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Facilitators and Barriers to Conducting Environmental Assessments for Food Establishment Outbreaks, National Environmental Assessment Reporting System, 2014-2016

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Abstract

Environmental health specialists often perform environmental assessments (EAs) when a suspected or confirmed foodborne illness outbreak is linked to a food establishment. Information from EAs helps officials determine the cause of the outbreak and develop strategies to prevent future outbreaks; however, EAs are not always conducted. To determine facilitators and barriers to conducting EAs, we analyzed open-ended responses reported to the National Environmental Assessment Reporting System about these assessments. We found that EAs were conducted most often when illness was identified, a jurisdiction had a policy to investigate illnesses, and there were resources for such a response. EAs were not conducted in instances such as limited resources, insufficient training, uncooperative facility personnel, or if the establishment fell outside of health department jurisdiction. Identifying the facilitators and barriers to conducting EAs can enable health departments to develop strategies that improve their ability to conduct EAs.

Introduction

Foodborne illness is a significant public health problem in the U.S. (Angelo, Nisler, Hall, Brown, & Gould, 2017; Centers for Disease Control and Prevention [CDC], 2013; Gould et al., 2013; Scallan, Griffin, Angulo, Tauxe, & Hoekstra, 2011), resulting in approximately 48 million illnesses, more than 128,000 hospitalizations, and more than 3,000 deaths annually (Scallan, Hoekstra, et al., 2011). Some of these illnesses eventually are linked with outbreaks in retail food establishments (CDC, 2013; Gould et al., 2013), defined by the Food and Drug Administration as an “operation that stores, prepares, packages, serves, vends

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food directly to the consumer, or otherwise provides food for human consumption such as a restaurant" (U.S. Department of Health and Human Services, 2013). Annually, more than 800 foodborne illness outbreaks are reported to the Centers for Disease Control and Prevention (CDC) and most of these occur in restaurants (CDC, 2013; Gould et al., 2013). In 2016, public health agencies in all 50 states, the District of Columbia, and U.S. territories reported more than 800 foodborne illness outbreaks to CDC and 60% of single-setting outbreaks occurred in a restaurant (CDC, 2018a).

State and local public health departments typically are responsible for investigating restaurant-related outbreaks to 1) understand how and why the outbreak occurred, 2) implement immediate measures to stop the outbreak, and 3) develop long-term measures to prevent future outbreaks.

Environmental assessments (EAs), typically conducted by environmental health staff in public health departments once an outbreak is suspected or confirmed, are an important component of these investigations (Selman & Guzewich, 2014; CDC, 2018b). An EA is a system-based component of a foodborne illness outbreak investigation that fully describes how the environment contributed to the introduction and/or transmission of agents that cause illness. EAs are not the same as a routine inspection—a routine inspection addresses food safety concerns occurring at the time of the inspection.

EAs are designed to thoroughly describe the past environment that led to the outbreak and to identify contributing factors to the outbreak and its antecedents. EAs typically involve the investigator visiting the outbreak establishment and interviewing the manager about establishment characteristics (including food preparation policies and practices and employee practices) that could have contributed to the outbreak. These assessments also typically involve a review of the processes used in the production of food items suspected to be linked to the outbreak and observations of employee food preparation practices. Information collected through EAs is critical to outbreak prevention—it helps investigators determine the environmental factors that contributed to the outbreak, facilitates root cause analysis, and ultimately generates data that can prevent future outbreaks (Food and Drug Administration, 2018). EAs are not always conducted during outbreak investigations (Brown, Hoover, Selman, Coleman, & Schurz Rogers, 2017; Selman, 2010; Selman & Guzewich, 2014;) and the reasons why have not yet been fully explored.

The purpose of this study was to determine the situations and circumstances that facilitate or inhibit EAs during an outbreak investigation. We examined information provided by state and local environmental health staff who reported their outbreak investigation data to CDC's National Environmental Assessment Reporting System (NEARS) (CDC, 2018c). Understanding facilitators and barriers to EAs can help state and local health departments create a working environment that makes conducting an EA easier.

Methods

We used Creswell's phenomenology approach (Creswell, 1998) to describe the meaning of our respondents' firsthand experience with EAs—specifically, why they were or were

not able to conduct an EA for a given foodborne illness outbreak investigation. We used a grounded theory approach (Corbin & Strauss, 1990; Patton, 2001) to discover patterns and themes in the qualitative data using inductive reasoning. Grounded theory asserts that when in the exploratory phase of research, researchers should not begin analysis with preconceived notions of what they will find. Instead, researchers should recognize patterns and create themes and a set of codes "from the ground up" (Attride-Stirling, 2001). Our study was exploratory in nature; therefore, we created codes as commonalities in responses emerged.

Dataset

We used qualitative data reported to NEARS for the years 2014–2016 about why EAs were or were not conducted for the outbreaks reported to the system. NEARS is a surveillance system developed by CDC's National Center for Environmental Health to capture data from EAs conducted by state and local health departments during foodborne illness outbreak investigations.

State and local health department staff reporting data to NEARS were asked, "Were any environmental assessments conducted at food service establishments in your jurisdiction as part of the outbreak?" They were given the option to answer yes, no, or to skip the question. Respondents who answered yes were asked to briefly describe the reasons why EAs were conducted in their jurisdiction as part of this outbreak. Those who responded that they had not conducted an EA were asked why no EAs were conducted at food service establishments in their jurisdictions as part of the outbreak.

Open-ended responses to these questions about EAs were exported into Microsoft Word, and common words and ideas were identified and coded into basic, organizing, and global themes (Attride-Stirling, 2001). Two independent coders reviewed the raw text responses and created basic themes. The two coders then compared their basic themes and used new or adjusted themes to again review the raw text responses and apply the theme codes. The coders then explored the basic themes and developed organizing themes that were used to create global themes (Attride-Stirling, 2001). The global themes were compared between coders and finalized.

Results

Between 2014 and 2016, 403 foodborne illness outbreaks were reported to NEARS by 16 jurisdictions. Of those, 383 (95%) occurred in a single location and 20 (5%) occurred in multiple locations. A causative agent was identified in 310 (76.9%) outbreaks; norovirus was the most commonly identified agent (61.0%), followed by *Salmonella* (16.1%), *Clostridium perfringens* (5.5%), and *Campylobacter* (3.6%). Outbreaks occurred most often in restaurants (334 of 414 locations, 80.7%), followed by catering facilities (22 of 414 locations, 5.3%), and other facilities such as banquet halls, golf clubs, bakeries, and hotels (29 of 414 locations, 7.0%).

Facilitators to Environmental Assessments

In response to "Were any environmental assessments conducted at food service establishments in your jurisdiction as part of the outbreak?" 93.3% (376 of 403) responded that they had conducted an EA and 6.7% (27 of 403) responded that they had not conducted an EA. More than 60% (10 of 16) of the sites always conducted an EA, while most remaining sites completed an EA for more than 50% of the outbreaks reported to NEARS. All of the respondents provided a reason why they either did (n = 376) or did not (n = 27) conduct an EA as part of the outbreak response. All of the responses were examined to discover common themes describing the facilitators and barriers to conducting an EA. Four global themes emerged as to why an EA was conducted (Figure 1):

1. Respondents reported that they initiated an EA when there was known or suspected illness (79.3%, 298 of 376). All of these illnesses were identified through surveillance activities, customer complaints, or laboratory reports. Reports of using surveillance data to trigger an EA were mentioned frequently, as were reports of strong communication among the epidemiology, environmental health, and laboratory programs within the health department. This communication included sharing laboratory reports of confirmed illness with environmental health specialists by colleagues in the epidemiology department or directly by laboratorians.

   The three-legged stool approach (epidemiology, environmental health, and laboratory) to investigating outbreaks helps identify potential sources faster, stopping the outbreak and preventing future outbreaks. The use of a formal complaint identification system at the health department was a common way a health department learned about illnesses or about customer observations of food mishandling during preparation or service. Respondents also mentioned learning about illnesses on crowd-sourced reviews about local businesses, which resulted in the health department conducting an EA.

2. Respondents reported that they usually conducted an EA as part of an outbreak investigation in collaboration with epidemiologists and laboratorians (32.2%, 121 of 376). Respondents reported that their goal in the investigation was to conduct a root cause analysis using epidemiology, environmental health, and laboratory data.

3. An EA was conducted when there was a health department policy to do so (10.9%, 41 of 376). Health department policies included case count thresholds to clearly define an outbreak, described the health department's jurisdiction, and established when the health department would respond, which occasionally included direct requests from health department colleagues for an EA.

4. An EA was conducted as part of an overall prevention strategy that included surveillance monitoring and tracking (6.9%, 26 of 376). The long-term goal of environmental health specialists is to prevent future outbreaks by creating strong public health recommendations based on lessons learned during EAs.

Barriers to Environmental Assessments

Three global themes emerged about why an EA as defined by NEARS was not conducted (Figure 2):

1. A policy in place regarding regulatory authority prevented the health department from responding (70.4%, 19 of 27). For example, some respondents noted that the outbreak occurred at a facility outside of the health department's jurisdiction. In some cases, the investigation was handed off to the entity with jurisdiction (e.g., another health department or agency such as the state's Department of Agriculture). In other cases, the food preparation facility fell outside of legal jurisdiction (e.g., home kitchens). Other respondents noted that they conducted a routine inspection rather than an EA.

2. Logistical problems prevented the health department from responding (25.9%, 7 of 27). Several respondents noted a lack of resources within their department at the time of the outbreak, resulting in an inability to conduct an EA. In these situations, more focus was placed on taking immediate measures to stop the outbreak and less of a focus was placed on identifying long-term measures to prevent future outbreaks. Respondents also mentioned that a lack of training on how to conduct an EA prevented them from conducting an EA.

3. Human factors prevented a response or prevented an effective response (18.1%, 5 of 27). Human factors included a communication breakdown between colleagues within the health department; delays in learning about an outbreak; an uncooperative facility; uncooperative patrons to a facility; or fear of creating conflict due to other factors such as religious practices, cultural differences, or a facility's volunteer staff.

Discussion and Conclusion

There were several common themes among those who did or did not conduct an EA. Both groups of respondents mentioned the importance of health department policies in helping them determine when an EA should be conducted. Strong policies supporting the importance of EAs and outlining when and how to conduct them are vital for future outbreak investigations. Both groups also mentioned communications within their health department as either a facilitator or barrier to conducting an EA, and this aspect supports findings from previous research (Brown et al., 2017; Selman & Green, 2008;). Well-established routes of communication within a health department during an outbreak help facilitate information sharing at all stages of the investigation, from first learning that there is an outbreak through all steps of the investigation and final reporting. The decision to conduct an EA appears heavily dependent on a health department's ability to conduct the response either in terms of available resources, logistics, or competing priorities at the time of an illness report or outbreak.

Human factors that prevented environmental health specialists from conducting an EA can present the greatest challenge. It is crucial to have a well-trained environmental health specialist to conduct an effective EA. While some environmental health specialists rely on

on-the-job training or learning from a colleague, a standard approach to training is key to teaching the skills needed to identify outbreak environmental factors and antecedents and then crafting appropriate control measures and outbreak prevention recommendations. CDC's online training resource, the Environmental Assessment Training Series (EATS), can bridge this training gap (www.cdc.gov/nceh/ehs/elearn/ea_fio/index. htm). Other human factors such as building relationships, navigating sensitive cultural situations, and dealing with uncooperative facility managers are certainly challenging during an outbreak investigation and can stall an otherwise successful investigation.

CDC's Integrated Food Safety Centers of Excellence (CoE) provides information to help during an especially difficult interview or interaction. Six state health departments and affiliated university partners in Colorado, Florida, Minnesota, New York, Oregon, and Tennessee have been designated as a CoE. Each CoE has its own website containing resources. A unified website contains information and resources on topics including complaint investigation, interviews and questionnaires, and environmental assessments (www.coefoodsafetytools.org). Resources include a cultural food safety application, restaurant questionnaires based on food ethnicity, and training videos including tips for dealing with difficult interviewees. These and other resources can help with difficulties that arise because of human factors in an investigation.

The concepts and approaches presented in the above resources are not limited to use during outbreaks. For example, interviewing managers about their specific policies and procedures and creating a food flow diagram within a facility in the absence of an outbreak can reveal system weaknesses and lead to recommendations that prevent an outbreak from occurring. Additionally, practicing these skills on a more routine basis can help the environmental health workforce maintain their skills. As the workforce uses these skills more regularly, operators of retail food establishments also become more familiar and comfortable with more-detailed inquiries, so if an outbreak occurs, they might be more open to answering questions during the investigation. This approach would likely be more resource-intensive and its success would depend on a health department's ability to conduct such routine inspections.

Qualitative data analysis on what helps and hinders environmental health specialists when conducting an EA can be useful in devising strategies to facilitate EAs in common practice. Care should be taken, however, when interpreting this study's results. These data are qualitative and reflect the experiences of those who provided the information, so these results are not generalizable to a wider population. Additionally, some responses were brief and might not have provided enough information to fully understand why an EA was not conducted.

For example, some respondents reported that they conducted a routine "inspection only" without a reason why that decision was made. It is possible that the environmental health specialist did not have enough information, such as a suspected or confirmed causative agent or list of foods consumed, to do an EA. This approach could be due to the timing of the facility visit (i.e., early in the investigation) or due to a communication breakdown between the environmental health and epidemiology departments, each requiring a different

solution (e.g., conduct an EA when more information is gathered or create a chain of communication for outbreak-related information within the health department during an outbreak investigation). Finally NEARS participation is not mandatory and not all outbreaks are reported to NEARS. Therefore, the data in this study likely underreport the number of outbreaks in which no EA was conducted and do not include the reasons why those EAs did not occur. This study's results can provide a foundation for future research and help health departments determine strategies to improve the frequency and effectiveness of EAs when outbreaks occur in their jurisdictions.

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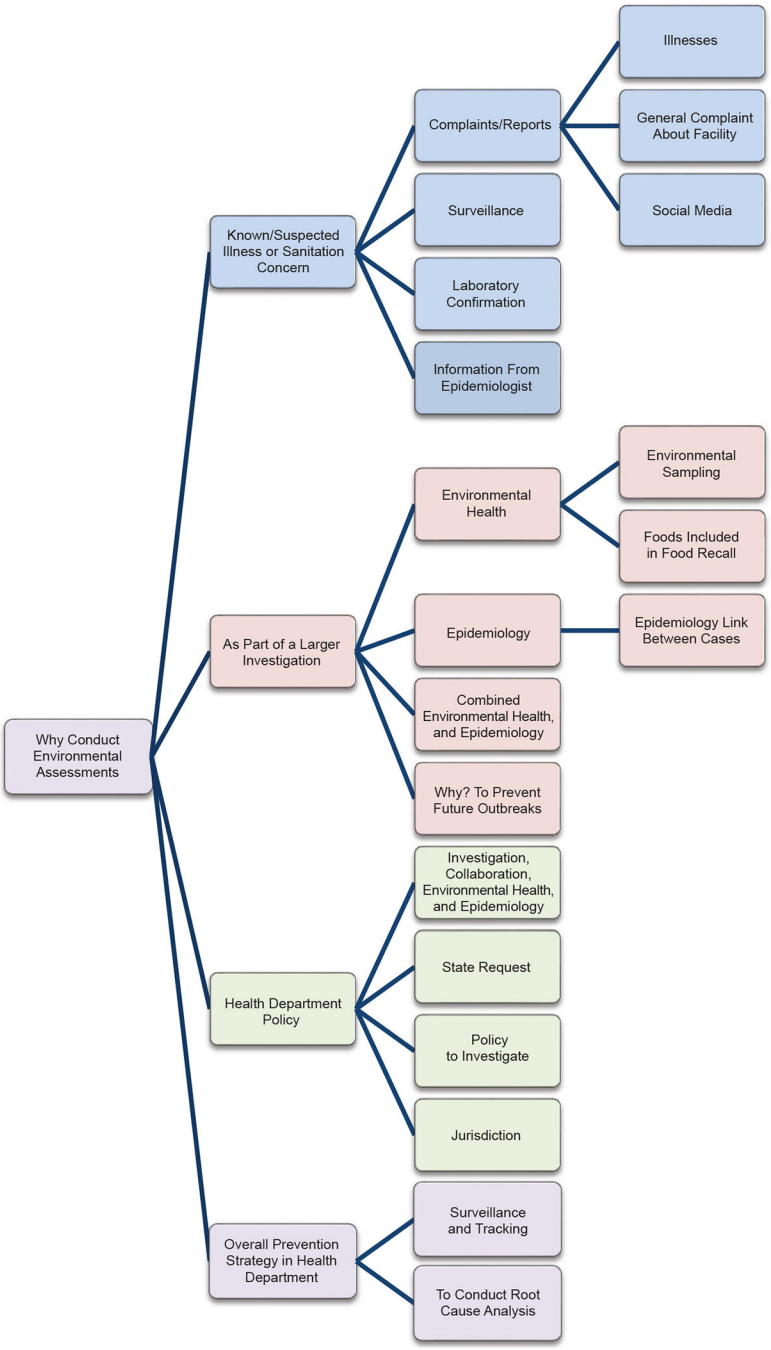

FIGURE 1.

Facilitators to Conducting Environmental Assessments, National Environmental Assessment Reporting System, 2014–2016

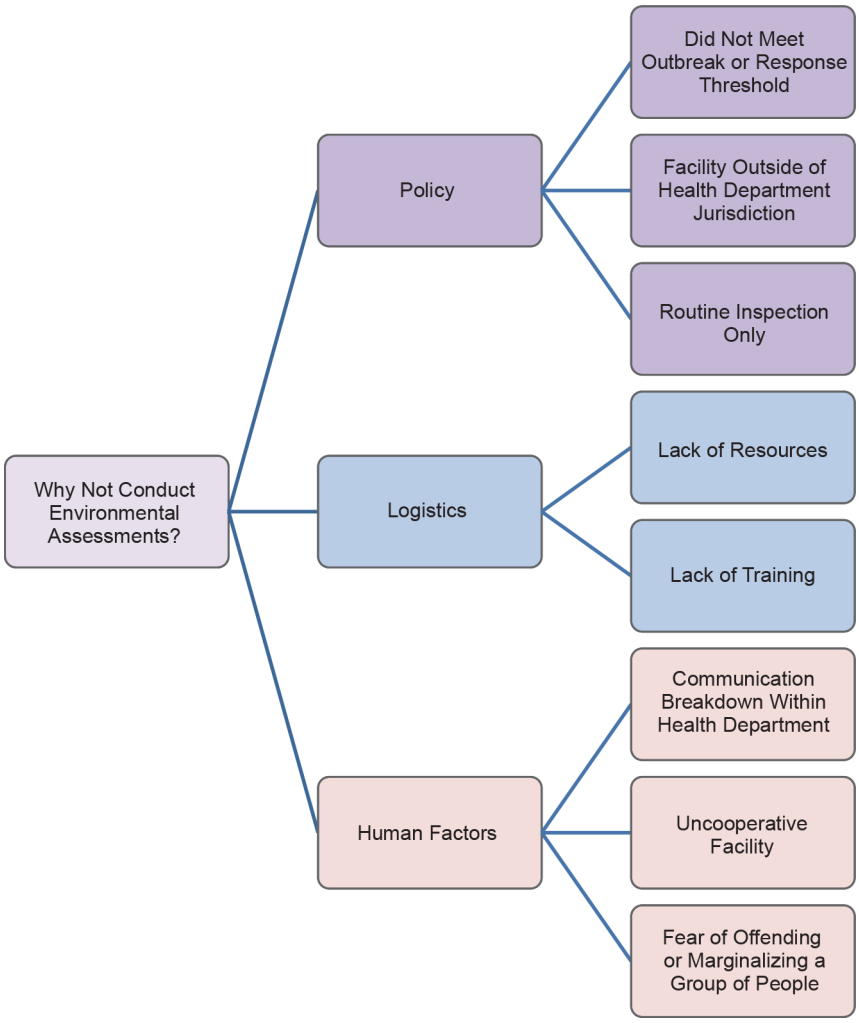

FIGURE 2.

Barriers to Conducting Environmental Assessments, National Environmental Assessment Reporting System, 2014–2016