



**CSTE**

COUNCIL OF STATE AND  
TERRITORIAL EPIDEMIOLOGISTS

# **Non-Infectious Foodborne Disease Outbreak Response Assessment**

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## **Summary Report**

October 2025

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## EXECUTIVE SUMMARY

In 2025, the Council of State and Territorial Epidemiologists (CSTE) worked with the Colorado Integrated Food Safety Center of Excellence (CO Food Safety CoE) at the Colorado School of Public Health to develop a mixed-methods, national assessment on non-infectious foodborne outbreak (NIFO) response. CSTE convened a NIFO Workgroup of investigators and other public health partners from state and local public health agencies. The group guided the development and dissemination of the assessment. Partners at the Centers for Disease Control and Prevention (CDC) provided subject matter expertise and insights. The goals of the assessment were to evaluate the capacity, barriers, and resource needs for NIFO response at state and territorial public health agencies. **This report summarizes the quantitative and qualitative feedback from state and territorial public health agencies on the challenges and opportunities related to NIFOs.**

An online assessment was piloted and launched in June 2025. Data collection occurred June-July 2025. The assessment included a combination of closed-ended, Likert scale, rank, and open-ended responses. The intended audience for the assessment included programs at public health agencies that would be involved in NIFO response. The programs included but were not limited to environmental health, foodborne epidemiology, and toxicology. The work group collected 84 complete responses to the online assessment. Responses came from 45 states and one US territory.

The CO Food Safety CoE used preliminary findings from the assessment to develop a semi-structured focus group interview guide to further explore, contextualize, and expand upon quantitative results. Focus group participants were recruited from online assessment respondents. Focus groups were conducted in June-August 2025. 22 participants, representing 16 states, participated in four focus group sessions.

Based on the online assessment and focus group feedback, respondents were confident in their own program's ability to respond to NIFOs; however, they identified important system-level barriers. Some of the barriers included ambiguity around state and national leadership roles, major delays in national coordination, a lack of data sharing platforms and agreements, and delayed regulatory enforcement. Given the

infrequency of NIFOs and the large number of highly diverse and variable potential contaminants, resources need to be flexible, easy to access, and adaptable for just-in-time use. Future protocols and resources should be developed in collaboration with state partners, federal agencies, and national organizations. The future collaborations should include the Council to Improve Foodborne Outbreak Response (CIFOR) and the Integrated Food Safety Centers of Excellence.

Based on the 2025 assessment, CSTE recommends state and territorial public health agencies

- Identify state-specific protocols for collaboration and leadership;
- Develop and update internal and external contact lists;
- Build strong partnerships with poison control centers and other external agencies;
- Establish formal and informal data sharing agreements; and
- Develop protocols for unregulated products.

For a coordinated public health response, CSTE recommends agencies

- Develop just-in-time trainings and resources for public health professionals investigating NIFOs;
- Develop protocols for national coordination of multi-jurisdictional NIFOs and outbreaks of unknown etiology;
- Improve the timeliness of NIFO investigations by rapidly developing national case definitions, standardized outbreak questionnaires, and recommended control measures;
- Expand partnerships between national organizations and agencies; and
- Improve data standardization and platform interoperability.

Respondents increasingly recognized NIFOs as an emerging public health concern with the potential to cause widespread illnesses. More than half of respondents were concerned that staffing reductions would affect their overall ability to respond to NIFOs (62%), including investigation delays and loss of staff with expertise.

## BACKGROUND

Non-infectious foodborne outbreaks (NIFOs) are an underrecognized but significant cause of illness in the United States (Kai Yee Law et al. 2019, Troeschel et al. 2025, Walker et al., 2025, FDA 2024). NIFOs occur when chemical, physical, or other non-biological agents contaminate the food supply, mostly resulting in acute illnesses. A recent report highlighted NIFOs as an emerging public health concern, with outbreaks linked to environmental changes, shifting dietary trends, novel food technologies, and regulatory changes (Georganas et al. 2024).

Foodborne outbreak investigations are typically led by state, tribal, local, and territorial (STLT) public health agencies, in collaboration with environmental health agencies, regulators, and federal partners. Collaborators include the Centers for Disease Control and Prevention (CDC), the Food and Drug Administration (FDA), and the US Department of Agriculture's Food Safety Inspection Service (USDA FSIS). Federal partnerships may depend on the suspect agent; for example, for seafood-related NIFOs involving marine toxins and harmful algal blooms, the National Oceanic and Atmospheric Administration (NOAA) and the Environmental Protection Agency (EPA) may serve as additional federal partners.

Foodborne outbreaks caused by non-infectious contaminants can be particularly complex because they require coordination across diverse public health programs and agencies (e.g., epidemiology, foodborne disease, environmental health, toxicology, laboratories, law enforcement). Multidisciplinary investigations with non-traditional outbreak partners can face communication barriers, unclear legal authority, and differences in investigation methods. These complicating factors can lead to delays in implementing interventions. The range of non-infectious agents further complicates rapid detection and response. These include naturally occurring toxins, heavy metals, chemicals, allergens, and regulated or unregulated psychoactive substances.

Recent multistate investigations looked at lead and chromium contamination in applesauce (Troeschel et al. 2025), adverse events linked to Diamond Shroomz™ products (Walker et al. 2025, FDA 2024), and chemical contaminants in plant-based

lentil crumbles (Firestone et al. 2025, FDA 2022). These investigations underscore the need for improved planning and investigation protocols and have highlighted persistent challenges arising from the absence of clear NIFO guidelines and the need for a national data-sharing platform for outbreaks linked to unknown or non-infectious contaminants. Although these recent investigations have increased attention around NIFOs, such outbreaks are not new. Historical investigations demonstrate the wide range of etiologic agents and the complexity of coordinating public health responses (Table A1).

In response to these ongoing challenges, and in the absence of prior work systematically evaluating NIFO capacity, the Council of State and Territorial Epidemiologists (CSTE) convened a NIFO Workgroup. In Spring 2025, CSTE released a request for proposals to conduct a national assessment. The Colorado Integrated Food Safety Center of Excellence (CO Food Safety CoE)\* was selected as the collaborating consultant. The goals of the assessment were to evaluate the current capacity, barriers, and resource needs for NIFOs at state and territorial public health agencies.

\*The Food Safety Centers of Excellence (Food Safety CoEs) were established in 2012 under the Food Safety Modernization Act. They partner with STLT public health agencies regionally and nationally to improve foodborne disease detection and investigation (White et al. 2022).



# METHODS

## Summary

A mixed methods evaluation of non-infectious foodborne outbreak (NIFO) practices among state and territorial public health agencies was conducted from June to August 2025. Data collection included an online assessment with closed- and open-ended questions and separate focus groups.

NIFOs were defined as an outbreak caused by consuming a food or drink contaminated or adulterated by a non-infectious or unknown agent that may cause illness. Agents can include, but are not limited to, chemicals, food additives, fish and shellfish toxins, mushroom toxins, cannabis, pharmaceuticals, pesticides, metals, and any other unregulated substance. In contrast, infectious foodborne diseases are caused by bacteria, viruses, or parasites. Infectious foodborne diseases are contagious. Non-infectious foodborne illnesses are not contagious and cannot be spread from person to person.

## Online Assessment

### *Development*

An environmental scan and key informant interviews were conducted in May 2025. The scan and interviews informed the development of the assessment tool.

The environmental scan included a review of the peer-reviewed literature (see Appendix D, Table D1), documentation from recent NIFOs (published reports, questionnaires, hotwash summaries), and publicly available guidelines. Semi-structured key informant interviews were conducted by a single interviewer using a flexible, discussion-based approach (Appendix A). Key informants were selected from pre-established contacts who had prior experience and expertise with NIFOs. Additional insights and feedback were collected and summarized through discussions with the CSTE NIFO Workgroup, CSTE, and CDC.

The assessment tool was developed by the consultant team in collaboration with CSTE staff and the NIFO Workgroup. The work group was comprised of STLT public health professionals who were active in recent NIFO response activities and had an interest in continuing the conversation on how health departments can learn from those recent responses. The assessment was developed in Qualtrics and included up to 24 questions, incorporating skip logic to tailor questions based on respondent input.

Questions covered program background; program capacity; perceived barriers to communication and leadership, outbreak detection and case finding, data collection, data sharing, and control measures; and resources related to NIFO response.

Questions included a combination of closed-ended, Likert scale, rank, and open-ended responses (Appendix B). Likert scale questions for perceived barriers included the following response options and embedded definitions: *Not a challenge* (easily completed with existing staff and protocols); *Minor challenge* (requires some extra effort but does not affect the investigation); *Moderate challenge* (requires extra effort and may delay parts of the investigation); *Major challenge* (demands significant effort, causing delays or gaps in the investigation); *Extreme challenge* (very difficult or impossible – the investigation is severely impacted); *Not applicable for my program*.

Assessment tool drafts were reviewed by the NIFO Workgroup, CSTE leadership, and CDC staff between May 30 and June 3, 2025. The assessment was piloted by 22 NIFO Workgroup members prior to the official launch on June 4, 2025. Assessment responses were collected through August 1, 2025.

### ***Dissemination***

The intended respondents for the assessment included program staff who would lead or be involved in NIFO response in their jurisdiction. Respondents were asked to coordinate with their team and submit one response per program. If multiple programs in one agency were likely to be involved in an investigation, separate responses were encouraged for each program. Responses from state and territorial agencies were included. Responses from local public health agencies were excluded because the assessment was not widely disseminated to these agencies. Therefore, the results would not be representative. While responses from federal partners would have been

eligible for inclusion, we did not directly disseminate or solicit responses from federal partners and did not receive any responses.

The assessment was distributed via the Integrated Food Safety Centers of Excellence regional network. Specifically, it was shared with state-level foodborne partners, members of the CSTE Environmental Epidemiology Subcommittee, state environmental health directors, NIFO Workgroup members, CSTE annual conference attendees, and the Council to Improve Foodborne Outbreak Response (CIFOR) listserv members. To maximize participation, targeted follow-up communications were sent to states with missing responses two weeks before the assessment closed.

### ***Analysis***

Incomplete responses are defined as responses with less than 70% of assessment questions completed. Incomplete responses were excluded from analysis. Quantitative data from the online assessment were analyzed using descriptive statistics in SAS version 9.4. Frequencies and proportions were used to describe respondent characteristics, program capacity, perceived barriers, and resource needs. All responses from the eight open-ended questions were reviewed and descriptively coded by one consultant team member. Responses were iteratively compared within each question to identify recurring concepts. Then, the responses were grouped into broader parent categories. The resulting codes were quantitatively summarized.

The quantitative data were stratified into three categories that reflected the outbreak-related experience of the respondent's program area(s): (1) infectious disease outbreak programs like foodborne disease, other infectious diseases, or cross-cutting outbreak teams; (2) non-outbreak programs like environmental health, environmental epidemiology, toxicology/hazard assessment, laboratory, or substance use; and (3) multidisciplinary programs, specifically programs spanning three or more areas or with overlap between outbreak and non-outbreak programs.

### **Focus Groups**

### ***Objective***

The focus groups were held to build on the quantitative findings and to explore state-level public health practices and recommendations aimed at strengthening NIFO detection and response. By engaging professionals across disciplines and areas of subject matter expertise, the discussions aimed to generate forward-looking strategies and identify potential best practices for future outbreak response.

### ***Format***

A semi-structured focus group interview guide was developed by the consultant team with input from CSTE program staff (Appendix C). Questions covered data sharing preferences and barriers, leadership guidance recommendations, timeliness challenges, expertise, and resources. While participants were encouraged to draw from their experiences investigating NIFOs, the discussion was future oriented.

Four one-hour focus groups were conducted between June 25, 2025, and August 15, 2025. All focus groups were conducted using Zoom teleconferencing software version 6.4.12. Each session began with a standardized introduction and an opt-out consent option for those who did not wish to be recorded. All sessions were recorded. Zoom's built-in transcription software was used to create transcripts for each discussion.

### ***Participation and Recruitment***

As part of the online assessment, respondents were asked whether they, or someone in their program, would be interested in participating in a focus group. Email addresses were collected from those who expressed interest. Focus group participants were recruited via email on a rolling basis.

In the first recruitment wave, two focus groups were scheduled based on overlapping availability identified via a Doodle scheduling poll. Each focus group aimed to include 5 to 8 participants. Efforts were made to ensure multidisciplinary representation and geographic diversity across participating states. The first two focus groups were intentionally scheduled to include representation from environmental health professionals.

As online assessment data collection continued, a second round of emails was distributed to both those who had not been scheduled in the first round (due to scheduling conflicts) and new respondents identified from the latest assessment responses. The second round followed the same scheduling process, with a focus on assembling a diverse and multidisciplinary group.

To ensure toxicology perspectives were included, purposive sampling was used for the fourth and final focus group. Assessment respondents who indicated their program included toxicologists were emailed directly and asked to forward the request to relevant staff. In addition, foodborne epidemiologists who had to cancel their previously scheduled sessions were invited to participate. As with earlier groups, the focus group was scheduled to ensure sufficient participants and multidisciplinary representation.

## ***Analysis***

### **Transcript Review and Preparation**

All transcripts were reviewed for accuracy and cleaned to ensure clarity. At the beginning of each focus group, participants were encouraged to vocalize their agreement and reactions rather than using Zoom's chat feature. This guidance was intended to ensure that all sentiments were accurately captured in the audio recordings and resulting transcripts. Participants adhered to this request, avoiding the need to merge the chat and recording transcripts.

To protect participant privacy, names and identifying details were omitted during analysis, and each participant was assigned a random identification number. References to jurisdictions were anonymized.

### **Coding and Categorization**

Two project team members (KH, AW) independently reviewed and descriptively coded the first three focus group transcripts. Each coder then organized their codes into parent categories. Upon completion, the coders compared their assigned codes to identify areas of overlap and divergence. The coding framework was then refined through an iterative process to ensure that the final codes accurately captured the sentiments identified by both reviewers and reflected an understanding of the shared experiences

and opinions of participants. Codes were then applied to the final focus group transcripts. The coded content from all transcripts was then consolidated and organized under the *a priori* topic areas used in the assessment. The coders made minor adjustments to headings to reflect the broader topic areas represented by the qualitative and quantitative data. These were subsequently presented as findings under the following topic summaries: Program Capacity and Subject Matter Expertise, Communication, Collaboration and Leadership, Outbreak Detection and Case Finding, Data Platforms and Sharing, Data Collection, Control Measures, and Resources.

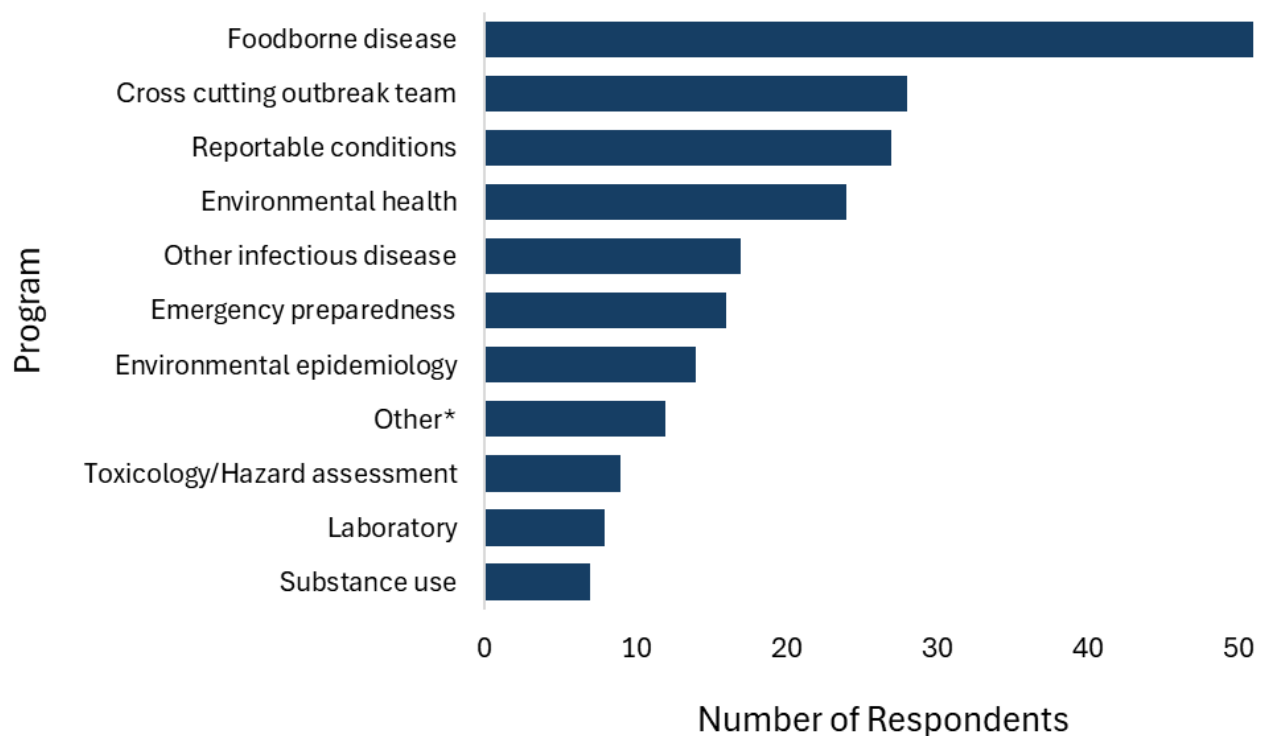
For brevity, a single quote was selected to illustrate each sentiment. In most cases, these sentiments were supported by multiple participants across several focus groups. When a sentiment was expressed by just one individual or within one group, this was noted in the text.

# RESULTS

## Respondents

There were 84 completed responses to the online assessment. Responses came from 45 states and one US territory. The number of complete responses per state ranged from 1-4 (median 1.5). The most frequent program area represented was foodborne disease (n=51), followed by cross-cutting outbreak team (n=28), and reportable conditions (n=27) (Figure 1). Because respondents could select more than one category, a single response may include multiple program areas. Half (49%) of respondents worked in program areas that routinely investigate outbreaks, 26% were from non-outbreak program areas, and 25% of respondents represented multidisciplinary programs.

**Figure 1.** Respondent program area (*select all that apply*) (n=84 respondents)



\*Other programs included: Childhood Lead Poisoning Prevention Program, FDA Funded Rapid Response Team, Foodborne and Waterborne Disease Epidemiology, Rapid Response Team, Non-Infectious Disease

Across 4 focus groups, there were a total of 22 participants representing 16 states. Focus groups lasted between 50 and 52 minutes (median 51 minutes). Focus group participants represented the following disciplines: infectious disease (n=13, 59%); environmental health (n=4, 18%); toxicology (n= 2, 9%); laboratory (n=1, 5%); informatics (n=1, 5%); and emergency preparedness (n=1, 5%). Attendance ranged from 3 to 8 participants per focus group (median 5.5).

## **Program Capacity & Subject Matter Expertise**

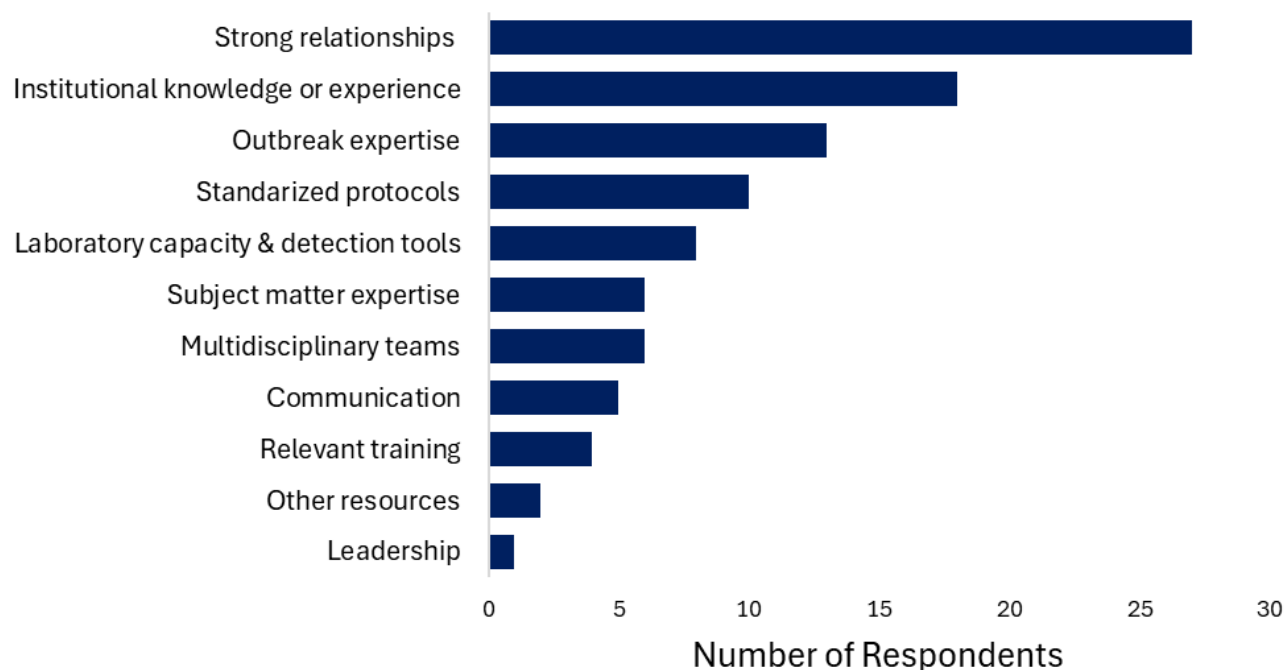
### ***Online Assessment Findings***

Respondents reported their program was *Very Confident* (14%), *Confident* (45%), *Neutral* (23%), or *Not Very Confident* (18%) in responding to NIFOs. No respondents reported that their program was *Not at all Confident*. Respondents in multidisciplinary programs were the most confident in responding to a NIFO (72% *Very Confident/Confident*), followed by those in outbreak programs (56%), and then those in non-outbreak programs (55%).

In an open-text question, 54% of respondents who reported feeling *Very Confident* or *Confident* cited that pre-established, collaborative relationships with other programs within their agency (e.g., toxicology, epidemiology, laboratory, environmental health, rapid response teams) and with external agencies (e.g., federal agencies, law enforcement, regulators, poison control center, local public health, department of agriculture) contributed to their programs' confidence. Other key factors included having institutional knowledge or experience with non-infectious or infectious agents (36%), general outbreak expertise (26%), standardized protocols (20%), laboratory capacity and detection tools (16%), subject matter expertise (12%), a multidisciplinary team (12%), excellent communication with partners (10%), relevant training (8%), additional resources (4%), and strong leadership (2%) (Figure 2).

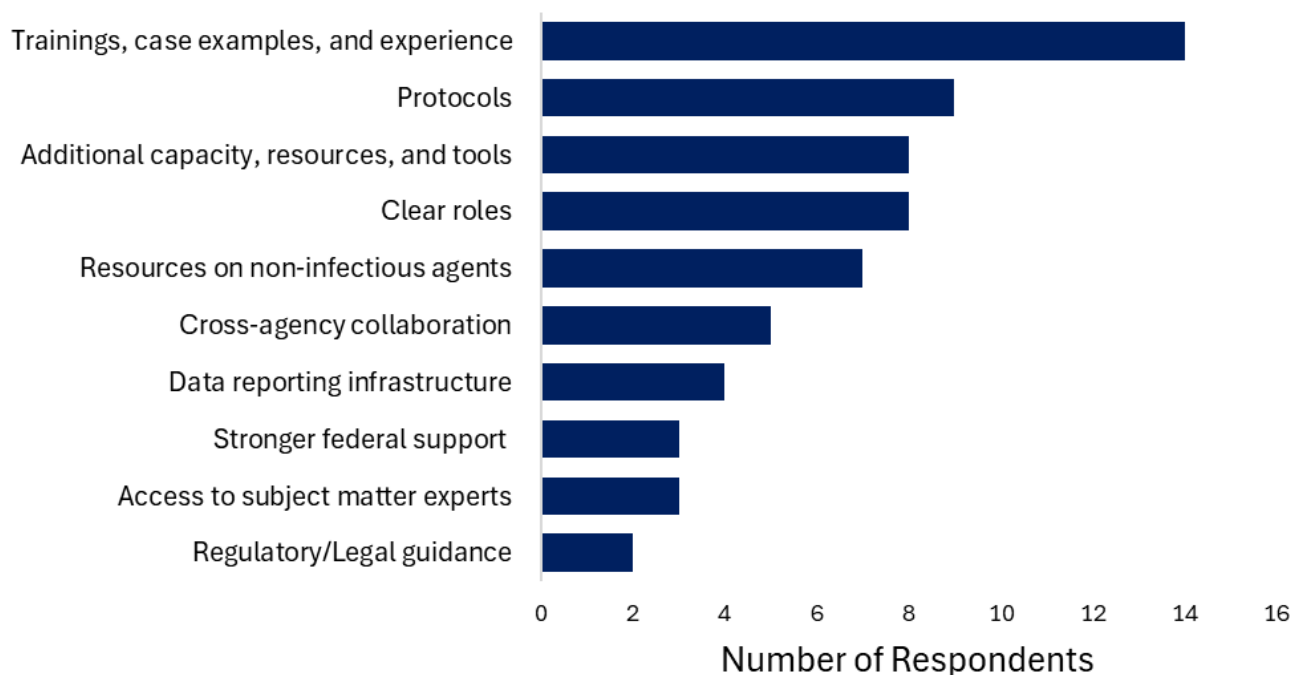


**Figure 2.** Factors contributing to programs' ability to respond to NIFOs, based on coded open-text responses (n=50 respondents)



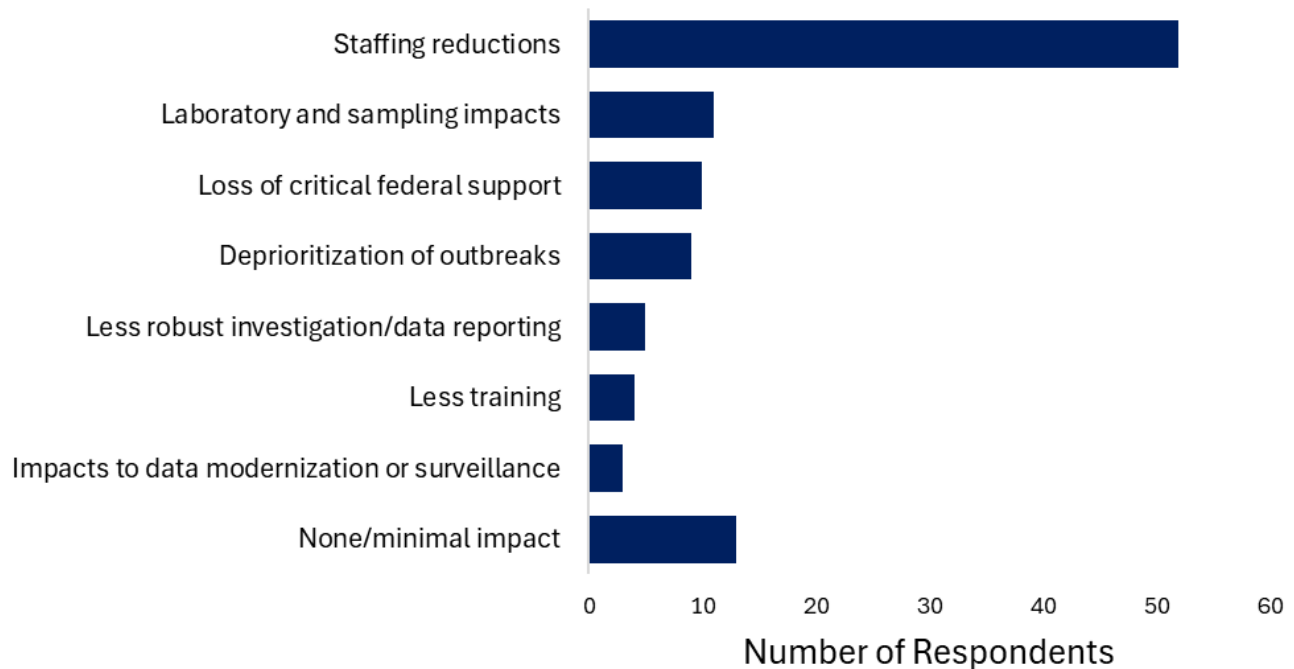
Among respondents who indicated *Neutral* or *Not Very Confident* levels of confidence, 41% identified training, case examples, and experience as factors that would improve their program's ability to respond to NIFOs. Examples of these included tabletops, specific training on non-infectious foodborne agents, general training on outbreak investigation and interviewing, asynchronous online training, and webinars. Other improvements mentioned included having protocols (27%), additional capacity, resources, or tools (24%), clearer roles and responsibilities (24%), specialized training or resources on non-infectious agents (21%), better cross-agency collaboration (15%), a data reporting infrastructure (12%), access to subject matter experts (9%), stronger federal coordination and support (9%), and regulatory or legal guidance (6%) (Figure 3).

**Figure 3.** Factors that would improve programs' ability to respond to NIFOs based on coded open-text responses (n=34 respondents)



Respondents were asked an open-text question about the impacts of proposed federal public health funding reductions on their program's ability to investigate NIFOs. More than half of respondents were concerned that staffing reductions would affect their overall ability to respond to NIFOs (62%), including investigation delays and loss of staff with expertise. A minority anticipated minimal impacts as their programs were already operating under no or minimal federal funds (16%). Some mentioned that they anticipated laboratory and sampling impacts (13%), loss of critical support and expertise at the federal level (12%), de-prioritization of NIFOs compared to infectious outbreaks (11%), less robust investigation and data reporting activities (6%), fewer training opportunities or capacity to attend trainings (5%), and impacts to current data modernization or surveillance efforts (4%) (Figure 4).

**Figure 4.** Impacts from federal funding reductions on programs' abilities to investigate NIFOs based on coded open-text responses (n=84 respondents)



### ***Focus Group Findings***

Focus group participants emphasized that NIFO response capacity is often limited, highly variable, and relies on others who must be pulled in on an as-needed basis. In many instances, available individuals may not have the specific expertise or skills required, particularly in areas like toxicology, and must be provided with substantial background and guidance.

“...[I]t was like, okay, who is actually capable of doing this [outbreak investigation], and has any time to devote to it.” ~Participant 18, Focus Group 1

This expertise may also include a need for federal partners to weigh in, and their understanding of this role is particularly important.

“CDC...different offshoots of the CDC have been very...helpful in these types of scenarios...They're usually willing to jump in... I think... the flip side, other agencies [...] have not been as helpful in the past ... when states are reaching out to them, or other experts are reaching out to them, it's because we've kind of exhausted our other options, and we're trying to think of other things that are

going on... and so it's not... like, pointing us to what's existing, like, on your website, it's not...helpful. It's more that we're reaching out because we're trying to brainstorm, think about different things, like, try to figure out what we're missing, or is there something else we could be doing? I think it's something that... does not seem to be understood well throughout all of national agencies.” ~Participant 11, Focus Group 4

Participants noted that smaller agencies require external support, and that even when subject matter expertise exists within a program or agency, those individuals may be stretched across multiple responsibilities, reducing their functional availability.

“We have a toxicologist, too. We're lucky that she is embedded in our branch. But I will say she is also being pulled [in] a thousand different directions any given day on anything that's not related to a non-infectious outbreak.” ~Participant 4, Focus Group 2

Capacity challenges are exacerbated by the infrequency of NIFOs, making it difficult to sustain trained staff and institutional knowledge over time, particularly given high staff attrition rates.

“The problem I see with that is that [non-infectious disease outbreaks are] so infrequent ... that you do that training, and then, 5 years later, then you need it [the training], and those people are gone now.” ~Participant 10, Focus Group 2

As resources shift and agencies reorganize, the ability to call on trusted groups or supplement response capacity also changes, presenting an ongoing challenge for public health agencies. While some participants noted they currently have sufficient capacity, they expressed concern about sustainability over time.

“And we also don't have a lot of experience with outbreaks themselves. So, then we would probably pull in... our rapid response team, but they're no longer within the agency...so then we would pivot...” ~Participant 15, Focus Group 1

One jurisdiction noted that the current lack of capacity and unfunded expectations means that even for in-place policies and regulations, action is not always taken.

“We...struggle a lot... [with] unfunded mandates, where we are told to do something, but are given no resources to do it, and I'll say, at least in our decentralized model for our counties, they just won't do it. They're just like, we don't have resources to do this, like, we...don't... we're not getting paid to do this, we're not doing this, like, and there's nobody to go out there and make them do

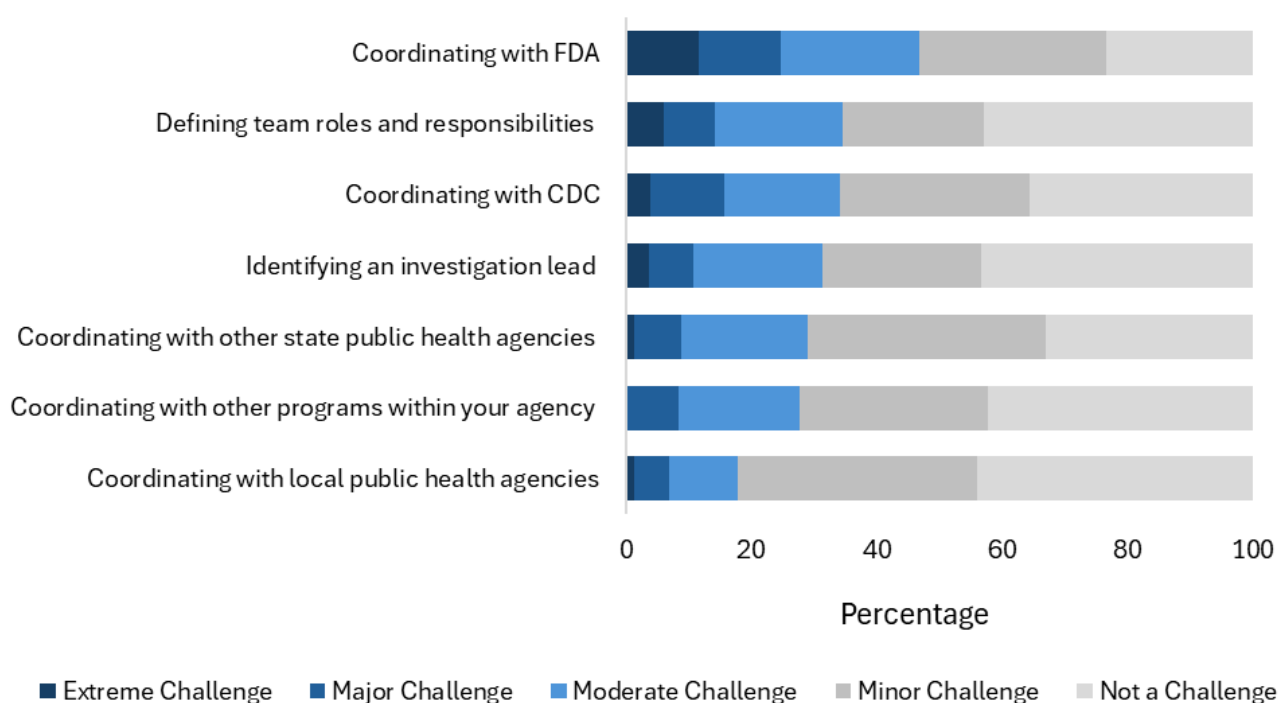
it. Like, sure, the rule says it, but nobody's coming out to enforce it, so they're still just not gonna do it. ..." ~Participant 11, Focus Group 4

## Communication, Collaboration & Leadership

### Online Assessment Findings

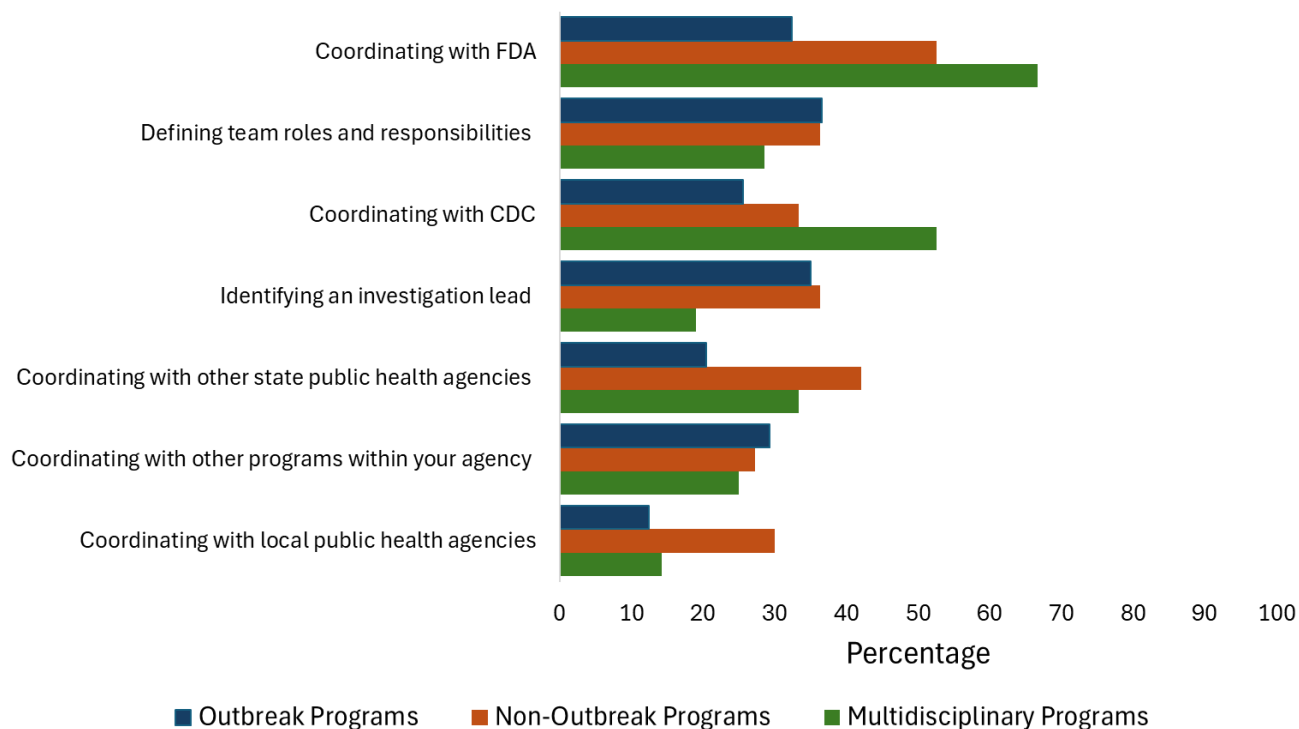
Respondents to the online assessment reported coordinating with FDA as the most significant challenge related to communication, collaboration, and leadership (47% selected as extreme/major/moderate challenge). They also reported defining team roles and responsibilities (35%) and coordinating with CDC (34%) as significant challenges. Coordinating within agencies or with local public health agencies was less challenging (Figure 5). Multidisciplinary programs reported the greatest challenges in coordinating with federal agencies (FDA and CDC), while non-outbreak programs had the greatest challenges in coordinating with FDA and other state public health agencies. Outbreak programs reported challenges related to defining team roles and responsibilities and identifying an investigation lead (Figure 5a).

**Figure 5.** Challenges with communication and leadership (n=84 respondents\*)



\*Denominator for responses excludes *Not applicable for my program*

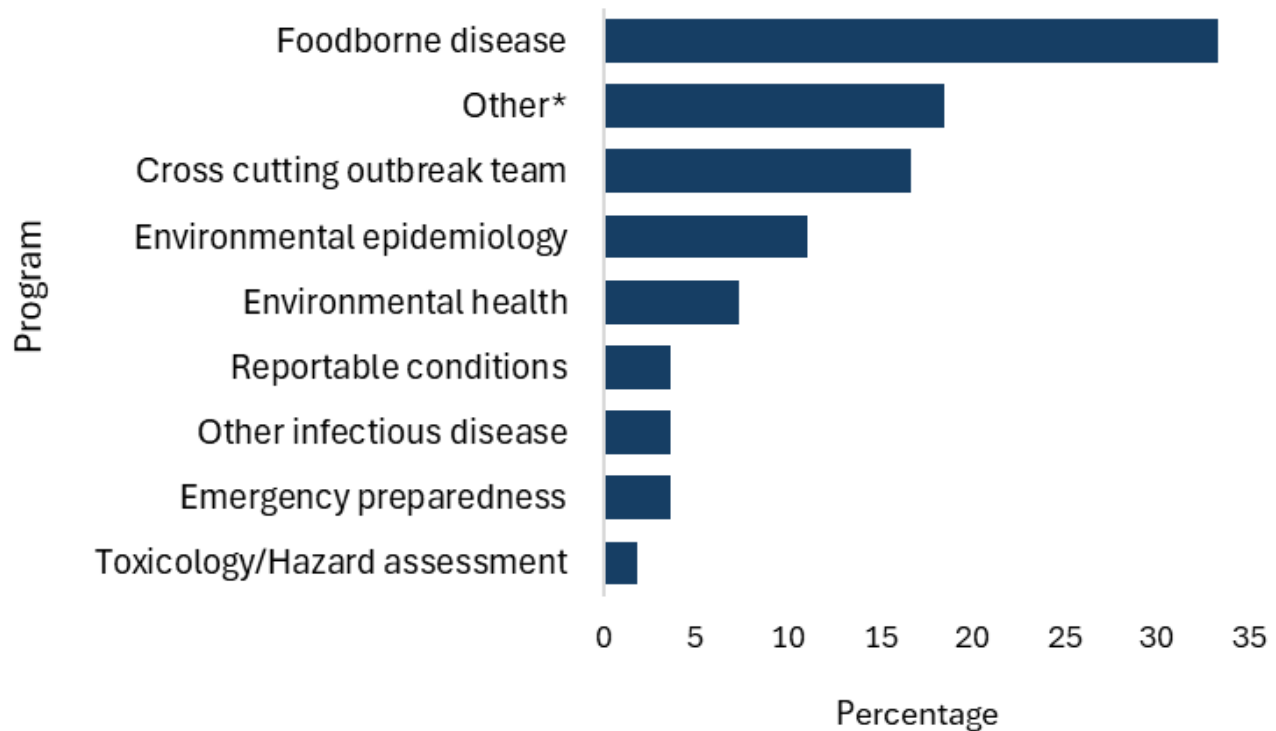
**Figure 5a.** Percentage reporting extreme, major, or moderate challenges with communication and leadership by program-area outbreak experience (n=84 respondents\*)



\*Denominators are stratified by program-area outbreak experience and excludes *Not applicable for my program*

Most respondents (64%) said a specific program at their agency typically leads NIFO responses when the agent is unknown. Of those, foodborne disease programs were the most common program leading non-infectious foodborne investigations (33%), followed by “other” programs (19%), and cross-cutting outbreak teams (17%) (Figure 6).

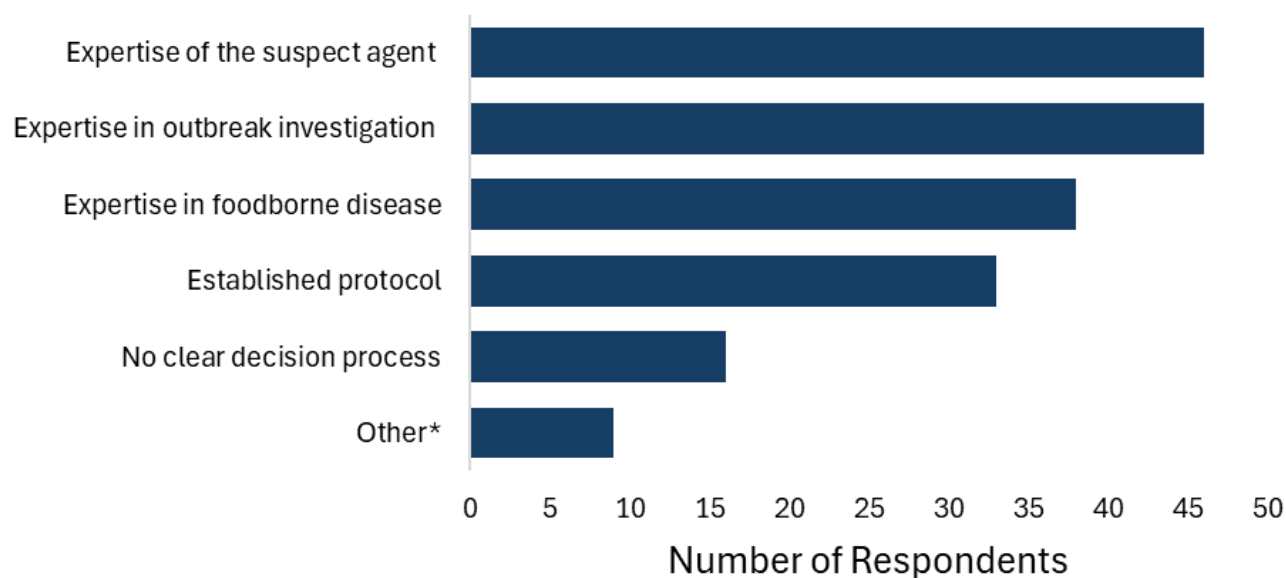
**Figure 6.** Programs typically leading non-infectious outbreak investigations (n=54 respondents)



\*Other programs included: "Both Foodborne disease and Toxicological Outbreak Programs", "Depends on suspected source and cause (EH, outbreak, or Threat Prep)", "Epidemiology", "Infectious disease epidemiology", "Occupational and Environmental Epidemiology, where our environmental toxicologist is housed.", "Our foodborne epi within the infectious disease epi and response section", "Rapid Response Team", "The same staff that investigates all foodborne outbreaks", and "Toxicological Outbreak Program"

Approaches to deciding who would lead NIFO investigations included outbreak investigation expertise (n=46; 55%) and expertise of the suspect agent (e.g., toxicology) (46; 55%), followed by expertise in foodborne disease (38; 45%). Some agencies had an established protocol for selecting a lead program (33; 39%), while others reported no clear decision process (16; 19%) (Figure 7).

**Figure 7.** How agencies decide who leads non-infectious outbreak investigations (*select all that apply*) (n=84 respondents)



\*Other methods included: Assigned/process of elimination (n=5; “no other state group is willing to do this”, “Process of elimination (i.e. non-ID, non-childhood lead, non-occ)”, “The State Epi assigns the work”, “the discipline with the most subjective coverage of that area can end up being the lead, particularly if no other program has expertise in the area”, “staff availability”); varies based on the situation (n=2; “depends on the situation”, “It will depend on jurisdictions”); and how the case was detected (n=2; “depending on notification method- if it originated with a compliant, EH would lead, if it originated from case-based surveillance/CDC notification, epi would lead”, “It depends on how the outbreak is reported to X and what products or causes are suspected to be involved, to align with subject matter experts. Teams within X work with one another and external agencies/partners when these sorts of outbreaks are reported.”)

### ***Focus Group Findings***

Communication, collaboration, and leadership were deeply interconnected topics throughout the focus group discussions. Communication, especially from leadership, was cited as a key factor in determining whether an outbreak response was coordinated or fragmented. Participants noted that leadership at both the state and federal levels need to deliver clear and coordinated communication messaging. For example, several



participants described confusion stemming from siloed communication, where federal organizations issued updates through separate channels, sometimes with differing messages. This made it difficult to determine who was actively involved in the outbreak response and complicated coordination across agencies.

“I think it's important to talk about how, how is information shared with states, into what programs?... there's been some investigations where...it's getting sent out to foodborne staff. But then other programs, like the lead program, [they] might get their own communications... And so, making sure that is coordinated with everyone, so that we're all getting the same messaging is really important.”  
~Participant 1, Focus Group 1

There were also notes that during federally coordinated responses, communications that normally happened between states and poison control were taken over by federal partners, which caused confusion.

“With Diamond Shruumz the Poison Control Center was involved, and we didn't even know it, because CDC got their data. And then they were telling us, oh, your poison control center... and we have a good relationship with poison control, but CDC beat them to the punch, telling us what was going on and stuff.”  
~Participant 10, Focus Group 2

A common area of improvement discussed by participants was the challenge of delayed inclusion in outbreak-related communications. Some reported that their programs or jurisdictions were not informed about an ongoing outbreak until cases had been identified in their state, even in situations where a contaminated product had been distributed in their area. They noted that these procedures often created difficulties in catching up with the outbreak's timeline, understanding prior actions, and identifying the current status. Several participants expressed a strong preference for receiving outbreak communications earlier, as a proactive measure, even if their jurisdiction had not yet identified any cases. They emphasized that earlier inclusion would better prepare them to respond if needed and help reduce the steep learning curve that results from being looped in during later stages of the investigation.

“I feel like sometimes in messaging, coming sort of, from the federal level down to the state level sometimes, and this can apply to... to non-infectious and infectious outbreak investigation, that messaging is just for the states with

currently identified cases. And so sometimes, if you get a case and you're partway through an investigation, you're A) playing catch-up as you have to read through this massive email chain, and B) sometimes you're a little bit at a loss as to what the heck is going on.” ~Participant 6, Focus Group 2

This was also mentioned in terms of involving all relevant programs from the onset, rather than attempting to add them later.

“...making sure that right from the beginning all the relevant people are brought to the table, and even if they're just on a purely spectator sport kind of thing. Because I think ...that really delays things, you have, you know, 3 agencies sitting at the table. And then you realize, oh, we should get the poison center in. There goes another week. And they're like, oh, we really need to get the Local Health Department in, and that.... so just having just a general call, these people call a meeting of these particular entities on day one ... then, you know, they can easily stop coming.” ~Participant 19, Focus Group 3

The concept of early and inclusive communication was also emphasized at the state level, where participants highlighted the importance of involving and effectively communicating with all relevant stakeholders from the outset of an outbreak response to avoid confusion.

“When it comes to outbreaks, we're really bad about just rapid fire starting these email threads. And you know, some people will get added, and then it's like everybody will start responding to the old emails, and then the thread gets mixed up and so at the end of it...It's chaos trying to figure out what really happened...” ~Participant 12, Focus Group 3

A huge component of preemptively preparing for coordinated communication is identifying the appropriate points of contact. Many participants emphasized the importance of having designated points of contact in place ahead of time, including those responsible for leading the outbreak, those representing key partner programs, and those who can provide subject matter expertise as needed. Several participants noted that while having a clear person to call is ideal, it is often difficult to determine who that person is in practice, and it is difficult to ensure that communications are coordinated across collaborating partners.

“...these non-infectious outbreaks don't seem to, at least to me, to have as clear of a point of contact, at least from the CDC end. Whereas a foodborne epi, we're pretty used to who our CDC contacts are and... how the outbreak process goes, as well as you know, our contacts within our agency. And even that part changes for these responses. We obviously need to work ... to figure that part out.”

~Participant 7, Focus Group 3

Fostering effective collaboration requires not only knowing the appropriate points of contact but also understanding the roles and responsibilities of partner programs and agencies. This includes having sufficient awareness to recognize the limits of a program's expertise and when a different approach is needed based on the nature of the outbreak or contaminant. An area for improvement is encouraging programs at state and federal levels to clearly communicate their capabilities and limitations so that all partners share a common understanding of roles.

“...we're starting to meet up with the various programs within our agency to kind of figure out like what their protocols are. Like, how they typically communicate with partners, whether state or federal or local... We're trying to figure out like what software they use...then trying to figure out...what triggered outbreaks.... for them, so that we could kind of try and find areas of over overlap between programs ...Where in the past, we might not have thought of incorporating them...” ~Participant 15, Focus Group 1

“...we don't get the same level of information from the FDA, and if...the FDA or an agency that has really clear regulations, having them just say, this is not our thing, or this, like, is beyond, or we have no mechanism for that, like, having that acknowledgement would help us deal with the situation a little bit more sometimes, instead of... us not being sure what they plan on doing, or... .. it's just hard to make plans if you're not sure what the other agencies are doing.”

~Participant 17, Focus Group 4

One participant noted that becoming a Rapid Response Team state fostered this collaboration and understanding of agency roles and contacts.

“...[our state] also recently became a Rapid Response Team state, and that's been a huge, you know, opportunity for us, because that really gets us to, engage more outside of the emergency, ... engage more with our Department of Ag, and our FDA colleagues, and our USDA colleagues, and our preparedness colleagues, to better understand... what are some of the routine things you all are working on right now, and then to give updates when we do have...situations where we think there might be an outbreak, or when we're in the middle of one,

and to really provide that up-to-date information to them. So, I really feel like being a part of that RRT has really helped us... engage more with partners.”  
~Participant 13, Focus Group 4

Focus group participants identified national-level groups as a potential solution for improving consistency in collaboration during NIFO responses. One group recommended establishing an overarching entity to help facilitate multistate responses, with suggestions ranging from a centralized coordinating body to an incident command structure. The goal of such coordination would be to promote clearer leadership and more streamlined communication across jurisdictions. Others emphasized leveraging existing national organizations with established networks and relationships, such as CSTE and the Association of Public Health Laboratories (APHL), to support early collaboration and maintain up-to-date contact lists.

“...you really need to almost have a group that works across groups.... that has experience doing these things. So that when something happens, because with these non-infectious foodborne outbreaks it is always a different group of people working together. And so, you need some unifying group that says, oh, now we're including these 5 different groups instead of those 5 different groups...”  
~Participant 10, Focus Group 2

In the final focus group, participants discussed potential groups within CDC (the Outbreak Response and Prevention Branch, the National Center for Environmental Health, and the Agency for Toxic Substances and Disease Registry) that would be ideal to lead future efforts. However, they did not reach consensus on which group would be best.

Leadership structures were also discussed by focus groups and varied widely across jurisdictions. In at least one state, there are efforts underway to develop standard operating procedures that assign leadership to environmental health staff based on the likely nature of the contaminant.

“...we're actually working on an SOP [standard operating procedure] for... specific responses associated with non-infectious adverse events...our foodborne epi group will not be the leads. It'll probably be our environmental health epidemiologists ....so, it's going to be a little bit different. And it's a kind of a little bit of a learning curve for them” ~Participant 3, Focus Group 3

However, multiple participants noted that foodborne or cross-cutting infectious disease epidemiologists are the default outbreak leads due to their investigative experience. For others, in the absence of established protocols or designated leads, responsibility is often assigned by default—frequently landing on those with general outbreak experience, regardless of subject matter expertise. In some cases, this results in confusion or conflict over who should take the lead, particularly when the program with technical expertise lacks outbreak experience, or vice versa. As participants explained:

“And this year, compared to last year, our resources may be drastically different. So, we might be even more lost in drawing straws than before.” ~Participant 18, Focus Group 1

There was discussion focused on the differences between centralized and decentralized states, noting that often in decentralized states, local or regional health authorities are often the entities that determine the implementation of outbreak directives.

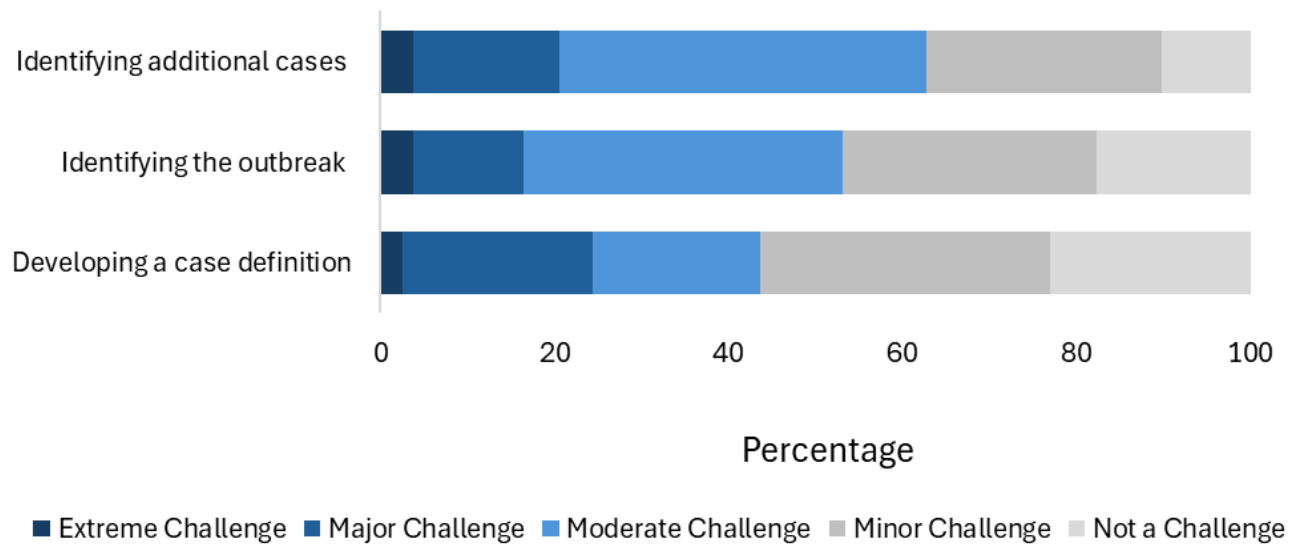
“...[A]ll of the local health departments are autonomous entities and actually have authority. So, in terms of working with them, we tend to follow their lead. If they want more information, more guidance, like a structured form, we can provide that. If not, they make their own form, and that sometimes depends on their resources that they have. So...we don't often have a one-size-fits-all..., but that does, mean we're not being consistent, and we have to just track all of the differences.” ~Participant 17, Focus Group 4

## **Outbreak Detection & Case Finding**

### ***Online Assessment Findings***

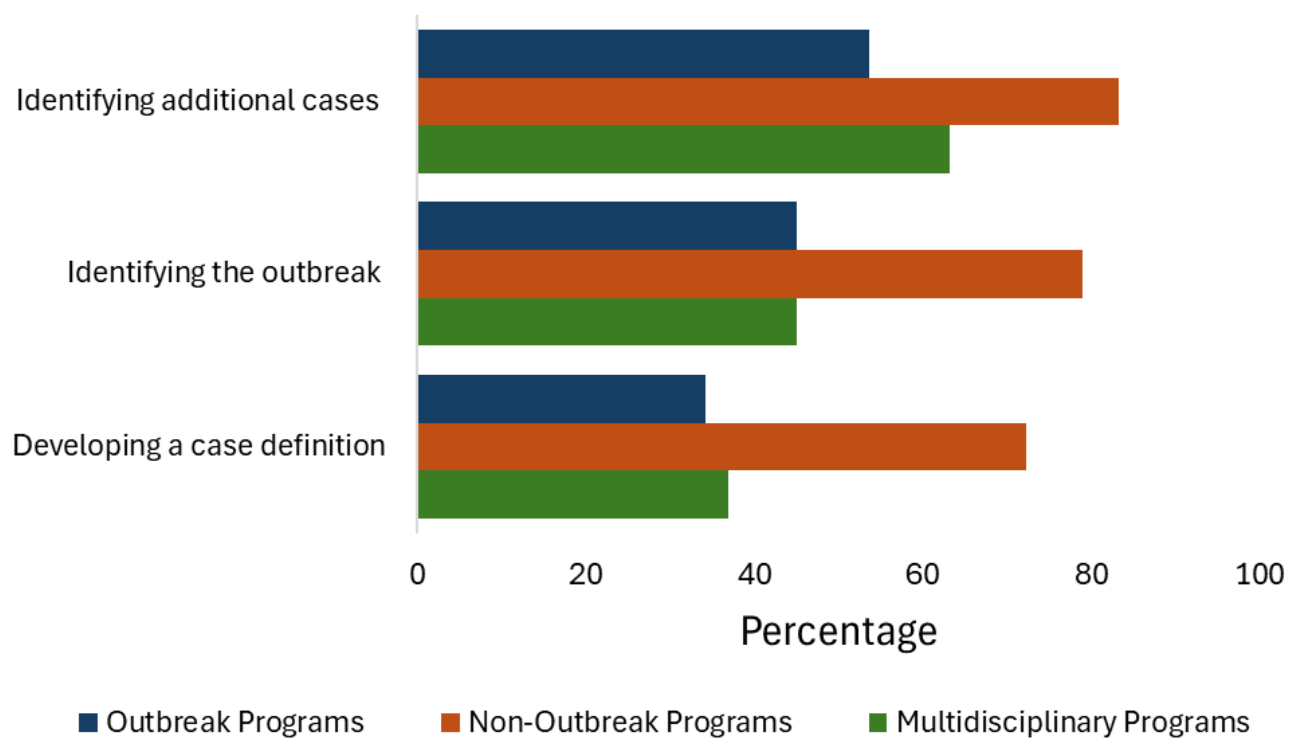
Identifying additional cases was noted as a challenge (63% selected extreme/major/moderate challenge), as was identifying the outbreak (53%), and developing a case definition (44%) (Figure 8). Outbreak detection and case finding activities were a greater challenge for non-outbreak programs and less of a challenge for outbreak programs and multidisciplinary teams (Figure 8a).

**Figure 8.** Challenges with outbreak detection and case finding (n=84 respondents\*)



\*Denominator for responses excludes *Not applicable for my program*

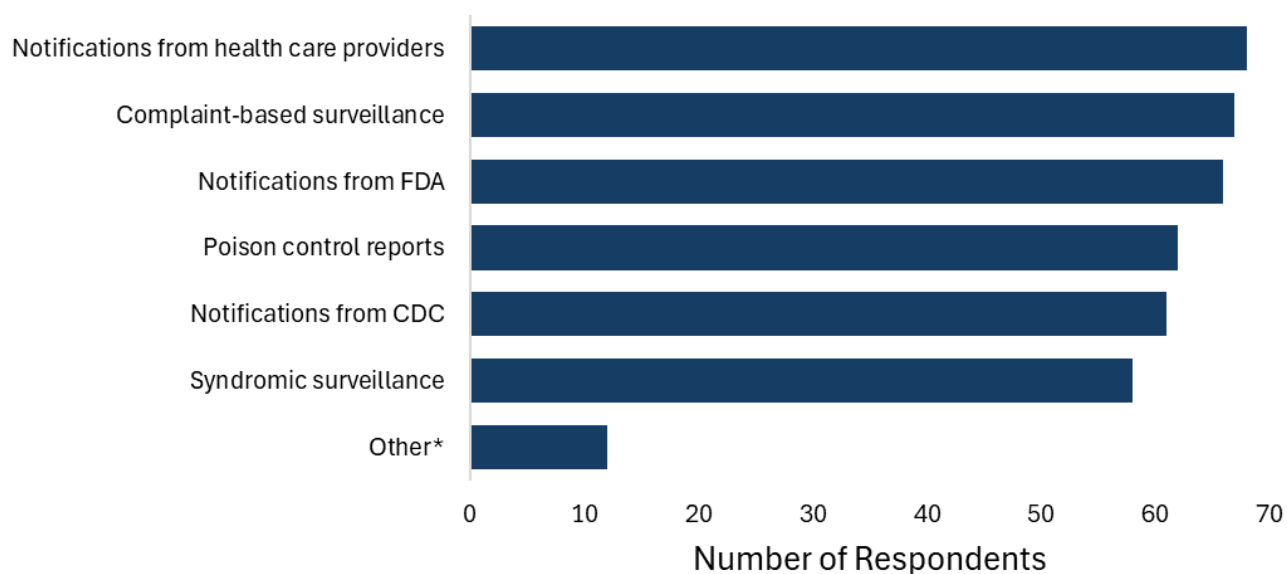
**Figure 8a.** Percentage reporting extreme, major, or moderate challenges with outbreak detection and case finding by program-area outbreak experience (n=84 respondents\*)



\*Denominators are stratified by program-area outbreak experience and excludes *Not applicable for my program*

The most common methods for identifying cases in multi-state NIFOs included notifications from healthcare providers (81%), complaint-based surveillance (80%), notifications from FDA (79%), poison control reports (74%), notifications from CDC (73%), and syndromic surveillance (69%) (Figure 9). Outbreak programs were most likely to identify cases from healthcare providers (98%), whereas non-outbreak programs were most likely to detect cases from complaint-based surveillance (77%), and multidisciplinary programs were most likely to detect cases through notifications from FDA (81%) (Figure 9a).

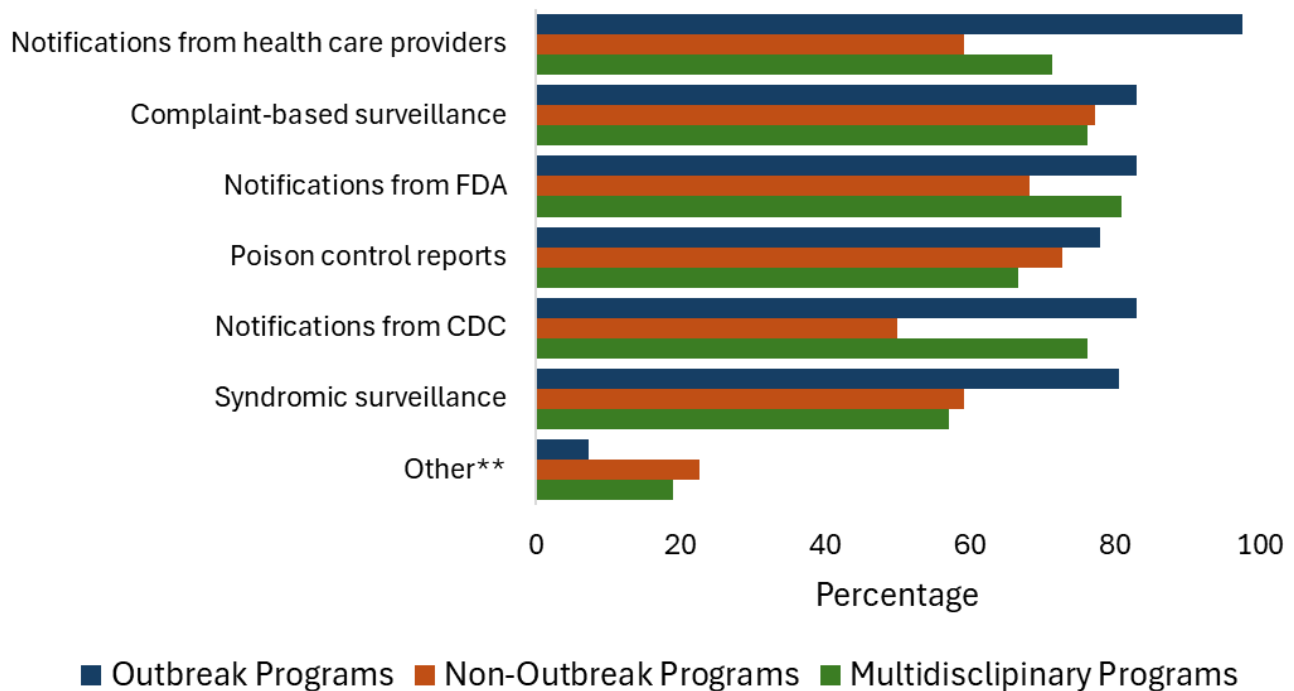
**Figure 9.** Methods for identifying cases in multi-state non-infectious foodborne outbreaks  
(select all that apply) (n=84 respondents)



\*Other methods included: N/A - case detection handled by a different program (n=4); non-traditional systems (n=2; "social media", "purchase records and/or customer lists"); local public health agencies (n=2); active surveillance (n=2); and case interview (n=2; "Case investigations for children with lead in blood meeting X case criteria for elevated blood lead levels. Nurse case managers check during home visits for food consumption and can also retroactively contact cases to see if they had consumed an identified product during the relevant time frame"; "Case-based interviews")



**Figure 9a.** Methods for identifying cases in multi-state non-infectious foodborne outbreaks by program-area outbreak experience (*select all that apply*) (n=84 respondents\*)



\*Denominators are stratified by program-area outbreak experience

\*\*Other methods included: N/A - case detection handled by a different program (n=4); non-traditional systems (n=2; “social media”, “purchase records and/or customer lists”); local public health agencies (n=2); active surveillance (n=2); and case interview (n=2; “Case investigations for children with lead in blood meeting X case criteria for elevated blood lead levels. Nurse case managers check during home visits for food consumption and can also retroactively contact cases to see if they had consumed an identified product during the relevant time frame”; “Case-based interviews”)

### ***Focus Group Findings***

Discussions during focus groups pointed to difficulties in identifying an outbreak with novel causative agents and applying case definitions. Specifically, definition components and guiding practices were not always obvious to investigators due to a lack of expertise or because of the novel aspects of the agent.

“It's kind of like a question on like when we're gonna decide...this is like an outbreak .... understanding...how, in those instances.. like what would be the trigger threshold for an outbreak... Because even when we're doing inventories with other programs, they're...like, we don't really have...a set definition on when an outbreak is triggered versus like a cluster or things like that. And again, it definitely is a case-by-case kind of thing, and it varies by the agent itself.... having a general idea on how to approach that, for heavy metals and stuff, especially if it's like months apart...” ~Participant 15, Focus Group 1

As noted in the Communication, Collaboration and Leadership section, a large component of case finding includes establishing collaboration and communication ahead of time, particularly with Poison Control Centers.

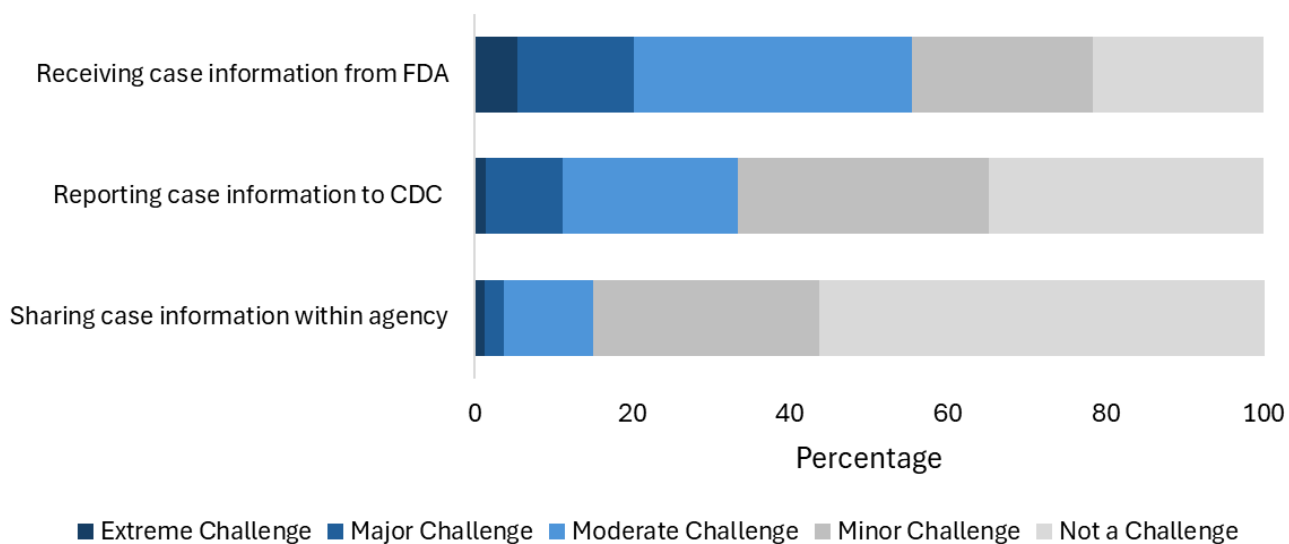
“...we did have a hard time trying to figure out who our actual cases were. It seemed like we were receiving emails from CDC, either weekly or biweekly. And the case count just kept going up...but we weren't receiving...you know...where are these complaints coming from? ...So, it was being collected in all different forms and fashions. But we weren't getting that information in a timely manner.... but we also gathered more information through syndromic surveillance. So that's how our case count went up as well. So, I don't know, it was just... it was a tough experience through that investigation... all around.” ~Participant 12, Focus Group 3

## **Data Platforms and Data Sharing**

### ***Assessment Findings***

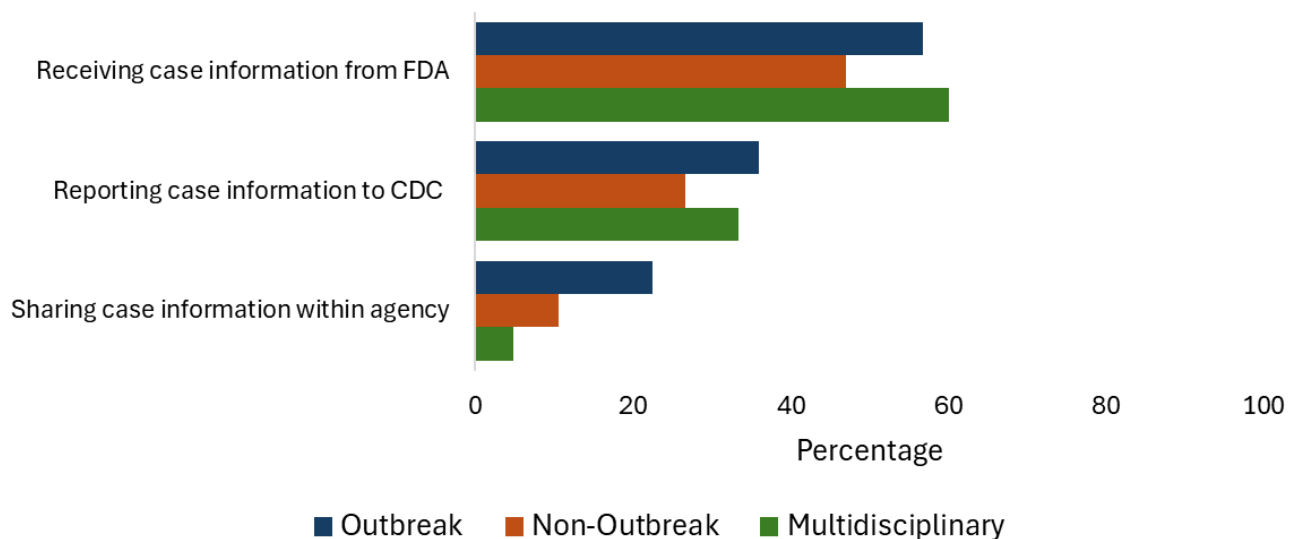
Receiving case information from FDA was identified as a challenge (55% selected extreme/major/moderate challenge), as was reporting case information to CDC (33%). Sharing case information within an agency was less of a challenge (15%) (Figure 10). Receiving case information from FDA and reporting case information to CDC were greater challenges for outbreak and multidisciplinary programs than for non-outbreak programs (Figure 10a).

**Figure 10.** Challenges with data sharing (n=82 respondents\*)



\*Denominator for responses excludes *Not applicable for my program*

**Figure 10a.** Percentage reporting extreme, major, or moderate challenges with data sharing by program-area outbreak experience (n=82 respondents\*)



\*Denominators are stratified by program-area outbreak experience and excludes *Not applicable for my program*

The System for Enteric Disease Response, Investigation, and Coordination (SEDRIC) was the preferred system to share data with CDC (ranked first by 47% of respondents), followed by REDCap. Microsoft Excel and CDC ShareFile Portal were more often mid-ranked. Google Forms was most often ranked last (Figure 9). Respondents in outbreak programs preferred SEDRIC, while non-outbreak programs favored REDCap. Multidisciplinary programs were divided between SEDRIC and REDCap (Appendix D).

**Figure 11.** Ranked preferences for systems to share de-identified data with CDC (n=73 respondents)

|                      | 1st | 2nd | 3rd | 4th | 5th | 6th |
|----------------------|-----|-----|-----|-----|-----|-----|
| SEDRIC               | 47  | 26  | 10  | 7   | 11  | 0   |
| REDCap               | 25  | 36  | 25  | 10  | 3   | 3   |
| Microsoft Excel      | 8   | 19  | 25  | 30  | 14  | 4   |
| CDC ShareFile Portal | 10  | 12  | 25  | 25  | 26  | 3   |
| Google Forms         | 5   | 5   | 15  | 29  | 37  | 8   |
| Other*               | 5   | 1   | 1   | 0   | 10  | 82  |

\*Other responses included: "Maven", "Microsoft Forms approved by IT", "Non-ID focused CDC platform", "calling CDC staff", and "encrypted emails to dedicated inbox"

### ***Focus Group Findings***

Focus group participants were asked to reflect on assessment findings, specifically regarding what made REDCap and SEDRIC the most preferred platforms. In discussing their preferences, several participants noted that familiarity with the platform was a key factor influencing their support and was seen as critical:

“...it's more just familiarity with those platforms.” ~Participant 18, Focus Group 1

Many participants from environmental health programs indicated they were only tangentially familiar with SEDRIC or previously had negative experiences regarding gaining access. A common concern, in addition to difficulty obtaining access, included limited opportunities to use it regularly, which made it challenging to maintain proficiency. Participants emphasized that ease of obtaining access is a critical feature for any data platform, suggesting it should be a high priority in platform selection and design.

“...I've run into the, we can't download it, it doesn't meet our security protocols, and so...It takes a long time during the event to just get access to the system. If it's not something already set up and available.” ~Participant 17, Focus Group 4

Overwhelmingly, the discussion surrounding REDCap was mostly positive. Even jurisdictions that noted the use of SEDRIC commented that it was great at transmitting data to CDC but was not a platform that they would deploy for field use, indicating they would still use REDCap.

“... [SEDRIC is] a repository and data sharing. But it's not like we're going to deploy SEDRIC for a response. We deploy REDCap or some other thing, and then we share the data to SEDRIC...” ~Participant 2, Focus Group 2

However, using REDCap required strategic planning to avoid multiple disparate REDCap instances.

“We tend to use REDCap for everything, and that has been good, but it's also had its issues, too, because now we've got these multiple REDCap databases, and we have been able to work more strategically in getting some of those, and then developing pipelines to be able to pull that data through an API connection into different systems, so into SEDRIC.” ~Participant 13, Focus Group 4

Similarly, use of systems like REDCap allowed outside agencies to provide information directly to states, such as Poison Control Centers:

“The Poison Control Centers, they wouldn't necessarily have all of the information the CDC was looking for right at the beginning of like that first call, but when we would call them back later they would be able to go back in [to REDCap] and enter in information later on into those exact reports.” ~Participant 15, Focus Group 1

However, one participant noted that in their state, REDCap was not permitted due to information technology restrictions. Given that jurisdictions use different systems for data collection and sharing, shaped by access, IT constraints, and field deployability, participants emphasized that any data-sharing platform must prioritize interoperability. In such cases, the platform must be capable of accepting and integrating data from a variety of other systems and partners. Given the technological restrictions and variability in how states can deploy platforms for data collection, interoperability was a recurring and central topic across all focus groups. While Application Programming Interfaces (APIs) were brought up in focus group 2 as a solution, focus group 3 noted that although ideal, APIs often take years to establish and likely would not be a solution in the near term. Many participants noted that a system needs to be able to ingest data from a variety of sources in more automated manners and not be limited to just case report data but also be able to capture the key environmental variables that are important in a non-infectious disease outbreak.

“...it's really difficult to have a system that everyone agrees upon and uses. So our solution to that problem was just to integrate our system with whatever system database we're going to be submitting to... so that they're familiar with their parts, we're familiar with our parts, and then we have a translation way of connecting those two so that the information can flow back and forth....seems to me that that's the way a lot of these connections could, and maybe should be made. Where, if epidemiologists have a particular way of doing things, poison centers have other ways of doing things, labs have other ways of doing things, getting ways to connect those systems might be a really good way to harness what's already there.” ~Participant 19, Focus Group 3

While the narrative above reflects common discussion points heard across focus groups, participants also highlighted several additional platform features that, although mentioned less frequently, were considered important. Security was one such feature, noting that centralized platforms felt more secure and less error-prone than alternatives like sending encrypted emails.

Another valued feature was the ability to track and audit data changes within the platform. For example, one participant described how helpful it was to receive alerts when case information was updated in REDCap. Others noted REDCap's text

messaging capabilities through third-party integrations as a beneficial function for outreach or case communication.

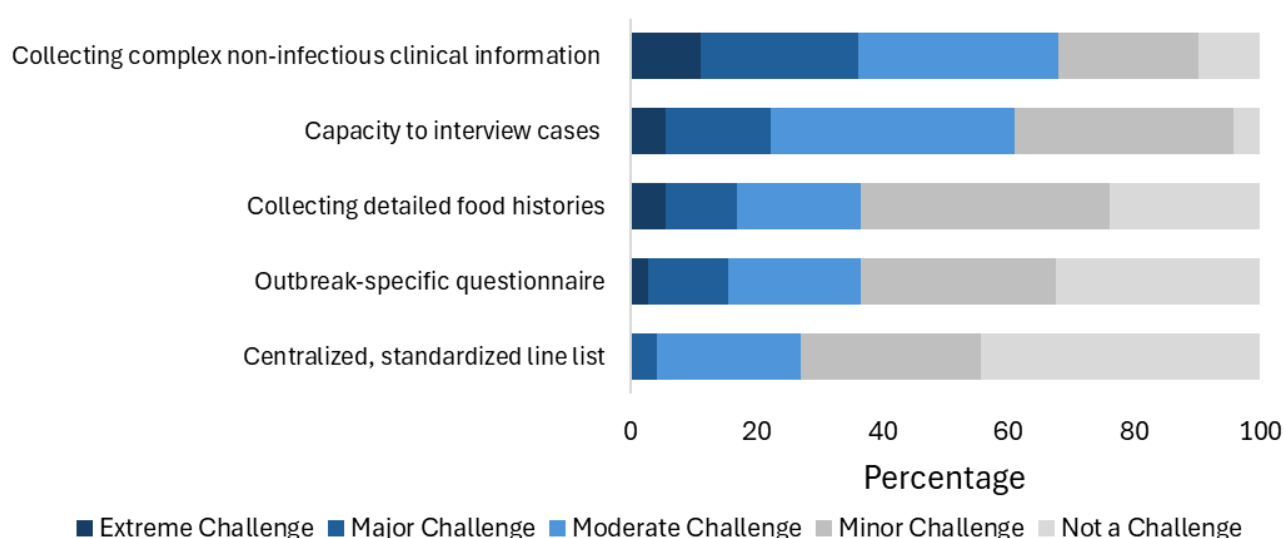
Participants also emphasized the importance of being able to modify or update forms within the platform, which they viewed as a key strength of REDCap. While this speaks to overall platform functionality, it is particularly relevant to the theme of flexibility in data collection and will be explored further in the subsequent section.

## Data Collection

### Online Assessment Findings

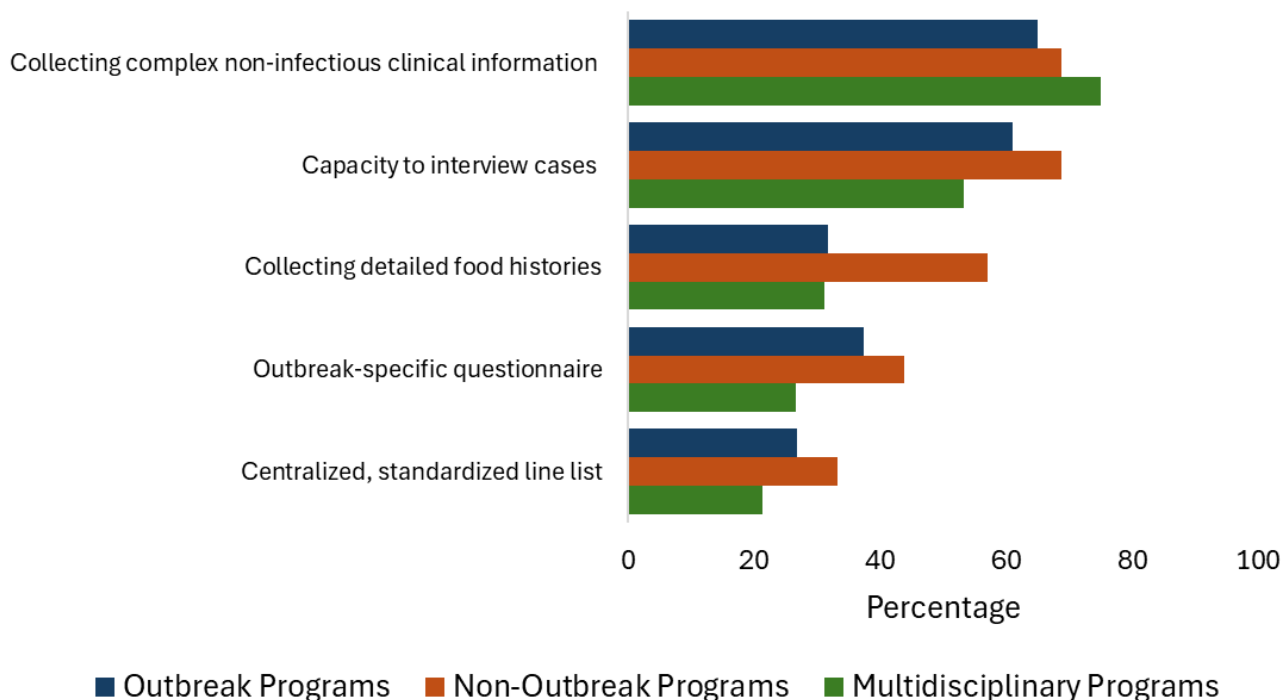
Collecting complex non-infectious clinical information was a challenge (68% selected *Extreme/Major/Moderate challenge*). Having sufficient capacity to interview cases (61%) was also a challenge. Maintaining a centralized line list (27%), developing an outbreak-specific questionnaire (37%), and collecting detailed food histories (37%) were less of a challenge for respondents (Figure 12). Collecting detailed food histories, developing an outbreak-specific questionnaire, and maintaining a centralized, standardized line list were greater challenges for non-outbreak programs compared to outbreak and multidisciplinary programs (Figure 12a).

**Figure 12.** Challenges with data collection (n=84 respondents\*)



\*Denominator for responses excludes *Not applicable for my program*

**Figure 12a.** Percentage reporting extreme, major, or moderate challenges with data collection by program outbreak experience (n=84 respondents\*)

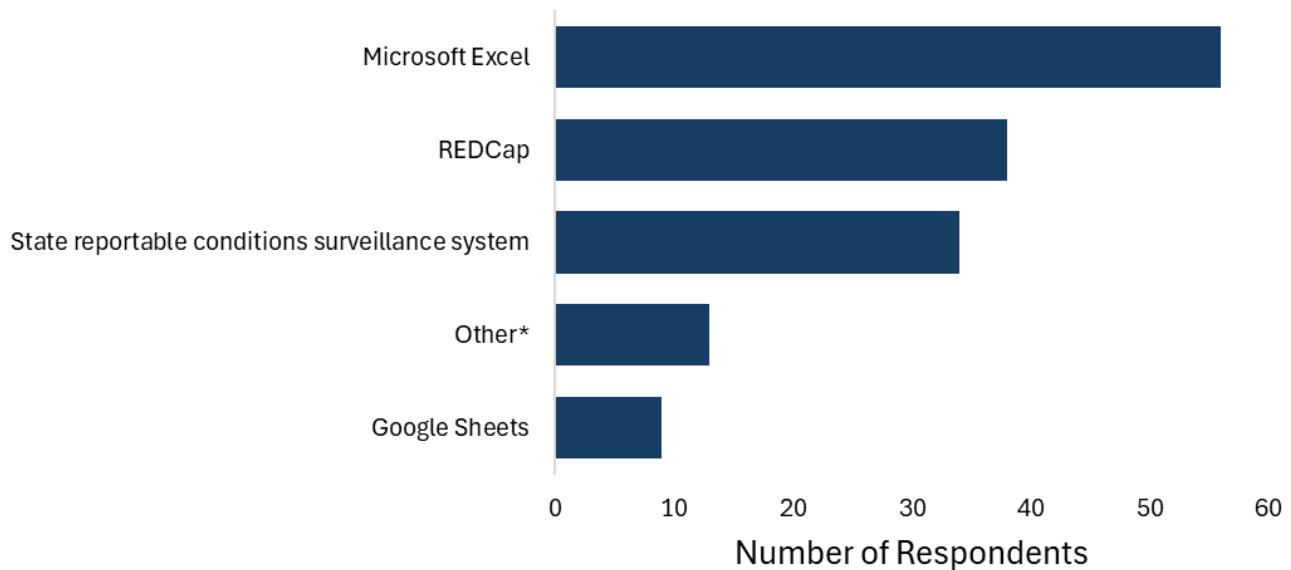


Microsoft Excel was the most common system used by programs to maintain a line list (67%), followed by REDCap (45%), and then states' reportable conditions surveillance systems (40%) (Figure 13). States' reportable conditions surveillance systems included state-developed systems (38%), Maven (21%), other systems (18%), National Electronic Disease Surveillance System (15%), and EpiTrax (9%). In an open-text question, several respondents whose program uses REDCap to maintain line lists mentioned that REDCap was not integrated with their state reportable conditions surveillance system, requiring manual data entry into both systems (26%). A few specified that REDCap was used as their primary system for tracking reportable conditions (8%), and one respondent (3%) mentioned that their agency has an interface that maps variables between REDCap and National Electronic Disease Surveillance



System Base System (NBS) and automates exporting/importing of data from REDCap to NBS.

**Figure 13.** System(s) used to maintain a line list during a non-infectious foodborne outbreak (select all that apply) (n=84 respondents)



\*No 'Other' responses were specified

### ***Focus Group Findings***

Across all focus groups, participants emphasized the importance of standardization in data collection, particularly in the context of multijurisdictional outbreak response. Standardization was seen as critical not only for ensuring consistent and complete data but also for enabling efficient data sharing and integration across systems and agencies. Shared structure, such as agreed-upon data elements, formats, and vocabulary, enabled participants to combine or compare data across states or platforms.

“I think standardization of the data collection is key. So that the way it's being collected in...in [one state] is the same way it's being collected in [another state],

you know. So those systems allow for standardization. They allow for shared vocabulary.” ~Participant 2, Focus Group 2

This need for consistency was closely tied to the broader discussion of data platforms. Participants described how standardized data collection supports interoperability, facilitates faster data transmission, and ensures that diverse systems can "speak the same language" during real-time investigations.

“...then also just being able to share like data dictionaries of the surveys as well with REDCap made it easy to kind of like, standardize it as well.” ~Participant 15, Focus Group 1

This standardization was further emphasized because data collection often occurred at the state level before federal data collection directives were developed.

“Because CDC was taking so long to get a standardized database out there, some states were already creating their own REDCap instances. And then they didn't match other states' REDCap instances. And so that was, that was an issue with...how do we standardize and do all things together? Especially when we have these multi-state outbreaks.” ~Participant 10, Focus Group 2

At the same time, participants acknowledged the importance of maintaining flexibility alongside standardization. Flexibility allows states to adapt tools to local workflows and emerging situations. They noted the value of flexibility, especially with REDCap, which allowed users to tailor data collection forms directly in the system to meet local needs while still aligning with national reporting requirements. This adaptability was seen as a significant advantage.

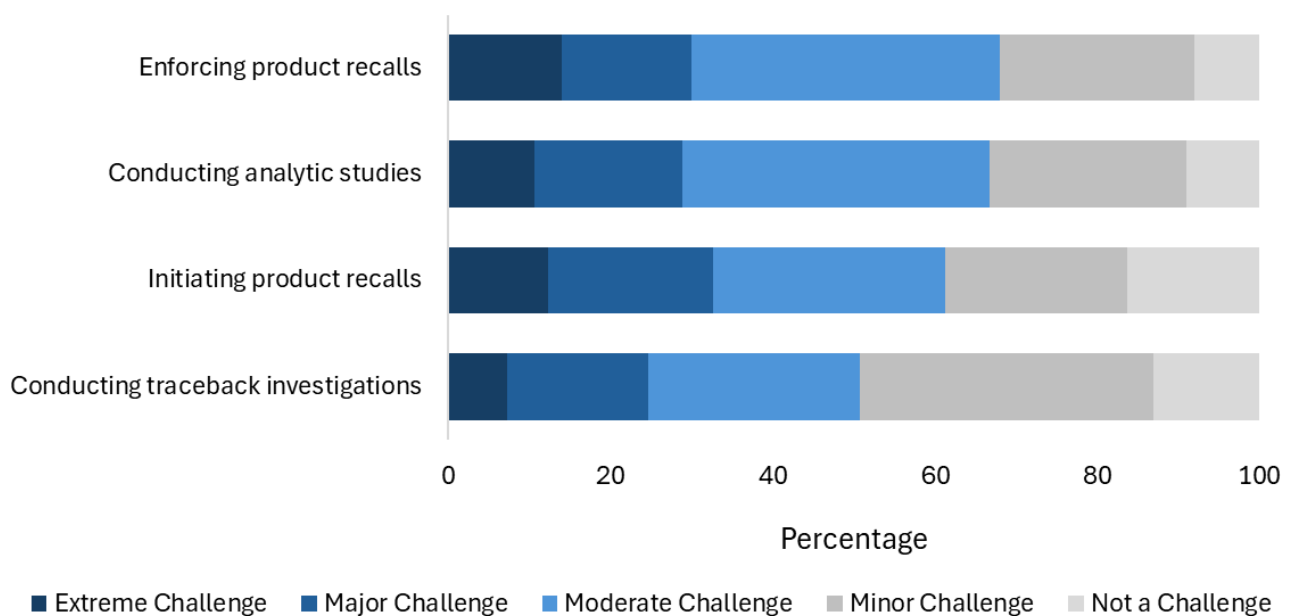
“I think this is another instance why REDCap is really great, is... we had these standard set of questions when we created this project in REDCap. But then we could still add in ... our specific questions we wanted to ask, because well, there were things that...CDC and FDA needed to know... There were other things that we needed...additional questions to track things that we are following up on, and things like that...so it was...It was nice because we had this coordinated survey that was across...all jurisdictions everything was the same, but we could still edit it and ask additional information that we wanted.” ~Participant 1, Focus Group 1

## **Control Measures**

### ***Assessment Findings***

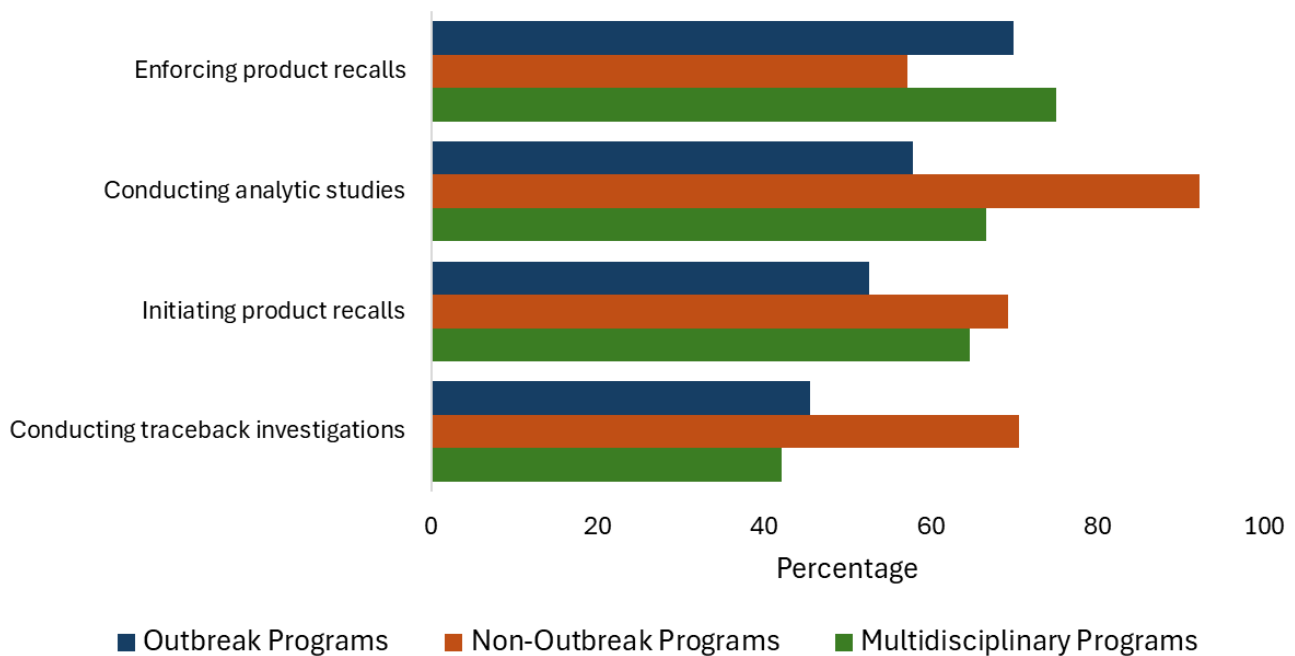
Respondents to the online assessment reported that enforcing product recalls was a significant challenge (68% selected as *Extreme/Major/Moderate* challenge), followed by conducting analytic studies (67%), initiating product recalls (61%), and conducting traceback investigations to identify the source of contamination (51%) (Figure 14). Enforcing product recalls was a greater challenge for respondents in outbreak and multidisciplinary programs. Conducting analytic studies and traceback investigations were more challenging for non-outbreak programs (Figure 14a).

**Figure 14.** Challenges with control measures (n=80 respondents\*)



\*Denominator for responses excludes *Not applicable for my program*

**Figure 14a.** Percentage reporting extreme, major, or moderate challenges with control measures by program outbreak experience (n=80 respondents\*)



\*Denominators are stratified by program-area outbreak experience and excludes *Not applicable for my program*

### Focus Group Findings

The topic of control measures was not included as a specific question in the focus group discussion guide and, as a result, received less in-depth discussion compared to other areas. However, participants shared comments that reflect how the ambiguous nature of certain products complicates the implementation of control measures during NIFOs. For example, one comment reflected on the complications related to determining which category a product falls into, whether food, drug, or something else, and how that can influence how agencies respond, including the involvement of law enforcement or regulatory entities.

“...coming together when we have some of these commodities that are.... nobody's really sure upfront what they are, I think, having that lead agency... coming out front and saying.... this is what this is, and this is how we're investigating it, would be really helpful early on, and I know that might not be

realistic for everything...but well, it seems like even having an understanding of how things get categorized may influence what can or does happen with it could be [helpful].” ~Participant 3, Focus Group 3

Another participant reflected on the surprising breadth of products available in retail settings that may not fall under standard regulatory oversight, noting that unregulated consumables are widespread and easily overlooked:

“...when we had the kratom thing going on...we had the same problem. You know, it's not a regulated product.... So, some of us got an eye opening because we went to the store, and we're like, Whoa, wow! Look at all this stuff that's in here...it's important that we don't forget that there's a lot... we're not aware of.” ~Participant 2, Focus Group 2

Participants also described how regulatory gaps can create confusion over who holds responsibility for implementing control measures. Some described situations where regulatory partners were hesitant or unable to take action when a product did not fall under their formal jurisdiction, even when public health intervention was clearly needed.

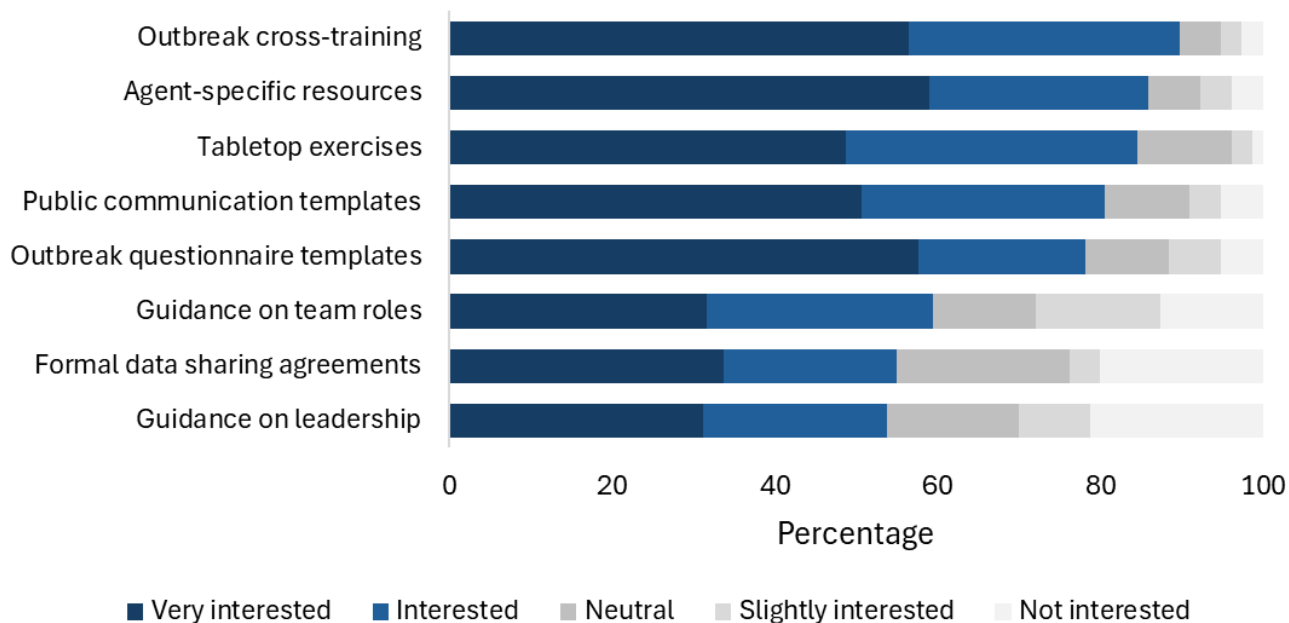
“So, so, the problem that came up was ...they're very oriented... toward what do they regulate and [where] can they go in and actually do something based on our regulations. Where this was a matter of trying to prevent further illness and we knew we had product in places all over the state. And they said, well, we can't go into that shop and do anything because we don't regulate it. We're like, yeah, you can walk in and see if they got product on the shelf and hand them a page that says, 'hey, this product has been recalled because it's...you know, by the company, because it's dangerous.' But they were unwilling to do that, you know....so there was a lack of understanding, too, of what in public health our goals are, and what we can do, not just from a regulatory standpoint.” ~Participant 10, Focus Group 2

## Resources

### *Online Assessment Findings*

Most respondents indicated that cross-training in outbreak investigation techniques (90%) would be the most helpful for NIFO preparedness. Respondents also indicated that agent-specific resources (86%), tabletop exercises (85%), public communication templates (81%), and outbreak questionnaire templates (78%) would be helpful resources. There was less interest in leadership guidance (54%), formal data sharing agreements (55%), and guidance on team roles (60%) (Figure 15).

**Figure 15.** Resources for future non-infectious foodborne outbreaks (n=80 respondents\*)



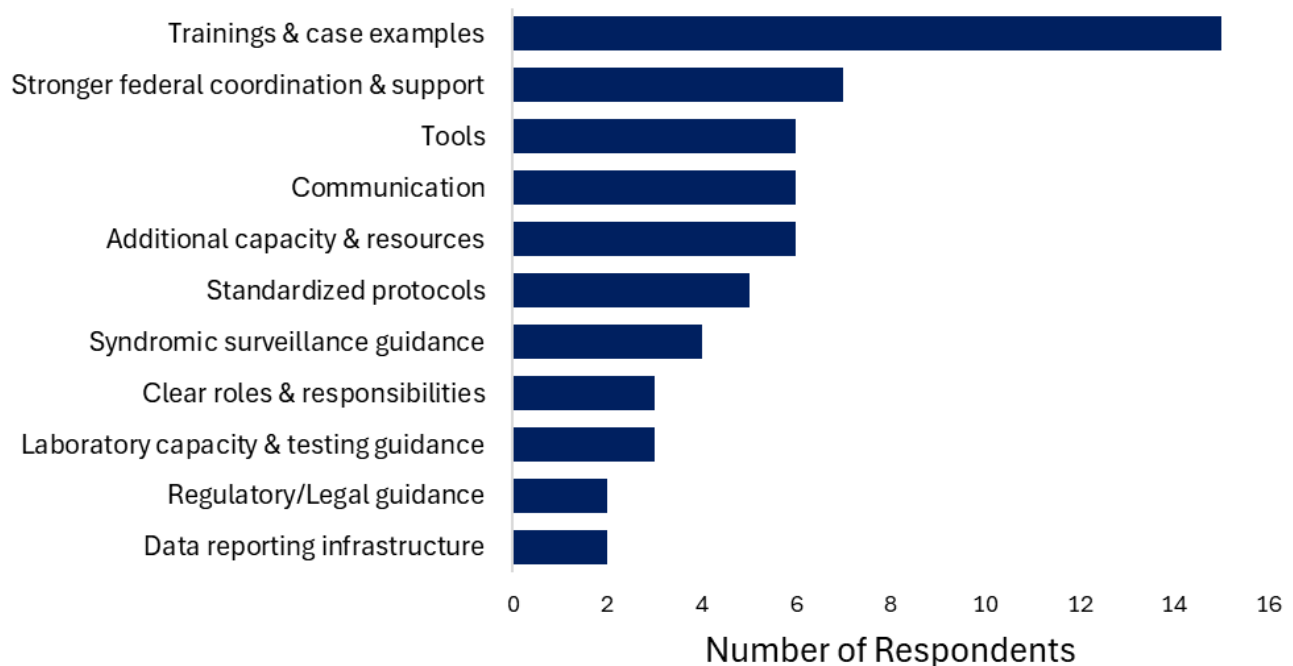
\*Denominator for responses excludes *I'm unsure what this is*

When asked about additional resources that could improve their program's ability to investigate NIFOs, 19% of respondents identified trainings and case examples in an open text question: specific trainings on non-infectious foodborne agents and case investigation, training materials for healthcare providers, general outbreak response training, self-paced online trainings, tabletops, and webinars (Figure 16). Others requested:

- Stronger federal coordination and support – such as established points of contacts and defined federal communication channels (9%)
- General tools – such as guidance on data collection priorities, data integration and analysis software, and how to identify and better reach affected populations (8%)
- Communication resources – such as response organization charts and a cross-jurisdictional communication platform (8%)
- Additional capacity and supplies (8%)

- Standardized protocols – including case definitions (6%)
- Guidance around syndromic surveillance – such as shared syndromic queries for non-infectious foodborne agents (5%)
- Laboratory support– including better support from the Association of Public Health Laboratories and testing guidance (4%)
- Regulatory/legal guidance (3%)
- Easier data reporting and sharing platforms (3%)

**Figure 16.** Additional resources for future non-infectious foodborne outbreaks (*open text*) (n=80 respondents)



### ***Focus Group Findings***

Throughout the discussions, prompts were used to explore potential resources that could address the concerns or ideal scenarios participants described. Many expressed uncertainty and hesitancy to commit to specific solutions. They noted a general belief that no single resource would work for everyone or make these investigations

straightforward. Participants emphasized that factors such as state governance structure and whether the outbreak agent is known or unknown could greatly influence the usefulness of any resource. They acknowledged the challenge of striking a balance between creating guidance broad enough to apply nationwide and specific enough to be actionable without requiring states to develop their own detailed playbooks. This difficulty is compounded by the fact that NIFOs are often highly variable and unpredictable in both their presentation and causative agents.

However, participants acknowledged that certain tools might still prove valuable. Some of these aligned with resources identified in the online assessment, while others emerged from the technology discussions. Suggestions included: agent-specific or symptomology cheat sheets, webinars or trainings, a contact list template or playbook, an overarching standing committee or working group, and a standardized questionnaire bank.

Developing cheat sheets for potential agents and/or symptomologies were discussed in both focus groups 1 and 2. Participants felt these resources would be valuable not only when outbreak leads were unfamiliar with a specific agent, but also for training interviewers. Several noted that such tools could help staff quickly get up to speed, both to facilitate conversations with potential cases and to meaningfully engage with outbreak partners.

“... if programs kind of had that [cheat sheet] available...like...okay, this is like the base information you would need to understand about like this specific contaminant or something. And then these are like, I don't know...these are the general questions we might receive from them, like FAQs, like during the interview, they have those questions for the interviewer...so then, training won't take like this whole large process of like, oh, man! Now we have to gather all of our internal materials for these people so that they can review them. And now we have to create a whole training slide deck for them on like to prep it, and everything.” ~Participant 15, Focus Group 1

However, participants noted that developing individual cheat sheets for all potential agents would require significant capacity and still might not cover every possibility—particularly since the outbreak agent is not always identified.



“We went down the road earlier last year of trying to create...you know, these specific [case report forms] forms and interview forms...by chemical. So, we would have, you know, one for cadmium, one for chromium, things like that. And then we realize that, you know, you make one, and then the next outbreak is thallium, and you don't have one. So, it's a really dangerous road to go down when you just start creating these new report forms almost like they're infectious diseases for chemical contaminants. But yeah, something probably more broad would be better.” ~Participant 4, Focus Group 2

Webinars and trainings were also briefly discussed in the focus groups, with participants suggesting a variety of formats, including tabletop exercises, on-demand webinars, and train-the-trainer models led by toxicologists or laboratorians. Suggested topics ranged from fostering interagency relationships to building agent-specific knowledge, as well as strengthening general outbreak response skills.

“CoEs [Integrated Food Safety Centers of Excellence] provide just fantastic training in my experience. I wonder if there's like a...an opportunity to do so... you know, there's like the trainings for new foodborne Epis that are like kind of self-guided, you know. It wouldn't be applicable like as a just-in-time thing. But I wonder if there's an opportunity to do something like that to kind of help build capacity ahead of the game?” ~Participant 21, Focus Group 1

“...the tabletops and the training is helpful to make sure that we all understand how communication routes go, and that they go smoothly.” ~Participant 17, Focus Group 4

Contact list templates and general playbook templates were also suggested, with the overarching goal to ensure that outbreak leads and response teams have, at a minimum, a reference for which programs, agencies, and disciplines should be engaged. Such templates could serve as a reminder in the moment to include these key partners in the response. There were also brief mentions of more general playbooks in determining leads or suggested steps to conduct an outbreak.

“Yeah, to that point, maybe less of a template and more of a “Considerations Document” ... this should be your thought processes. You're determining who should lead. And I mean, most of us have [a] preparedness plan. So, if there's an outbreak of something we, you know, we implement those, you know, and we modify as we go. That being said, having, you know, having something that helps you sort of think through in the moment when you're when passion is running high, and everybody's freaking out, and everybody's trying to respond is never a

bad thing is sort of a considerations. Have you thought about this? Have you thought about this. Have you thought about this.” ~Participant 2, Focus Group 2

However, participants acknowledged the challenge of creating these resources in a manner that they would be applicable across all outbreaks and jurisdictions.

“It might be better to have a very general type of guideline from... on a national scale, but because each jurisdiction is pretty different on how they investigate things...maybe it might be better to have it not too detailed, so that each jurisdiction can sort of adapt it on... on their own.” ~Participant 8, Focus Group 3

As noted in the “Communication, Collaboration & Leadership” section, participants recommended establishing a standing overarching committee or group to guide responses to these types of outbreaks. Those general points will not be repeated here, but it is worth noting that this resource was of interest across focus groups.

Finally, participants in focus groups 1 and 2 emphasized the value of having pre-prepared and widely shared question banks, data dictionaries, or a non-infectious hypothesis-generating questionnaire. They noted that these tools are critical for efficiency and particularly helpful for those who may be learning about an agent in real time, providing guidance on what elements are essential to include in a questionnaire or case report form. Participants suggested that housing these question banks in REDCap or a similar system would allow for easy integration into larger questionnaires. Several recounted past inefficiencies when questionnaires from federal partners were delayed; by the time they were released, multiple jurisdictions had already created their own versions, resulting in inconsistent data collection across jurisdictions. Developing expert-developed question banks for specific agents, as well as standardized sets for hypothesis generation, could promote greater consistency, even if new questionnaires are introduced and adopted later in the investigation.

“You know I have very limited knowledge of ...toxicology and things like that, so, you know, maybe instead of us all independently trying to research, like, what value should be included like having some sort of like...you know, these are kind of the standard ways of testing...just so that we can go ahead and import those [data elements] and... and not sound like super dumb when we're talking to poison control.” ~Participant 21, Focus Group 1

## DISCUSSION

CSTE's national, mixed-methods assessment evaluated the current capacity, barriers, and resource needs for non-infectious foodborne outbreaks (NIFOs) at state and territorial public health agencies. Multi-jurisdictional NIFOs are increasingly recognized as a public health challenge, with several recent investigations highlighting the complexity of these responses for federal, state, and territorial public health and regulatory agencies (Troeschel et al. 2025, Walker et al. 2025, FDA 2024, Firestone et al. 2025, FDA 2022). These investigations differ from typical infectious outbreak investigations in several ways: the causative agent is often novel and can be unknown, detection occurs through consumer or clinician complaints rather than laboratory-based surveillance, and the partnerships and leadership structures required are often different. While we included naturally occurring toxins in the scope of the assessment (e.g., fish and shellfish toxins, mushroom toxins), these did not emerge as the focus from assessment respondents and focus group discussions. These investigations may fundamentally differ from other NIFOs and could be considered separately in future guidance.

Eighty-four programs from 46 states and territories responded to the assessment. The assessment findings and focus group discussions highlight a need for both state-specific and coordinated infrastructure, guidelines, and leadership to support these investigations. This assessment was conducted in the broader context of public health workforce reductions, federal reorganization, and defunding, leading to widespread uncertainty about the future of public health and public health investigations (Greer et al. 2025, Helfrich et al. 2025).

### Confidence & Capacity

Respondents were generally confident in their own programs' ability to respond to NIFOs, with multidisciplinary programs reporting the highest levels of confidence. Confidence was related to having pre-existing, collaborative relationships with other programs within their agency and external agencies, as well as institutional knowledge or experience with non-infectious or infectious agents and expertise in outbreak management. Conversely, programs with lower confidence cited a need for additional

training, protocols, and resources. Because NIFOs are relatively infrequent, it is challenging for agencies to maintain consistently trained staff and institutional memory, particularly when different groups are involved in each response. These dynamics underscore both the importance of developing strong partnerships in advance and maintaining consistent leadership models across investigations.

Despite high programmatic confidence, respondents identified important system-level barriers – unclear state and national leadership, lack of interoperable data systems for data sharing, and uncertainty around regulatory authority – that inhibit a timely and coordinated response.

### **Team Composition & Leadership**

Composition of the investigation team and models for leadership varied considerably by jurisdiction. At a minimum, NIFO teams should consider including partners with expertise in outbreak investigation methods and the agent causing illness. Outbreak investigation expertise may include epidemiologists, environmental health professionals, and laboratorians, which is consistent with the Council to Improve Foodborne Outbreak Response (CIFOR) Guidelines for Foodborne Disease Outbreak Response (CIFOR 3rd Edition). Depending on the investigation circumstances, agent-specific expertise may come from environmental epidemiology, environmental health, toxicology, poison control, cannabis, tobacco, lead, or substance use programs.

Some agencies have both outbreak expertise and agent expertise within the same cross-cutting outbreak program, but that is uncommon. Because models look different across jurisdictions, a prescriptive national approach is not feasible. However, it would be beneficial for all jurisdictions to (1) have a pre-existing protocol for NIFO leadership structure and team composition, identifying relevant partners in advance, and (2) identify a primary point of contact for national coordination efforts. While co-leadership may work internally for some jurisdictions, most respondents agreed there would ideally be a single designated point of contact for national coordination. In addition, while some partners change based on the agent causing illness, it is important to keep leadership and outbreak program involvement consistent. Consistent involvement allows programs to follow systematic methods and retain institutional knowledge of NIFOs. While some

investigations were led by programs with agent-expertise, there was a consensus among assessment respondents, the NIFO Workgroup, and national agencies that NIFO investigations should be led by programs with outbreak expertise. In addition, coordination with local public health agencies should be planned in advance.

## **Data Sharing**

With so many different partners involved, standardization and sharing of case information were identified as major challenges. There was no universal consensus on a single preferred national platform. SEDRIC was most preferred by those working in foodborne disease, but other programs lacked access and reported usability concerns. In addition, SEDRIC is designed for multi-jurisdictional infectious disease outbreaks detected via PulseNet (laboratory-based surveillance). It is less functional for complaint-driven investigations and complex toxicological agents, which may require additional capabilities.

REDCap was preferred by environmental and toxicology programs and valued for its accessibility and flexibility. The ideal scenario, according to respondents, would be to use both platforms in tandem and have interoperability features within SEDRIC. As CDC transitions SEDRIC into the new One CDC Data Platform (1CDP), it will be important to integrate REDCap features or ensure compatibility between systems (CDC 2025).

Data collection was also a challenge, particularly around standardization and questionnaire development. Respondents requested standardized outbreak questionnaires, developed by a national agency, and deployed rapidly. Prompt interviewing (ideally within 1-3 days after reporting) has been shown to improve investigation outcomes (Tilashalski et al. 2022). Templates and question banks specific to NIFOs that are developed in advance may improve timeliness. Clearly defined investigation objectives could also improve timeliness. If the agent and vehicle are known, an abbreviated questionnaire may be sufficient to confirm case counts and guide control measures. Conversely, if the agent or vehicle is unknown or unconfirmed, more detailed clinical and exposure histories may be important, and analytic studies considered. Even if there is a strongly suspected vehicle, investigators may consider

epidemiologic and environmental hypothesis testing (e.g., epidemiologic studies, product tracing) to better understand the source of contamination (CIFOR 3rd Edition). Participants raised questions about who should conduct interviews (e.g., foodborne epidemiologists vs. medical epidemiologists or environmental epidemiologists). This question is more complicated in decentralized states where local public health agencies often lead interviews. Who conducts the interviews may be determined by the clinical detail necessary for the investigation, but jurisdictions may also consider clearly outlining interview protocols in advance.

Respondents and participants emphasized the importance of consistent communication and information dissemination during multistate investigations. States that identified cases later in the investigations, as well as programs brought in at a later stage, found it difficult to catch up with the investigation's status and actions. National coordination protocols could include not only a plan for sharing case data with federal partners, but also improved communication dissemination from federal partners to states and data sharing agreements so that federal agencies can share case information with states as feasible. Early planning for improved partner communication and engagement may improve the timeliness of identifying appropriate state contacts for coordination. This is especially true if there are standing data use agreements that can shorten the timeline to stand up information sharing. Additionally, to prepare for instances where states need to be added to an investigation or response effort at a later date, detailed documentation of processes and rationales for decisions made to date will support late state onboarding.

## **Control Measures**

Implementing regulatory action, including recalls, can be especially challenging during NIFO investigations. Regulatory partners should be included in the investigation team, and states may consider developing clear protocols for how product recalls will be rapidly enforced. Challenges are compounded when the implicated product is unregulated (e.g., cannabis edibles, psilocybin-containing products, or other supplements), illness may be related to either the intended health effect or

contamination, laboratory testing may require DEA-certified facilities, regulatory authority may be unclear, and when coordination with law enforcement is required.

These issues are not unique to NIFOs. Infectious outbreaks have also been linked to unregulated products, such as the multistate *Salmonella* outbreak associated with kratom (Schwensohn et al. 2024). Jurisdictions may consider expanding existing protocols, such as those developed for cannabis products (White et al. 2020) and adapt them for both infectious and non-infectious agents linked to unregulated products.

## Resources

Given the infrequent and variable nature of NIFOs, resources need to be flexible, easy to access, and adaptable for just-in-time use. Priority resources identified by respondents included cross-training in outbreak investigation methods and non-infectious agents, as well as resources to improve investigation timeliness, including pre-established partnerships and communication protocols, questionnaire templates, and agent cheat-sheets. Resources to improve outbreak detection included shared syndromic surveillance queries, education for healthcare providers, and formal partnerships between public health and Poison Control Centers. Future trainings and resources should be developed collaboratively with national and state partners, including the Integrated Food Safety Centers of Excellence and CIFOR. Several states are developing their own NIFO guidelines, and respondents expressed strong interest in improved national coordination, such as a standing committee or protocol for coordinating NIFO responses. For just-in-time resources for outbreak investigation methods, non-infectious resources should use or modify existing resources from the Food Safety CoEs (<https://foodsafetycoe.org/>).

## Limitations

This assessment had several limitations. It focused on programs within state and territorial public health agencies, so the perspectives of local and tribal health agencies were not represented and may differ substantially. While we attempted to recruit across programmatic disciplines, most respondents were foodborne disease investigators. Toxicologists were under-represented. Because focus group recruitment was tied to

survey participation, parallel imbalances were reflected in qualitative data. Similarly, the assessment was primarily disseminated through public health agencies, and there may be other agencies involved in these investigations (e.g., Poison Control, Department of Agriculture) that were underrepresented. NIFOs represent a wide range of agents, but recent high-profile investigations may have biased respondents to discuss recent outbreaks, rather than the full spectrum of non-infectious agents. Finally, while this assessment concentrated on widespread, multi-jurisdictional NIFOs, resources are also needed for localized events, including intentional contamination, which were outside the scope of this assessment.



# RECOMMENDATIONS

## CSTE Recommendations for State & Territorial Public Health

**Identify state-specific protocols for collaboration and leadership.** Investigation teams must include partners with expertise in outbreak investigation methods and the agent causing illness. Investigations should be led by programs with outbreak investigation expertise. There should be investigators within the team who are consistently involved in all NIFO investigations to ensure methods are systematically followed and institutional knowledge retained. A NIFO primary point of contact should be identified in each state and communicated to federal agencies for national coordination.

**Develop and update internal and external contact lists.** States should maintain a list of programs and contacts in their jurisdiction who may be involved in a NIFO, including contact information and programmatic expertise and capacity. Contacts should include programs within a public health agency and external agencies (e.g., Poison Control, Department of Agriculture, environmental agencies). Regular interaction between these groups should be programmed in and exercised to maintain those relationships and communication chains.

**Build strong partnerships with Poison Control Centers and other external agencies.** Lack of access to agent expertise was a common challenge. Partnerships should be developed with other programs and agencies with toxicological expertise, including public health laboratories, medical toxicologists, and toxicological programs at federal agencies. These partnerships may already exist within environmental health groups, and environmental health is essential to linking medical toxicology and environmental toxicology. In particular, poison control centers have medical toxicology expertise and can be partners in developing sentinel and complaint-based surveillance for detecting NIFOs and more importantly public health and medical activities to prevent or mitigate exposures. While poison control centers are key partners in these investigations, they typically do not have internal expertise in outbreak investigation

methods and outbreak case exposure assessment, and NIFO leadership should reside primarily within public health agencies.

**Establish formal and informal data sharing agreements.** FDA is limited in their ability to share reported case information with states in the absence of having a 20.88 agreement. These agreements should be established prior to an outbreak, and states should ensure the public health agency that would lead these investigations has a 20.88 agreement. Other informal data sharing agreements and logistics, such as with poison control centers and third-party, private complaint systems (e.g., [iwaspoisoned.com](http://iwaspoisoned.com)) should be established in advance.

**Develop protocols for unregulated products.** Unregulated products present their own set of challenges and can be associated with both infectious and non-infectious agents. As such, states should develop protocols for investigation and recall of unregulated products. Models for such protocols may already exist for products such as cannabis-infused edibles.

## **CSTE Recommendations for Coordinated Public Health Responses**

**Develop NIFO trainings and resources.** Just-in-time trainings and resources should be developed in collaboration with Food Safety CoEs and CIFOR, using instructional design methods that accommodate the needs and objectives of NIFOs, such as shorter, asynchronous formats. Where possible, existing Food Safety CoE resources should be modified and adapted.

**Develop protocols for national coordination of multi-jurisdictional NIFOs and outbreaks of unknown etiology.** Protocols for national coordination should clearly delineate the roles of federal agencies, including CDC (leading epidemiologic investigation) and FDA (leading regulatory investigation and enforcement). CDC should identify points of contact (for both outbreak investigation expertise and agent specific expertise) within the agency and have a clear protocol for NIFO leadership for the epidemiologic investigation. A protocol should include plans for national communication, including investigation updates and bi-directional case information sharing. This could also include additional considerations among FDA recall logistics in coordination with

jurisdictions. These protocols should incorporate state and territorial feedback and be shared widely.

**Improve timeliness of NIFO investigations by rapidly developing national case definitions, drafting standardized outbreak questionnaires, and implementing control measures.** NIFO investigations should abide by the same expectations as infectious outbreak investigations for timely investigation and control measures. CSTE or other non-governmental organizations may fill a pivotal role by bringing together federal, state, and local partners to speedily develop case definitions and standardized outbreak questionnaires and in recommending control measures if these things are not occurring as planned. The formation of a standing committee of national associations, STLT representatives and federal partners could support routine coordination and serve as a home base for developing standardized case definitions, control measures, and other capacity building resources for timely investigations and response.

**Explore partnerships between national organizations and agencies.** Partnerships for a coordinated national response for NIFOs may include CDC, FDA, CSTE, APHL, National Environmental Health Association (NEHA), CIFOR, Food Safety CoEs, STLT public health agencies, and FDA Rapid Response Team programs. Again, a standing committee including these organizations and agencies would support ongoing coordination and identification of needs.

**Provide input on data standardization and platform interoperability.** Standardized data collection and questionnaire template development, with state input, through 1CDP can include NIFO features, such as REDCap interoperability and communication dissemination (e.g., line lists, epidemic curves, environmental data).

## REFERENCES

Centers for Disease Control and Prevention. One CDC Data Platform.

<https://www.cdc.gov/data-modernization/php/one-cdc-data-platform/index.html>

Council to Improve Foodborne Outbreak Response. Guidelines for Foodborne Disease Outbreak Response. Third Edition. <https://cifor.us/downloads/clearinghouse/CIFOR-Guidelines-Complete-third-Ed.-FINAL.pdf>

Firestone MJ, Hedberg CW. Unexplained illnesses associated with a subscription meal service, 2022. *Journal of Food Protection*. 2025.

Georganas A, Maggiore A, Bottex B, European Food Safety Authority. Emerging chemical risks in food and feed. *EFSA Supporting Publications*. 2024.

Greer SL, Jarman H, Kulkoff R, Yaver M. Trump's second presidency begins: evaluating effects on the US health system. *The Lancet*. 2025;48.

Helfrich K, Bryer B, Marshall NC, et al. Perspectives of enteric disease epidemiologists at state public health agencies, United States, 2023. *Journal of Public Health Management and Practice*. 2025; *in press*

Kai Yee Law R, Kisselburgh H, Roblin D, Choudhary E, Schier J, Fraser M, Taylor E. Noninfectious foodborne exposures reported to two national reporting systems, United States, 2000-2010. *Public Health Reports*. 2019;134(5):552-8.

Schwensohn C, Nsubuga J, Cronquist L, et al. A multiple-serotype outbreak of *Salmonella* infections linked to Kratom, United States, 2017-2018. *Foodborne Pathogens and Disease*. 2022;19(9):648-53.

Tilashalski FP, Sillence EM, Newton AE, Biggerstaff GK, FoodCORE Team. Enhancing response to foodborne disease outbreaks: Findings of the Foodborne Disease Centers for Outbreak Response Enhancement (FoodCORE), 2010-2019. *Journal of Public Health Management and Practice*. 2022;28(4):E702-10.

Troeschel AN, Buser MC, Winquist A, et al. Investigation of lead and chromium exposure after consumption of contaminated cinnamon-containing applesauce – United States, November 2023-April 2024. *MMWR*. 2025;74(14):239-244.

US Food and Drug Administration. Investigation of adverse event reports: French lentil and leek crumbles (June 2022). <https://www.fda.gov/food/outbreaks-foodborne-illness/investigation-adverse-event-reports-french-lentil-leek-crumbles-june-2022>

US Food and Drug Administration. Investigation of illnesses: Diamond Shruumz-Brand chocolate bars, cones, and gummies (June 2024). <https://www.fda.gov/food/outbreaks-foodborne-illness/investigation-illnesses-diamond-shruumz-brand-chocolate-bars-cones-gummies-june-2024>

Walker HL, Roland M, Dudley S, et al. Severe health outcomes linked to consumption of mushroom-based psychoactive microdosing products – Arizona, June-October 2024. *MMWR*. 2025;74(1):14-16.

White AE, Van Tubbergen C, Raymes B, Contreras AE, Scallan Walter EJ. Cannabis-infused edible products in Colorado: Food safety and public health implications. *American Journal of Public Health*. 2020;110(6):790-95.

White AE, Garman KN, Hedberg C, et al. Improving foodborne disease surveillance and outbreak detection and response using peer networks – the Integrated Food Safety Centers of Excellence. *Journal of Public Health Management and Practice*. 2023;29(3):287-96.

## APPENDIX A - Additional tables and figures

**Appendix Table A1.** Results of a review of the grey and peer-reviewed literature review for non-infectious foodborne outbreak reports and guidance documents

| Contaminant Category | Contaminant    | Description                                                                                                                                                       | Source Type | Link                                                                                                                                                                                                                                                                                                                                                          |
|----------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Heavy metal          | Lead/Chromium  | Lead and Chromium Poisoning Outbreak Linked to Cinnamon Applesauce Pouches                                                                                        | CDC webpage | <a href="https://www.cdc.gov/lead-prevention/news/outbreak-applesauce-pouches.html">https://www.cdc.gov/lead-prevention/news/outbreak-applesauce-pouches.html</a>                                                                                                                                                                                             |
| Heavy metal          | Lead           | Childhood Lead Exposure Linked to Apple Cinnamon Fruit Puree Pouches — North Carolina, June 2023–January 2024                                                     | MMWR        | <a href="https://www.cdc.gov/mmwr/volumes/73/wr/mm7328a2.htm?s_cid=mm7328a2_w">https://www.cdc.gov/mmwr/volumes/73/wr/mm7328a2.htm?s_cid=mm7328a2_w</a>                                                                                                                                                                                                       |
| Heavy metal          | Lead           | Lead in Spices, Herbal Remedies, and Ceremonial Powders Sampled from Home Investigations for Children with Elevated Blood Lead Levels — North Carolina, 2011–2018 | MMWR        | <a href="https://www.cdc.gov/mmwr/volumes/67/wr/mm6746a2.htm?s_cid=mm6746a2_w">https://www.cdc.gov/mmwr/volumes/67/wr/mm6746a2.htm?s_cid=mm6746a2_w</a>                                                                                                                                                                                                       |
| Heavy metal          | Lead           | Spices found to be a significant source of lead poisoning in Douglas County.                                                                                      | News report | <a href="https://omaha.com/news/local/spices-found-to-be-a-significant-source-of-lead-poisoning-in-douglas-county/article_f64db444-8c47-11ed-9240-2b90c7ed6d19.html">https://omaha.com/news/local/spices-found-to-be-a-significant-source-of-lead-poisoning-in-douglas-county/article_f64db444-8c47-11ed-9240-2b90c7ed6d19.html</a>                           |
| Heavy metal          | Lead           | Re-emergence of Lead Poisoning from Contaminated Flour in a West Bank Palestinian Village                                                                         | Paper       | <a href="https://www.researchgate.net/publication/12393196_Re-emergence_of_Lead_Poisoning_from_Contaminated_Flour_in_a_West_Bank_Palestinian_Village">https://www.researchgate.net/publication/12393196_Re-emergence_of_Lead_Poisoning_from_Contaminated_Flour_in_a_West_Bank_Palestinian_Village</a>                                                         |
| Heavy metal          | Various metals | Toxic metal poisoning of metallic luster dust                                                                                                                     | MMWR        | <a href="https://www.cdc.gov/mmwr/volumes/70/wr/mm7043a2.htm">https://www.cdc.gov/mmwr/volumes/70/wr/mm7043a2.htm</a>                                                                                                                                                                                                                                         |
| Marine toxin         | Scombroid      | Scombroid Poisoning Associated with Tuna Steaks in Louisiana and Tennessee (2006)                                                                                 | MMWR        | <a href="https://www.cdc.gov/mmwr/preview/mmwrhtml/mm5632a2.htm">https://www.cdc.gov/mmwr/preview/mmwrhtml/mm5632a2.htm</a>                                                                                                                                                                                                                                   |
| Marine toxin         | Ciguatera      | Ciguatera Fish Poisoning — New York City, 2010–2011                                                                                                               | MMWR        | <a href="https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6204a1.htm#:~:text=During%20August%202010%E2%80%93July%202011%2C%20New%20York%20City%20experienced%2028,cases%20being%20ide">https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6204a1.htm#:~:text=During%20August%202010%E2%80%93July%202011%2C%20New%20York%20City%20experienced%2028,cases%20being%20ide</a> |

|                     |                      |                                                                                                                                                                                                                                   |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     |                      |                                                                                                                                                                                                                                   |             | <a href="#">ntified%20and%20treated.</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Other natural toxin | Unknown (tara flour) | Unexplained Illnesses Associated with a Subscription Meal Service, 2022                                                                                                                                                           | Paper       | <a href="https://pubmed.ncbi.nlm.nih.gov/39577807/">https://pubmed.ncbi.nlm.nih.gov/39577807/</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Other natural toxin | Unknown (tara flour) | Ingesting Risk — The FDA and New Food Ingredients                                                                                                                                                                                 | Paper       | <a href="https://www.nejm.org.proxy.hsl.ucdenver.edu/doi/full/10.1056%2FNEJMp2403165">https://www.nejm.org.proxy.hsl.ucdenver.edu/doi/full/10.1056%2FNEJMp2403165</a>                                                                                                                                                                                                                                                                                                                                                                                 |
| Other natural toxin | Unknown (tara flour) | Tara flour among emerging issues discussed in Europe                                                                                                                                                                              | News report | <a href="https://www.foodsafetynews.com/2024/08/tara-flour-among-emerging-issues-discussed-in-europe/">https://www.foodsafetynews.com/2024/08/tara-flour-among-emerging-issues-discussed-in-europe/</a>                                                                                                                                                                                                                                                                                                                                               |
| Other natural toxin | Thebaine             | Thebaine in poppy seeds                                                                                                                                                                                                           | News report | <a href="https://www.foodsafetynews.com/2022/11/poppy-seeds-not-meant-for-food-chain-behind-australian-illnesses/?utm_source=Food+Safety+News&amp;utm_campaign=66145e7e37-EMAIL_CAMPAIGN_2022_11_17_12_01&amp;utm_medium=email&amp;utm_term=0_f46cc10150-66145e7e37-40470743">https://www.foodsafetynews.com/2022/11/poppy-seeds-not-meant-for-food-chain-behind-australian-illnesses/?utm_source=Food+Safety+News&amp;utm_campaign=66145e7e37-EMAIL_CAMPAIGN_2022_11_17_12_01&amp;utm_medium=email&amp;utm_term=0_f46cc10150-66145e7e37-40470743</a> |
| Other natural toxin | Nicotine             | Intentional nicotine poisoning of ground beef                                                                                                                                                                                     | MMWR        | <a href="https://www.cdc.gov/mmwr/preview/mmwrhtml/mm5218a3.htm">https://www.cdc.gov/mmwr/preview/mmwrhtml/mm5218a3.htm</a>                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Other natural toxin | Oleander             | Toxic yellow oleander in tejocote root products                                                                                                                                                                                   | News report | <a href="https://www.foodsafetynews.com/2024/04/fda-issues-warning-about-toxic-yellow-oleander-in-tejocote-root-products/">https://www.foodsafetynews.com/2024/04/fda-issues-warning-about-toxic-yellow-oleander-in-tejocote-root-products/</a>                                                                                                                                                                                                                                                                                                       |
| Other natural toxin | Jimsonweed           | Jimsonweed Poisoning Associated with a Homemade Stew --- Maryland, 2008                                                                                                                                                           | MMWR        | <a href="https://www.cdc.gov/mmwr/preview/mmwrhtml/mm5904a3.htm">https://www.cdc.gov/mmwr/preview/mmwrhtml/mm5904a3.htm</a>                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Other natural toxin | Toxic star anise     | Neurological illness following consumption of herbal teas in which Chinese star anise ( <i>Illicium verum</i> ) had been contaminated with or substituted by toxic Japanese star anise ( <i>Illicium anisatum</i> ) – US, Europe, |             | <a href="https://pubmed.ncbi.nlm.nih.gov/15492355/">https://pubmed.ncbi.nlm.nih.gov/15492355/</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Mushroom toxin      | Morel mushroom       | Outbreak Linked to Morel Mushroom Exposure — Montana, 2023                                                                                                                                                                        | MMWR        | <a href="https://www.cdc.gov/mmwr/volumes/73/wr/pdfs/mm7310a1-H.pdf">https://www.cdc.gov/mmwr/volumes/73/wr/pdfs/mm7310a1-H.pdf</a>                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Pesticide           | Endrin               | Endrin Poisoning Associated with Taquito Ingestion -- California                                                                                                                                                                  | MMWR        | <a href="https://www.cdc.gov/mmwr/preview/mmwrhtml/00001395.htm">https://www.cdc.gov/mmwr/preview/mmwrhtml/00001395.htm</a>                                                                                                                                                                                                                                                                                                                                                                                                                           |

|                          |                                                                                                       |                                                                                                                                                               |             |                                                                                                                                                                                                                                       |
|--------------------------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Chemical                 | Sodium azide & hydrazoic acid                                                                         | Sodium Azide Poisoning at a Restaurant — Dallas County, Texas, 2010                                                                                           | MMWR        | <a href="https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6125a1.htm">https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6125a1.htm</a>                                                                                                           |
| Chemical                 | Melamine                                                                                              | Contamination of infant formula – China, 2008                                                                                                                 | NEJM        | <a href="https://pubmed.ncbi.nlm.nih.gov/19196669/">https://pubmed.ncbi.nlm.nih.gov/19196669/</a>                                                                                                                                     |
| Food additive            | Rapeseed oil                                                                                          | Severe illness from adulterated rapeseed oil sold as olive oil causing a novel eosinophilic pneumonia-like illness affecting over 20,000 people – Spain, 1981 | Lancet      | <a href="https://pubmed.ncbi.nlm.nih.gov/6116011/">https://pubmed.ncbi.nlm.nih.gov/6116011/</a>                                                                                                                                       |
| Pharmaceuticals/Chemical | L-tryptophan dietary supplements                                                                      | L-Tryptophan and Eosinophilia-Myalgia Syndrome following a manufacturing process change – US, 1989-1990                                                       | NEJM        | <a href="https://pubmed.ncbi.nlm.nih.gov/2370887/">https://pubmed.ncbi.nlm.nih.gov/2370887/</a>                                                                                                                                       |
| Pharmaceuticals/Chemical | Aegeline                                                                                              | Acute hepatitis and liver failure linked to a dietary supplement                                                                                              | MMWR        | <a href="https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6240a1.htm">https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6240a1.htm</a>                                                                                                           |
| Pharmaceuticals/Chemical | Acetylpsilocin, psilocin, pregabalin, desmethoxyyangonin/dihydrokavain/kavain, Ibotenic acid/muscimol | Severe Illness Potentially Associated with Consuming Diamond Shrooms™ Brand Chocolate Bars, Cones, and Gummies                                                | CDC webpage | <a href="https://www.cdc.gov/environmental-health-studies/outbreak-investigation-diamond-shrooms-products/index.html">https://www.cdc.gov/environmental-health-studies/outbreak-investigation-diamond-shrooms-products/index.html</a> |



**REDCap** ranking as a platform to share de-identified data with CDC by program area (n=73 respondents\*)

|                                     |            |            |            |            |            |            |
|-------------------------------------|------------|------------|------------|------------|------------|------------|
| <b>Cross-cutting outbreak team</b>  | 30         | 33         | 26         | 7          | 0          | 4          |
| <b>Emergency preparedness</b>       | 36         | 18         | 36         | 9          | 0          | 0          |
| <b>Environmental epidemiology</b>   | 31         | 46         | 15         | 8          | 0          | 0          |
| <b>Environmental health</b>         | 35         | 41         | 18         | 6          | 0          | 0          |
| <b>Foodborne disease</b>            | 19         | 34         | 28         | 11         | 4          | 4          |
| <b>Laboratory</b>                   | 33         | 0          | 67         | 0          | 0          | 0          |
| <b>Other infectious disease</b>     | 13         | 31         | 38         | 13         | 6          | 0          |
| <b>Reportable Conditions</b>        | 19         | 38         | 19         | 19         | 4          | 0          |
| <b>Substance use</b>                | 86         | 0          | 14         | 0          | 0          | 0          |
| <b>Toxicology/Hazard Assessment</b> | 43         | 29         | 14         | 14         | 0          | 0          |
|                                     | <b>1st</b> | <b>2nd</b> | <b>3rd</b> | <b>4th</b> | <b>5th</b> | <b>6th</b> |

\*Respondents may select more than one program area

**REDCap** ranking as a platform to share de-identified data with CDC by program-area outbreak expertise (n=73 respondents)

|                                   |            |            |            |            |            |            |
|-----------------------------------|------------|------------|------------|------------|------------|------------|
| <b>Outbreak Programs</b>          | 18         | 35         | 23         | 15         | 5          | 5          |
| <b>Non-Outbreak Programs</b>      | 29         | 41         | 24         | 6          | 0          | 0          |
| <b>Multidisciplinary Programs</b> | 38         | 31         | 31         | 0          | 0          | 0          |
|                                   | <b>1st</b> | <b>2nd</b> | <b>3rd</b> | <b>4th</b> | <b>5th</b> | <b>6th</b> |

**SEDRIC** ranking as a platform to share de-identified data with CDC by program area (n=73 respondents\*)

|                                     |            |            |            |            |            |            |
|-------------------------------------|------------|------------|------------|------------|------------|------------|
| <b>Cross-cutting outbreak team</b>  | 56         | 33         | 4          | 0          | 7          | 0          |
| <b>Emergency preparedness</b>       | 27         | 45         | 9          | 9          | 9          | 0          |
| <b>Environmental epidemiology</b>   | 38         | 31         | 8          | 8          | 15         | 0          |
| <b>Environmental health</b>         | 24         | 41         | 24         | 6          | 6          | 0          |
| <b>Foodborne disease</b>            | 60         | 23         | 9          | 4          | 4          | 0          |
| <b>Laboratory</b>                   | 33         | 17         | 17         | 17         | 17         | 0          |
| <b>Other infectious disease</b>     | 56         | 31         | 0          | 0          | 13         | 0          |
| <b>Reportable Conditions</b>        | 58         | 27         | 4          | 0          | 12         | 0          |
| <b>Substance use</b>                | 0          | 14         | 29         | 14         | 43         | 0          |
| <b>Toxicology/Hazard Assessment</b> | 29         | 43         | 0          | 14         | 14         | 0          |
|                                     | <b>1st</b> | <b>2nd</b> | <b>3rd</b> | <b>4th</b> | <b>5th</b> | <b>6th</b> |

\*Respondents may select more than one program area

**SEDRIC** ranking as a platform to share de-identified data with CDC by program-area outbreak expertise (n=73 respondents)

|                                   |            |            |            |            |            |            |
|-----------------------------------|------------|------------|------------|------------|------------|------------|
| <b>Outbreak Programs</b>          | 65         | 25         | 5          | 3          | 3          | 0          |
| <b>Non-Outbreak Programs</b>      | 18         | 18         | 18         | 18         | 29         | 0          |
| <b>Multidisciplinary Programs</b> | 31         | 38         | 13         | 6          | 13         | 0          |
|                                   | <b>1st</b> | <b>2nd</b> | <b>3rd</b> | <b>4th</b> | <b>5th</b> | <b>6th</b> |

## **APPENDIX B – Key Informant Interview Questions**

What were the biggest challenges in recent non-infectious foodborne outbreaks?

How could the timeliness of these investigations be improved?

What determines who leads a non-infectious foodborne outbreak in your jurisdiction?

What are the options for data sharing during these investigations? What are the limitations of these options?

What do you want these investigations to look like going forward?

What resources do you think are needed?

What other thoughts do you have?

## APPENDIX C – Online Assessment Tool

The Council of State and Territorial Epidemiologists (CSTE) invites you to participate in this assessment on **non-infectious foodborne outbreaks**.

We are seeking input from professionals in programs such as environmental health, foodborne epidemiology, and toxicology at state public health agencies. Your responses will help guide the development of recommendations and model practices for investigating non-infectious foodborne outbreaks.

Please coordinate with your team to submit one response per program. If multiple programs at your agency would be involved in an investigation, each program should submit a separate response.

The assessment should take approximately 15-20 minutes to complete (including the time it takes to discuss with your team), and all responses will be confidential. Contact [alice.white@cuanschutz.edu](mailto:alice.white@cuanschutz.edu) if you have questions.

*Non-infectious foodborne outbreak definition: For the purposes of this assessment, a non-infectious foodborne outbreak refers to an outbreak caused by consuming a food or drink contaminated by a non-infectious or unknown agent. This can include, but is not limited to, chemicals, food additives, fish and shellfish toxins, mushroom toxins, cannabis, unregulated substances, pharmaceuticals, pesticides, and heavy metals.*

*Unlike infectious foodborne diseases, which are caused by bacteria, viruses, or parasites, noninfectious foodborne illnesses are not contagious and cannot be spread from person to person.*

### Eligibility

1. What type of agency do you work at?

- State public health agency
- Tribal public health agency
- Local public health agency
- Territorial public health agency
- State agriculture agency
- State environmental agency
- CDC
- FDA
- Other (specify): \_\_\_\_\_

*If local public health agency, “Thank you for your interest! This assessment is intended for state-level agencies. We hope to gather feedback from local public health partners in the future. You are welcome to continue, but your responses may not be included in the results.”*

### Background

2. What is your jurisdiction? (drop down)

•

3. Which describes your program(s)? (Select all)

- Cross-cutting outbreak team
- Emergency preparedness
- Environmental epidemiology
- Environmental health
- Foodborne disease
- Laboratory
- Other infectious disease
- Reportable Conditions
- Substance use
- Toxicology/Hazard Assessment
- Other (specify): \_\_\_\_\_

## Program Capacity

4. How confident is your program in responding to non-infectious foodborne outbreaks? (Not at all confident / Not very confident / Neutral / Confident / Very confident)

5a. [If confident/very confident] What contributes to your program's ability to respond to non-infectious foodborne outbreaks? (open)

5b. [If neutral/not very/not at all confident] What would improve your program's ability to respond to non-infectious foodborne outbreaks? (open)

6. Describe any impacts from proposed federal public health funding reductions on your program's ability to investigate non-infectious foodborne outbreaks. (open)

## Barriers & Future Strategies

The next several questions will ask about barriers your program may face during non-infectious foodborne outbreak investigations. Please answer based on your overall experience. We understand that barriers may vary between outbreaks – just do your best to reflect common or significant challenges. There will be an opportunity to share additional context at the end of the assessment.

### Challenges with Communication & Leadership

7. How challenging are the following activities for your program during non-infectious foodborne outbreak investigations:

|  | Not applicable for my program | 1 – Not a challenge<br><i>Easily completed</i> | 2 – Minor challenge<br><i>Requires some extra</i> | 3 – Moderate challenge<br><i>Requires extra effort</i> | 4 – Major challenge<br><i>Demands significant</i> | 5 – Extreme challenge<br><i>Very difficult or</i> |
|--|-------------------------------|------------------------------------------------|---------------------------------------------------|--------------------------------------------------------|---------------------------------------------------|---------------------------------------------------|
|  |                               |                                                |                                                   |                                                        |                                                   |                                                   |

|                                                      |  |                                          |                                                     |                                                 |                                                            |                                                           |
|------------------------------------------------------|--|------------------------------------------|-----------------------------------------------------|-------------------------------------------------|------------------------------------------------------------|-----------------------------------------------------------|
|                                                      |  | <i>with existing staff and protocols</i> | <i>effort but does not affect the investigation</i> | <i>and may delay parts of the investigation</i> | <i>effort, causing delays or gaps in the investigation</i> | <i>impossible. The investigation is severely impacted</i> |
| Identifying an investigation lead                    |  |                                          |                                                     |                                                 |                                                            |                                                           |
| Defining team roles and responsibilities             |  |                                          |                                                     |                                                 |                                                            |                                                           |
| Coordinating with other programs within your agency  |  |                                          |                                                     |                                                 |                                                            |                                                           |
| Coordinating with other state public health agencies |  |                                          |                                                     |                                                 |                                                            |                                                           |
| Coordinating with local public health agencies       |  |                                          |                                                     |                                                 |                                                            |                                                           |
| Coordinating with FDA                                |  |                                          |                                                     |                                                 |                                                            |                                                           |
| Coordinating with CDC                                |  |                                          |                                                     |                                                 |                                                            |                                                           |

8. Does a specific program at your agency usually lead non-infectious foodborne outbreaks when the agent is unknown? (Yes / No / Unsure)

9. *[If yes]* Which program typically leads these investigations?

- Cross-cutting outbreak team
- Emergency preparedness
- Environmental epidemiology
- Environmental health
- Foodborne disease
- Laboratory
- Other infectious disease
- Reportable Conditions
- Substance use
- Toxicology/Hazard Assessment
- Other (specify): \_\_\_\_\_

10. How does your agency decide who leads these investigations? (select all)

- Established protocol
- Based on outbreak investigation expertise
- Based on expertise of the suspect agent (e.g., toxicology)
- Based on expertise in foodborne disease
- No clear decision process
- Other (specify): \_\_\_\_\_

### Challenges with Outbreak Detection & Case Finding

11. If notified of a multi-state non-infectious foodborne outbreak, how would your program identify cases in your jurisdiction? (Select all)

- Syndromic surveillance
- Poison control reports
- Complaint-based surveillance
- Notifications from health care providers
- Notifications from FDA
- Notifications from CDC
- Other (specify): \_\_\_\_\_

12. How challenging are the following activities for your program during non-infectious foodborne outbreak investigations:

|                              | Not applicable for my program | 1 – Not a challenge<br><i>Easily completed with existing staff and protocols</i> | 2 – Minor challenge<br><i>Requires some extra effort but does not affect the investigation</i> | 3 – Moderate challenge<br><i>Requires extra effort and may delay parts of the investigation</i> | 4 – Major challenge<br><i>Demands significant effort, causing delays or gaps in the investigation</i> | 5 – Extreme challenge<br><i>Very difficult or impossible. The investigation is severely impacted</i> |
|------------------------------|-------------------------------|----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| Identifying the outbreak     |                               |                                                                                  |                                                                                                |                                                                                                 |                                                                                                       |                                                                                                      |
| Developing a case definition |                               |                                                                                  |                                                                                                |                                                                                                 |                                                                                                       |                                                                                                      |
| Identifying additional cases |                               |                                                                                  |                                                                                                |                                                                                                 |                                                                                                       |                                                                                                      |

### Challenges with Data Collection

13. How challenging are the following activities for your program during non-infectious foodborne outbreak investigations:

|                                                        | Not applicable for my program | 1 – Not a challenge<br><i>Easily completed with existing staff and protocols</i> | 2 – Minor challenge<br><i>Requires some extra effort but does not affect the investigation</i> | 3 – Moderate challenge<br><i>Requires extra effort and may delay parts of the investigation</i> | 4 – Major challenge<br><i>Demands significant effort, causing delays or gaps in the investigation</i> | 5 – Extreme challenge<br><i>Very difficult or impossible. The investigation is severely impacted</i> |
|--------------------------------------------------------|-------------------------------|----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| Developing an outbreak-specific questionnaire          |                               |                                                                                  |                                                                                                |                                                                                                 |                                                                                                       |                                                                                                      |
| Maintaining a centralized, standardized line list      |                               |                                                                                  |                                                                                                |                                                                                                 |                                                                                                       |                                                                                                      |
| Having sufficient capacity to interview cases          |                               |                                                                                  |                                                                                                |                                                                                                 |                                                                                                       |                                                                                                      |
| Collecting complex non-infectious clinical information |                               |                                                                                  |                                                                                                |                                                                                                 |                                                                                                       |                                                                                                      |
| Collecting detailed food histories                     |                               |                                                                                  |                                                                                                |                                                                                                 |                                                                                                       |                                                                                                      |

14. What system(s) does your program use to maintain a line list during a non-infectious foodborne outbreak? (select all)

- Google Sheets
- Microsoft Excel
- REDCap

15. *[If selected]* How does your agency integrate REDCap with your state reportable conditions surveillance system?

- State reportable conditions surveillance system

16. *[If selected]* What surveillance system? EpiTrax, Maven, NEDSS, state-developed, other (specify):

- Other (specify):

### Challenges with Data Sharing



17. How challenging are the following activities for your program during non-infectious foodborne outbreak investigations:

|                                                            | Not applicable for my program | 1 – Not a challenge<br><i>Easily completed with existing staff and protocols</i> | 2 – Minor challenge<br><i>Requires some extra effort but does not affect the investigation</i> | 3 – Moderate challenge<br><i>Requires extra effort and may delay parts of the investigation</i> | 4 – Major challenge<br><i>Demands significant effort, causing delays or gaps in the investigation</i> | 5 – Extreme challenge<br><i>Very difficult or impossible. The investigation is severely impacted</i> |
|------------------------------------------------------------|-------------------------------|----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| Sharing case information between programs within my agency |                               |                                                                                  |                                                                                                |                                                                                                 |                                                                                                       |                                                                                                      |
| Reporting case information to CDC                          |                               |                                                                                  |                                                                                                |                                                                                                 |                                                                                                       |                                                                                                      |
| Receiving case information from FDA                        |                               |                                                                                  |                                                                                                |                                                                                                 |                                                                                                       |                                                                                                      |

18. Rank the following systems to share de-identified case data with CDC (*Drag and drop to rank from most preferred to least preferred.*)

- Google Forms
- REDCap
- SEDRIC (System for Enteric Disease Response, Investigation, and Coordination)
- Microsoft Excel
- CDC ShareFile portal
- Other (specify):

### Challenges with Control Measures

19. How challenging are the following activities for your program during non-infectious foodborne outbreak investigations:

|  | Not applicable for my program | 1 – Not a challenge<br><i>Easily completed with existing</i> | 2 – Minor challenge<br><i>Requires some extra effort but</i> | 3 – Moderate challenge<br><i>Requires extra effort and may</i> | 4 – Major challenge<br><i>Demands significant effort,</i> | 5 – Extreme challenge<br><i>Very difficult or impossible.</i> |
|--|-------------------------------|--------------------------------------------------------------|--------------------------------------------------------------|----------------------------------------------------------------|-----------------------------------------------------------|---------------------------------------------------------------|
|--|-------------------------------|--------------------------------------------------------------|--------------------------------------------------------------|----------------------------------------------------------------|-----------------------------------------------------------|---------------------------------------------------------------|

|                                                                                                                                           |  | <i>staff and protocols</i> | <i>does not affect the investigation</i> | <i>delay parts of the investigation</i> | <i>causing delays or gaps in the investigation</i> | <i>The investigation is severely impacted</i> |
|-------------------------------------------------------------------------------------------------------------------------------------------|--|----------------------------|------------------------------------------|-----------------------------------------|----------------------------------------------------|-----------------------------------------------|
| Conducting analytic studies (e.g., case-control study, binomial probability, subcluster analysis) to identify the source of contamination |  |                            |                                          |                                         |                                                    |                                               |
| Conducting traceback investigations to identify the source of contamination                                                               |  |                            |                                          |                                         |                                                    |                                               |
| Initiating product recalls                                                                                                                |  |                            |                                          |                                         |                                                    |                                               |
| Enforcing product recalls                                                                                                                 |  |                            |                                          |                                         |                                                    |                                               |

## Resources

20. Which of the following resources would you be interested in for future non-infectious foodborne outbreak preparedness?

|                                      | I'm unsure what this is | 1 - Not interested | 2 - Slightly interested | 3 - Neutral | 4 - Interested | 5 - Very interested |
|--------------------------------------|-------------------------|--------------------|-------------------------|-------------|----------------|---------------------|
| Guidance on who leads investigations |                         |                    |                         |             |                |                     |
| Guidance on team roles               |                         |                    |                         |             |                |                     |
| Outbreak questionnaire               |                         |                    |                         |             |                |                     |

|                                                                       |  |  |  |  |  |  |
|-----------------------------------------------------------------------|--|--|--|--|--|--|
| templates                                                             |  |  |  |  |  |  |
| Formal data sharing agreements (e.g., 20.88 agreement with FDA, MOUs) |  |  |  |  |  |  |
| Agent-specific resources (e.g., chemicals, heavy metals, cannabis)    |  |  |  |  |  |  |
| Public communication templates                                        |  |  |  |  |  |  |
| Tabletop exercises                                                    |  |  |  |  |  |  |
| Cross-training in outbreak investigation techniques                   |  |  |  |  |  |  |

21. What other resources would improve your program's ability to investigate non-infectious foodborne outbreaks? (open)

## Wrap up

22. Please use the space below to share anything else you feel is important about non-infectious foodborne outbreak investigations. (open)

23. Would someone from your program be interested in participating in small group discussions about how to improve non-infectious foodborne outbreak investigations (this would take one hour of their time from late June to early July)? (Yes/No)

24a. [If yes] Please provide an email:

24b. [If yes] What topics would your program like to discuss in more detail? (open)

Thank you for taking the time to complete this assessment. Your feedback will be essential to developing recommendations for non-infectious foodborne outbreak investigations. Please email [alice.white@cuanschutz.edu](mailto:alice.white@cuanschutz.edu) with any questions or concerns.

# APPENDIX D – Focus Group Guide

## Focus Group Interview Guide:

### CSTE Non-Infectious Foodborne Outbreaks Projects

#### Welcome and Introduction (about 4 minutes)

*Hi everyone and thank you so much for being here today. I truly appreciate your time and your willingness to participate in this discussion. As a reminder, these focus groups are part of a project led by the Colorado Integrated Food Safety Center of Excellence and the Council of State and Territorial Epidemiologists. We're gathering input from professionals working at the state level so that we can gain insights into investigating non-infectious foodborne outbreaks. We started by sending out an assessment that is still in its collection phase, and we are also completing these focus groups to supplement the assessment results. In total, we're aiming to complete 4 to 5 focus groups.*

*My name is Kate Helfrich, and I'm with the Colorado Integrated Food Safety Center of Excellence. I come from a background in public health as both an epidemiologist and public health nurse, and I'll be facilitating today's focus group. I'm joined by [Amanda/Alice], also from the Colorado Food Safety CoE, who will be co-facilitating.*

*Before we begin, I'd like to share a brief overview and a few logistics.*

*Today's focus group is centered on non-infectious foodborne outbreaks—a category that, we all know, is complex, diverse, and often challenging to respond to. These outbreaks can be triggered by a wide range of agents, from paralytic shellfish poisoning to heavy metal contamination (like lead), toxins, chemicals, or other impurities found in food or consumable products. They may be identified in many different ways and involve varied disciplines across public health and regulatory systems. Because this topic is so broad, I encourage you to keep that breadth in mind as we move through the conversation.*

*Our main goal today is to explore what future responses and model practices could look like—and what it would take to achieve them. To that end, although we hope you'll draw on your past experiences, we'll be focusing specifically on forward-looking strategies that could help strengthen future responses to non-infectious foodborne outbreaks, rather than hot washing past investigations.*

*To help us stay focused and fully engaged, today's session will be recorded. This allows me, specifically, to avoid taking extensive notes and ensures that I can engage and keep the conversation on track. The recordings will be used to prepare a summary report that highlights key insights and themes. While we may use direct quotes to illustrate those themes, we will not include any individual names or programs.*

*A few additional notes before we begin:*

- *I'll guide us with a few structured questions, but this is intended to be a conversation, not a formal interview.*
- *Please respond to each other, share your perspectives, and ask questions.*

- *If you feel comfortable, turning on your video is encouraged*
- *If possible, please stay off mute so that you can jump in quickly*
- *Please also share your thoughts verbally rather than in the chat.*
- *There are no right or wrong answers, and I just ask everyone to be respectful of differing viewpoints.*
- *If we stray too far from the topic, I'll gently guide us back.*
- *And finally, please make sure your microphone is working so you can fully participate.*

*With that, if you're not comfortable being recorded, you're welcome to decline participation, and we can follow up to find an alternative way for you to share your input. But I'm going to **hit record**, and it should prompt you to consent, and let's go ahead and get started.*

*Let's take just a real quick minute to go around and have everyone introduce themselves. Please let us know your name, the state in which you work, and the type of program you work in, such as foodborne, cross-cutting infectious disease, or environmental health.*

### Opening Question(s):

*To Start, we want to talk about data sharing particularly in the context of multistate outbreaks involving coordination across jurisdictions or with federal agencies.*

1. In our assessment, SEDRIC and RedCap were both ranked as preferred methods to share de-identified data during an outbreak. We also acknowledge that most of our assessment respondents to date have been from cross-cutting or foodborne epi programs.

With that in mind, what features of these platforms make them preferred over others?

2. Still thinking about SEDRIC and RedCap. What are some of the barriers to using these platforms for non-infectious foodborne outbreaks?

Potential Probes:

What solutions do you think could help with that?

Would that solution be helpful to others on the call?

*Now we want to shift gears and think about how states coordinate internally — across programs or departments — to respond to non-infectious foodborne outbreaks.*

3. Based on the assessment responses, it looks like most programs assign outbreak leadership to those with outbreak investigation expertise or those with expertise on the specific agent. However, we've also heard that in practice, it's not always clear who should be involved, or when.

How would you recommend developing guidance on which groups or programs should be involved in these outbreak investigations?

Potential Probe:

Would this look different for home rule states vs non home rule states?

*As we move into these next questions, I encourage you to think broadly. Feel free to reflect on what works (or doesn't) in your own context, but also on patterns or challenges you've seen at the regional or national level.*

4. In past outbreaks timeliness has been a challenge whether related to developing questionnaires, initiating product recalls, or sharing critical information. What do you think could improve the timeliness of these investigations in the future?

*If Time Allows:*

5. We learned from the assessment that expertise plays a significant role in the confidence of programs responding to investigations. How can we build up and maintain expertise for these investigations?

Potential Probe:

What would improve your program's ability to respond to non-infectious foodborne outbreaks?

Would this look different for home rule states vs non home rule states?

6. What resources would better prepare programs for future non-infectious foodborne disease investigations?

. Potential Probes:

How do others feel about that?

Would that resource not work for anyone? Why?

Would having that at your agency improve your ability to respond?

*If building/sustaining relationships comes up:* From a national perspective, how could we formally support or encourage the development of that kind of resource?

## **FINAL QUESTION**

Thinking about the broader topic of non-infectious foodborne outbreak response...

6. What else haven't we discussed that you feel is important?

## **Prompts To Use as Needed:**

- Who else has something to say?
- I would like to hear more from...
- Would you explain further?
- Would you give an example?
- Does anyone have a different take?

- Has anyone tried a different approach?

#### Potential Backup Questions/Prompts:

1. When it comes to training, protocols, or other shared resources, how targeted or general do you think they should be? Should they be tailored to a specific audience (e.g., environmental health, epidemiology), state, or agent type, or should they be broadly applicable?
2. What investigation techniques do you think need to be improved during non-infectious foodborne outbreaks? Clarification if needed: This could include case-finding, interview techniques, analytic epi studies, environmental investigations, or any other method you rely on.
3. What single change would make the biggest impact to improve collaboration for a non-infectious foodborne outbreak involving multiple programs or agencies? Potential Probe: What are the facilitators and barriers to making that change at your agency

