Running Head: FOOD PROTECTION

Environmental Health Professionals on Food Protection and Defense: A Needs Assessment and Suggestions for Future Research

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Abstract

When it comes to the public food supply, it is the environmental health (EH) professionals' job to oversee its safety and protection; however, there is little research on EH professionals' role in terror-related emergencies involving the food supply. Focus groups of EH professionals from Michigan, California, and Minnesota were conducted to assess the general knowledge and concerns of food safety personnel, as well as identifying gaps in existing education materials. EH professionals are aware of the potential for the intentional contamination of the food supply, but information is limited. Moreover, EH professionals do not believe their role in intentional contamination incidents involving the food supply is clearly defined.

The data collected in this paper supports the data from Reischl and Buss (2004) in that knowledge of intentional food contamination is mediocre at best and more training is needed. EH professionals have a variety of training methods available to them, as well as a preference for many; however, there is no clear consensus on which delivery methods are preferred. Three perspectives on coordination, the bureaucratic, structural, and network perspectives, are offered to help guide future research and education planning.

Table of Contents

Environmental Health Professionals on Food Protection and Defense: A Needs Assessment and Suggestions for Future Research

A preliminary investigation of environmental health (EH) professionals' roles and training needs relative to terrorism-related emergencies indicates that more attention needs to be paid to equipping these individuals to prepare for, prevent, and respond to intentionally-created food contamination crises (Reischl and Buss, 2004). First responders (e.g. firefighters, law enforcement personnel) are typically trained to deal with all types of emergencies. Relative to the food supply as a target of terrorism, it is the EH professionals' job to oversee its safety and protection (neha.org, 2007). There is, however, little research on EH professionals' role relative to terror-related emergencies involving the food supply. This paper describes research to identify the educational needs of EH professionals across government borders in order to ultimately develop educational materials to equip EH professionals to manage and mitigate terror-related food emergencies. In addition, it outlines three perspectives on coordination between organizations during emergency response situations to help guide future research.

A collaboration between the U.S. Department of Homeland Security's (DHS) National Center for Food Protection and Defense (NCFPD), a DHS Academic Center of Excellence, and the Association of Food and Drug Officials (AFDO) has lead to research into food biosecurity: threat prevention, threat response, risk management and communication, and education are key components of that research. As an education partner in the NCFPD, researchers at Michigan State University's National Food Safety and Toxicology Center (NFSTC) have begun to investigate the communication between individuals in the public and private sector on food-related intentional contamination issues, and in addition, have focused upon providing educational materials to food regulatory personnel.

In Fall 2006, the NFSTC component of the NCFPD lead three focus groups of EH professionals from Michigan, California, and Minnesota to assess the general knowledge and concerns of food safety personnel relative to food protection and intentional contamination, to address their perceived and stated roles in an event, to collate their views on preferred educational content and delivery modes, to identify gaps in existing education materials, and to determine barriers relative to their receipt of training. This paper describes general patterns in the data in order to provide background for a more in-depth needs assessment that will help develop core-competencies and training materials for EH professionals relative to food protection.

Background

In July 2004, Reischl and Buss conducted and summarized findings from a state-wide study of EH professionals in Michigan to identify their needs in becoming better prepared for bioterrorism and other terrorist-caused emergencies. The aims of the research were to determine the self-rated level of confidence among Michigan's EH professionals for demonstrating relevant emergency planning and response competencies, and to also determine the specific training topic preferences of Michigan's EH professionals. Responses were collected from 404 EH professionals representing all 45 local health departments from throughout the state. Results indicated that the top five training topics, in order, are: (1) EH role in emergencies, (2) water security, (3) food security, (4) biological emergency responses: principles and procedures, and (5) risk assessment applications for EH emergencies. Furthermore, 49 percent of respondents indicated a preference towards training in food security, suggesting a concern for food in terrorist-related incidents. In addition, EH professionals rated their confidence levels for key competencies for describing, performing, and identifying skills needed for effective emergency response. Four response themes were summarized as: (1) describing the role of EH professionals,

(2) planning for emergency response, (3) identifying key system resources, and (4) emergency response and mitigation. Most responses gravitated towards the middle on a five-point scale, while the lowest confidence ratings were in describing the role of EH professionals in emergency response.

Table 1. Preferred Training Topics Among Michigan's EH Professionals

According to this research, EH professionals' role in emergencies is the most prominent training topic (68 percent of respondents endorsed), but drew the lowest confidence rating. Confidence ratings between 2.02 and 3.21 on a five-point scale were reported on the ability of EH professionals to describe their role in emergency situations. An average rating of 3.21 on a five-point scale was reported for the maintenance of regular communication with partner professionals in other agencies, but ratings dropped to 2.65 when participants were asked to describe their role in emergency response as outlined by their own agencies' plan. Confidence ratings between 2.34 and 3.15 on a five-point scale were reported by EH professionals when asked about planning for emergency response, ratings between 2.85 and 3.54 on a five-point scale were reported when they were asked about identifying key system resources (although the lowest rating was their ability to identify system resources outside of their agency), and finally ratings between 2.69 and 3.54 were reported on the EH professions' ability relating to emergency response and mitigation. Lastly, three additional competencies were reported from EH directors and supervisors on their ability to plan for emergencies. Ratings were between 2.64 and 2.94 on a five-point scale having no average above 3.0 like other groups; this suggests that individuals

who are in charge of the creation and dissemination of planning guidelines are in need of emergency preparedness training.

Table 2. Confidence Ratings of Michigan EH Professionals

Method

Three focus groups consisting of state and county EH managers/directors (N=15) from Michigan (N=5), Minnesota (N=6), and California (N=4), including one chairman of an academic department of environmental health at a California community college, were conducted during Fall 2006 by the education component of the NCFPD. Participants were selected according to an availability sample; participants from each state were solicited asking for their participation in a one-hour focus group conducted via telephone conference call. Final participation was determined by the majority's availability, and a time, date, and list of participants was confirmed.

Each focus group was moderated by one of the two graduate students who conducted this research. A moderator guide was developed and used to prompt participants' responses to questions relative to the intentional contamination of food and education on that subject. The guide was supplemented by support questions and prompts generated by the moderator order to facilitate order and clarity. The focus groups were recorded on cassette tape and transcribed by graduate students. The transcribed data was grouped, analyzed, and synthesized to produce the results summarized below.

Results

Results were synthesized according to eight research questions: (1) What do professionals know about intentional contamination, (2) what do EH professionals see as their role in intentional contamination events, (3) what organizations or groups of people do EH professionals see as responsible for intentional contamination, (4) how do EH professionals describe their relationship with emergency responders, (5) how are EH professionals trained in general and specific to intentional contamination, (6) what training do EH professionals prefer, (7) what delivery methods of training do EH professionals prefer, and (8) what are barriers to training?

Table 3. Research Questions

These research questions were reduced to two sections in the description of results below: *Knowledge of Intentional Contamination Issues* and *Training and Education on Intentional Contamination Issues.*

Knowledge of Intentional Contamination Issues

Environmental health professionals are aware of the potential for the intentional contamination of the food supply, but information is limited. Because EH professionals participating in the focus groups have had little to no experience with intentional contamination, particularly in their own jurisdiction, awareness has stemmed from professional publications, the CDC, and information reported by the general news media. Along with the absence of localized examples from which to learn, other limitations include the rarity with which food service operators ask EH professionals about intentional contamination. This has prevented the concern

from entering their daily job routine. They feel that awareness levels do need to change, but first the gaps relative to the consistency of information and messages must be addressed.

Roles in intentional contamination events are similarly unspecified. EH professionals say that they have yet to make the jump from food protection to food defense, so their job is food safety and food security ("acknowledging a need to incorporate defense into safety") rather than prevention of intentional incidents. They do think that their roles are not clearly defined, especially for specific events; as of now, they still follow normal procedures even if an event was intentional. They feel that they are making the mistake of trying to define roles as they go along, rather than defining where they need to be. In short, they feel that their role as defined by others has been to be reactive as opposed to proactive with intentional contamination issues.

EH professionals see themselves as first responders and the first line of defense for anything unusual in a food facility. Even reporting the smallest incident, claims one respondent, is important, as it could be intentional, and they identified their own need to educate food providers more and more on contamination issues. Educational topics addressed by EH professionals in Minnesota, a state that encourages the conveyance of the difference between intentional and non-intentional contamination issues by EH professionals to their clientele, include leaving food unprotected, site security, inspection of deliveries, verification of delivery personnel, inspection the condition of food, employee security, and other issues related to the retail environment. EH professionals, however, do not understand how to help food packaging as it involves different controls compared with food service. It was also stated that improvements were needed in EH professionals' communication of resources and meeting customers' needs.

Insights and suggestions into their roles in intentional contamination issues were briefly mentioned. One group stated that an algorithm is used in their investigative procedures that

included: determining the extent of outbreak; looking for contamination, growth, and survival of the contaminate; and initiating a destructive or corrective measure. This model feeds into emergency operations in the event of bioterrorism incident. Additionally, EH professionals stated that they frequently work on teams with public health and labs on outbreaks once an incident becomes larger.

The distribution of responsibility for intentional contamination events is unclear. Some EH professionals do not see any way to protect the intentional contamination of the food supply, contending that it is up to food service personnel (educated by EH professionals) in industry to be the first barriers. Industry bares a major responsibility according to EH professionals because of their own need to safeguard their product; however, no direct responsibility or reactive role within industry was stated. This is coupled with the belief that many industry partners do not have mandatory training. Furthermore, public health becomes the next responsible party, but it is not clear who will run the investigation once several parties are involved.

EH professionals have the job of determining whom to involve in investigations, but their knowledge of the practice is limited. Use of the Incident Command System (ICS) was mentioned briefly, but it was stated that not everyone knows how to use it. Public health has bioterrorism coordinators, but they do not necessarily involve environmental health; public health also has epidemiologists that are separate from environmental health.

It was stated that the main difference with intentional contamination, as opposed to accidental contamination, is the involvement of law enforcement and opening dispatch. Law enforcement has responsibility for communicating with environmental health if they are the first responders, but EH professionals say that law enforcement has been unable to recognize environmental health's role in an investigation. They suggest that there needs to be an

institutional understanding and connection with emergency responders, particularly police and fire. Communication with emergency responders occurs in infrequent meetings (Michigan) and using the same listserv (Minnesota), but they say it is relatively new and more communication is needed. To one participant, the Sheriff's office seemed to know to contact environmental health right away in a food related incident, but they never hear from police or fire officials.

EH professionals say that the product involved in an intentional contamination event determines responsibility to state and/or federal entities. In the entirety of the focus groups, parties/entities who would be involved in a contamination incident, aside from environmental health, include: local law enforcement, fire and emergency medical technicians, public health including labs, epidemiologists, and nurses, state police, the Federal Bureau of Investigation, DHS, the CDC, the food service industry, the food packaging industry, and the food transportation industry. There is, however, no hierarchical order or system of understanding of the system for response once all parties become involved. EH professionals felt that initial responsibility should reside in investigators, but due to limited experience lack the knowledge to fulfill this role.

Training and Education on Intentional Contamination Issues

Environmental health professionals feel that their training is not specific to intentional contamination issues; a predominant limitation suggested by EH professionals is the lack of training that is specific to procedures and skills needed to respond to and investigate intentional contamination incidents. One downside of inadequate skill levels and experiences associated with an intentional contamination event is the prevention of investigators from recognizing whether an event is intentional or accidental. Training has usually been categorized under formal

disaster, bioterror, and chemical response, but not specifically intentional food contamination, and was stated as being very piecemeal. Despite these concerns, EH professionals do feel that the all-hazards approach to training has increased dramatically and is much better than in the past.

Some broadening of knowledge has occurred though EH professionals' attendance at conferences or professional organization meetings that include guest speakers. Additional sources are info from federal agencies' online training and from less technical journals. In addition, employing graduate students who receive training at universities or through DHS-funding has boosted organizational knowledge. Specific resources mentioned by the EH professionals include, in no particular order: Center for Disease Control (CDC), National Environmental Health Association (NEHA), state environmental health conferences, state governmental community health and agriculture departments, university-based departments of public health, the Michigan Health Alert Network system (HAN), the National Association of County and City Health Officials (NACCHO), Advanced Practice Centers (APC), National Incident Management System (NIMS), and university-based online training modules. Tabletop exercises through private consultants were often cited as training methods, but they said that this training is often reactive. Some EH professionals have developed minor in-house training around local incidents that fill the gaps found in existing training.

Preferred training among EH professionals lacks solidarity. Some want broad-based all-hazards training that can apply to many situations, but built upon realistic scenarios derived from case studies. They feel that they should take participants step-by-step through crisis prevention, detection, diagnosis, response, and recovery. This process would permit participants an understanding of how to shift from phase to phase in the investigative process. Others, however,

want training that allows for problem solving as opposed to pre-determined right and wrong answers because they feel that nothing is “by the book” during a real scenario.

EH professionals feel that the best training has involved the face-to-face interaction of environmental health and groups such as industry, retail, and regulators. Under these conditions, an understanding of each other’s roles and terminology is achieved as each group has brought their own processes for everyone to learn how they work. Continued training is desired that includes the above groups plus local, state, and federal agencies to allow knowledge of how everyone will be affected and how they are to work with others. Such training allows them to exercise against the plan or carry out the plan, as well as build a plan if needed is a top priority. EH professionals specifically need training that involves developing their role as understanding the process, understanding the gaps, and defining the training; they want to be able to “train the trainer” and take a proactive approach to intentional contamination incidents.

The mode of training delivery is also lacking solidarity; the debate centers around interpersonal or organizational training versus mediated training. Some EH professionals liked satellite and web-based training exercises because it allowed for learning at one’s own pace, while most preferred tabletop exercises and conferences to receive training. One participant cited a survey of environmental health directors that showed that 55 out of 62 preferred face-to-face training. All, however, agreed that training in either method relative to intentional contamination was insufficient at this point in time.

Mixed training methods were mentioned, even preferred by some. Dynamic training, as opposed to static lecture or reading material, is better even if it is through a mediated channel. A personal contact is better than visual information alone, and courses with quizzes, tests, and interactivity also enhance the training experience. It was stated that using web- or satellite-based

training before getting face-to-face training will also enhance the experience; internet training is good for individual training, but mixed training and face-to-face training are needed to bridge gaps in communication and collaboration among agencies.

Finally, barriers to training were the most significant issues regarding training and education. By far the biggest training barrier is budget. The budget obstacle extends into the second most important barrier - time. EH professionals feel that budget is a barrier because training is expensive; it costs money to travel, to pay overtime, and to have enough staff to support a department while part of it is being trained. Most departments already have a shortage of staff, so allowing some to leave for training makes staffing even tighter. Face-to-face training consumes time and money, but it is thought of as the most effective method of training. Substantial learning of the planning and implementation process is difficult because not everyone is available to learn it interpersonally, particularly when involving outside agencies. Moreover, getting people to sit down and take the time to learn when there is no urgency involved is difficult, even if the resources are free and less time consuming. There is no centralized location for training, though it was stated as a need.

Quality of training is also an obstacle; available training is not always what is needed or desired. Web-based training can leave questions unanswered and hardware to run virtual classrooms does not work well, according to EH professionals. There is a lack of awareness to available quality materials due to difficulty searching for it or poor marketing of it by its producers; other times environmental health directors are too busy to disseminate it if is not urgent. Training outside of environmental health is difficult to learn because other areas use specialized languages, particularly emergency response and epidemiology. In industry, some do not have mandatory training (e.g. retail food operators) so training in their area is not readily

available, nor are individuals easily available to collaborate. Finally, EH professionals are not sure how to bring new hires up to speed on an aging workforce; training methods vary between young and old. For example, podcasts were discussed as a training method, but most were unsure if the older generation would use them. This is an emerging barrier to individuals, but not to the system.

Participant Comments

The following comments concerning intentional contamination knowledge and training are specific quotes from the data to get a better idea of how the comments and concerns were communicated. It should be understood that these comments may contradict others, or even the data above, but this is under the assumption that the results above represent general trends across all the data, while the statements below are individual comments that may be of interest to future researchers:

What do EH professionals know about intentional contamination?

- In the front line all of us are connected to the internet, we see articles in professional publications, CDC, news articles about things that have happened with intentional contamination. Locally, my own experience, we haven't had any intentional that I know of…

- Although we have an understanding of the disparity of the two [food protection vs. food defense] we certainly don't have a grip on how to solve the problem of protection and defense in food service because of the different nature of food service and packaging.

- I say just in addition that in our daily inspections we are not looking so much for contamination, but food protection. So with good practices you can be on the look out and be watching for these things, but there isn't a way to prevent someone intentionally contaminating.

- From an academic perspective, of course we are interested in the whole farm to fork management system, so most of our attention to date has been on the usual and customary retail food safety issues. So there has been a whole less amount of thought on the whole defense issue, at least on my end, for someone who purposely wants to contaminate the food supply.

What do EH professionals see as their role in intentional contamination events?

- One of the things you started talking about was the role and particularly the role each of us individuals or as a profession might play in intentional contamination. I think one of the things is that the role hasn't been defined.

- The role isn't defined. In my opinion we are making the mistake of trying to make it up as we go rather than defining where we need to be.

- To my knowledge our environmental health bureau has never been involved in defining the EH role in a disaster exercise. We are called in by the planners to oversee and respond appropriately.

- Our issue I think is trying to help coordinate the state and local response, and I think there are some kind of issues of coordination, not only in California, but I expect elsewhere.

- I think early detection is key in an intentional incident…from a local perspective to recognize even in a situation where it may directly be affecting the local community that and intentional food event would clearly impact all of us relative on what public information messages we are giving out and being able to clearly articulate what the risk is, not only to the industry, but the general public.

What organizations or groups of people do EH professionals see as responsible for intentional contamination?

- The light is going to have to go on when somebody had to say "this is beyond what we normally would see as a food-borne outbreak, maybe we should contact police." I don't contact state police in anything unless it's "suspicious out of the ordinary." I think at that point in time we would contact them and that's when the label proposed intentional or unintentional we think would exist

- At some point police agencies may become involved if in the course of determining how did this food get contaminated, what was it contaminated with, somebody says, "could this be intentional?" So the skill to recognize has to reside in the initial investigating team. Now, are we proficient in making that determination? Probably not. We don't have a lot of practice in this.

- I am not aware of any department I've worked with that have gone to the point of during a major food-borne outbreak where they start talking to an emergency management coordinator, nor the local police.

- We just did a major tabletop exercise on agro-terrorism here in San Diego in which the FBI was present. This gentleman said to not plan on him taking over the investigation, he said, "I will be involved in it, but don't plan on handing it off to me." Some of us in the past figured that in the past when the FBI stepped in, it was a different set of rules, there was going to be a new boss, or whatever. I think we were realizing they still wanted the

environmental health and health professionals to do what they do best, and not try and run that part, but they do have a clear role in what we'd be doing.

- If it happened in a restaurant clearly initiating things locally, but it would quickly involved in the system we have in place relative to intentional contamination involving those informed in health to do the epi- side of it, and then if it's a supply issue to involve the department of agriculture at the state level and quickly all the way up the chain to the federal agencies. I think with those systems we have experience on the unintentional contamination, I think the main addition is involving law enforcement on the front end and interchange.

- We do routinely use the Health Alert Network and work interagency and with the MN Department of Health, particularly with any epidemiological concern whether they be intentional with the water supply, the food supply, anything affecting public health basically, and to Disease Prevention and Control. But it is new to us in environmental heath to include law enforcement in food cases, but especially with tampering, that's very important. Good point.

How do EH professionals describe their relationship with emergency responders?

- From my experience, our emergency response coordinator attends weekly meetings with the health officer who also attends a monthly meeting at the emergency operation center. So there is an ongoing dialogue.

- I think most of the agencies across the state have been trained in the National Information Management System (NIMS) that is used by emergency managers and has been for years…this allows us to better communicate and operate within the systems that are in place in other areas, but not in public health.

- I have 21 communities and almost as many fire departments, but we've given directions and had multiple conversations with all the chiefs. When we have fires, when restaurants have fires in the middle of the night and I get a call, I can tell you that its one of three communities because they are the only ones that call, and that's not a standard thing they do everyday. I have real concerns if its left to fire or police officials because they won't call, but if it gets to the sheriff's office where most of their management team are, then we usually get involved right away because we have made those connections very solidly

How are EH professionals trained in general and specific to intentional contamination?

- My perspective is to follow the money. In that regard, our money for training comes through our local health department-based emergency response because they get dollars from the Feds through MDCH. The Department of Community Health's Office of Public Health Preparedness, along with public health training networks and University of Michigan are funded to provide disaster, bioterrorism, chemical preparedness focused training. So that's how we've gotten a lot of the statewide training, so far.

- I agree, it's been very piecemeal; we go to very topic specific training from a variety of agencies. Some of the best training that we've had is when MDA came in and did industry training. As regulators, we were invited to attend as well and that was some of the best training I've had in this subject because it involved industry and regulators working together as a team and working through some areas and it really did get at the heart of the matter about being pro-active and discovering vulnerabilities and working through that process together. But that kind of training is rare and opportunities are few and far between.

- Whatever training that we get is hopefully broad enough based so that we can apply it to other situations so we can get the best bang for our buck. So that's the important thing, it will help with terrorism, and we are a fortunate county that has not had to deal with that problem, but there are a lot of similar things that it could be applicable to day-to-day jobs that people are doing.

- That is interesting because from an academic perspective we get "binged" for being too general. Participants will be like "yea you are talking about pan-flu, but I really need help with earthquakes, with fires, so how does that relate to me?"

What training do EH professionals prefer?

- One of the gaps I see is a good literature search on intentional contamination. We don't have a thesaurus book or anything of examples, I mean we may have collected them over the years, but there's nothing that has pulled this together and says these are intentional contamination examples, and really use them, even if it's in a tabletop, for review as a case history and reviewing them.

- I think having a variety of people around the table, police agencies, businesses, hospitals, media, and public representatives. In the past trainings we never look at those agencies, and every time we bring them in we bring in another process.

- I just think the biggest gap has got to be the involvement of multidisciplinary training, including industry, it's really important to involve the very place where we expect or where we are going to be looking to find the problem. It's rare for that to come together in training.

- Scenarios that people can work through or that are realistic can be helpful to individuals even if they are case studies of previous things that have occurred.

What delivery methods of training do EH professionals prefer?

- We've experimented with internet-based training. It's appealing in price and availability, but it tends to be lacking impact. In that the other perspectives are pre-scripted and we sit and listen and we don't get to ask questions. We've tried using it, but the staff really comes away with a lot of unanswered questions.

- We could have interactive classrooms that make things more available and affordable if the stuff just worked. The software and some of the support technology isn't there. It's not readily available.

- In our case, we like satellite more than web interaction

- We have some employees that did something with botulism in Argentina, they did a web course with that, but they were also involved in some chat groups. The staff came back to me and said it was a nice course, but they would have actually liked to have been talking with these people in person and not necessarily the delayed things on these computers. There is something about that personal contact that impresses people more or causes people to remember more, more than just the visual clue on a computer screen.

- The internet methods work really well. First off, you can work at your own pace and you can complete sections or modules and come back to them. I think they can be easily updated and maintained. That's my personal opinion.

What are barriers to training?

- Money, time and travel.

- I think the content, as well as to find the training forces. I know we have time in the winter to participate in training and the funding is there for it, but it's really just not that available. If there was training that was more internet or web-based we could certainly use it.

- The other problem I have is with 60 people on my staff when there is a good training, and it doesn't matter what size you're staff is, you cannot send your entire staff to a single training. You need to be able to spread it out over a period of time and be able to send a few at a time so you are not left empty handed.

- One of the other barriers that we've talked about all morning is just defining or putting down someplace the gaps because if there's a gap, that's a barrier itself, until you identify what that gap is and then go to someplace that is going to address that gap.

- This is a very complicated issue. We can have things put on the web from an academic perspective, but once that gets out to the local and county offices, getting someone to sit in their chair long enough when there is no urgency around it is difficult.

- To me, the biggest challenges we face is how to coordinate response plans across federal, state, and local and then across various disciplines within that, and then do it in a way that industry is really up to speed and involved in it from the get-go. I mean from farm to fork so many different people are involved in it. Seeing the whole big picture and knowing how it all fits together to me, I think there is still a long ways to go on that.

- One of the obstacles I know of that took us some time is that public health has recently become a member of the emergency response. I think that there is still a perception out there that it's a police and fire thing, you know guns and hoses, which still needs to be overcome. They have had 150 some years to develop these systems in public health, as far as being a part of the emergency response team, its relatively recent.

Other?

- It's one of the limited opportunities we have to sit and share perspectives and experiences. My feeling is that we spend a lot of time stewing in our own juice and we don't know what we are doing and don't devote the time that we need to share experiences because we have a lot to share with each other to help make one another stronger.

- A small percentage of our folks belong to NEHA and they will read the articles that are there, or if someone brings to their attention "oh this special article" then we'll read it. But as with any professional group you have those who become members of their organizations and others who unless their employers are going to pay for it, they are choosing not to.

- I learned there is some training that we are not aware of that we need to do a better job of at least figuring out where this stuff is coming from.

- I think we need to get better at our delivery system.

- Its amazing sometimes that the newspaper knows about things before we do. Its improved, but there is still the occasion that a news story that we are like "when did that happen" when we never received notification of it.

- The media has more access sometimes in a timely fashion than we do. That concerns me.

Discussion

Dr. Kathleen Tierney (2005) examined the difficulty of coordination among organizations in emerging disaster situations and identified three key approaches to coordination: the bureaucratic/organizational perspective, the structural perspective, and the network/analytic perspective. Key reasons why crisis coordination is difficult according to Tierney include:

- Crisis events occur with little or no warning
- Organizations may lose facilities, personnel, and communications capability; responding entities may undergo structural changes, task-related changes, or possibly both

    - The crisis environment is dynamic, with new problems continually emerging
- Unanticipated impacts and consequences in a disaster create the need for improvisation
- The responding elites vary in terms of organizational structure, organizational culture, the nature and extent of pre-event planning, and their routine and crisis-related procedures and practices
- Relationships among responding entities (police, firefighters, emergency medical services, and others) vary in terms of formal, direct authority, and planned collaboration such as that based on memoranda of understanding
- Disaster milieu is often characterized by organizational differences in perceptions of: response needs and priorities, authority and responsibility for different tasks, and organizational resources and capabilities.

In addition, Tierney identified consequences to the above challenges, including significant potential for miscommunication, duplication, and conflict, and a need for ongoing negotiation and clarification regarding roles, relationships, and responsibilities. Moreover, she states, organizations often undergo rapid change in the course of a disaster, which can be less evident to individuals outside of that organization. Many of the above challenges and consequences are evident in data collected from EH professionals; therefore, it is fitting to discuss the results from three perspectives to provide researchers with groundwork for future empirical questions.

Bureaucratic Perspective

According to a bureaucratic perspective, good planning can overcome all problems (Tierney, 2005). This perspective stresses the importance of the planning process over the planning product because the product only materializes in the event of a disaster; however, disasters rarely, if ever, emerge in a consistent form as they progress, or from disaster to disaster.

This perspective may not provide concrete answers to coordination challenges, but it offers insight into faults in existing methods of preparedness that may help to close the gap between process and product without completely overhauling the system in place. Under the assumption that good planning can overcome all problems, a bureaucratic perspective in researching existing emergency preparedness systems will help identify weaknesses that result in poor coordination.

By default, this paper takes the bureaucratic perspective; the initial goal of this research was to define gaps in knowledge and education of intentional food contamination under the assumption that the gaps could be filled with better educational tools. It is evident in the data that there are many gaps in knowledge of intentional contamination and a lack of proper educational tools to fix them. Also evident in the responses, is a lack of solidarity among EH professionals on how to ameliorate the planning process; every department, organization, industry, and even individual has different coordination practices and preferences for education materials. It is difficult to conceptualize efficient modes of coordination between EH professionals and other organizations through the bureaucratic perspective despite the abundance of many types of educational materials.

Structural Perspective

The structural perspective is based on the D-R-A-T taxonomy (Kreps, 2002) that characterizes disaster response by variations in presence and temporal ordering of: (1) Domains, (2) Resources, (3) Activities, and (4) Tasks (Tierney, 2005). According to DRAT, a continuum exists among organizational structures that can change according to challenges to normal structural arrangements. On one end, there is the Domain-Tasks-Resources-Activities continuum of response that emphasizes order, where a domain (e.g. police work or firefighting) would dictate tasks and resources. On the other end, there is the Activities-Resource-Task-Domain

continuum of response that is characteristic of collective behavior and action; in other words, if the domain is not clearly defined according to a pre-existing structure, response will be altered and coordination challenges arise. Response related sub-tasks may be characterized by a number of different organizational forms and the differences must be taken into account.

The structural perspective provides a framework for alternative disaster response. The Domain-Task-Resources-Activities continuum is much like the bureaucratic perspective in place; an environmental health incident (e.g. food contamination) is a domain that dictates tasks, resources, and activities for response, most of which are pre-planned. The issue, however, is that EH professionals do not feel they have a clearly defined role when the disaster response blurs the lines between organizations and their respective responsibilities (e.g. a fire in a supermarket calls for firefighters and EH professionals). The DRAT taxonomy implies that any one of the four assignments can happen in any time order, so it is the responsibility of all the organizations to know how to respond and collaborate as they unfold. The data in this research paper suggest a need for education in multi-disciplinary response and coordination, but there is also a concern for the willingness of agencies to participate due to time and money constraints.

The data suggests that face-to-face education methods are desired for this cross-disciplinary training, though internet- and satellite-based training methods would be supported as supplementary education. First, the structure of emergency response surrounding food-related disasters should be organized in order to develop training materials for EH professionals.

Network Perspective

The network perspective (Drabek, 2002) calls for the formation of Emergent Multi-Organizational Networks (EMONs) during disaster response (Tierney, 2005). EMON coordination must take into account definition of core strategies, control strategies, as well as

cultural challenges and consequence challenges. Definition of core strategies includes domain clarification, jurisdictional negotiation, and resource familiarization; control strategies include appeals to prior legitimacy, reference to planning documents, reference to prior experience, and decentralized decision-making. The effects of these control strategies include the use of self-managed work teams, an emergent process of collaborative planning, the emergence of community-government partnerships, and the use of mutual aid.

The network perspective to coordination assumes a more agentic approach to disaster response. EMONs require strong communication among all organizations prior to and during crisis situations, as well as a strong grasp of knowledge of the structure and strategies of emergency response. The data in this paper suggest EH professionals have a need to incorporate EMONs into their response procedures, but there was no mention on how it should be implemented. A desire to learn several of the strategies, from domain clarification to community-government partnerships, is there; it is, however, just a matter of getting everyone involved on the same page. EMONs requires that multidisciplinary training methods that many of the EH professionals mentioned a preference for, including web-based and/or satellite training, as well as interpersonal methods such as conferences and tabletop exercises.

Before a full EMONs system can be incorporated into EH professionals' workflow, a set of core strategies and control strategies must be assimilated from all organizations involved in emergency response. It is necessary to develop EH core competencies first, but in order to promote full coordination and collaboration in emergency response scenarios, education must go beyond one's own domain. A second need is a single online network for communication between organizations, government agencies, and across state borders to promote communication. Many

such sites have been developed or are in the process of being developed, but the data in this paper does not show that any one site is being used predominantly.

Conclusion

Environmental health professionals are aware of the potential for the intentional contamination of the food supply, but information is limited. Moreover, EH professionals do not believe their role in intentional contamination incidents involving the food supply is clearly defined. The data collected in this paper supports the data from Reischl and Buss (2004) in that knowledge of intentional food contamination is mediocre at best and more training is needed. EH professionals have a variety of training methods available to them, as well as a preference for many; however, there is no clear consensus on which delivery methods are preferred.

Coordination among and between government agencies and health departments is sporadic, which signifies a need for better coordination to promote collaboration in disaster response situations. Three perspectives on coordination, the bureaucratic, structural, and network perspectives, are offered to help guide future research and education planning. It is hoped that this research will foster investigation into the best educational materials for EH professionals that will promote effective collaboration during intentional food-related disasters if it is ever needed.

References

Drabek, T. E., & McEntire, D. A. (2002). Emergent phenomena and multiorganizational coordination in disasters: Lessons from the research literature. *International Journal of Mass Emergencies and Disasters, 20*(2), 197-224.

Kreps, G. A., Bosworth, S., Mooney, J., Russell, S., & Myers, K. (1994). *Organizing, Role Enactment, and Disaster: A Structural Theory*. Newark, DE: University of Delaware Press.

Reischl, T. M., & Buss, A. N. (2004). Michigan Environmental Health Training Needs Assessment Report. Unpublished Research. Michigan's Center for Public Health Preparedness. University of Michigan School of Public Health.

Tierney, K. (2005). *Coordination, A conceptual overview*. Paper presented at the Crossings: Workshop on cross-border security cooperation.

Appendix A

Moderator Guide for Food Protection and Defense Needs Assessment

I. INTRODUCTION (3 Minutes)

Hi. My name is …., I work with the National Center for Food Protection and Defense's Education Group and I'll be your moderator this morning.

Welcome to our focus group discussion. A focus group is simply a group of people who get together to talk about a topic of interest to researchers. The group usually talks about the topic for about an hour until all of the questions are answered and everybody has said what they want to say.

Before we begin, I want to point out that I am recording this on an audio tape recorder.

We will be talking about issues related to intentional contamination of the food supply, how you view your role in protecting against intentional contamination, and what training you might need to better deal with an intentional contamination. You should know that I am not an expert in this area. I am simply here to lead the discussion and make sure that everybody gets a chance to talk. The goal is to determine your training needs for issues of intentional contamination of the food supply. This information will be used to develop curricula and training which will help fulfill those needs.

We want everyone to feel comfortable talking about their ideas, thoughts, beliefs and feelings about food protection and defense. There are no right or wrong answers here, so please, everybody talk. Do not be afraid of telling the group what you think, even if it sounds like you disagree. We expect people to have different ideas.

We have a lot to discuss in the next hour, so I might move our talk along at a slower or faster speed, depending on how much we are getting through. If we go on to talk about something else when you still have not said what is on your mind, please don't be afraid to stop me at anytime. Also, I might skip over you if you have talked a lot OR I might call on you if you haven't talked at all. My goal is to try to get everyone to talk. Okay?

What is said during this call will not be shared with anyone else. We will, however, be recording this talk with a tape recorder so we don't forget what was said. Even though your words are being tape recorded, nothing that you say will be connected with your name and no one else will know what you said. Okay?

Any questions? Okay, let's get started!

II. WARM UP & ICE BREAKER (4 Minutes)
(Goal: to get everyone comfortable talking)
A. I'd like to begin by having each of you tell us your name and a how you got started in environmental health, and your current role.

III. ROLE IN FOOD PROTECTION AND DEFENSE (15 Minutes)
(Goal: Perceptions of own role in food protection & defense, differences between FPD & food safety, articulate collaborative role, understanding of)
A. What do you know about issues related to intentional contamination?
-How does it differ from food safety?
-How is it the same as food safety?

B. How do you see your role in an intentional contamination incident?
-How has this role changed?
-Has it changed?
-How do you know when you are protecting and defending food?

C. Who or what department is responsible for dealing with intentional contamination?

D. Who would you need to communicate and coordinate with in the event of an intentional contamination issue?
-in your agency
-across agencies
-outside of agency?

IV. EXISTING TRAINING THAT APPLIES
(Goal: perceptions of existing training, what made it useful, what could have been improved)
A. What training are you aware of that covers food protection and defense?

B. What features made that training successful?

C. What features did the training lack?

V. BARRIERS TO TRAINING

A. What are barriers to additional training?

B. How much of your budget goes to training?

C. What do you do to overcome these barriers?

D. Are there training models you are aware of that deal with some of these barriers?

VI. WHAT DELIVERY METHODS OR CHANNELS WOULD YOU PREFER?

A. Where do you get your information?
-What are some characteristics of a trustworthy source?
-Who are credible sources for food information?

B. What are some delivery methods you have seen for training of this nature?

C. Do all these methods work in all situations?

C. How would you mix channels or methods to increase effectiveness?

VII. CONCLUSION

A. Thank you for taking the time to discuss needs for training in food protection. What would you say we learned today?

B. Do you have any final thoughts or comments about your educational needs? Anything else at all that you want to say?

Thank you very much for participating in our focus groups! Your input will help us to develop educational curricula and training that can meet your needs.