculum for Penn State Extension to train farmers market vendors in food safety that is now available online through the Penn State Extension website .

This Penn State research is a perfect example of how a land-grant university should function, Cutter pointed out.

"We are using science—in this case, a structured research program—to support decision-making and development of a curriculum," she said. "What we do in extension is absolutely critical to keeping agriculture-related businesses in operation. We develop programs, activities and products around these types of research projects and then deliver them to the citizens of Pennsylvania."

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