



Beyond Measurement?

Evaluating Environmental Public Health: Assessing the Effectiveness of Food Safety Programs

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In January 2010, the environmental health director of Louisiana, John Smith, attended a director's meeting run by the state health commissioner in Baton Rouge. The meeting was called in response to the release of the preliminary annual state budget.

"The preliminary state budget was released yesterday and it looks like the Louisiana Department of Health is facing another round of cuts across the board. I am passing around a spreadsheet that has the proposed cuts to your individual departments and programs," the state health commissioner said.

On this spreadsheet, John noted the environmental health department faced a 20% budget reduction. This would force John to lay off personnel even though his entire department had been overworked and understaffed for quite some time. The food safety program had absorbed the largest reduction, which John attributed to a public perception that the program was not very effective and overly burdensome on restaurants and the food industry.

The state health commissioner continued, "The only way we're going to be able to fight this budget cut is by proving to the state legislature with solid facts that our programs are vital to the health and safety of Louisiana residents. You have 3 weeks to perform an evaluation of the programs that are on the chopping block."

ⁱ Disclaimer: All opinions and views expressed in this case study are of the authors and the authors alone. They do not represent the official position of the Association of State and Territorial Health Officials or the Louisiana Department of Health and Hospitals.

John was faced with an incredible task. How could he make the case that environmental health programs, especially food safety, are critical to protecting public health, and a reduction in financial resources could be detrimental to the health of state residents? He had never undertaken this kind of program evaluation before. He needed to answer some significant questions, including:

- How do restaurant inspections impact the public's health?
- How can his staff measure the impact to public health if it does exist?
- How much does the food safety program cost to implement?
- What is the estimated cost of food-borne illness in the state, from both direct medical expenditures and lost school and work days?

Question 1 What sort of roles and responsibilities do environmental health professionals have regarding food safety?

Question 2 What type of information would the environmental health director need to know to help make his case to the state legislature?

Question 3 From the farm to the plate, what are some of the ways food can become contaminated with pathogens?

BACKGROUND ON FOOD SAFETY

The U.S. Centers for Disease Control and Prevention (CDC) estimates 48 million food-borne illnesses occur every year—128,000 people are hospitalized and 3,000 die from food-borne

illness.¹ A majority of these food-borne illnesses are mild and, therefore, never reported. The most common pathogens responsible for food-borne illness include *Campylobacter*, *Salmonella*, and *Escherichia coli* 0157:H7.² These pathogens are found abundantly in nature and throughout the course of food processing. According to CDC, the foods most commonly associated with food-borne illness outbreaks are raw foods from animal origins, including meat, poultry, raw eggs, unpasteurized milk or cheese, and raw seafood. Processed foods that combine raw animal products, such as sausage or ground beef, also pose a high risk of contamination. In addition, raw vegetables and fruit are considered at high risk of contamination due to unsanitary processing conditions, such as using fecal contaminated water for washing and rinsing.³ Upon reaching a processing facility or restaurant, food can be contaminated as a result of improper sanitary conditions, such as dirty equipment or poor personal hygiene, as well as close contact with other foods that are at high risk for contamination, such as raw meats. Thus, food contamination can occur during many points in the food production process.

State and local health departments use food safety inspections to prevent illnesses that can be caused by food contamination. The current food safety inspection system, based on the concept of Hazard Analysis and Critical Control Point (HACCP), is a preventive approach to food safety as opposed to a reactive approach.⁴ The HACCP system is intended to prevent the occurrence of food safety issues "by assessing the inherent hazards attributable to a product or a process, determining the necessary steps that will control the identified hazards, and implementing managerial control practices. . . ."⁵(para 1) The HACCP system identifies critical control points, which inform inspection guidelines that define critical versus noncritical violations. A critical violation, as defined by the U.S. Food and Drug Administration (FDA) 2001 *Food Code*, is a violation "that, if in noncompliance, is more likely than other violations to contribute to food contamination, illness, or environmental health hazard."⁶(Listing of Terms: 19a) The five general circumstances for food-borne illness include:

1. Food from unsafe sources—such as food past its expiration date
2. Inadequate cooking—for example, poultry or beef that is not cooked to the appropriate temperature to ensure pathogens are destroyed
3. Improper holding temperatures—for example, dairy products or seafood not stored in adequately cold temperatures to keep from spoiling
4. Contaminated equipment—such as dirty cooking implements or surfaces directly involved in food preparation

5. Personal hygiene—for example, employees not washing their hands after using the bathroom⁷

Evidence of these conditions or behaviors during an inspection indicates noncompliance with the *Food Code* and results in a critical violation.

According to the FDA, routine food safety inspections have been an integral part of food safety regulation since the early days of public health.⁸ As Americans have increasingly eaten meals outside of the home, retail food inspections have become an essential component of the food safety system. However, the responsibility for food safety in the United States spreads beyond the FDA, across many agencies, at all levels of government.

More than 3,000 state, local and tribal agencies have primary responsibility to regulate the retail food and foodservice industries in the United States. They are responsible for the inspection and oversight of over 1 million food establishments—restaurants and grocery stores, as well as vending machines, cafeterias, and other outlets in healthcare facilities, schools, and correctional facilities.⁹(para 1)

States vary according to where they house retail food programs. For example, responsibility may reside at the state-level agriculture department, state-level environmental health department, at the county level, or it may be a shared responsibility among multiple entities. In Louisiana, the retail food program is centralized within the Center for Environmental Health in the Louisiana Office of Public Health. The Center for Environmental Health ensures safety for almost 32,000 food establishments throughout the state of Louisiana. The term *food establishments* includes full-service restaurants, fast-food businesses, cafeterias in hospitals, prisons, nursing homes, and schools, concession stands, delis, bars, and grocery stores. The primary functions of the state food safety program include:

- Responding to consumer complaints and reports of food-borne illness
- Providing food safety certification
- Issuing permits
- Conducting food establishment inspections
- Performing food safety education¹⁰

These essential services are designed to ensure the food supply is adequately protected for Louisiana residents and visitors.

Another important component of the food safety system is food outbreak surveillance and response. According to

the CDC, food-borne outbreak investigations help identify new pathogens, new routes of exposure, and potential gaps in the food safety system. They also help improve scientific understanding of the nature of food contamination and more effective strategies to prevent illness from occurring.¹¹ Public health professionals monitor the occurrence of food-borne outbreaks to be able to understand what caused an outbreak, control the source of the outbreak, minimize the number of people affected, and prevent future outbreaks from happening. There are seven primary steps that occur during an investigation of a food-borne disease outbreak (see Box 16-1).

The role of state public health agencies in a food-borne outbreak investigation depends on the size and scope of the outbreak. State health agencies will generally become involved if an outbreak spans several cities or counties but will also work with federal partners in the event of a multistate outbreak. Investigating a food-borne disease involves several professional disciplines within public health, including epidemiologists, microbiologists, environmental health specialists, or sanitarians, as well as regulatory compliance officers or inspectors.¹³ In Louisiana, responsibility for food-borne disease investigations falls on the Infectious Disease Section within the Community Health Office—outside of John's office. Therefore, in the case of an outbreak, sanitarians and

food safety inspectors in John's office must work very closely with the epidemiologists and microbiologists in the Infectious Disease Section to find the source of the outbreak and minimize the risk to the population. However, the Community Health Office faces similar budget cuts as John's environmental health program and works with limited staff capacity and resources when responding to outbreaks. Deepening budget cuts will affect all aspects of the food safety system in Louisiana and could affect the agency's ability to adequately respond and protect public health in the event of an outbreak.

Question 4 What food safety practices would a health inspector look for during a routine restaurant inspection?

Question 5 What are examples of recent food-borne illness outbreaks that have taken place in the last 2 years? What was the cause of the outbreak?

Question 6 What actions can health inspectors take to mitigate or prevent an outbreak from occurring?

WORKFORCE SHORTAGES, FOOD SAFETY INSPECTIONS, AND HUMAN HEALTH: AN EVIDENCE BASE?

Across the United States, counties and states have recently been coping with similar budgetary challenges. According to a survey of state health officials conducted by the Association of State and Territorial Health Officials in 2009, 83% of state health departments suffered job losses between July 2008 and July 2009, and almost three quarters of state health departments made cuts to their fiscal year 2009 budget.¹⁴ States are dealing with these budget cuts by eliminating entire programs and reducing services. Additionally, state health departments are incapable of filling some positions when staff leave or retire.

John wanted to find out more about how other states' food safety programs had been affected by workforce shortages and how other states performed evaluations of their programs. To gather this information, John had one of his staff members review the scientific literature regarding the utility and effectiveness of food safety programs. She came across a few news articles from El Paso County, Colorado, where, for a number of years, the health department has lacked the staff resources to perform two inspections per year of restaurants and other food providers as required by law.¹⁵ Additionally, a report released in 2008 on the healthcare infrastructure in Colorado Springs (in El Paso County), revealed complaints about restaurant cleanliness and employee hygiene increased from 60 in 2005 to 219 in 2007. The report went on to explain that the health department's annual budget was relatively low compared to other departments within the county, and that the Colorado

BOX 16-1 Steps for Investigating a Food-Borne Disease Outbreak

1. Detecting a possible outbreak
2. Defining and finding cases
3. Generating hypotheses about likely sources
4. Testing the hypotheses
5. Finding the point of contamination of and source of the food
6. Controlling an outbreak
7. Deciding an outbreak is over¹²

Outbreaks are identified through public health surveillance, informal and formal reporting, and laboratory testing and tracking. Once a possible outbreak has been identified, public health officials go through the subsequent steps to identify possible cases, find the point of contamination, and take action to prevent more cases from occurring. The steps do not necessarily have to happen in this sequence and often overlap one another in time or occur at the same time.

Department of Health and Environment's number of full-time-equivalent personnel was only two thirds the national average. This makes performing inspections in accordance with state regulations very difficult. The authors of the Colorado Springs report noted that although the county has not seen a major increase in food-borne outbreaks, complaints of sickness from food poisoning increased nearly threefold from 2005 to 2006.¹⁶ While this association is not necessarily causative, the Colorado Springs report suggested that workforce shortages may present serious public health risks.

John's researcher also found several peer-reviewed articles discussing restaurant inspection frequency. Allwood, Lee, and Bordon-Glass published an article in 1999 comparing restaurant mean inspection scores in Bloomington, Minnesota, between 1987, when inspections were performed four times a year, and 1988, when the health department faced diminishing resources and was forced to decrease the frequency of inspections to three times a year. The study showed restaurant inspection scores were significantly higher (better) in 1987 when restaurants were inspected four times a year, compared to 1988, when frequency was decreased.¹⁷ The authors concluded that routine "restaurant health inspections continue to play a vital role in protecting the public from foodborne disease."¹⁸(Discussion, para 1)

In contrast, Canadian researchers performed a study to assess the impact of inspection frequency on compliance of food safety regulations in restaurants. The researchers identified high-risk restaurants and routinely inspected them three, four, or five times a year. They then compared inspection scores among the three frequency groups. The authors did not find a statistical difference between outcome measures based on inspection frequency.¹⁹ The results of this research therefore shed doubt on the findings from the Allwood et al. study. Despite their findings, the authors from Canada concluded that "food premise inspections should continue to play an important role in protecting the public from food-borne illnesses by educating workers."²⁰(p 60)

In the peer-reviewed literature, the staff member came across several contradictory studies that analyzed the utility and effectiveness of restaurant inspections. The Seattle-King County Washington Health Department performed the first such study in 1987. It conducted a study to determine whether poor routine inspection scores were associated with reported outbreaks in restaurants. To conduct this study, the health department identified 28 case restaurants that reported a food-borne outbreak and two control restaurants per case that did not report an outbreak (56 control restaurants). The Seattle-King County researchers found, "restaurants with poor inspection results [were] more likely to have outbreaks,"²¹(p 590) and that routine inspections by the health department could help identify restaurants with an increased risk of an outbreak. However, when epidemiologists from the Florida Department of Health tested the claims made by the Seattle-

King study by performing a similar analysis of routine restaurant inspections during 1995 in Miami-Dade County, Florida, researchers found that lower inspection results did not correlate with an increased risk of an outbreak.²²

Despite variances in the literature regarding the frequency of retail food inspections and the ability to predict restaurant-induced outbreaks, the FDA still recommends that to sustain an effective risk-based food safety program, state agencies should maintain well-resourced programs. The FDA 2009 *Food Code*, a model document intended to provide government entities at all levels with scientifically sound guidance for regulating the retail and food service industry, recommends:

... regulatory agencies should have adequate funding, staff, and equipment necessary to support a risk-based retail food safety program designed to reduce the occurrence of food-borne illness risk factors. Program management should do everything they can to secure funding and resources to support regulatory food programs.²³(Section 3.D.)

The FDA also recommends every food safety program should have at least one full-time staff member devoted to food for every 280–320 inspections.²⁴ In Louisiana, the ratio of sanitarians to the number of expected food inspections is already much higher than the recommended FDA ratio; this does not even consider other inspection responsibilities of the sanitarians. Sanitarian inspection responsibilities cover a wide range of program areas, including: beach monitoring, building and premises, commercial seafood, disease/vector control, food and drug, infectious waste, milk and dairy control, mollusks and shellfish, on-site wastewater, and retail food establishments.²⁵ For example, in the East Baton Rouge area, only seven sanitarians perform all the inspections required by Louisiana regulations. There are approximately 2,775 food establishments in the East Baton Rouge area, which creates a ratio of 396 retail food establishments in need of inspection per sanitarian. In the current situation, East Baton Rouge sanitarians must perform nearly 25% more inspections than FDA recommends for an effective food safety program. This ratio does not even consider the other sanitarian program area inspections. Even now, it is difficult for John's sanitarian staff to perform the number of inspections required at the recommended frequency to protect public health. Continued cuts to the budget will result in decreased staff capacity and place greater inspection responsibilities on the remaining sanitarians, who will in turn have to reduce inspection frequency and quality.

Question 7 What have you learned thus far that could better inform your answer to question No. 2?

Question 8 The literature review illustrated the studies conducted were varied in methodology and are not recent publications; how do you think this would impact on John's current dilemma?

After reviewing the background literature, John is presented with several options for his program evaluation. He does not have the time or resources to carry out a lengthy prospective study like some of the studies from the literature. However, his department uses an online database to store and track the results of food safety inspections. In this database, John has access to all electronic inspections of food establishments from 2005 (the electronic system was not available before then). For each inspection record, John can access several key pieces of information, including the date of inspection, the type of inspection (e.g., routine, reinspection, or complaint), and critical and noncritical violation information. Through this electronic system, John can also track which restaurants received complaints and view the results of the inspections that followed from those complaints. Additionally, John can contact the Infectious Disease Section for information and data on recent outbreaks in the state.

Question 9 As John begins to design his program evaluation, what principal factors should be evaluated? Outline a suggested methodology. Consider its strengths and limitations. Keep in mind that John has a relatively small amount of time left to make his case to the governor.

Question 10 Assume that even in the best scenario, John will face some budget cuts and will need to balance the level of available resources while ensuring an adequate level of protection against illness. Is there a way he can glean insights from his program evaluation to begin to inform the following decisions?

1. Should he cut additional personnel?
2. Should he limit the scope of his department's environmental health services (for example, reduce the number of retail food inspections, or eliminate or cut back on some of his other environmental health programs)?

THE FUTURE OF PUBLIC HEALTH IN A BUDGET-CONSTRAINED WORLD

The current reality is that substantial budget cuts threaten the ability of all levels of government to provide an adequate level of public health protection. With increased budget cuts, many public health departments are experiencing workforce

reductions and are not able to continue many public health programs. In a study conducted by the Association of State and Territorial Health Officials in 2010, the four primary measures state health departments are taking in response to the budget cuts include eliminating programs, reducing services, lowering administrative costs, and cutting back staff via layoffs, furloughs, and attrition. Since 2008, 87% of state health departments have suffered job losses, and they were expected to face another 16% in budget cuts by fiscal year 2011.²⁶ Local health departments echo the struggle faced by state health departments. The local health department workforce was hit by a 15% reduction in 2008 and 2009. Additionally, 38% of local health departments reported a lower budget in 2010 than the previous year. Local environmental health programs were ranked third in terms of hardest-hit programs, experiencing 17% of cuts, next to chronic disease screening and treatment programs at 19% and clinical health services at 21% of all cuts.²⁷ According to the Trust for America's Health Report, *Shortchanging America's Health: A State-by-State Look at How Public Health Dollars are Spent and Key State Health Facts*, CDC funds for state and local health environmental health programs saw a total of \$87,680,289 in cuts during fiscal year 2009.²⁸ All three tiers of government face budgetary challenges, and as a result, workforce reductions.

Furthermore, the environmental health workforce in state health departments is shrinking rapidly. In addition to budgetary reductions, environmental health workforce shortages are a result of several other factors, including the accelerated rate at which environmental health professionals are retiring. There is also a lack of skill set and interest in environmental health, which health departments have to overcome in order to recruit and train new staff. This dilemma can be attributed to underqualified candidates, a lack of competitive salary for state health departments, and insufficient environmental health marketing efforts. The environmental health workforce must confront these challenges with better outreach and marketing to universities and trade schools to help recruit younger people into the field. Additionally, environmental public health professionals need strong science and data to validate the effectiveness of their programs, especially during lean financial periods.

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REFERENCES

1. U.S. Centers for Disease Control and Prevention. Estimates of Foodborne Illness in the United States. <http://www.cdc.gov/foodborneburden/index.html>. Updated December 22, 2010. Accessed April 3, 2011.
2. Centers for Disease Control and Prevention. Foodborne infections: what are the most common foodborne diseases? http://www.cdc.gov/nczved/divisions/dfbmd/diseases/foodborne_infections/#common. Updated December 13, 2010. Accessed April 3, 2011.
3. Centers for Disease Control and Prevention. Foodborne infections: what foods are most associated with foodborne illness? http://www.cdc.gov/nczved/divisions/dfbmd/diseases/foodborne_infections/#association. Updated December 13, 2010. Accessed April 3, 2011.
4. US Food and Drug Administration. FDA 2001 food code—annex 5: HACCP guidelines. <http://www.fda.gov/Food/FoodSafety/RetailFoodProtection/FoodCode/FoodCode2001/ucm089302.htm>. Updated April 2004. Accessed April 5, 2010.
5. Idem. US Food and Drug Administration. Annex 5. April 2004.
6. US Food and Drug Administration. FDA 2001 food code—chapter 1: purpose and definitions. <http://www.fda.gov/Food/FoodSafety/RetailFoodProtection/FoodCode/FoodCode2001/ucm089124.htm>. Updated April 2004. Accessed April 5, 2010.
7. Idem. US Food and Drug Administration. Annex 5. April 2004.
8. Idem. US Food and Drug Administration. Annex 5. April 2004.
9. FDA. Retail food protection: a cooperative program. <http://www.fda.gov/Food/FoodSafety/RetailFoodProtection/default.htm>. Updated February 9, 2011. Accessed April 3, 2011.
10. Louisiana Center for Environmental Health, Office of Public Health. Retail food program home page. <http://www.dhh.louisiana.gov/offices/?ID=216>. Accessed November 7, 2010.
11. Centers for Disease Control and Prevention. Preventing future outbreaks. December 2009. <http://www.cdc.gov/outbreaknet/investigations/preventing.html>. Accessed November 7, 2010.
12. Centers for Disease Control and Prevention. Investigating foodborne outbreaks. December 2009. <http://www.cdc.gov/outbreaknet/investigations/investigating.html>. Accessed November 7, 2010.
13. Centers for Disease Control and Prevention. Key players in foodborne outbreak response. December 2009. http://www.cdc.gov/outbreaknet/investigations/key_players.html. Accessed November 7, 2010.
14. Association of State and Territorial Health Officials. Impact of budget cuts on state public health. <http://www.astho.org/Display/AssetDisplay.aspx?id=4818>. Accessed November 7, 2010.
15. Auge K. Home of TABOR in a pinch. *The Denver Post*. March 1, 2009. http://www.denverpost.com/newsheadlines/ci_11810109. Accessed April 3, 2011.
16. Limbert WM and Beard S. Health care infrastructure in Colorado Springs—chapter 1: Public health. January 2008. Colorado Springs, CO: Western Strategies Institute.
17. Allwood P, Lee P, Borden-Glass P. The vital role of restaurant health inspections. *J Environ Health*. 1999;61(9):25–28.
18. Allwood et al, 1999.
19. Newbold KB, McKeary M, Hart R, Hall R. Restaurant inspection frequency and food safety compliance. *J Environ Health*. 2008;71(4):56–61.
20. Newbold et al, 2008.
21. Irwin K, Ballard J, Grendon K, Kobayashi J. Results of routine inspections can predict outbreaks of foodborne illness: the Seattle-King County experience. *AJPH*. 1989;79(5):586–590.
22. Cruz M, Katz D, Suarez J. An assessment of the ability of routine restaurant inspections to predict food-borne outbreaks in Miami-Dade County, Florida. *AJPH*. 2001;91(5):821–823.
23. U.S. Food and Drug Administration. FDA food code 2009: annex 5—conducting risk-based inspection. <http://www.fda.gov/Food/FoodSafety/RetailFoodProtection/FoodCode/FoodCode2009/ucm187947.htm>. Updated October 30, 2009. Accessed April 28, 2010.
24. Idem. U.S. Food and Drug Administration. Annex 5. October 30, 2009.
25. Sanitarian Services; Center for Environmental Health. Louisiana Department of Health and Hospitals. Title 51. Public health—sanitary code. <http://www.dhh.louisiana.gov/offices/?ID=206>. Accessed February 1, 2010.
26. Association of State and Territorial Health Agencies. Impact of budget cuts on state public health. <http://www.astho.org/Display/AssetDisplay.aspx?id=4818>. October 2010. Accessed November 5, 2010.
27. National Association of City and County Health Officials. Local health department job losses and program cuts: state-level tables from January/February 2010 survey. http://www.naccho.org/advocacy/upload/JobLossSurvey_State-level-tables-3-10.pdf. Published March 2010. Accessed November 5, 2010.
28. Trust for America's Health. Shortchanging America's health: a state-by-state look at how public health dollars are spent and key state health facts. <http://healthyamericans.org/assets/files/TFAH2010Shortchanging05.pdf>. March 2010. Accessed November 5, 2010.