Laura R. Green, Ph.D.

Behavioral Science and Food Safety

Editor's note: NEHA strives to provide up-to-date and relevant information on environmental health and to build partnerships in the profession. In pursuit of these goals, we feature a column from the Environmental Health Services Branch (EHSB) of the Centers for Disease Control and Prevention (CDC) in every issue of the Journal.

In this column, EHSB and guest authors from across CDC will highlight a variety of concerns, opportunities, challenges, and successes that we all share in environmental public health.

EHSB's objective is to strengthen the role of state, local, and national environmental health programs and professionals to anticipate, identify, and respond to adverse environmental exposures and the consequences of these exposures for human health. The services being developed through EHSB include access to topical, relevant, and scientific information; consultation; and assistance to environmental health specialists, sanitarians, and environmental health professionals and practitioners.

Laura Green is a behavioral scientist with the Environmental Health Services Branch. She assists the branch's Environmental Health Specialist Network with the design and implementation of studies on restaurant workers' food safety knowledge, attitudes, and practices.

As a behavioral scientist working with environmental health (EH) programs on restaurant food safety projects, I am occasionally asked what behavioral science has to do with food safety. My answer is that restaurant food safety is very much dependent on human behavior. Indeed, research indicates that most food-service-establishment foodborne illness outbreaks can be attributed to food workers' improper food handling practices (Bryan, 1988). Thus, human behavior is an important component of restaurant food safety.

As such, behavioral science can be an important tool in EH programs' efforts to ensure that food workers handle food safely. In their development of food safety interventions, EH practitioners can use the substantial body of research on behavior change. Most food safety interventions provide knowledge to food workers with the expectation that workers will translate this knowledge into practice. Yet numerous studies on different types of behavior, including food safety, indicate that although knowledge may be a necessary component of behavior change, it is not always sufficient (Rennie, 1995). For example, Clayton, Griffith, Price and Peters (2002) found that 63% of food workers admitted they did not always carry out the food safety behaviors that they knew they should. In other studies, food workers reported engaging in food safety practices much more frequently than they were observed actually engaging in those practices (Manning & Snider, 1993; Oteri & Ekanem, 1989).

These findings are not surprising. Human behavior is complex, and multiple factors, not just knowledge, affect whether humans engage in any particular behavior. Several behavioral science theories have focused on identifying these factors, which include, in part, knowledge, attitudes, and beliefs about the behavior; intentions to engage in the behavior; perceived behavioral norms; and perceived barriers to engaging in the behavior (Ajzen, 1991; Glanz, Lewis, & Rimer, 2002; Triandis, 1980). Recently, several studies focused on identifying factors that affect whether food workers engage in specific food safety practices. For example, recent studies conducted by the Centers for Disease Control and Prevention's Environmental Health Services Branch have identified factors affecting food workers' implementation of cross-contamination prevention, proper hot and cold holding, and hand washing, among other safe food handling practices. For more information on these studies, visit www.cdc.gov/nceh/ehs/EHSNet/highlights.htm#Focus_Group_Study and www.cdc.gov/nceh/ehs/EHSNet/Docs/JFP_Food_Worker_Hand_Hygiene.pdf. The factors identified in one of those studies are listed in Table 1.

This behavioral science research highlights the need for food safety interventions that do more than provide food safety education. EH practitioners could respond to this need in several ways. They could

- encourage restaurant managers to engage in activities that address factors

TABLE 1

Factors Impacting Safe Food Preparation Practices Identified by Food Workers and Managers

Factor	Hand Washing	Cross-Contamination Prevention	Glove Use	Adequate Food Doneness	Proper Holding	Proper Cooling	Proper Reheating
Time pressure/high volume of business/staffing	✓	✓	✓	✓	✓	✓	✓
Structural environment, equipment, resources	✓	✓	✓	✓	✓	✓	✓
Management/coworker emphasis	✓	✓	✓		✓	✓	
Worker characteristics	✓		✓	✓	✓	✓	
Negative consequences	✓	✓	✓		✓		
Education and training	✓	✓			✓		✓
Restaurant procedures	✓			✓	✓		
Gloves and sanitizers	✓	✓					

Note. A check mark indicates that the factor was mentioned by participants in focus group discussions as something that impacted (either positively or negatively) their ability to engage in the practice. From "Factors impacting food workers' and managers' safe food preparation practices: A qualitative study," by L. Green & C. Selman, 2005, *Food Protection Trends* 25, p.983.

(other than knowledge) that impact safe food handling, such as modeling and supporting food safety and removing barriers to safe food handling, including inadequate staffing and inadequate equipment;
- conduct activities that would increase understanding of the factors that impact safe food handling in their jurisdiction; and
- develop and test strategies to address those factors, and incorporate successful strategies into their food safety activities.

Such activities should improve the effectiveness of food safety programs as well as contribute to our broader understanding of effective food safety strategies.

Another important behavioral science tool EH practitioners can use in their food safety efforts is the interview methods developed by behavioral scientists for gathering information from people about their behavior. Many EH activities—restaurant inspections, environmental assessments, and foodborne outbreak investigations—involve interviewing managers and workers about food handling practices, and there are often concerns about whether the information provided during these interviews is accurate. The use of behavioral science interviewing techniques can improve the quality of information collected in these situations.

In interviews, people are typically motivated to appear "good": to engage in socially desirable behavior, to be helpful to the interviewer, and to provide the information they think the interviewer wants. Their responses in interviews are biased by these motivations. Such biases may be particularly strong when there are potential negative consequences for "wrong" answers, such as during inspections or outbreaks investigations. The influence of these biases can be minimized, if not eliminated, by using the following techniques (Bradburn, Sudman, & Wansink, 2004; Frey & Oishi, 1995).
- Establish rapport with interviewees by using their names, engaging in small talk, and appearing attentive to what they have to say. These behaviors should increase interviewees' comfort and cooperation.
- Maintain neutrality and refrain from behaviors that communicate to interviewees what the "right" or "wrong" answers are. Such behaviors include interjecting opinions (e.g., "That's a good answer!"); verbally or nonverbally communicating feelings about what the interviewee is saying (e.g., frowning); and suggesting answers to questions when interviewees hesitate to answer (e.g., "To what temperature do you cook your chicken?...165 degrees?").
- Avoid questions that may suggest that one answer is preferable to another (e.g., "You washed your hands after you cut the meat, right?").
- When asking about desirable behaviors, avoid questions that assume the behavior, as those assumptions can suggest the "right" answer (e.g., "*How many* employees have received food safety training?" vs. "*Do any* employees receive any food safety training?").
- When asking questions about particularly undesirable behaviors, consider asking "loaded" questions, which increase the probability of obtaining accurate answers. Two ways to do this are 1) assume the behavior in the question (e.g., "*When* [as opposed to *if*] you are unable to wash your hands, what prevents you

from doing so?"), and 2) indicate in the question that the behavior is common (e.g., "We know that not even the best workers are able to check food temperatures every time they are supposed to—how often are you not able to check food temperatures?").

- Ask questions about particularly sensitive topics later in the interview. This technique gives interviewees time to get comfortable with the interviewer and may make the sensitive questions less salient.
- Explain the reason for the question. Helping interviewees understand the importance of accurate, honest information in solving the problem at hand will appeal to their desire to be helpful. (e.g., "I'm trying to learn how chicken is handled so that we can understand what happened and prevent it from happening again.").
- *If possible,* ensure confidentiality or anonymity. Interviewees are more likely to be honest if they know what they say will not be shared with others.

EH practitioners' application of behavioral science research and methods in their food safety activities should contribute to a better understanding of food handling practices, more effective food safety programs, and ultimately, safer restaurant food.

Corresponding Author: Laura R. Green, Ph.D., Centers for Disease Control and Prevention, National Center for Environmental Health, Environmental Health Services Branch, 4770 Buford Highway, MSF-60, Atlanta, GA 30341. Email: lrg0@cdc.gov.

References

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50,* 179–211.

Bradburn, N., Sudman, S., & Wansink, B. (2004). *Asking questions*. San Francisco: Jossey-Bass.

Bryan, F. (1988). Risks of practices, procedures, and processes that lead to outbreaks of foodborne diseases. *Journal of Food Protection, 51,* 663–673.

Clayton, D., Griffith, C., Price, P. & Peters, A. (2002). Food handlers' beliefs and self-reported practices. *International Journal of Environmental Health Research, 12,* 25–39.

Glanz, K., Rimer, B.K. & Lewis, F.M. (2002). *Health behavior and health education: Theory, research and practice*. San Francisco: Wiley & Sons.

Green, L., & Selman, C. (2005). Factors impacting food workers' and managers' safe food preparation practices: A qualitative study. *Food Protection Trends, 25,* 981–990.

Green, L., Radke, V., Mason, R., Bushnell, L., Reimann, D., Mack, J., Motsinger, M., Stigger, T., & Selman, C. (2007). Factors related to food worker hand hygiene practices. *Journal of Food Protection, 70,* 661–666.

Manning, C., & Snider, S. (1993). Temporary public eating places: Food safety knowledge, attitudes, and practices. *Journal of Environmental Health, 56,* 24–28.

Oteri, T., & Ekanem, E. (1989). Food hygiene behavior among hospital food handlers. *Public Health, 103,* 153–159.

Rennie, D. (1995). Health education models and food safety education. *Journal of Royal Society of Health, 115,* 75–79.

Triandis, H. (1980). *Values, attitudes, and interpersonal behavior*. In H. Howe & M. Page (Eds.), *Nebraska Symposium on Motivation* (pp. 195–259). Lincoln: University of Nebraska Press.

Advertisers Index