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Policy Implications of Intentional Contamination of the Retail Food Chain

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2019

Abstract

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MPA, University of Illinois-Springfield 2005

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Proposal Submitted in Partial Fulfillment

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Abstract

The retail food safety chain is vulnerable to deliberate contamination, yet food safety professionals and emergency managers typically respond to intentional contamination in different ways. Little is known about the practices of environmental health food safety professionals (EHFSP) as compared to emergency managers and whether those approaches can be combined to more successfully impede intentional food contamination. The purpose of this narrative policy analysis was to use routine activity theory to compare the narratives of EHFSPs and emergency managers to determine whether there are opportunities to better understand the relationship between vulnerability and resiliency of the retail food safety chain. Data were primarily collected through interviews with 5 EHFSPs and 5 emergency managers from various regions in the United States. Interview data were inductively coded and then subjected to Braun and Clarke's thematic analysis procedure. Key findings indicate that EHFSPs generally are ill suited to meet resiliency goals, ambivalence voiced by EHFSPs results from a lack of continual preparedness training, and neither EHFSPs nor emergency management officials' familiarity with the social dimensions of resiliency is at a point where they can design adequate measures for a resilient retail food system. Therefore, recommendations to policy makers focus on a need for an enhanced training that is inspired by principles of emergency management so that they are better able to respond to acts of intentional contamination, thereby building a resilient retail food chain with economic and social benefits.

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Dedication

I am dedicating the study:

To all environmental health food safety professionals that strive every day to provide and ensure a safe food supply for their constituents and the nation.

To all emergency management officials that provide safety and comfort during and after an emergency.

Acknowledgments

My thanks and appreciation:

To Dr. Bruce Lindsay and Dr. Tanya Settles for their patience, guidance and belief in me that made it possible to complete this journey.

To the participants that took part in the study in which they gave their time, thoughts and insights that made the study exciting and complete.

To my children and grandchildren that inspire me to reach for the sky through their love and belief that dad and granndpa would complete what was thought to be insurmountable.

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Chapter 1: Introduction to the Study

Intentional contamination of the food chain is not an impossibility. It would be unwise to theorize that intentional contamination of the food safety supply is an unlikely occurrence. Unlike accidental contamination, intentional contamination of the food safety chain is a deliberate action that could more negatively affect the general population than the accidental contamination of the food safety chain. The adverse effects would include psychological implications, economic implications, as well as social consequences. Additionally, intentional contamination of the food chain is hard to distinguish from accidental contamination because the procedures to detect each are similar.

To combat such effects, policies targeted at the intentional contamination of the food safety chain must address the full spectrum of potential impacts on the food safety retail sector. Also, these policies must involve mechanisms that solidify the local food safety system response, hereafter referred to as the retail food safety chain. The portions of the retail food safety chain most likely affected are restaurants and grocery stores.

The food safety chain includes the farm to table food safety supply inclusive of prefarm inputs, farmers, processors, transportation, distributors, retailers, and consumers (Newman, Leon, & Newman, 2016). Incidents involving the accidental contamination of the retail food safety chain has cost shareholders on average 1.15% of their wealth and $7 billion in revenue (Hussain & Dawson, 2013; Pozo & Schroeder, 2016). Contributing to the costs are 21st century patterns of globalization, changing trends of consumer eating preferences, diversity of pathogens, and increased numbers of individuals entering food insecurity (Boivin, Crowther, Prendergast, & Fuller, 2014; Font-i-Furnols & Guerrero,

2014; Fung, Wang, & Menon, 2018; Khanna, 2016,; Schmidt, Shore-Sheppard, & Watson, 2016).

Unlike accidental contamination, it is possible that with instances of intentional contamination consumer levels of trust will influence policies targeting the intentional contamination of the retail food safety chain, whether the event is ongoing or once the event has subsided (Wilson et al., 2017). Such events may create generalized recognition among the public that the retail food safety chain is not safe. This could influence consumer behavior (Hansen, Sørensen, & Eriksen, 2018; McCluskey, Kalaitzandonakes, & Swinnen, 2016) regarding the purchasing of food.

The disease impacts of intentional contamination of the retail food safety chain are unknown primarily due to the infrequency in which intentional contamination occurs (Meulenbelt, 2018). However, there are sufficient data that indicate that on average at least thousands of people die and millions become ill annually from incidents involving the accidental contamination of the farm to table food supply chain (Institute of Medicine, 2005; Mead et al., 1999; Painter et al., 2013; Scallan, Hoekstra, et al., 2011; Scharff, McDowell, & Medeiros, 2009). Based on this data, it is easy to hypothesize that an intentional contamination event could be far worse than an accidental contamination event. Therefore, policies designed to combat the deliberate contamination of the retail food safety chain must involve strengthening food safety measures that would alert system operators to improve their procedures and operations (Johnson-Hall, 2017; U.S. Food & Drug Administration [FDA], 2014). There is, however, no data on the policy implications of intentional contamination of the retail food chain in the United States.

The diversity of the farm to table food supply chain in the United States is such that all points along the continuum are susceptible to contamination. Nonetheless, there is evidence that “identifying the source and propagation of contamination in the food safety supply chain is complex” (Chaturvedi, Armstrong, & Chaturvedi, 2014, p.160). Some researchers believe the majority of food contamination incidents happen at home and in the workplace (Clayton, Clegg Smith, Neff, Pollack, & Ensminger, 2015; Jensen, Friedrich, Harris, Danyluk, & Schaffner, 2015).

No matter the segment of the farm to table food safety supply chain under discussion, each part of the food safety chain is vulnerable to contamination. To mitigate the impact of a potential intentional contamination event, industry, government, and the private sector must work together. However, despite their best efforts, intentional contamination of the retail food safety chain is a distinct, albeit low, probability event at this time (Davidson et al., 2017). Though intentional contamination of the retail food safety chain might be a low probability event, the retail food safety chain must be capable of responding to such probabilities. A way of responding to such events requires that the retail food safety chain become resilient enough that it will continue normal functioning during periods of disruption or when threatened internally or externally (Tendall et al., 2015, p. 18). The focus of this study was to view resiliency through the prism of the retail food safety chain system.

This study used the definition of food terrorism developed by the World Health Organization: Food terrorism is "an act or threat of deliberate contamination of food for the purpose of causing injury or death to civilian populations" (World Health

Organization & Food Safety Department, 2002, p. 3). However, the goal of this study was to explore the resilience policy implications of intentional contamination of the retail food chain. Understanding what terrorism, specifically food terrorism, is will provide the foundation for when deliberate contamination of the retail food chain can become a terrorist target (Bogadi, Banović, & Babić, 2016). An example in which food was the vehicle for intentional contamination of the retail food chain occurred in 1984 in Dalles, Oregon. This event involved two separate waves in which intentionally contaminated food involved ten restaurants (Jansen, Breeveld, Stijnis, & Grobusch, 2014). Patrons frequenting these establishments became part of what health officials thought at the time was a routine foodborne outbreak investigation (Török et al., 1997). This event should have focused attention on the probability of using the food safety supply for the conduct of not just criminal acts, but as a means to foment terrorism. However, it was not until 1986 that investigators concluded that contaminations occurring at the ten restaurants were intentional (Török et al., 1997 p. 393). Seven hundred and fifty-one patrons experienced acute gastroenteritis caused by Salmonella gastroenteritis (Török et al., 1997 p. 393). During the investigation, the Federal Bureau of Investigations (FBI) and Oregon Public Health Laboratory identified Salmonella typhimurium found at the Rajneesh Medical Center as the proximate cause of the illnesses. It was at the Rajneeshpuram compound, located on the Rajneesh Medical Center, where the Rajneesh cult produced vials of Salmonella typhimurium for future use (Török et al., 1997 p. 393). There are other examples of intentional contamination of food such as the following scenarios:

- In 2003, an event involving a supermarket in Michigan involved the recall of 1,700 pounds of ground beef. The subsequent investigation uncovered the intentional contamination of ground beef with nicotine (Centers for Disease Control and Prevention [CDC], 2003). This deliberate act resulted in the illness of 100 people.
- In 1981, rapeseed oil sold as olive oil (Gelpí et al., 2002) caused an outbreak in Spain that resulted in toxic oil syndrome. This outbreak led to the illness of 20,000 individuals and several hundred deaths (Posada de la Paz et al., 1996). The etiology of this outbreak disturbed the public so much that the World Health Organization recommended the suspension of animal testing for toxic oil syndrome due to the unreliability of the results. The fact that the oil market in Spain operated with questionable practices is an indication of how quickly a contaminated product could find its way into the food supply system. (Posada de la Paz et al, p. 256).

In 1978, mercury-contaminated citrus fruit afflicted at least 12 children from The Netherlands and West Germany (Khan, Swerdlow, & Juranek, 2001). Economic instability in Israel fueled this intentional act (Khan et al., 2001, p. 4).

These incidents, though not inclusive of all attempts, are proof that intentional contamination of the food safety supply is a possibility for which nations, states, and local municipalities must take steps to shore up their economic and social infrastructures. Operating from a state of readiness before an intentional contamination event will significantly promote stabilizing economic and social foundations during such incidents.

Shoring up the economic and societal infrastructures before a deliberate contamination event will rely on the capability and capacity of local resources. The ability and capacity of local resources are vital considerations as to how communities respond to disasters such as the intentional contamination of the retail food safety chain. As part of an overall public health response, the presumption is that environmental health food safety professionals (EHFSP) such as public health sanitarians, environmental sanitarians, sanitarians, food scientists, environmental health specialists, and environmental health practitioners will respond to intentional contamination events. To respond, these EHFSPs rely on the current 4-cycle model of emergency management (Rose, Murthy, Brooks, & Bryant, 2017). The traditional emergency management model uses the command and control methodology of the National Incident Management System (NIMS; Federal Emergency Management Agency [FEMA], 2017)

NIMS, however, does not require that emergency management officials must understand the nuances of food safety and foodborne outbreak investigations that are central to how EHFSP respond to such events. NIMS does not necessarily prepare EHFSP for their role in meeting public health emergency preparedness capabilities, and the decision-making process (Stoto et al., 2018, p. 2) that is part of emergency management.

Background to the Problem

The concept of resilience is similar to the idea of vulnerability (Zio, 2016). To understand resiliency and vulnerability within the context of the intentional contamination of the retail food safety chain, EHFSP and emergency management

officials must operationalize the differences and similarities between resiliency and vulnerability.

Operationalizing these differences and similarities is vital to how EHFSP and emergency management officials handle the response to an intentional contamination event. According to Kim and Marcouiller (2015), vulnerability is more about the interaction of the intensity of disasters events with the community reaction (p. 947) such as food safety measures that do not protect against the proliferation of foodborne illnesses within a community. Vulnerability also refers to the "impact of hazards" (Kim & Marcouiller, 2015, p. 947) on a community and how the community relates to the impact of the hazard (Kim & Marcouiller, 2015, p. 947). Palliyaguru, Amaratunga, and Baldry (2014) did not necessarily disagree with these assertions. However, to these authors, vulnerability is also a matter of "exposure and capacity" (p. 47).

Nonetheless, resiliency is focused on how the retail food safety chain absorb an impact and return to a normal state of functioning (Kim & Marcouiller, 2015). Absorbing disturbances are essential, but how the system recovers during and after an event (Coetzee, Van Niekerk, & Raju, 2016) is essential as well. These authors believe complex adaptative systems allows resiliency to flourish thus enabling those systems to learn and adapt (Coetzee et al., 2016). The retail food safety chain must not only change, but resiliency also requires the retail food safety chain to focus on the current disturbance. Focusing on the current disturbance acknowledges that the system's return to normal will change based upon the threat (Coetzee et al., p. 199).

There are different strategies for analyzing resilience that exist in the literature. These strategies highlight the multidimensional nature of resilience (Distelberg et al., 2018) inclusive of ecological, social, community, and individual constructs (Dobie & Schneider, 2017; Gil-Rivas & Kilmer, 2016; Hua, Chen, & Luo, 2018; Kulig & Botey, 2016). In this study I viewed resiliency as the ability of a system (retail food safety chain) to exhibit "persistence and ability to absorb disturbances while reconstructing relationships between system entities"(Sakurai, Watson, & Kokuryo, 2016, p 2862), caused by for example intentional contamination events.

Viewing resiliency through the prism of a system's ability to rebound despite crises or adverse events helps responders to withstand operational disruptions (Alexander 2014; Giannakis & Bruggeman, 2017; Woods, 2015; Zobel & Khansa, 2014). At the community level, creating resiliency is centered on efforts toward enabling the community to function capably across different sectors and responsibilities (Gil-Rivas & Kilmer, 2016). At the national level, resiliency has a prominent role as recognized by Presidential Policy Directive 21. Presidential Policy Directive 21 sets the tone at the national level in which the focus on resiliency involves the nation's critical infrastructures. It is important to note that the farm to table food safety supply continuum is one of the nation's seventeen critical infrastructures (U.S. Department of Homeland Security [USDHS], 2013). As a critical infrastructure, the farm to table food supply continuum must endure new and old threats that target the processing, production, distribution, and preparation sectors (Meulenbelt, 2018), farm to table movement (AnchorComm, 2018), and cottage foods (Rice, 2018). There is also the enduring idea

that widespread intentional contamination of the food safety chain in the United States is at best a remote possibility (U.S. Department of Health & Human Services, 2013).

The 1984 Dalles, Oregon, incident has been the focus event for the trajectory of policies relating to intentional contamination of the retail food safety chain up until and after September 2011. Also, there was a belief that methods that will kill on a large scale are more appealing than methods not designed to inflict mass causalities (Jarvis, Macdonald, & Nouri, 2014). Such arguments are similar to arguments regarding the response to cyberterrorism (Jarvis, Macdonald, & Nouri, 2014, p. 71). It is only recently that awareness of the danger that cyberterrorism poses to significant and meaningful technological infrastructures has been widely recognized (M. Maldonado, 2016) within the mainstream of thought regarding the plausibility of cyberterrorism. Presently, the concern regarding cyberterrorism has changed. In others, words, cyberterrorism is a perceived high probability event, rather than a perceived low probability event.

Nonetheless, as the FDA admits, it is wise to develop ways to combat the intentional contamination of the farm to table food safety supply chain. The Food Safety Modernization Act of 2011 is an example of a way to fight the intentional contamination of the farm to table food safety supply chain. An essential objective of the Food Safety Modernization Act was to highlight policies that will mitigate the effects of intentional contamination of the farm to table food safety supply chain (USDHS, 2013). The Food Safety Modernization Act mandate targeted the food safety system at almost every stage of the food safety supply chain, leading up to but not including the retail level (Drew & Clydesdale, 2015). Therefore, because the Food Safety Modernization Act does not target

the retail portion of the food safety chain, it makes sense that incorporating resiliency at the retail food safety chain level is a measure of response heretofore not provided.

Additionally, despite internal or external stress or shocks to the system (Brzezina, Kopainsky, & Mathijs, 2016) resiliency will allow the retail food safety chain system to maintain operational readiness. Effective countermeasures will limit the possibility of an attack (Manning, Smith, & Soon, 2016). What resilience brings to bear are the very countermeasures perpetrators believe are not present when selecting targets to attack. If these countermeasures are not present, their absence creates gaps (Manning, Smith, & Soon, 2016, p. 11) in the retail food safety chain that can perpetuate fear (Manning, Smith, & Soon, 2016, p. 22) relative a safe retail food safety chain.

Building a resilient (Manning & Soon, 2016a) retail food safety chain system is a significant step toward maintaining the consumer's faith (Reiher, 2017) in the retail food safety chain. It is unwise to discount the consumer perceptions in respect to the continued viability of the food safety chain, (Aung & Chang, 2014; Fernqvist & Ekelund, 2014; Nocella, Romano, & Stefani, 2014; Reiher, 2017). A resilient retail food safety chain system requires adequate response planning. A review of the literature failed to identify studies investigating a link between resiliency and intentional food contaminations.

The current model for responding to a widespread intentional contamination event involves the consolidation of several national standards. In addition to PPD-21, there is the National Response Framework (FEMA, 2013b), NIMS (FEMA, 2016b), and the National Preparedness Goal, (FEMA, 2011b). These models set the parameters for how the nation responds to disasters whether natural or human-made. The role of public health

officials during public health emergencies (Malilay et al., 2014) is outlined in The Public Health Security and Bioterrorism Preparedness and Response Act of 2002. The National Infrastructure Protection Plan (USDHS, 2013), on the other hand, focused on protecting and maintaining the resiliency of the farm to table food safety supply chain as a critical infrastructure of the nation.

In response to the present approach, in this study I argue that food safety and food defense measures alone are short-lived and do not guard against intentional contamination of the farm to table food safety supply chain, especially the retail food safety chain. Unlike accidental contamination, intentional contamination of the retail food safety chain can last for several weeks or months and is fluid and unpredictable. To have an efficient and comprehensive response to such an event requires policies that incorporate resiliency as a primary consideration in response planning.

Problem Statement

The interdependencies of the global food safety chain increase the possibility that the intentional contamination of the retail food safety chain will occur in the United States (Davidson et al., 2017). It is also possible that current detection methods, no matter how robust, will fail to detect a widespread intentional contamination incident. Food safety within the retail food safety chain depends upon interdiction at each step of the farm to table food safety supply chain (Kanai, Kakizaki, Matsutani, Nakata, & Kaneko, 2015, p. 40). Despite such countermeasures, and though stakeholders have faith that these countermeasures are sufficient enough to blunt any attempt at deliberate contamination of the retail food safety chain (Alvarez et al., 2010, p 165), the risk of food-borne related

illness has not subsided (Painter et al., 2013). This sort of thinking has led to food safety system complacency (Alvarez et al., 2010 p. 165) and overlooks the vulnerability of the retail food safety chain. To understand the nexus between risk and resiliency of the retail food safety chain, a narrative policy analysis of the retail food safety chain system that incorporates the perspectives of retail food safety chain stakeholders, including federal, state, and local governments is needed. A narrative policy analysis will help stakeholders to understand the risk of deliberate contamination and how vulnerabilities affect the resiliency of the retail food safety chain. A study using routine activity theory (RAT) may provide valuable context by focusing on those vulnerabilities that provide suitable targets and the absence of capable guardians for acts of intentional contamination.

Purpose of the Study

The purpose of this study was to use narrative policy analysis to explore the relationship between the vulnerability and the resilience of the retail food safety chain to intentional contamination. This study was exploratory in the sense that currently there was a lack of data regarding resiliency as a factor in response policies involving the food safety chain. The goal of this research was to describe how EHFSP and emergency management officials from the Midwest, Pacific Northwest, and Eastern sectors of the United States view opportunities for intentional contamination of the retail food safety chain and their readiness to respond based on the resilience of the retail food safety chain.

Research Questions and Hypotheses

The overarching research question this study answered was:

RQ: How do policy counternarratives encapsulate the perspective of EHFSP regarding the vulnerability and resiliency of the retail food safety chain?

The sub-questions to the overarching research question were

SQ1: How do the policy counternarratives describe how emergency management officials view vulnerabilities and resiliency of the retail food safety chain?

SQ2: How do the factors that cause uncertainty relate to the intentional contamination of the retail food safety chain?

Theory or Conceptual Framework

RAT is principally used in criminology to explain how crime influences the regular activity of individuals and groups (Cohen & Felson, 1979; Franklin, Franklin, Nobles, & Kercher, 2012; Branic, 2015; Eck & Weisburd, 2015; Leukfeldt & Yar, 2016). RAT as the theoretical framework for this study was used to evaluate the convergence of the availability of suitable targets (retail food safety chain), the presence of likely offenders (those who seek to contaminate the retail food safety chain intentionally), and the absence of capable guardians (retail food safety chain countermeasures). Though a discussion of RAT in Chapter 2 is forthcoming, it is useful to note at this moment that as unconventional to the study of intentional contamination of the retail food safety chain RAT may be, RAT helps to articulate purpose, methods, means, and ends of why intentional contamination occurs. It is also noteworthy that a deliberate attempt to contaminate the retail food safety chain is a crime as envisioned by the FBI (J. Hunter, 2015, p. 83) and that such an attempt has tendencies of terrorism as well (p. 66).

Nature of the Study

Narrative inquiry (in this case, narrative policy analysis) is used to improve the "systematic procedure to identify policy beliefs of actors through their narratives" (Mockshell & Birner, 2016, p. 4). Martinez (2019, p. 2), describe narrative policy analysis as part of the narrative paradigm "analysis of policy stories created and circulated by policy actors and communities" (p. 16). Narrative policy analysis can shape the nature of policies leading to solutions based on discursive discussions.

Roe's (1994) 4-step methodological process for narrative policy analysis follows a distinct pattern in which uncertain, complex, and polarized discourses are explicated through stories (p. 3). As told through stories in the form of scenarios or arguments (Roe, 1994, p. 3), the narrative policy analysis process begins with identifying policy narratives that have a high degree of uncertainty or complexity. Second, the researcher seeks scenarios or arguments that are counter to the prevailing policy narrative (Roe, 1994, p. 3). Third, through a comparison of the dominant and counterprevailing scenarios or arguments, "metanarratives" (Roe, 1994, p. 4) arise that are designed to bring opposing policy narratives into an agreement (Bridgman & Barry, 2002). The last step in the process is for the researcher to determine how the metanarrative has changed the perception of the problem such that conventional means of policy analysis can take place (Bridgman & Barry, 2002; Roe, 1994).

Another focus of this qualitative study revolved around the decision-making and collaborative methods of the EHFSP and the emergency management community. Also, in this study I explored what EHFSP and emergency management officials' communities

know regarding the application of policies related to deliberate contamination and the resiliency of the retail food chain.

To use narrative policy analysis as the methodological premise for this study and RAT as the theoretical framework required a qualitative approach. An approach in which the researcher becomes engrossed in what Stake (2010) termed "studying how things work" (p. 11). How things worked in this study was through purposeful sampling that employed units of analysis that were “rooted in epistemology, theory, and richness and quality of data of the issue” (see Roy, Zvonkovic, Goldberg, Sharp, & LaRossa, 2015, p. 244). The units of analysis in this study were EHFSP and emergency management officials who worked in government with responsibilities for responding to potential or actual intentional contamination events. This data collection process garnered the perspectives, stories, and arguments of EHFSP and emergency management officials regarding policies that relate to deliberate contamination and the resiliency of the retail food safety chain. Data analysis consisted of qualitative coding and thematic analysis. Recruitment of participants was via professional associations; direct email solicitation, state level environmental health food safety programs, emergency management programs, public health emergency preparedness programs, and key and expert informants obtained during purposeful sampling. Chapter 3 details additional information on participant recruitment, sampling schemes, and issues regarding credibility and trustworthiness.

Definitions

Understanding the following terms is necessary because of the ambiguity surrounding deliberate and unintentional contamination of the retail food safety chain;

Absence of capable guardian(s): The intellectual dimensions of the RAT "de-psychologize and depersonalize" capable guardians not as police officers but "neighbors, friends, relatives, and bystanders" (Clarke & Felson, 2008, p. 3).

Agroterrorism: Grieco (2015) described agroterrorism as the "deliberate use of biological or chemical means to depreciate, stunt, halt, or destroy an agricultural asset or set of assets" (p. 28).

Biocrime: Biocrime is the deliberate use of a biological agent by an individual or a small group of individuals motivated only by revenge, or financial gain (Jansen et al., 2014; Lehman, 2014).

Bioterrorism: Jansen et al. (2014,) described bioterrorism as "the deliberate release of viruses, bacteria or other agents used to cause illness or death in people, but also in animals or plants" (pp. 489–490), and Nyatepe-Coo and Zeisler-Vralsted (2004,) states it is "the intentional use of disease-causing organisms or products of organisms to infect humans, other animals, or plants in order to cause civil unrest and panic" (p. 224).

Community resilience: Community resilience at its core is focused on the ability and capacity of a community to deal with adversity, and recover from the adversity (Plough et al., 2013).

Food defense: Food defense "refers to protecting the food supply from intentional adulteration with a motive to cause harm" (Manning & Soon, 2016b, p. 823).

Food protection and defense: The Food Protection and Defense Institute (Food Protection and Defense, 2019) views food protection and defense as "the sum of actions and activities related to prevention, protection, mitigation, response, and recovery of the food system from intentional acts of adulteration. This includes intentional adulteration from both terrorism and criminal activities. Criminal activities include economically motivated adulteration, as well as acts by disgruntled employees, consumers, or competitors intending to cause public health harm or business disruption." (p.1).

Food terrorism: The World Health Organization describes food terrorism as "an act or threat of deliberate contamination of food for human consumption with chemical, biological or radionuclear agents for the purpose of causing injury or death to civilian populations and/or disrupting social, economic or political stability" (World Health Organization & Food Safety Department, 2002, p. 3).

Likely offender: According to RAT, a likely offender is anyone with means, reason, opportunities, or tendencies to commit a crime (Branic, 2015, p. 2).

Restaurant food defense: This type of food defense views any logical and cost-effective means of defending the retail food safety chain that reduces the chances of food terrorism from occurring (Xirasagar et al., 2010, p. 10).

Suitable target: A suitable target as envisioned by RAT is any entity that is likely to have an association with the likely offender (Branic, 2015, p. 2).

Terrorism: Terrorism, as defined in this study, is taken from Levy & Sidel (2012) to mean "politically motivated violence or the threat of violence especially against civilians with intent to instill fear" (p. 6)

Assumptions

There are three assumptions associated with this qualitative study. First, EHFSP and emergency management officials are not always familiar with operationalizing the differences between food defense, accidental contamination, and intentional contamination of the retail food safety chain. Second, I assumed I would collect without hindrance documents and other reports needed for understanding decision-making and collaboration relating to deliberate contamination and the resiliency of the retail food safety chain. Finally, I assumed that key expert informants would provide open and honest answers and perspectives regarding decision-making and collaboration within and between organizational units.

Scope and Delimitations

Exploring the perspectives of EHFSP and emergency management officials from only the Pacific Northwest, Midwest, and Eastern regions of the United States was a limitation of this study. Another limitation was recognizing some differences that exist between EHFSP, emergency management officials, and programs regarding the focus of emergency preparedness. However, the presumption was that the recognition of these differences occurs in relation to the implementation of NIMS.

Limitations of the Study

Researchers who perform narrative policy analysis through the explication of stories as scenarios or arguments strive to intervene in issues that are not only controversial but have a high degree of uncertainty and in which those involved do not have an idea as to the ultimate direction of the issue (Roe, 1994). Qualitative research

approaches such as narrative policy analysis provide insight into a phenomenon in a setting in which the phenomenon occurs (Florczak, 2017).

A limitation when using narrative policy analysis is the inability to generalize results to another unit of analysis primarily because of sampling limitations (Weis & Willems, 2017). Narrative policy analysis in particular because of its reliance on stories and arguments must provide answers to questions relating to (a) whether falsehood is a byproduct of narrative policy analysis, (b) whether narrative policy analysts are capable of taking account of the research itself because of its highly subjective nature, and (c) whether narrative policy analysis misconstrues truth (VanderVoort, 2003). Lastly, a potential limitation of narrative policy analysis is whether the conceptualization and interpretative processes enlightens or muddles the end product (Whiffin, Bailey, Ellis-Hill, & Jarrett, 2014).

Significance of the Study

The results of this study lay the foundation for incorporating resiliency into the intentional contamination of the retail food safety chain policy-making apparatus. There is also the strong possibility this study will allow EHFSP and emergency management officials the opportunity to understand the intentional contamination of the food safety supply outside the professional area in which they individually operate. Deliberate contamination of the food safety chain can have a dramatic impact upon how EHFSP and emergency management officials view not only the regulatory and medical outcomes of foodborne illness but also how the economic, social, and psychological imprint of such events affect the retail food safety chain community.

A primary objective of this study was to explore the relationship between the vulnerability and the resilience of the food safety chain to intentional contamination. Therefore, the results of this study may create the foundation for a paradigm shift within the broader environmental health community, specifically EHFSP. This paradigm shift would pertain to how the broader environmental health and public health communities approach and think about the development of policies regarding the intentional contamination of the retail food safety chain. This may also apply to public health and emergency management preparedness planning. Another benefit of this study is that it may open opportunities for other parts of the farm to table food safety supply continuum to learn about and incorporate best practices for protecting the food supply.

Summary

Consequences of intentional contamination of the retail food safety chain include the possibility in which there is chaos (Aung & Chang, 2014) within the food safety chain as well as with the public at large. A sense of normalcy reduces far-reaching social, economic, and psychological effects of the event.

The feeling of normalcy occurs because of resiliency policies that will alert persons in the food safety chain to make the necessary alterations to their preparedness planning and response. Resilience policies may lead to a sense of adaptive capacity (Béné et al., 2018) regarding an intentional contamination event thus mitigating the outcome of such incidents.

Chapter 2: Literature Review

Introduction

The academic literature on the intentional contamination of the retail food safety chain is limited; however, the research on food safety is plentiful. As with food safety, there is a substantial amount of literature focusing on resiliency. However, many of the studies target community resilience. Nonetheless, there is limited research blending resiliency and intentional contamination of the retail food safety chain.

Literature Search Strategy

In the literature review I outline the search strategy and the sequential steps needed to argue for reviewing current policies related to intentional contamination of the retail food safety chain and the relevancy of those policies to current realities. In that vein, the literature review begins with a strategy that identifies specific search terms. Strategy terms such as *biocrime, collaboration, decision-making, disaster, disaster management, foodborne diseases, food safety, food terrorism, intentional contamination of the retail food safety chain, resilience, RAT,* and *terrorism*, either alone or in conjunction with *terrorism* and *foodborne diseases*.

I reviewed articles from Google Scholar, databases including Thoreau, Political Science Complete, Sage Full-Text Collection, International Security, and Counter-Terrorism Reference Center, and ProQuest Central databases. Databases used less often but just as important included Academic Search Complete, Homeland Security Digital Library, and Medline. Supporting the databases were several websites that included U. S. Government websites.

Government websites included the FBI, FEMA, USDHS, U.S. State Department, NIMS, CDC, FDA, and U.S. Department of Agriculture. Industry and trade association websites included the American Society for Public Administration Section on Emergency Management and the National Environmental Health Association (NEHA).

Routine Activity Theory

Originally conceived as the antithesis to universally accepted theories of criminology, RAT focuses on attributes of crime on the daily-routinized actions of individuals (Branic, 2015). Through the routine activities of people, victimization is a constant (Mollenhorst, Edling, & Rydgren, 2018). RAT decrees that to be a victim of crime, there are at least three required elements. The elements are motivation to commit a crime, an available target, and absence of a deterrent for crime to occur (Brown, 2017; Clarke & Felson, 2008, p. 2; Cohen & Felson, 1979)

RAT relies on the idea that the theory is integral to studying crime via victimization. To test this central thesis, Spano and Frelich (2009) assessed the validity of motivation to commit a crime, an available target, and absence of countermeasures to deter the potential for crime as fundamental concepts of RAT. Through multivariate studies that focused on RAT conceptualization, the authors found support for the fundamental concepts of RAT (Spano & Frelich 2009, p. 308). The fact that RAT is a valid theory is vital for describing how RAT explains intentional contamination of the retail food safety chain. Crime would appear to be the only thing that RAT and the deliberate attempt to contaminate the retail food safety chain share.

Another commonality between RAT and the intentional contamination of the retail food safety chain is catching someone in the act of committing a crime. Using units of analysis such as incidents reported to the National Incident-Based Reporting System, Drawve, Thomas, and Walker (2014) explored the relationship between the significant elements of RAT and the probabilities of arrest. The results of the study indicated that "the core elements of RAT are robust predictors of variation for the chances of arrest" (Drawve et al., 2014, p. 465).

Though aggravated assault is the type of crime in Drawve et al.'s (2014) study, these findings are valid for the intentional contamination of the retail food safety chain. In the event of uncertainty regarding this assertion, past research involving the core premises of RAT has shown that patterns of victimization cross over to various crime outcomes (de Melo, Pereira, Andresen, & Matias, 2018; Drawve et al., 2014; Wick et al., 2017).

Food Safety

The study of food safety (Falenski et al., 2015; Kilbane, 2018) is essential to the understanding of intentional contamination of the retail food safety chain. An example is a study conducted by Mead et al. (1999) in which the authors emphasize food safety that focuses on the causes of foodborne diseases. Using foodborne related data only, Mead et al. (1999) estimated 76 million foodborne related illnesses, 325,000 hospitalizations, and 5,000 deaths annually in the United States. A study by Scallan, Hoekstra et al. (2011) improved upon the Mead et al. study utilizing different methodologies and assessment of risk . In the Scallan, Griffin et al. (2011) study there are 9.4 million episodes of food-

related illness by which only 31 pathogens of known etiology contributed to the illnesses (p. 7). These statistics make the case as to why the study of deliberate contamination of the retail food chain is critical.

An evolving and relatively new approach to understanding the prevalence and incidence of foodborne diseases is in the field of cost estimation (Scharff, 2015). The primary reason for implementing cost estimation revolves around the level of uncertainty in explaining the real burden of foodborne diseases (p. 1065). To alleviate this concern, an estimate of the cost burden will assist policymakers in their decision-making efforts at understanding the antecedent costs of foodborne diseases (Buzby & Roberts, 1996; Crutchfield & Roberts, 2000). The antecedent costs of foodborne diseases approach (McLinden, Sargeant, Thomas, Papadopoulos, & Fazil, 2014; Minor et al., 2015) spawned a current discussion based on past research regarding the actual economic burden of foodborne diseases (Mead et al., 1999; Scharff, 2010, 2012; Scharff et al., 2009). The modified cost of illness approach (McLinden et al., 2014; Minor et al., 2015; Scharff, 2015) is a comprehensive analysis of the economic burden of foodborne illnesses. The Scharrf (2015) study showed that the inclusion of medical costs, lost quality of life indices, and the input of uncertainty measures the true economic burden of foodborne illnesses. The reason for this assertion is that the Scharff (2015) study includes pathogens and the societal cost of foodborne illnesses (pp. 1064–1066).

However, in response to the Scharff (2015) study, McLinden et al. (2014) and Minor et.al (2015), using their cost of illness approach, argued that differences in outcomes between the two studies may be a factor of methodology rather than an actual

estimate of the burden of foodborne illnesses. Additionally, when reviewing the Mead et al. (1999), Scallan, Griffin, Angulo, Tauxe, and Hoekstra (2011), Scallan, Hoekstra, et al. (2011), and Scharff (2015) studies, prudence dictates that the reader be aware that the differences between the studies are not a reflection of changes in the foodborne related disease incidence (Minor et al., 2015). However, these same authors emphasized that improvements in the overall methodological procedures occur based on "lost quality-adjusted life days (QALDs) and monetary costs"(Minor et al., 2015, p. 1126).

Nonetheless, in a comparison of the Mead et al. (1999) study and the Scallan, Griffin et al. (2011) study, Scharff (2015) updated his 2012 thesis. The 2012 thesis included a basic and enhanced cost of illness model that included variables missing in the other studies. These models indicated that annual economic costs of foodborne illness were $51 billion and $77.7 billion respectively. The basic model similar to Scharff's 2009 study uses financial losses from medical care, loss of productive work, and loss of utility because of death. The enhanced model used the economic value derived from pain and suffering in addition to the losses incurred from the basic model (Scharff, 2015, p. 125). The Scharff (2015) focus changed from estimating on a national scale to estimating on a state by state scale. Estimation on a state by state scale provided insights of foodborne illnesses theretofore not studied (Scharff, 2015, p. 1065). The insights afforded from a state by state comparison included "differences in the incidence of illness, differences in medical and productivity costs, and differences in welfare losses caused by death and lost quality of life" (Scharff, 2015, p. 1064). Despite some differences, the main point is the proliferation of foodborne diseases provides the needed incentive for

decision-makers to focus on pathogens and other causal factors (Bintsis, 2017; Dewey-Mattia, Manikonda, Hall, Wise, & Crowe, 2018; Horn & Bhunia, 2018). It is the pathogens and other causal factors that are the most significant threats to health (Horn & Bhunia, 2018, pp. 3–4). Thus, the growth of pathogens becomes a threat, and food becomes the vehicle for fear when it comes to the intentional contamination of the retail food safety system, (Kilbane, 2018, p.174).

A study looking at the monetary burden of foodborne diseases on restaurants conducted by Bartsch, Asti, Nyatghi, Spiker, & Lee (2018) concluded the costs could range from $3,968 to $2.9 million per single outbreak based on the restaurant. The authors used a computational simulation model to show the costs to a restaurant were primarily the result of "lawsuits, legal fees, outbreak size and lost revenue (Bartsch et al., 2018, p. 274).

Consumer confidence in the food safety chain (Devaney, 2016; Wang & Alexander, 2018) has significant implications for the response to a deliberate contamination event. The loss of trust and commitment of consumers has detrimental effects regarding the safety of the food safety chain (Charlebois, Von Massow, & Pinto, 2015; Garcia-Fuentes, Ferreira, Harrison, Kinsey, & Degeneffe, 2014; Ling, 2018; Wang & Alexander, 2018). One example of how consumer perceptions are affected is how consumers will respond to an intentional act to harm the food safety supply.

A factor analysis study by Onyango, Hooker, Hallman, and Mohammed (2011) examined the perception and reaction to intentional contamination of the food safety supply. The authors developed a survey tool that would collect data related to attitudes

towards bioterrorism (p. 1). Starting in October and ending in November 2004, the authors conducted telephone interviews with 50 states (p. 2). The purpose of the survey was to collect data related to respondent's viewpoints regarding specific biological agents (anthrax, botulism, cyanide, and salmonella), and to determine if responses varied based on the agent (p. 2). They found the possible reactions would be along the lines of panic, fatalistic, fearful, emotional, optimistic, controlled, and acceptance.

Another concern regarding consumer perceptions is the ultimate loss of consumer confidence in the food safety chain based on information received via the media. It is wise to consider the impact of the media on the loss of consumer confidence, especially during an intentional contamination event. Ling (2018) using the model developed by Fishbein to understand consumers rational decision-making found consumers decision-making rests upon three principles (Ling, 2018, p.211). Those principles are (1) information the consumer has on hand, (2) understanding and perceptions regarding the safety of the retail food safety system and (3) what consumers expect from the food safety supply chain all have a direct effect on their decision-making apparatus (Ling, 2018, p. 211).

The public uneasiness with the food safety chain relates to their understanding that the food safety chain is not as safe as the government and the industry portray it to be (Garcia-Fuentes et al., 2014, p. 40). An example in which fears that the food safety chain might not be as safe is the CDC Environmental Health Specialists Network (EHS-Net) Project. This project chronicled since 2002 over 15 studies looking at restaurant food safety policies and procedures (CDC, 2015). The purpose of the CDC EHS-Net Project is

to improve the discipline of environmental health practice through collaborative efforts with state and local epidemiologists and laboratorians. The collaboration between state and local EHFSPs, epidemiologists, and laboratories focuses on understanding the root factors of foodborne diseases (Selman, 2006).

Their studies range from looking at chicken handling practices, (Green Brown, Khargonekar, & Bushnell, 2013), beef handling practices, (Bogard, Fuller, Radke, Selman, & Smith, 2013) to handling practices of leafy greens (Coleman, Delea, Everstine, Reimann, & Ripley, 2013), and hand hygiene practices in restaurants (Sumner et al., 2011). Each of these studies used observational and semi-structured interviews that revealed practices, policies, and procedures that warrant action on the part of the industry and the regulatory system in reducing the incidence of foodborne diseases.

One way to understand the significance of why it is vital for the industry and regulatory authorities to focus on indices related to foodborne diseases is because dining out as compared to eating at home is becoming a trend (Adam, Hiamey, & Afenyo., 2014, p.136). A study conducted by Adam, Hiamey, and Afenyo (2014, p. 136) in which they attempted to show the eating preferences of consumers and the choice of where consumers eat is a different preference. Using questionnaires given to students from the University of Cape Coast in Africa (p. 137), the authors were able to show that consumers wanted food that was hot, prepared in a clean environment, and handled by clean employees (p. 139). These findings may very well correlate with the ambiguity consumers appear to foster regarding when eating out, that there is a level of risk they are willing to accept.

Several studies have outlined the uncertainty of consumers relating to their food risk perceptions, knowledge, and decision-making (Garcia-Fuentes et al., 2014; J. Kim, Almanza, Ghiselli, Neal, & Sydnor, 2018; Ling, 2018; Nesbitt et al., 2014; Olsen, Røssvoll, Langsrud, & Scholderer, 2014; Wilcock & Ball, 2014) One such study conducted by Kher et al., (2013) focused on the ambiguity of consumers. In their study, using several focus groups, Kher et al., (p. 78) found different results regarding the perceptions of consumers toward the hazards of food and the reliability of traceability systems to provide transparency. The authors found that consumers had positive feelings relating to the reliability of the industry and regulators to enhance the transparency of tracing food during an event. However, in other instances, there were negative feelings relating to the effectiveness of tracking food during an event (79–80). It is worth noting that although this study focused on European and Brazilian consumers, this study did not detect the cross-national differences of participants as responsible for their differing feelings toward the reliability of the traceability systems (p. 81). In another study in which the authors used the Ajzen theory of planned behavior (Ajzen, 1991), Giampietri & Finco, (2016) surveyed 60 students from the "Faculty of Agricultural Sciences, Università Politecnica delle Marche in Italy" (p. 136) regarding their preferences to shop at a what is termed as a "short food supply chain" (SFSC), (p. 135) as compared to a grocery store. They found differences in propensity to buy and consume food based on the participant's belief that SFSC long term sustainability, as well as SFSC locations, played an integral role in their decision-making. Thus, the consumer's attitude and preferences toward where and what to purchase (Ajzen, 2016, p. 136) is an indication of

their purchasing capability during an intentionally or unintentionally contaminated food event.

Terrorism

A review of the 2016 data from Global Terrorism Database (GTD),(University of Maryland, 2016) indicates more than 13,400 cases of terrorist activity around the world. Based on the GTD, there is less food terrorism than other forms of terrorism. The history of terrorism is rich and robust (Bilala & Galamas, 2015; Benjamin Onyango et al., 2011; Toros, 2017). Suffice to say; terrorism is a compelling issue in the literature (Bilala & Galamas, 2015; Crenshaw, 2014; B. Onyango et al., 2011; Pain, 2014; Sandler, 2014; Toros, 2017), as well as in practice (Atran, Axelrod, Davis, & Fischhoff, 2017; J. Hunter, 2015; L. Y. Hunter, 2016; Sageman, 2014). This study acknowledged the importance of terrorism, however only within the context of individually based activities such as lone wolf terrorism. The literature review on terrorism focuses on lone wolves precisely because of their anonymity that may enable attempts to contaminate the food supply to succeed.

The idea of lone wolf's terrorism is not new in the United States. There are several glaring examples of lone wolves terrorism such as "Unabomber Theodore Kaczynski who committed 16 bombings over a 17-year period, the racist serial killer Joseph Paul Franklin responsible for an estimated 23 attacks over four years, and Muharem Kurbegovic, the Alphabet Bomber, who launched ten attacks in two years" (Hamm & Spaaij, 2015, p. 4).

In a study commissioned by the National Consortium for the Study of Terrorism and Responses to Terrorism, Asal, Deloughery, and King (2013) reported on their comparative study on lone wolf terrorism and violent hate crime groups. The authors used specific elements of lone wolves and hate groups activities and comparative data associated with violence along with U.S. Census data to glean demographic information that would provide insight into each group violent characteristics (p. 1). The report found that these two groups share commonalities beyond the activities for which they advocate. Lone wolves like violent hate groups are not known to affiliate with any particular organization; operations target a broader community, and though there is disagreement among scholars, hate groups are also considered terrorist (p. 4). These authors assert that lone wolf terrorists are here to stay (p. 2) and will soon become the public figure [sic] that requires counterterrorist organizations to study and understand (p. 2). The potentialities inherent in lone wolf's terrorism is worthy of note to the retail food chain community because of their modus operandi.

The study of lone wolves terrorism is a difficult undertaking because of the inability to detect lone wolves (Atran et al., 2017; Crenshaw, 2014). Another difficulty is distinguishing lone wolves attacks from other attacks not associated with lone wolves, such as extremists of all typologies (Becker, 2014; Gruenewald, Chermak, & Freilich, 2013; Reid Meloy & Yakeley, 2014). Data from government-sponsored reports in which the authors "compared homicides committed by loners with other extremist violence" (Chermak & Gruenewald, 2015, pp. 65–68) were one of the few studies on loners to use quantitative analysis to understand specific characteristics of loners. Loners similar to

lone wolves are described as independent and do not subscribe to any specific ideology (p. 65). The authors used open source databases that identified information in which domestic extremists committed crimes (p. 72). To gain a deeper level of knowledge related to the characteristics of loners, the authors used a logistic regression model (p. 81). The results indicated that loners had prior military experience, mental illness was of concern, and loners were younger (p. 81). These results as compared to another comparative study in which the focus was a comparison between lone wolf's characteristics and assassins, and school attackers is another example of describing lone wolves as potential purveyors to deliberately contaminate the food chain. McCauley et al., (2013) using reports sponsored by the U.S. government found there were common characteristics of assassins and school attackers that are comparable to lone wolves (pp. 15–17).

Aside from the inability to distinguish lone actor offenders from non-lone actor offenders, the study did find that similar to lone wolves, assassins and school attackers plan for violence, they operate independently for the most part, and they act out of personal animosity or self-aggrandizement (p 6).

Intentional Contamination of the Food Supply

The FBI considers intentionally contaminating the food chain as a crime (Freilich, Chermak, Belli, Gruenewald, & Parkin, 2014; Grumezescu, 2018; Jansen et al., 2014; Macdonald, 2015). As such, there is a relationship between the intentional contamination of the food safety chain and crime. One glaring example of the nexus between intentional contamination of the food safety chain and crime centers on the "mass Salmonella

poisonings on the part of the Peanut Corporation of America" (Leighton, 2014). According to the CDC, nine deaths and at least 714 confirmed cases of illnesses were associated with this outbreak (CDC, 2009; Leighton, 2014). Sept. 21, 2015, the CEO of the Peanut Corporation of America received 28 years, and the peanut broker for the Peanut Corporation of America was sentenced 20 years in federal prison, for fraud and conspiracy (Flynn, 2015). In this case, the intent was to allow a defective product into the food chain for economic reasons (Goetz, 2013).

What bounds the relationship between intentional contamination of the food safety chain and crime is the fact that "intent" and "motivation" are the proximate behaviors in each case (Drawve et al., 2014; Nganje et al., 2009). Whether or not the intent and motivation are present depends upon the status of countermeasures in place, also known within RAT as capable guardianship.

Most of the time when scholars speak of intent, the discussion centers around the intent of the criminal (Keller & Miller, 2015), however, there is the intention to report a crime that is relevant to social researchers or any discipline interested in determining the factors behind crime reporting. There is a study to explore the intent to perform. This study used elements of Ajzen (1991) Theory of Planned Behavior. The thesis of the study was by exploring "attitudes, social norms, and perceived behavioral control" (1991, p. 196), the intent is better understood. Using Survey Monkey, 985 participants took part in a scenario in which they had to perceive themselves as victims of crime. (p. 197). They were also surveyed to determine attitudes, social norms, and perceived behavioral control (p. 197). Through confirmatory factor analysis, principal component analysis, and

varimax rotation they were able to substantiate that the Theory of Planned Behavior Model predicted intent.

The intent through harmful or malicious attempts to contaminate the food safety supply according to Willis et al., (2015) occurs anywhere. There are few data points known about food terrorism in the United States. These results appear to justify what the skeptics of food terrorism argue as the impossibility of food terrorism. The theorem regarding the impossibility of food terrorism, and by extension attempts at deliberately contaminating the retail food safety chain exists because historically these events skeptics (Kirby, 2017) have won the day in many instances.

Scholars that viewed RAT as a theoretical construct, attempt to distance the theory from inclinations of those predisposed to criminal activity as compared to events (Clarke & Felson, 2008, p. 3) in which criminal activity take place.

This distinction is an important one because focusing on inclinations tends to deal with issues that are unquestionably understood since if a crime happens, one has to be inclined to commit such a crime (p. 2). The same applies to an attempt to contaminate the retail food safety chain. Whereas by focusing on events in which criminal activity could take place, Clarke and Felson (2008) believed there are “likely offenders, suitable targets, and absence of capable guardians” (2008, p. 2) all of which are central to this study.

At this stage in the discussion on crime and intentional contamination of the food safety supply, it is worth the time to assess the interrelationship between food terrorism, and attempts to intentionally contaminate the food safety supply.

Food terrorism according to The World Health Organization is "an act or threat of deliberate contamination of food for human consumption with chemical, biological or radionuclear agents for the purpose of causing injury or death to civilian populations and/or disrupting social, economic or political stability" (World Health Organization & Food Safety Department, 2002, p. 3). Taking note of the two particular circumstances in which food terrorism occurs there are intent and motivation to cause injury or death, which translates to the purposes of intentionally contaminating the food safety supply (Bogadi et al., 2016; Kilbane, 2018). The main difference between intent and motivation is the scope in which the manifestation of intent and motivation comes to life. Both denote a crime in the broader sense of terrorism. Both are designed to create a modicum of fear, but only one would result in mass casualty instantaneously (Ellis, 2014, pp. 216-220) if successful, and that would be food terrorism.

The implication is such that subsequent and systematic attempts to intentionally contaminate the food safety supply would not rise to the level of food terrorism. However, in most cases, as discussed in Chapter 1, the intent and motivation required in a deliberate attempt to contaminate the food safety supply are localized and narrow in focus. Therefore, when discussing food terrorism and attempts to intentionally contaminate the food safety supply, specifically the retail food safety chain, these terms are interchangeably only within the context and scope in which they occur.

There is a political, social, and economic approach in which intent and motivation are designed to cause a much broader dysfunction within these systems (Naor, 2014; World Health Organization & Food Safety Department, 2002). An example of a

dysfunction that occurs due to terrorism is economic. There is a relationship between terrorism and economic contraction (Naor, 2014, (p. 1). Naor (p. 4) used the Diamond model of expenditures (Diamond, 1965) in which the proportion of those that die from a terrorist attack is an indication of terror running rampant within a given area (in this case Israel), and that the government can reduce the death rate through a good provided. This quantitative analysis proved that the impact of terrorism on the economic vitality of an area is not just possible, but real (Naor, 2014, pp. 11–16).

Looking at the facts through the prism of unintentional contamination of the food safety chain, in which food-borne diseases is the outcome, we might have to conclude that there are not capable guardians that will prevent deliberate attempts to contaminate the food safety chain (Kirk et al., 2015; Minor et al., 2015).

Studies by Basra and Neumann (2016) in which they looked at the nexus between crime and terrorism is an indication that criminal activity has a place in terrorism, and by extension intentions to contaminate the retail food safety chain. The Basra and Neumann study concentrated on understanding the nexus of political and policy implications for terrorism research purposes (p. 35). The authors went so far as to claim that criminal activity provides insight into the radicalization process (p. 35). Crime and terrorism occurring via the internet (Gilmour, 2014) are potentially viable resources for terrorists, and lone wolves that would like to contaminate the retail food safety chain (Weimann, 2014). These examples forms an intersection in which crime and terrorism and by extension, intentions to contaminate the food safety supply may occur.

Though not happening necessarily in the United States on a grand scale (Becker, 2014; Ellis, 2014) excluding of course, the Oklahoma City Bombing (History.com Staff, 2009), 9/11 (Brooke, 2008), Boston Marathon Bombing (Globe Staff, 2013) and San Bernardino shootings (Lah & Moya, 2015), there is the possibility that in the future increased levels of lone wolf non-state actors involved in attempts at contaminating the retail food safety chain may occur.

There is limited academic literature on attempts at contaminating the retail food safety chain. Despite these limitations, this study found the academic literature on food terrorism focuses on specific attributes of the food safety chain deemed either protective or that enhances the vulnerability of the food safety chain.

The academic literature also revealed the potential psychological, social, and economic repercussions of food terrorism. Take, for example; one study found the prevalence of post-traumatic stress disorder (PTSD) varied with geographic proximity to the event site (Mahat-Shamir et al., 2017, p. 439). As part of this study, the researchers discovered that proximity to the stressful site is a predictor of a level of PTSD (p. 442). These findings were part of a study reviewing the status of 379 participants from Tel Aviv, Israel. The study attempted to prove whether proximity to the stressful site, previous exposure to a past stressful event are indicative of what will be the likely psychological reactions occurring from widespread successful attempts at contaminating the retail food safety chain. Additionally, there is the chance that "based on previous studies, whether previous exposure to traumatic events in the past, but no previous exposure to stressful events"(Mahat-Shamir et al., 2017, p. 440), are indicative of what

will be the likely psychological reactions occurring from widespread successful attempts at contaminating the retail food safety chain. The academic literature on food terrorism also focuses on risk perception and risk analysis related to food safety. The research reveals there are potential counter-terrorism approaches to the food safety chain as illustrated through efforts relating to the security of the food safety chain.

An important finding from the literature review revealed that studies related to the trust factor and the confidence of consumers in the safety of the food supply, has significant implications for how governmental units response to food terrorism may unfold (Barnett et al., 2016; Font-i-Furnols & Guerrero, 2014; Garcia-Fuentes et al., 2014; Irianto, 2015; Lassoued & Hobbs, 2015; Ling, 2018).

The literature review also revealed there is considerable uncertainty regarding how consumers will react to such an event.

This uncertainty is another reason-developing resiliency within the retail food safety chain is possibly the best counterterrorist response available to the food safety chain.

Resilience

This study defines resilience consistent with Bruneau et al., (2003, p. 735) description as “the ability of social units (e.g., organizations, communities) to mitigate hazards, contain the effects of disasters when they occur, and carry out recovery activities in ways that minimize social disruption and mitigate the effects”. Adding to this definition is Allmark et al., (2014, p. 2) who stated, " resilience is the internal quality i) of something ii) to return to a state (such as equilibrium) iii) in the face of external challenge

or adversity. In other words, resilience is of something, to something, to some endpoint". Research on resilience began with the work of C.S. Hollings (1973). Hollings (1973) exploration of the intermixing of ecological theory and how natural systems behave led toward an understanding of how ecological systems can absorb change and adverse occurrences. Despite the changes and consequences, these systems remain stable.

This portion of the literature review aims to highlight community resilience as the foundational centerpiece in which resilience policies regarding attempts at contaminating the retail food safety chain should occur. The goal of community resilience focuses on the retention of the community viability in which the whole community as a collective maintains its stability during crisis events (CARRI Institute, 2013, p. 10).

Issues of lack of community groups, leaders, and the lack of a community network during an adverse event (Thornley, Ball, Signal, Lawson-Te Aho, & Rawson, 2015) affects the resilience of a community. It is important to note that the resiliency of the community is as much about the collective nature of the community before an adverse event, as it is about the preparedness of the community during and after an adverse event (Cavallo, 2014; Cheshire, Esparcia, & Shucksmith, 2015).

An exploratory qualitative and survey-based research study looking at the mitigation and preparedness activities of public, private, and non-profit organizations,(Chikoto, Sadiq, & Fordyce, 2013) found that mitigation and preparedness practices varied significantly. Public organizations engage in preparedness and mitigation efforts more than private and non-profit organizations. Whereas, non-profit organizations participate in mitigation and preparedness activities more than private organizations (p.

401). These distinctions are important because organizations, whether governmental or as part of the retail food safety chain community, play a vital role in response to attempts at contaminating the retail food safety chain, and the foodborne disease outcomes associated with such events (Fagotto, 2014; Xiao & Peacock, 2014).

The role of the public and private entities is crucial during the recovery phase of the emergency management operation. A study conducted in Korea exemplifies the importance of recovery. The goal of the study was to use community resilience cost index to assess quantitatively the disaster resilience capacity of a region based on recovery costs during the post-disaster phase of the emergency (Yu, Kim, Oh, An, & Kim, 2015, p. 7). The authors used linear regression to distinguish losses from recovery costs (p. 9). Some of the conclusions from this study were (1) recovery costs are higher in the private sector than any other sector, (2) the ratio of recovery costs is proportional to the type of hazard and (3) recovery costs cannot be the only basis for decision-making in setting priorities for disaster mitigation purposes (pp. 11–12). The results are instructive for understanding the potential resilience capacity of communities as part of the response policy process. It is evident from the studies cited that an understanding of community resilience is synonymous with an understanding of the status of resilience as part of the policy development apparatus.

Homeland Security Presidential Directive 21 specifies the importance of community resilience and as a critical part of public health preparedness efforts (Wulff, Donato, & Lurie, 2015). To highlight this point, a report on the intentional contamination of food using chemical, biological, radiological and nuclear agents (CBRN) found the

food chain to be vulnerable to contamination. However, it is at the retail level that introduction into the food supply becomes easier (Meulenbelt, 2018). If attempts at contaminating the retail food safety chain were a widespread phenomenon, it is at the retail, community level that the food safety chain is most vulnerable. Thus, policies targeting resiliency should focus on the community level.

Central to the development of policies targeting resilience is the four properties and four dimensions of resilience. The properties of resilience are robustness, redundancy, resourcefulness, and rapidity (Bruneau et al., 2003). Robustness "essentially represents a judgement between the measurable criteria and the overall amount of resilience", (Zobel & Khansa, 2014, p. 85). Redundancy is the ability of a system to substitute the loss of functionality to the system (Bruneau et al., 2003, p. 737). Resourcefulness is the ability of the system to marshal the resources that would sustain the system's robustness and identification of issues made in support of resource availability (p. 737). Rapidity is the ability of the system to maintain priorities and programmatic goals as soon as possible thus containing the damage to the system (p. 738). Therefore, to understand the properties of resilience, an understanding of the dimensions of resilience is necessary (p. 738), especially during policy development. Quantifying resilience is a complex undertaking. To do so requires that measures of a community infrastructure occur before and after an event (p. 740). To explain measures of community infrastructure, the authors put forth several earthquake scenarios to measure the following elements:

- "The technical and organizational resilience as the annual probability that the system can satisfy the robustness and rapidity criteria on earthquake risk."
- "Advanced loss estimation models can be applied to estimate the economic consequences of damage and disruption sustained by the power, water, hospital, and emergency response and recovery systems" and
- "At both the infrastructure systems and community levels, the annual probability of achieving resilience can be evaluated for cases with and without the application of specific advanced technologies (e.g., new materials, response modification technologies)" (p. 742).

Though the Bruneau et al., (2003) study deals with the dimensions of resilience related to earthquakes or natural disasters, these dimensions apply to the study of resilience and the deliberate contamination of the retail food safety chain. The technical dimension of resilience is a physical system that is akin to the system components of the farm to table food safety chain that must meet standards of performance (p. 738). The second dimension of organizational resilience refers to the argument of this study, which is that critical infrastructure such as the retail food safety chain must organize around the four properties of resilience (i.e., robustness, redundancy, resourcefulness, and rapidity) (p. 738). The social and economic dimensions of resilience refer to the lessening of the critical elements of the retail food safety chain to disruptions, as well as the levels of financial loss resulting from disruptions, caused by the deliberate contamination of the retail food safety chain (p. 738). The interdependent nature of the properties of resilience

to the dimensions of resilience is an inescapable axiom necessary to the conceptualization of policies related to the intentional contamination of the retail food safety chain.

A prime example of this assertion is a study in which the authors conceptualized resilience regarding the four properties of resilience (Wicker, Filo, & Cuskelly, 2013). The authors used a 20-item questionnaire, content validity, reliability, and validity of the organizational resilience scale and linear regression analysis for data analysis purposes (p. 514). What they found was that sports clubs with a higher level of the four properties of resilience recovered faster and entirely from the disaster (p. 520).

Another example worth mentioning is the advent of resourcefulness during a disruption period. A study on organizational resilience and flooding, using an exploratory case study approach found that 22 organization's resourcefulness aided the ability to respond and recover from an adverse event (McGuinness & Johnson, 2014, p. 450). In this particular case, the level of resourcefulness is a direct result of the ability to utilize social capital (p. 451). All of these examples provide ample evidence of how robustness, redundancy, resourcefulness, and rapidity are useful properties for developing policies regarding attempts at contaminating the retail food safety chain.

Vulnerability

In his article titled "Triggering agents, vulnerabilities, and disaster reduction: towards a holistic paradigm," David A. McEntire (2001) states there are many variables responsible for increased disaster vulnerability. He categorized these variables along the lines of physical, social, cultural, political, economic and technological (pp. 191–192). Consistent with the theme of increased vulnerability, the Highfield et al., (2014) study

attempted to unearth the viability of exposure to hazards, and indices of vulnerability (structural and social) after a disaster.

The authors selected housing units as their unit of analysis for the study. In developing their hypothesis for the study, Highfield et al., (2014, pp. 5–6) focused on the selection of "Hazard Exposure and Physical Vulnerability, Structural Vulnerability and Damage, and Social Vulnerability Variables to understand the effects of Hurricane Ike. The findings indicate if community resilience is the goal, focusing on the indices above ("Hazard Exposure and Physical Vulnerability, Structural Vulnerability and Damage, and Social Vulnerability Variables"(pp. 5–6)) to alleviate potential threats from a hurricane is a sub-goal of community resilience. These findings are instructive for emergency management and planning purposes (pp. 12–13).

When developing emergency response frameworks, and contingency planning regimens, it is important to keep in mind the issue of vulnerability as risk (Zio, 2016, p. 140). How policymakers, EHFSP, and emergency management officials react to vis-a-vis risk vulnerability of the food safety supply is a question worth exploring. What are the priorities based on the potential public health impact, perceptions of consumers regarding the risk, to the food safety supply? What are the possible market disruptions emanating from outbreaks, and the social reactions toward emergency policy development (Mackey & Strathdee, 2015; Walker & Blackburn, 2015)? Two studies exemplify and serve as an example of the perception of risk from the social-cognitive perspective and perspectives related to behaviors during the preparedness phase of an event. In a study by Espina and

Teng-Calleja (2015), they utilized a social-cognitive perspective to determine the status of environmental and individual factors conducive to preparedness.

The study methodology involved a correlational design with participants that had experienced a natural disaster such as a typhoon (p. 165). The results from the study proved the authors' hypothesis that individual and environmental factors are conducive to, and enhance preparedness (p. 168). It appears that risk perceptions are commensurate with an individual's experience related to a specific hazard or emergency event (p. 169). Experiences with previous hazards or emergency events enable individuals to prepare themselves at a higher level than those without such experiences (p. 169).

The effects of how social-cognitive factors affect disaster preparedness is a reason why Gin et al., (2014, p.87) wanted to "understand factors influencing preparedness behavior, particularly how demographics might influence preparedness behavior and whether preparedness actions are related". The authors used the General Social Survey with 1388 observations to "test a conceptual path model of preparedness that includes demographic variables and three latent variables as mediators of the effects of demographics on preparedness: Cognitive Preparedness; Peer Group Behavior Awareness, and Perceived Effectiveness" (2014, pp. 87–89). The model used by the authors discovered that demographic variables did not have a direct effect on the disaster preparedness of individuals (p. 90). However, the "latent variables" discussed earlier are better suited to explain behaviors related to disaster preparedness (p. 90).

The construct of vulnerability like resiliency has an interdisciplinary

function consisting of socio-political, socio-ecological, psychological science, disaster reduction, economic and organizational constructs (Aligica & Tarko, 2014; Allodi, 2017; Bec, McLennan, & Moyle, 2016; Borum, 2014; Fekete, Hufschmidt, & Kruse, 2014; Feng, Wang, & Li, 2014; J. H. Maldonado & Moreno-Sánchez, 2014; Maru, Stafford Smith, Sparrow, Pinho, & Dube, 2014; Palliyaguru et al., 2014; Zio, 2016). Nonetheless, vulnerability in this study focuses on the context in which attempts at contaminating the retail food safety chain occurs. In that regard, a review of the literature indicated there is not a diverse array of academic literature on attempts at contaminating the retail food safety chain and vulnerability. In the realm of food terrorism and by extension attempts at contaminating the retail food safety chain, threats to the food safety chain are not only credible but constitute a real possibility of happening (Behavioural Analysis Program, Operational Training Unit, 2007; Chaturvedi et al., 2014; Grumezescu, 2018; Peter, 2015).

The food safety chain as a critical infrastructure of importance (Grumezescu, 2018) is emblematic of the vulnerability of any interconnected and interdependent (p. 135) system. Thus, the literature on vulnerability within the context of disasters focuses on the relationship of vulnerability to systemic risks (Cavallo & Ireland, 2014; Chaturvedi et al., 2014; Cummins & Weiss, 2014), and the interrelationship of vulnerability, resilience, and adaptive capacity (Frazier, Thompson, & Dezzani, 2014; Lei, Wang, Yue, Zhou, & Yin, 2014).

There is the recent influence of what McEntire (1999, p. 58) termed “invulnerable development.” As espoused by McEntire (1999) invulnerable development addresses

vulnerability more directly concerning the events that allow disasters to occur (McEntire, 2001). In other words, what McEntire (2001) calls triggering events are the underlying causal factors or contributing factors to disaster events? An example within the realm of attempts at contaminating the retail food safety chain would be not developing a surveillance system that would act as a forewarning of foodborne outbreaks. Having such a system would constitute improving the resiliency of the system.

Emergency Preparedness and Planning Models

The foundation of the public health emergency preparedness and planning process includes The National Preparedness Goal (FEMA, 2011b) Homeland Security Presidential Directive 21 (White House, 2013), and the Public Health Security and Bioterrorism Preparedness and Response Act of 2002. The purpose of these documents focuses on the adoption of principles and practices designed to ensure the safety of the public during emergencies or disasters irrespective of the source (Burkle, 2010; Arbon, Gebbie, Cusack, Perera, & Verdonk, 2012). Take for instance the Whole Community concept subscribed to by FEMA and incorporated into FEMA's emergency management approach. This method emphasizes the collaborative and coordinated efforts of the entire community (emergency management, public health, organizational leaders inside and outside government, community leaders). These efforts toward building capacity and more importantly, resiliency, (Cutter, 2016; FEMA, 2011a; Islam & Walkerden, 2014; Lombardo & Ryan, 2013) are critical for policies related to attempts at contaminating the retail food safety chain.

The Los Angeles County Community Disaster Resilience (LACCDR) initiative (Eisenman et al., 2014; Wells et al., 2013) utilized and studied a variant of this approach called community resilience. The purpose of this project initiative was to use community partnerships as a means to put in place community resilience programs when policy directives and available resources allowed such an opportunity (pp. 1173–1174). What the LACCDR found was that benefits of the LACCDR initiative included community engagement through partnerships, informing the public about preparedness, how to leverage resources from the community to enhance community resilience, and data that indicates the usefulness of the initiative to community resilience as compared to current methods of community resilience (Eisenman et al., 2014, p. 8487). Part of the intent to drive public health toward more community based collaborative systems stems from the perception that public health operates under a silo orientation (Kaufman et al., 2014). Since most EHFSP work within a public health system and emergency management officials as part of the emergency management system, these perceptions are instructive for developing policies related to attempts at contaminating the retail food safety chain. Vielot and Horney (2014) sought to deal with the perception of silo orientation within public health when they studied merging emergency functions. To understand if merging of duties would improve efficiency and effectiveness of the emergency management process, Vielot, and Horney (2014) studied six North Carolina counties that merged functions between public health and emergency management (p. 2913). Their exploratory study, using semi-structured phone interviews with key informants that have shared roles and responsibilities, found these merged functions contributed to a streamlined and

improved operational function of public health and emergency management (p. 2918). The authors admit that despite the challenges of merged functions, qualifications, and division of responsibilities should focus on combined and nonmerged positions to gain better insight into the quality of service (p. 2918).

Decision-Making

One of the many issues related to decision-making may include more than the vulnerability of the food safety chain. It is the uncertainty that is the most prominent issue in food terrorism (Chaturvedi et al., 2014; Kalra et al., 2014; Lerner, Li, Valdesolo, & Kassam, 2015). The uncertainty reflected in responding to these events is not only time dependent, but also a reflection of the instability of conditions in which the food safety chain exists (Bueno-Solano & Cedillo-Campos, 2014; Conrado, Neville, Woodworth, & O'Riordan, 2016; Maitland & Sammartino, 2015).

In a case study dealing with heuristics when making decisions, and the uncertainty accompanying such decisions, Maitland (2015) wanted to examine decision-making under conditions of the uncertainty of a sizeable multi-national company. A proposal by Maitland (pp. 4–7) posit that (1) decision-making within a group will utilize different heuristics in their decision-making, (2) individuals with experience making decisions under conditions of uncertainty brings to bear a richness of understanding, and (3) heuristics of individuals that are strategic decision-makers scope of understanding is broad and wide-ranging. Maitland's (2015, p. 8), data collection consisted of "17 semi-structured, 1.5-hour interviews with 11 individuals; participant surveys; annual reports; company announcements; media reporting; and confidential Board papers". What the

study makes clear is that how decision-makers utilize heuristics is emblematic of their strategic decision-making skills in addition to their judgment under conditions of uncertainty. This study provides insight into strategies decision makers use during moments of uncertainty and is a lens into "the nature of learning and expertise, and a need to focus specifically on the nexus between different types of experience and their encoding in cognitive structures" (2015, p. 19).

Collaboration

The National Response Framework (FEMA, 2013b) is the mechanism through which the private sector, non-governmental organizations, tribal, federal, state, local governments, and citizens can plan for and organize for the express purpose of responding to threats from natural or human-made disasters. The updated version improves upon the previous version (FEMA, 2016a) regarding the whole community concept by establishing methods of integration and collaboration.

A study that involved examining the activities of the South Florida Ecosystem Restoration Task Force is an excellent example of these principles. The task force objectives targeted a consensus-oriented and transparent process that would reduce conflict among the diverse interests that made up the task force (Heikkila & Gerlak, 2014).

The objectives of this ten-year longitudinal study focused on elements of collaborative processes over time (p. 7). The results of the study reveal three overarching themes the literature describes as indicative of collaborative process elements. These elements include "internal governance and administration, internal communication, and

external communication" (2014, p. 2). Principles of collaboration espoused by Bunker et al., (2015) and Sawaiha (2014) insist that (1) collaboration is necessary, (2) collaboration must be part of the emergency management cycle, (3) collaboration must be built into the emergency management system as "repertoires of collaboration" (Bunker et al., 2015, p. 61) that are not command and control dependent.

The importance of collaborative processes in attempts at contaminating the retail food safety chain is highlighted by the absence of EHFSP in the preparedness planning continuum (Davis, Bevc, & Schenck, 2014; Schoch-Spana, Selck, & Goldberg, 2015; Selvey, Rutherford, Dodds, Dwyer, & Robinson, 2014; Wahl, Willumsen, Jensvoll, Finstad, & Berglund, 2015). This absence is indicative of public health preparedness planning as exemplified in a study focused on the essential services of environmental health. This study postulated that understanding the importance of mobilization of community partnerships in dealing with environmental health issues and problems (Gamboa-Maldonado, Marshak, Sinclair, Montgomery, & Dyjack, 2012) improves collaboration. The authors used social cognitive theory as the backdrop for 14 semi-structured interviews of top-level environmental health and emergency response administrators from Riverside and San Bernardino counties in California (p. 25). What Gamboa-Maldonado (2012) found is environmental health professionals thus by extension EHFSP, are not connected to the emergency preparedness process. The reasons for this disconnect stems from the environmental health professionals historical emphasis on providing fee for service activities (Low, 2015) and the environmental health professionals uneasiness regarding their role and responsibility in emergency

preparedness (Courtney, Bond, & Maher, 2014; Johnson, 2013; Siddiki, Carboni, Koski, & Sadiq, 2015). The top-down structure of emergency management processes (Boersma, Groenewegen, Ferguson, & Wolbers, 2014) also contributes to a disconnection from the emergency preparedness process. This approach to public health preparedness, especially as it relates to the functions of EHFSP must change if effective collaboration with community partners, the private sector, and public sector communities are possible.

Conclusion

The literature review reveals numerous challenges inherent in developing response policies related to attempts at contaminating the retail food safety chain. The number of studies concerning attempts at contaminating the retail food safety chain, resiliency, and response policies are limited.

However, as this literature review reveals, the ultimate purpose of intentionally contaminating the retail food safety chain is not the injuries caused by deliberately contaminating the retail food safety chain, but rather the economic and psychological effects of food terrorism (Drakos & Kallandranis, 2015; Ellis, 2014) and by extension intentionally contaminating the retail food safety chain.

It is important to note that the focus of attempts at contaminating the retail food safety chain is on resilience.

Therefore, actions on the part of those who would try to contaminate the retail food safety chain do not target the use of pathogenic agents, but preferably create social anxiety, economic, and psychological disruptions within and outside the retail food safety chain (Altier, Thoroughgood, & Horgan, 2014; Bogadi et al., 2016; Ellis, 2014; Ljujic,

van Prooijen, & Weerman, 2017). This approach distinguishes this study from other studies as part of homeland security activities.

Last, resilience and vulnerability are intertwined constructs in which the ability to recover from adverse events can be tied to the level of vulnerability as well as the adaptive capacity of an individual or community (Gallopín, 2006; Lei et al., 2014; Palliyaguru et al., 2014). A critical component of homeland security is not only the need to reduce the impact of disasters (Palliyaguru et al., 2014) but to build and sustain community preparedness (Plough et al., 2013; White House, 2013).

It is the focus of this literature review to identify the lack of relevant academic literature on the topic of attempts at contaminating the retail food safety chain and resilience. Additionally, this literature review has found food terrorism might be a low-intensity event. If a community or the retail food safety chain fails to put in place capable guardians designed to abate the social, psychological, and economic disruptions caused by attempts at contaminating the retail food safety chain the "functional capacity" of a community is diminished (White, Edwards, Farrar, & Plodinec, 2014, p. 201). Through the methodological process espoused by narrative policy analysis and RAT, this study fills a needed and yet undiscovered gap in homeland security preparedness. That gap is the mistaken belief that policies related to responses to attempts at contaminating the retail food safety chain are the same as responses to unintentional contamination of the food chain (Bogadi et al., 2016; Davidson et al., 2017; Pedersen et al., 2016).

Therefore, the hope is that public health emergency preparedness decision-makers recognize the benefit of developing policies focusing on resiliency as a valid and useful

methodology. An additional gap relates to a lack of recognition that a resilient retail food safety chain is consistent with a resilient community (Lombardo & Ryan, 2013; Thornley et al., 2015) thus a safe food safety supply.

Chapter 3: Research Method

Introduction

The goal of this chapter is to describe the methodology used in the present study for understanding system resilience following deliberate attempts at contaminating the retail food safety chain. The methodology for the study was qualitative and relied upon narrative policy analysis to focus the research design. The units of analysis for the present study included EHFSPs and emergency management professionals from state environmental health and emergency management programs from the Pacific Northwest, the Central, and the Eastern sectors of the United States. These states were included in the study primarily because either they had universities that were participating in the Department of Homeland Security Science and Technology Centers of Excellence (DHS S&T COE) or I was familiar with the emergency management and foodborne disease investigation protocols.

Designing a qualitative research project requires specific criteria that inform the reader of the quality of the research effort. The criteria for this study were:

- a topic that is interesting yet relevant,
- the theoretical constructs are complex yet appropriate for the study,
- honesty regarding potential biases,
- the research project has concrete details along with a thick description,
- the project is evocative yet can be transferable,
- the research project contributes to the field of interest in a significant way
- the research has robust ethical standards, and

- the study achieves its purpose (Tracy, 2010).

This study used purposeful sampling to identify key informants and decision makers who had the necessary understanding of emergency management and foodborne disease outbreak protocols (see Gentles, Charles, Ploeg, & McKibbon, 2015).

As described further in this chapter, the process of exploring resilience related to the deliberate contamination of the retail food safety chain began with the research design and rationale. Once the research design and rationale became clear, my role as researcher took center stage in the research process. The next steps in this methodology were to identify the population (EHFSPs and emergency management professionals), justify the sampling strategy, and explain why the choices of participants could help to understand the phenomenon of interest. Instrumentation such as interviews assisted in focusing the study on the subject of resilience. In this chapter I also describe the process for recruiting employees of environmental health food safety and emergency management programs and EHFSP and emergency management professionals who work within these programs. This chapter ends with a description of the data analysis process, threats to validity, the role of trustworthiness, and ethical procedures.

Research Design & Rationale

Because the purpose of this research was to explore the relationship between the vulnerability and the resilience of the retail food safety chain to intentional contamination via a qualitative narrative policy analysis, three questions required answers. First, how does the policy counter-narrative(s) encapsulate the perspective of EHFSP regarding the vulnerability and resiliency of the retail food safety chain? Second, how do the policy

counternarratives describe how emergency management officials view the vulnerabilities and resiliency of the retail food safety chain. Third, how do the factors that cause uncertainty relate to the intentional contamination of the retail food safety chain?

The present study was exploratory. What this means is that as a qualitatively oriented study, this study was not hypothesis-driven. Also, in the study I searched for an understanding of resiliency in regards to the deliberate contamination of the retail food safety chain. The unit of analysis was EHFSPs and emergency management professionals from the Pacific Northwest, Central, and Eastern portions of the United States. Two of the four states in this study have universities participating in the DHS S&T COE. DHS S&T COE universities conduct research that addresses issues of importance to the homeland security community (USDHS, 2015). The goal of DHS S&T COE is to "work closely with the homeland security community to develop customer-driven, innovative tools and technologies to solve real-world challenges. COE partners include academic institutions, industry, national laboratories, DHS operational components, S&T divisions, other federal agencies, state, local, tribal and territorial homeland security agencies, and first responders" (USDHS, 2015, p. 1).

There were three reasons why these populations were ideal for this qualitative exploratory study. First, because the DHS S&T COE operate in some of the states in this study, there was the chance there was a robust public health preparedness system operating in these states or that one would develop because of DHS S&T COE. Second, these states operate (as do other states) based upon the Pandemic and All-Hazards Preparedness Act of 2013. These states also use the Incident Command System (Ansell &

Keller, 2014; FEMA, 2016b) that encompass all public health and emergency management preparedness activities. Last, each unit of analysis participating in the study has similar characteristics relating to their food safety or emergency management programs. The implication is that these units of analysis operate using a similar process regarding their food safety and emergency management responsibilities. Thus, the issue of legitimation becomes less troublesome because inferences exist (see Plano Clark & Creswell, 2008) regarding standard operating procedures each unit of analysis deploys during an emergency. Additionally, if the assumption is correct that units of analysis operate using a similar process regarding their food safety and emergency management responsibilities, then literal replication or theoretical replication is possible (see Kerrigan, 2014).

Because this study involved more than one site, using the interview guide improved the reliability of results because all respondents received standardized questions enabling me to probe, follow-up with additional questions, and develop subtopics as part of the research effort (see Luton, 2010, p. 28). Questions in the interview guide (see Appendix D) occurred in concert with conversations with state-level EHFSP and emergency management professionals from the participating states.

During this phase of the study, the goal was to obtain as much information from key informants as possible. The purpose was to develop a picture of how each state describes the policy narratives and metanarratives essential to their story or argument in regard to incorporating the concept of resilience during intentional contamination events. Questions to participants focused on EHFSP and emergency management professionals'

interpretation of challenges, opportunities, and readiness posture for engagement in developing resilience policies or frameworks before and during a deliberate contamination event.

Role of the Researcher

My role as the researcher in this study was to develop credibility by making it clear that I took great care to ensure that no professional or any other biases influenced data collection and analysis and interpretation of information (see Miller, 2015; Surmiak, 2018; Wadams & Park, 2018). Also, I outlined in explicit terms my background, training, and experience (see Sarma, 2015). I utilized the precepts of credibility as articulated by Cope (2014), and Sarma (2015) by ensuring a high degree of rigor during the data collection and analysis. Through careful and skillful use of identifying the sampling strategy and the population for the study and a detailed explanation of the data collection instrumentation, I determined the policy narratives and metanarratives central to the stories or argument regarding the relationship of resiliency to the deliberate contamination of the retail food safety chain.

Any professional associations or supervisory oversight between the researcher and the unit of analysis should be noted. There were instances where the units of analysis may interact with me during periods of professional association because I am presently employed in the field of interest in the study. However, I had no supervisory or oversight authority with the units of analysis.

Study Population and Participants

The population for this study was EHFSP and emergency management professionals who worked in state environmental health food safety programs and emergency management programs in the Pacific Northwest, Central, and Eastern sectors of the United States. I recruited EHFSP

- who operated from the state level of government, had technical and supervisory responsibilities related to foodborne disease outbreak investigations and public health emergency management responsibilities; the recruited EHFSP came from either the public health and agriculture sectors or both in each state depending upon how the state organized the food safety responsibilities;
- emergency management officials with technical and supervisory responsibilities related to emergency management with a specific focus on response, recovery, and mitigation and
- EHFSP and emergency management officials from Midwest, Pacific Northwest and Eastern regions of the United States.

As a subset of the public health community, EHFSP bring a wealth of experience in food safety. EHFSP also bring a thorough understanding of environmental health issues in an emergency (Kalis & Zeidel, 2016; Rehfuess & Bartram, 2014). As a subset of the state public health community or agriculture departments, EHFSP focuses on developing and maintaining regulatory oversight of food safety. As been noted by some within the environmental health field and as one of the purposes of this study, there is a

need for research endeavors to create the foundation for a paradigm shift regarding the role of EHFSP in public health and emergency management preparedness planning (Kaufman et al., 2014; Weine, Eisenman, Kinsler, Glik, & Polutnik, 2017).

Sampling Strategy

The sampling strategy consisted of purposive sampling utilizing criterion for participating, and the concept of saturation as a method to focus the data collection effort (Vasileiou, Barnett, Thorpe, & Young, 2018). Criteria for participation included EHFSP with technical and supervisory responsibilities related to foodborne disease outbreak investigations, and public health emergency management responsibilities at the state level of government. Emergency management officials have technical and supervisory responsibilities related to emergency management with a specific focus on response, recovery, and mitigation.

The idea of saturation denotes a period in the research effort when new information is meaningless and circular regarding the relevancy of the data (p. 3). Saturation is problematic if the researcher does not keep in mind the nature of the population studied, provide clear guidance on how a unit of analysis is selected, and whether there are adequate resources to carry out the project (p. 9).

Malterud (2016) make the point that qualitative research requires no hard fast rules for sample size. The only caveat when deciding sample size comes from a study in which the author used academic information for characterizing and discussing of sample sizes as articulated through academic literature (Vasileiou et al., 2018, p. 4). In the study, Vasileiou et al., (p. 15) makes note of the fact that if saturation is a concern, and it is in

the present study, since the saturation point has no definitive marker, basing the sample size upon the determination of how the data speak instead of an arbitrary number is a practical approach toward establishing sample size.

Qualitative Instrumentation

Instruments for this qualitative oriented study included interviews and current and archival documents. The use of this form of instrumentation ensures the preeminent role of the researcher in the research effort. As stated earlier in this chapter, the researcher in qualitative research is the data collection instrument (Sanjari, Bahramnezhad, Fomani, & Sho, 2014; Shaw & Satalkar, 2018). Therefore, the biases, values, personal characteristics of the researcher conducting qualitative research has a potential impact on the validity and reliability of the research effort (Shaw & Satalkar, 2018, pp. 80–83). The exploratory nature of the study is such that an interview guide will allow the researcher an opportunity to explore the phenomenon without the rigidity of other interviews types (Kallio, Pietilä, Johnson, & Kangasniemi, 2016).

Recruitment and Data Collection

State-level EHFSP participants were recruited via an internet search of environmental health professional associations such as NEHA, Conference for Food Protection (CFP), Association of Food, and Drug Officials (AFDO), the International Association of Food Protection/individual NEHA state affiliates of participating states.

The internet search focused on obtaining contact information for state directors of food safety programs at the departments of health and agriculture. The purpose of contacting the state directors of food safety programs at the departments of health and

agriculture were to discuss the following; (1) purpose and outline of the study, (2) ascertain their willingness to participate in the study, (3) discuss pertinent materials that pertain to emergency management response, recovery and mitigation, and (4) contact information for other key informants such as food safety programs directors. A script for recruitment is attached.

I contacted key informants at state departments of health and agriculture with technical and supervisory responsibilities related to foodborne disease outbreak investigations and public health emergency management responsibilities. Key informants included food safety program directors, and public health emergency managers from public health, and agriculture agencies. During the initial contact, I discussed research objectives, protocol, and conduct of the interviews. A script for recruitment is attached.

I recruited state-level emergency management officials from the Midwest, Pacific Northwest & Eastern regions of the US via an internet search of the National Emergency Management Association (NEMA), the American Society for Public Administration Section on Emergency and Crisis Management, and state affiliates of NEMA participating in the research. The internet search focused on obtaining contact information for emergency management personnel at the state level. The purpose of contacting state emergency managers was to ascertain a willingness to participate in the study and for contact information for other key informants that meets the criteria for technical and supervisory responsibilities related to emergency management with a specific focus on response, recovery, and mitigation. A script for recruitment is attached.

Based on information received from state directors of food safety programs at the departments of health and agriculture, and state-level emergency management officials' potential participants were contacted using email or phone. I discussed the reason for the study, the potential location of the interviews, the timetable for the study, and the conduct of interviews. To ensure confidentiality and consent of participants, I obtained informed consent from individual participants, and letters of cooperation from state agencies participating in the research.

Steps taken by me included making arrangements via email or phone to solidify time and location of interviews of public health and agriculture, and emergency management officials from the Midwest, Pacific Northwest, and Eastern regions of the US. Additionally, I obtained necessary equipment such as voice recorder, notepads, writing materials deemed essential for conducting the interviews.

Conduct of interviews with participants from the Midwest, Pacific Northwest, and Eastern regions of the United States, included obtaining documents such as food defense plans, public information materials related to emergency preparedness, and other documents as needed resulting from the interviews and discussions with the main informants.

Contact with the principal informants from public health and agriculture agencies in addition to emergency management agencies from participating states provided the framework for soliciting participation in each state. Furthermore, recruitment of EHFSP and emergency management officials' key informants at the state level provided the necessary information regarding the status of resilience during intentional contamination

events. Key informants' participation was not contingent on the EHFSP and emergency management officials understanding of resilience during deliberate contamination events.

Data collection consisted of gathering information regarding EHFSP and emergency management professional's perspectives of collaboration, and decision-making, and their understanding of resiliency within the context of a deliberate attempt to contaminate the retail food safety chain. All interviews were either face-to-face, email, or by phone. Using multiple sources of information such as face-to-face, email, and phone interviews, and respondent validation helped to define the nature of, collaboration, and decision-making, and resiliency in intentional contamination events. It was important to conduct interviews so that the I could understand the differences between how EHFSP and emergency management professionals approach the issue of intentional contamination events. It was also important to ascertain how each EHFSP and emergency management professionals perceived collaboration and decision-making within his or her organizational structures. The benefit gained from this process is the improvement in communication within the public health emergency management system, and the emergency management system in each state.

There is also a benefit from the improvement in communication between public health, and emergency management in each state. Additionally, the results of the data collection provided insight into the presence or absence of EHFSP in the emergency management of deliberate contamination events.

Observation of EHFSP and emergency management professionals during a real-life setting in which deliberate contamination takes place is ideal. However, the difficulty

in observing intentional contamination events relates to the frequency in which it occurs if it occurs at all. There is also the fact that resources are not available to conduct observation in each state. Nevertheless, using Bruneau (2003) resilience properties and dimensions, it was possible to ascertain the status of resiliency during a deliberate contamination event by extrapolating from documents, and a review of emergency preparedness plans. Reviewing plans using the resilience properties and dimensions, and the interview guide assisted in extrapolating how resilience functions during an intentional contamination event. Obtaining information from key informants from each state set the foundation for further interviewing conducted with EHFSP and emergency management professionals. There are challenges, most notably because I may know some of the key informants through professional associations. This factor could create interviewer bias as well as external validity issues.

Qualitative Data Analysis Plan

According to Runeson and Höst (2009), there is a hypothesis-generating data analysis and hypothesis confirmation data analysis. Since this study is exploratory, this study will use a hypothesis-generating data analytic framework. This framework includes the use of open coding then a coding process resembling selective coding depending upon the results from the open coding process. Qualitative data analysis in this study also consisted of thematic coding, using NVivo 11 Plus to help with the delineation of themes. NVivo 11 Plus was helpful to this research effort in that the software program assisted with the categorization of themes, made theme articulation easier, ability to assign and delineate themes across categories and enable flexibility in auto-coding (Ranney et al.,

2015). Additionally NVivo 11 Plus helped with the development of word trees and mind maps (p. 1110). Data collection in qualitative research exists to "describe, classify and interconnect phenomena with the researcher's concepts"(Graue, 2015, p. 8).

Validity and Trustworthy Issues

According to Zohrabi (2013), there is congruence between validity and trustworthiness in qualitative as well as quantitative research. It is important to note that utility and dependability are part of the same equation.

Ethical Procedures

Discussions with participants on how I handled confidentiality issues in addition to providing assurances regarding information obtained were vital to the credibility of the study. It is essential that I provided credible evidence that key informants and other participants' anonymity during the data analysis phase and reporting phase of the study remained intact. One way of ensuring this was through the Institutional Review Board (IRB) process. This study requires that the researcher goes through the IRB because interaction with humans is an integral component of the study. (The Walden University IRB approval number for this study was 11-01-16-0286602). Other ways of providing assurances related to the development of the instrument in which there were no identifying characteristics of participants other than demographic information such as age, sex, and ethnic identity. All information is aggregated to prevent identification through demographic measures.

Chapter 4: Research Findings

Introduction

The focal point of this chapter is to outline the data collection, data analysis, and the results of the study including a description of the population and participants, the sampling strategy, the qualitative instrumentation, recruitment, data collection methodology, and data analysis.

In this chapter I also discuss challenges to validity and reliability and trustworthiness issues encountered and how they were met. Grouped into the following themes are the findings: (a) uncertainties and stability, (b) ambivalence and non-ambivalence, (c) familiarity and deference, (d) not budgeted for emergencies versus achieving economic assistance, (e) view of normalcy versus mechanics of normalcy, (f) routine approaches versus holistic approaches, (g) a gap versus working together, (h) more similarities than differences exist, and (i) lack of assessing gaps.

Each theme helps answer the study's research question and subquestions:

RQ: How do the policy counternarratives encapsulate the perspective of EHFSP regarding the vulnerability and resiliency of the retail food chain?

SQ1: How do the policy counternarratives describe how emergency management officials view vulnerabilities and resiliency of the retail food chain.

SQ2: how do the factors that cause uncertainty relate to the intentional contamination of the retail food chain?

Research Results Architecture

The design for this study was exploratory using the perspectives of EHFSP and emergency management officials from the Pacific Northwest, Central, and Eastern sectors of the United States. The study methodology was narrative policy analysis based on Roe's (1994, pp. 3–4) 4-step methodological procedures. Accordingly, contrasted by the counternarrative of EHFSP and emergency management officials was the dominant narrative of the narrative policy analysis responses. This process provides a metanarrative of the arguments presented by EHFSP and emergency management officials. According to Roe (p. 4), a new and revised policy narrative can spring forth that places the arguments in a logical format for further exploration.

Because the nature of the study was to explore, I was required to engage with participants and to utilize current and archival documents to answer the research questions. See Appendix A for the resiliency factors and resiliency criteria. Appendix B depicts the properties of the resiliency factors and resiliency criteria.

Participants Demographics

Ten participants were included in the study, five EHFSP with an average of 18 years as food safety professionals and five emergency management officials with an average of 18 years in that field. All participants had supervisory or technical responsibilities for food safety or emergency management. Additionally, participant selection criteria included participants having responsibilities related to foodborne disease outbreak investigations or emergency management public health responsibilities at the state level of government. Emergency management respondents also were required

to have responsibilities related to emergency management response, recovery, and mitigation in state government.

Collection of Data

Purposeful sampling, interviews, and the review of current or archival documents completed the data collection process. Five states were represented in the study. The food safety programs (counternarratives) participating included departments of health and departments of agriculture. The emergency management programs (counternarratives) participating came from emergency management agencies and public health preparedness programs. The number of participants represents a workable sample size for this study. According to scholars, narrative policy analysis study may range from 2–15 participants (Busanich, McGannon, & Schinke, 2014; Gentles et al., 2015).

The interview process consisted of four face to face interviews. The remaining interviews included e-mail (2) and phone calls (4) of which one included a group interview consisting of two participants. I conducted interviews using an interview guide, and they were recorded per consent of participants. For all recordings I used a Sony recording device and downloaded to Sound Organizer 1.6.01 for transcription purposes. HyperTranscribe Version 1.6 transcribed the recordings. Microsoft Word 2016 became the domain for all transcriptions. All transcriptions are password protected. I downloaded the transcribed documents to NVIVO 11 Plus for coding and thematic analysis. I took great care to ensure anonymity and confidentiality issues were addressed before, during, and after the interviews. My dual role of researcher as a certified foodborne disease

outbreak investigator and emergency preparedness practitioner was explained to participants.

Documentation of Validity and Trustworthiness

Both groups provided information based on their technical and supervisory responsibilities related to foodborne disease outbreak investigations, public health emergency management responsibilities, and emergency management. I strove to ensure that key informants and other participants' anonymity during the data analysis phase and reporting phase of the study remained anonymous. One way I sought to achieve this goal was through the IRB process. It is a requirement that all studies in which there is interaction with humans must be processed and approved by the university IRB. Other ways of providing assurances relate to the development of the instrument in which there are no identifying characteristics of participants. The interview guide for the study obtained no demographic information except for the length of time participants had worked in their respective disciplines. All participants provided a letter of cooperation and gave their informed consent to take part in the study. I emphasized the importance of confidentiality and the ethical considerations required by the university. I performed respondent validation using member-checking to ensure the transcription process described the interview process consistently with the participants' understanding and memory.

Data Analysis

NVIVO 11 Plus is the preferred software program used for qualitative data analysis purposes. Data analysis followed a modification of Braun & Clarke's (2006)

thematic analysis procedure. I developed and used themes because of the exploratory focus of the study.

Table 1 outlines the thematic steps used in this study. The interview questions analyzing factors of resiliency were autocoded to compare similarities and differences between the dominant narratives and the counternarratives (see Figure 1 for the mindmap showing the resiliency factors). The themes were then autocoded, recoded, and explored using the Word Frequency module in NVIVO 11 Plus to create a word cloud. The Word Frequency query in NVIVO 11 Plus looks for exact words. It also helps identify frequently occurring concepts.

Table 1

Steps in Thematic Analysis

Analytic Step	Process Description	Useful in Present Study	Process Used in Present Study
Familiarizing yourself with your data:	Transcribing data (if necessary), reading and rereading the data, noting down initial ideas.	Yes	Transcribed data using HyperTranscribe Version 1.6
Generating initial codes	Coding exciting features of the data in a systematic fashion across the entire data set, collating data relevant to each code.	Yes	Code data using NVIVO 11 Plus. Code data from Food Safety Interviews and Emergency Management interviews. All coded data related to the resiliency factors. Since the categories of decision-making, collaboration, emergency management, resiliency, and vulnerability were part of the interviews in furtherance of the research questions; these factors are part of the coding process. Developed from the EHFSP and emergency management officials autocoded nodes are Word Clouds
Searching for themes:	Collating codes into potential themes, all data relevant to each potential theme.	Yes	Food Safety and Emergency Management Officials were coded as autocoded nodes then coded into themes using NVIVO 11 Plus Query features. The themes were then coded further and aligned with the factors of resiliency along with the categories of decision-making, collaboration, emergency management, resiliency, and vulnerability.
Reviewing themes:	Checking in the themes work in relation to the coded extracts (Level 1) and the entire data set (Level 2), generating a thematic „map" of the analysis	No	
Defining and naming themes:	Ongoing analysis to refine the specifics of each theme, and the overall story the analysis tells; generating clear definitions and names for each theme.	Yes	Developed from prior themes is a word cloud. The results from this activity were coded to dig deeper in the attempt to locate other potential themes. Concepts maps are developed to highlight essential concepts emanating from the data.
Producing the report:	The final opportunity for analysis	Yes	Report Findings

Adapted from Braun and Clark 2006

Archival and current documents were autocoded along with interviews to get a deeper understanding of potential underlying thematic areas. This initial coding process (see Saldana, 2016, p. 115) provided an avenue for more in-depth analysis. To develop an understanding of the rough ideas emanating from the interviews are word clouds developed from the EHFSP and emergency management officials' autocoded nodes. Figure 2 and Figure 3 highlight the word clouds for EHFSP and emergency management officials respectfully. The text query feature of NVIVO 11 Plus allowed for an opportunity to explore salient ideas from the word clouds and develop further thoughts using the word tree.

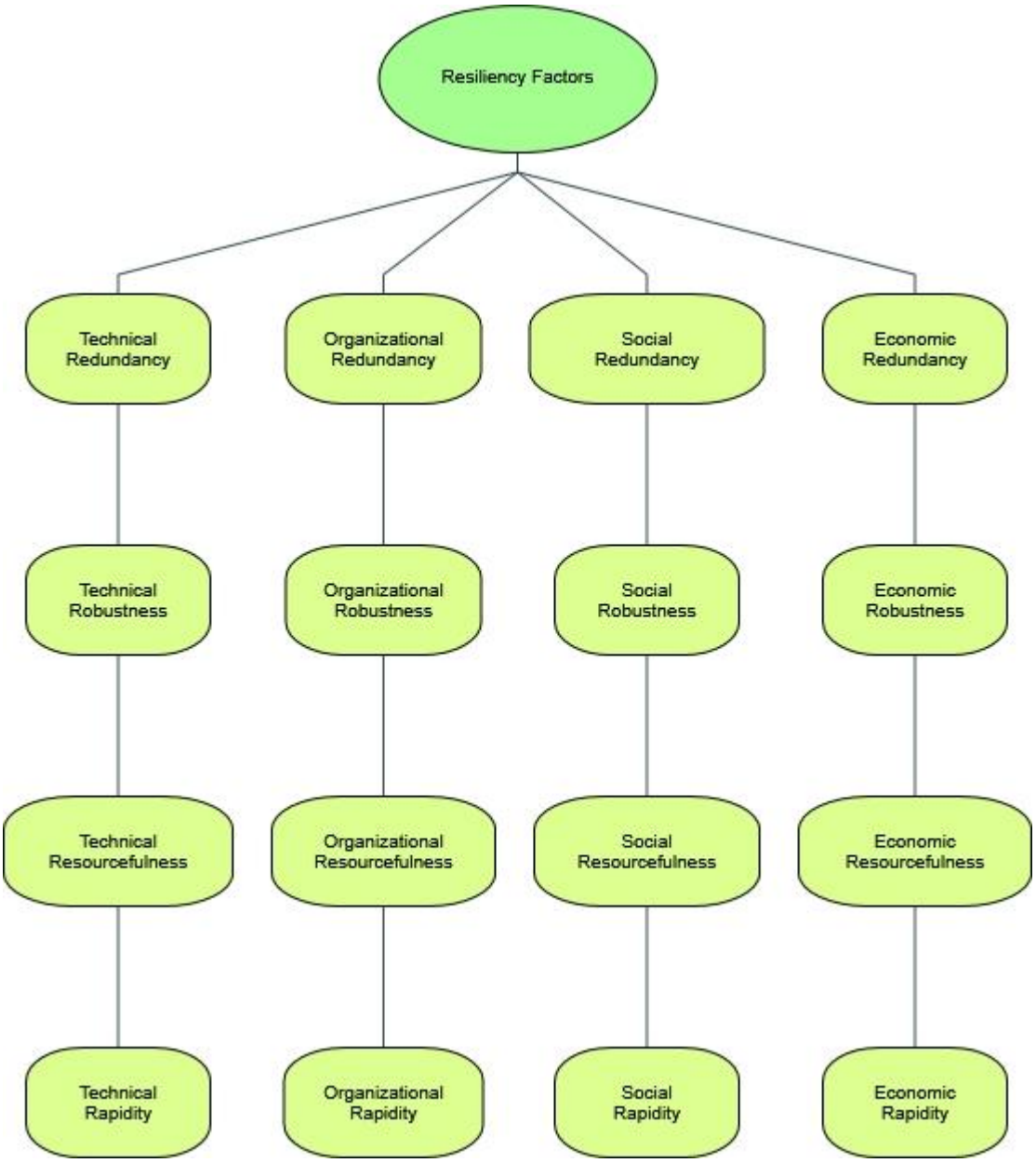

Figure 1. Mindmap of resiliency factors.

Figure 2. Word cloud food safety.

Figure 3. Word cloud emergency management.

Results

Since this is an exploratory study, dominant narratives from the perspective of EHFSP focuses on the idea that EHFSP, are not connected to the emergency preparedness process (Gamboa-Maldonado et al., 2012; Schoch-Spana et al., 2015)**.** Therefore, the perspective of EHFSP on incorporating the concepts of resiliency and vulnerability into food defense planning policy is based on their less than adequate understanding of emergency management generally. The concepts of resiliency and vulnerability within an emergency management context is a challenge for EHFSP as well. Whereas, the counter-narrative focuses on the idea that the top-down structure of emergency management processes (Boersma et al., 2014) also contributes to a

disconnection from the emergency preparedness process on the part of EHFSP. Therefore, current practices regarding an emergency, no matter the type is adequate for response planning purposes. However, the ability of emergency management officials to latch on to the dual concepts of resiliency and vulnerability is a greater possibility because of their familiarity with such concepts.

Derived from participants interviews are the perspectives of participants and the researcher's understanding and insights gained from the interviews, data collection, transcription, and the coding and recoding exercises. First, there is a focus on EHFSP and emergency management official's perspectives. The perspectives of both groups relate to the first and second research questions. Last, is the question related to uncertainty regarding the intentional contamination of the retail food chain. The uncertainty factors explored are Emergency Management, Collaboration, Decision-making, and Vulnerability.

Following are the themes of dimensions of resilience and uncertainty factors as identified by EHFSP and emergency management officials during the interview process.

Theme 1: Uncertainties and Stability

> Theme 1: There are uncertainties in EHFSP approaches and the prudence of maintaining stable systems on the part of Emergency Management Officials.
>
> The ability to provide backup/duplicate systems relies on building the capacity to do so when needed, but not beforehand. The structures developed such as working with local partners enable duplication of effort when needed. If these structures are not in place, then reliance upon federal or other state partners not affected by

> the event would be a natural point of support. It is clear from the interviews with EHFSP that reliance upon existing systems forges most of their preparation and response methodologies.

There is not a need to change the approaches already in place if they are in place. As stated in the interviews, vulnerabilities are existing that would impact the ability of EHFSP to participate as a fully informed partner. Furthermore, most of what EHFSP voiced through their answers was a lack of a holistic approach that includes an understanding and willingness to step outside the boundaries established by routine operations. One EHFSP stated,

> We do not have any way to diagnose damage. We have our lists of licensed facilities but would have no way to know which ones were affected by an event. We would have to do some phone survey or field visits to determine the extent of the damage or rely on media or other emergency reports (emergency operations center, hospital intake reports, police or fire response) but there is no organized process to do so. Again, we are more reactive than proactive in this area.

Emergency management officials focus on the idea that developing, maintaining collaborative, cooperative relationships will increase access to capabilities and capacities that enable continued service provision. What resulted from the interviews with Emergency Management Officials is the view that having different systems in place provides redundancies, support, and relief. An emergency management official stated,

> We place a high premium on establishing the relationships essential to successful outcomes. Additionally, using the structures provided by NIMS, ICS, will enable

> the system redundancies, and support needed for preparing and responding to incidents."

Theme 2: Ambivalence and Non-ambivalence

> Theme 2: The ambivalence voiced by EHFSP results from a lack of continued preparedness training. Emergency management officials' exposure to preparedness training provides a sense of certainty on their part.

Overall, the perceptions displayed by EHFSP centers on ambivalence regarding how they carry out critical disaster-related functions. EHFSP displayed some hesitancy regarding the making of decisions as well as forging ahead with actions related to properties of resilience. As one EHFSP stated,

> They say, recovery always begin in the middle of the response, or the early stages of the response. If you can begin with the end in mind, what is the potential for this incident to escalate? If it does escalate, how are we going to mitigate the consequences? Prevent them from snowballing. If they do snowball, how do we recover from the ones we cannot prevent. This mindset has to be integrated among responders. So, recovery has to happen at multiple levels. The consumer has to recover. The mental perceptions of safety become important. Is it safe to buy from these food safety retailers? For them to feel comfortable, they must feel like the people making the response had to have their act together going into it. They must have clear communication.

True to form and discipline, Emergency Management Officials highlight their belief in the systems developed through the emergency management process. The belief

that the systems will work as is and not only is adaptable but flexible to any situation. This point was driven home by an emergency management official that stated, “Regular exercises that include multiple disciplines and organizations are an efficient method to evaluate the capabilities of responders, including those involved in the food system.”

Theme 3: Familiarity and Deference

> Theme 3: Familiarity with existing resources and systems act as a bulwark against the unknowns of emergency management on the part of EHFSP. Compared to EHFSP, emergency management officials are less sanguine about their level of comfort in regards to the social dimensions of resiliency.

EHFSP views the social dimensions of resiliency within the framework of existing structures, processes, and programs that are familiar to them. These views include food safety regulations. Regulations act as a bulwark against escalating casualties and disruptions emanating from an incident.

The building of relationships with operators is key to establishing the necessary network vital in dealing with the disruption caused by such an event. The building of relationship does not mean EHFSP have a clear understanding of what it takes to mitigate negative consequences on the part of communities stricken by the event. One participant perspective highlights the point by stating,

> There are specific regulatory actions that we in Department of Agriculture could utilize such as embargo, summary suspension of a license, or seizure that could help contain and control the immediate public health threat. We’d then work with

our partners such as DOH and FDA to work on controlling the public's exposure to the contaminated product as well.

On the question of social dimensions of resiliency, Emergency Management Officials tend to defer to food safety professionals. The deference to food safety is not absolute. Emergency Management Officials will rely upon the structures of their discipline to offset any deference to food safety. Emergency Management Officials focuses on communication with the public and responders. The reason is that these factors set in place necessary mitigation elements required during a response. Setting in place the mitigation elements does not mean, that emergency management officials believe they are the only conduit through which these activities take place. However, there are exceptions to the rule. As one emergency management official stated, "I do not believe we would have a vital role in these issues except to work public messaging hoping to allay fears. Public Health would deal with ill individuals and care facilities."

Theme 4: Not Budgeted for Emergencies Versus There Are Means of Achieving Economic Assistance

Theme 4: EHFSP existing economic resources are scarce and unavailable at best. Programmatic uncertainties do not bound emergency Management Officials thus economic resiliency has possibilities.

EHFSP's ability to utilize resources to assist with reducing economic losses is contingent on whether federal programs are available. Assisting operators with economic hardships are not part of Standard operating budgets for EHFSPs. Once again, there is a heavy reliance on utilizing existing procedures and processes for response purposes.

During the interviews, it became clear that EHFSP does not believe that economic resiliency is within their operational parameters. One participant stated, “There may be emergency resources that the state could provide. Otherwise, the financial resources used would be those that are generally devoted to regular work that is now used to address the event.”

Emergency Management Officials remain true to their structures. They believe that current system operators and operations are adequate such that economic stabilization flourishes through prior connections with partners. Through targeted programs, economic stabilization in the words of one participant, “There is a robust public-private partnership program that allows the state to leverage private-sector organizations for logistical and commodity acquisition assistance during an emergency.”

Theme 5: Different Views of Normalcy Versus Mechanics of Normalcy

> Theme 5: EHFSP believes conducting activities consistent with routine operations is a way of returning to a state of normalcy. Emergency Management Officials understand that the mechanics of returning to normal encompasses planning.

When it comes to the restoration of services, EHFSP view their preparation and response activities through the prism of routine functions related to food safety. EHFSPs will operate through emergency management protocols for which they have some familiarity. One participant says it best:

> How do you get back to routine after a huge event? That is interesting because you do not think about what is normal because the normal in theory is nothing, so how do you get back to nothing that is normal. Nothing is going on, yeah, that is

> an area people need to think about, because what is routine. What is normal do you know you got back there? It could be surveillance data regarding case counts, but that is more of an epidemiology thing, how do you know normal in the case of food safety.

Emergency management officials have detailed plans and strategies for economic restoration activities. These plans and strategies are in place despite perceptions that not all businesses will recover. Therefore, in the view of one emergency management official,

> There are some actions that agencies can take to optimize the time to return to functional levels. The most important step may be for an organization, and all organizations involved in food response including private sector businesses, to develop a continuity of operations plan (COOP). A COOP plan will list critical, essential functions and an estimated time for restoration of various services, as well as information and a methodology for restoration.

Theme 6: Routine Versus Holistic Approaches to Emergency Management

> Theme 6: There is nothing wrong with the routine work of EHFSP. However, translating those virtues into an emergency management context is problematic. The introduction of a Rapid Response Team alleviates some of the need to integrate routine work into emergencies. As far as Emergency Management Officials are a concern having in place a holistic approach to emergency management provides the most significant opportunity for success.

EHFSP believe cooperation and coordination with local, state and federal partners must be a part of the food defense planning process. Cooperating and coordinating with local, state and federal partners must be real no matter what legislative or organizational structures are in place. Thus, as one participant stated,

> Real briefly, I do know that we have a relatively robust emergency management system when it comes to all-hazards emergencies. Anything from flooding to natural disasters, to things that would require activation of the Emergency Operations Center. Once again, our expertise is centered on the human food aspects of emergency response. The Rapid Response Team is a significant component of the coordination around that, not only a tactical kind of activity; on the community side as far as going out conducting sampling & environmental assessments, root cause analysis & all that. Also, from an information sharing side, like I mentioned before, public health partners, FDA & local health jurisdictions, lab, anyone with a horse in the race we try to reach out & share that information as appropriate. Other structural components are the other programs within our agency. We are the Rapid Response Team program.

Emergency Management Officials predicate their actions on a holistic approach to emergency management. The following statement by an emergency management official is indicative of a holistic approach to emergency management. As stated by the participant,

> Our state employs a whole community preparedness approach to emergency management within the State. Our emergency management system includes the

> emergency management agency, the Governor's Office, numerous state agencies, private-sector partners, voluntary organizations, and, perhaps most importantly, numerous local emergency management offices, each of which is led by a local emergency management director. The agency's mission is to coordinate people, organizations, resources, and information to ensure the safety and resiliency of people, businesses, communities, infrastructure, and the environment in the state.

Theme 7: Collaborative Differences of Opinion – A Gap versus Working Together.

> Theme 7: The perspective of EHFSP is that more collaborative opportunities ensure matters related to food safety include input from all partners. There is a difference of opinion among emergency management officials on the subject of the level of collaboration with public health entities, notably, EHFSP.

EHFSP believed their collaboration efforts are effective and yield good results. However, it takes a commitment of time that impacts routine work. One participant stated,

> I think it is a gap in that, not all the people not everybody is at the table when you are doing preparations, is an issue." Another participant stated "part of the process in emergency management for food is our capability of communicating with one another.
>
> That may seem simple, but you think that would be organic. In my opinion, this has been a challenge. Open communication with our partners, to be part of that culture and sharing the information you can.

There is some emergency management officials' viewpoint that coordination with their public health partners (EHFSP) is an issue worth exploring. One emergency management official stated,

> Our level of collaboration is very high during emergencies. Having this close, regular contact is a strength. The only weakness that I can identify is that public health and food defense are niche topics that not all emergency managers understand well.

Theme 8: More Similarities Than Differences Exist

> Theme 8: EHFSP posits that communication as a decision-making device is essential and must involve relevant parties in the discussion. Vital to communication are those established protocols consistent with NIMS and state level procedures. Not dissimilar to EHFSP position, emergency management officials' decision-making stay within the confines and consistent with NIMS, although not in all instances.

EHFSP established protocols are confined to food safety structures already in place and emergency planning policies. The protocols will allow current systems the ability to withstand the stress of an intentional contamination event. Additionally, through discussions with partners, EHFSP will have cooperation and coordination of effort.

> An illustration of this type of thinking is expressed by one participant who stated, "The standards are focused on preventing foodborne illness incidents, and some people argue that those rules if correctly implemented would provide some

> emergency response related prevention; but the way the rules are applied, there aren't any." Another participant indicated,
>
> So, in our jurisdictions, the local health jurisdiction has to get a report that something is going on. That report wherever that report comes from is going to be sent to the health department., If you know where that facility is located, then those reports will be correlated. Then at some point, multiple reports come in that meets the definition of an illness outbreak or some event. Then that local jurisdiction will connect with the state people and work on the investigation. The weakness there is the point, are multiple points, multiple jurisdictions involved. They both have to connect with the state.

Emergency management official's perspectives on the decision-making process focus to some degree on the structures inherent in NIMS. There is ambiguity regarding recognition of the importance of local authority in instances involving the retail food chain. One participant stated,

> It is building a relationship, trust, understanding awareness. We know there are things the locals will not be able to decide. We are going to have to run it up the chain. We know their capabilities better. We are aware of where we add training; we did tabletop exercises together where we have talked about escalating cases.

Another participant stated "the agency has a tiered structure for decision making. Routine decisions are regularly made by the Joint Operations Center, during incidents that can be appropriately handled by minimal staffing and coordination.

Theme 9: Lack of Assessing the System

> Theme 9: EHFSP and Emergency Management Officials view vulnerability as revolving around the idea that gaps exist in the system. These gaps are varied and may depend upon a lack of assessing the system.

Assessing the retail food chain system from the viewpoint of EHFSP requires understanding the nuances of the system. In the words of one participant,

> "Vulnerability is an area where you are subject to potential problems. It a place where you do not have a food safety hazard prevention plan in place, and your food safety system allows somebody to cause a problem."

The viewpoint of emergency management officials is similar to that of EHFSP on the question of vulnerability. As one official stated,

> The vulnerability is what are you most likely to be impacted by that you have not for some reason been able to protect against. A vulnerability within the framework of an emergency event is if you live by the river you are most likely experiencing flooding than the person living on the hill. That is a vulnerability.

Summary

Purposeful sampling enabled me to explore the perspectives of knowledgeable professionals regarding resiliency and vulnerability of the retail food chain. Whereas, to explore conventional and counternarratives, themes emerged from the narrative policy analysis process. Themes are essential to understanding resiliency and vulnerability of the retail food chain. The findings from the study are the result of exploring the conventional

and counternarratives of EHFSP and emergency management officials. Chapter 5 will highlight what the findings represent in the form of recommendations for future studies.

Chapter 5: Results

Introduction

In this chapter I describe the results of the study and identify opportunities for future research based on the findings in this study. I also describe how the findings align with the study's theory and outline how the study contributes to the field of environmental health food safety practice. The chapter ends with recommendations and concluding thoughts on the relevancy of the study to social change.

This study examined how EHFSP and emergency management officials handle intentional contamination events. The focus of the research was their ability to operationalize the differences and similarities between resiliency and vulnerability properly. Fundamentally, the answers to these questions are explored using narrative policy analysis within the context of routine activity theory. Guiding this research was the primary research question. The primary research question from the perspective of EHFSP was that the dominant narrative focuses on the idea that there is a lack of EHFSP connection to the emergency preparedness process (Gamboa-Maldonado et al., 2012). Therefore, how do the policy counternarratives encapsulate the perspective of EHFSP regarding the vulnerability and resiliency of the retail food chain?

Additionally, the perspective of EHFSP on incorporating the concepts of resiliency and vulnerability into food defense planning policy is based on their less than adequate understanding of emergency management generally. So, questions that are important to this effort are how the policy counternarratives describe how emergency management officials view vulnerabilities and resiliency of the retail food chain, and how

the factors that cause uncertainty relate to the intentional contamination of the retail food chain.

Summary of Results and Recommendations

This study focused on exploring the perspectives of EHFSP and emergency management officials regarding the concepts of resiliency and vulnerability. I used NVIVO 11 Plus to develop themes deciphered from the EHFSP and emergency management officials' interviews. Following is a summary of the results emanating from each theme.

Theme 1: Uncertainties and Stability

EHFSP relies on current dogmas to guide their approach to food defense planning, whereas emergency management officials understand the redundancies needed for preemptive action. Such dogmas on the part of EHFSPs include a heavy reliance on reacting to the event when it happens.

This reaction may be the result of an unfamiliarity with the emergency management process and a belief system that focuses on their regulatory responsibilities inherent in their day to day responsibilities. Aside from those EHFSPs who are involved with the rapid response team concept, it is uncertain that developing redundancies that are substitutable in anticipation of an event receives much attention on their part generally. The reasoning behind the statement is not to say that the redundancies needed are not available but because the knowledge of the redundancies are limited and thus unavailable generally to EHFSPs.

Based on this finding, EHFSP should familiarize themselves with the rapid response team and emergency management concepts and principles. The critical emergency management principles and concepts needed for resiliency purposes include preparation, prevention, protection, and mitigation. These fundamental principles should anchor the whole community concept developed by FEMA as a means to institutionalize resiliency in emergencies (FEMA, 2011a, p. 3).

The whole community familiarization process must permeate the EHFSP organizational unit tasked with the response. Once all EHFSP become familiar with such concepts and principles, they must intertwine their understanding of regulatory procedures with emergency management. Doing so will enable EHFSP to situate themselves proactively for a response. Additionally, EHFSP understanding of resiliency will add value to the response effort.

Theme 2: Ambivalence Regarding How to Approach Food Systems and Emergency Management

Based on discussions with EHFSP and emergency management officials, there is ambivalence regarding their ability to provide decisive decision-making and actions deemed essential to their responsibilities during an emergency involving the retail food chain. Emergency management officials' ambivalence regarding their decisions and consequently their actions relates to their lack of understanding of the retail food systems. The lack of expertise affects their response regarding how best to integrate the emergency management system process within the context of an emergency involving the retail food chain. The basis of EHFSP ambivalence is their lack of understanding of the

preparedness efforts in the context of maintaining the integrity of the food system. This feeling of uncertainty stems mostly from their lack of emergency preparedness training. Based on this finding, EHFSP and emergency management officials must establish a training and enculturation process focusing on the relationship between retail food safety and the principles of emergency management.

Emergency management officials comfort with the emergency management process does not substitute for an in-depth understanding of food systems. EHFSP comfort with the retail food system does not substitute for understanding the relationship between retail food and emergency preparedness. To meet the goal of the resiliency of the retail food chain, EHFSP and emergency management officials must revamp the architecture of their approach through a reassessment of their "beliefs, values and the underlying assumptions" (Schein, 2010, pp. 23–32) that guide their emergency preparedness and food safety actions. These steps provide the opportunity for resiliency to take root. Therefore, allowing the concept of resiliency to permeate the organization affects the policies related to retail food emergencies.

Theme 3: Familiarity and Deference

The interviews with EHFSP and emergency management officials indicated that their familiarity with the social dimensions of resiliency is not at a point where they can design measures needed for a resilient retail food system. Consequently, emergency management officials have to defer to EHFSP on matters related to the retail food chain. This finding suggests that EHFSP should think anew regarding their familiarity with the retail food chain community. Thinking anew entails working with the community

exclusive of the industry they regulate. Thinking anew involves accepting the whole community concept through engagement with community leaders, community residents, and organizational and professional entities not part of their current stakeholders' group (FEMA, 2011a, p. 3). The whole community concept is a " philosophical approach in how to conduct the business of emergency management" (FEMA, 2011a, p. 3). These actions will place EHFSP on the forefront of encouraging capacity building and maintenance of functional food safety systems. Through the whole community concept, EHFSP will set aside the routine and put forth measures targeted toward the reduction of adverse outcomes for the community.

Emergency management officials must also think anew regarding moving from passive acceptance to active engagement of food systems generally. Similar to EHFSP, emergency management officials' acceptance of a change in their focus is necessary for success in food defense. Emergency management officials' reliance upon the EHFSP community to engender the necessary emergency management acumen alone might be counterproductive to the resumption of services.

Theme 4: Not Budgeted for Emergencies Versus There Are Means of Achieving Economic Assistance.

The achievement of economic resiliency through the budgeting process for EHFSP is problematic because there are service fees associated with EHFSP routine work and activities. The use of fees for food safety budgeting is not conducive to dealing with economic losses on the part of the retail food community. Additionally, such losses from the perspective of EHFSP is an issue for the industry alone, thus, not part of their

operational lexicon, whereas for emergency management officials, budgeting for emergency events is what they do.

Therefore, coming up with creative mechanisms that intertwine concepts of retail food safety with economic hardship experienced by the community is an approach worth exploring. Consequently, EHFSP might consider "substitutable" (Bruneau et al., 2003, p. 737) preventive measures that enhance the functional requirements of the retail food community due to economic loss. These actions will require close collaboration and coordination with emergency management officials and the retail food community. Once again, the use of the whole community concept enables EHFSP to utilize their understanding of food systems commensurate with reducing direct and indirect losses due to an event.

Theme 5: Different Views of Normalcy Versus Mechanics of Normalcy

Interviews with EHFSP uncovered their reluctance to shed actions related to how they engage with the retail food community on the issue of economic loss during an emergency food event. The perspective of EHFSP is that the retail food community financial loss does not comport with their views on what EHFSP are typically responsible for as a regulatory entity.

Emergency management officials are generally aware of actions they can take to help businesses before and during an event. Typically, they suggest companies develop a continuity of operations plan (COOP) for emergency conditions. COOP is a process designed for business and government to remain operational during emergencies (Cook,

2015). Therefore, emergency management officials are available to help with the mechanics of developing a COOP.

Though some EHFSP has a limited understanding of COOP, the knowledge is not universal; therefore, the findings suggest normalcy for EHFSP should rest on an understanding of COOP as part of their mitigation strategy for retail food emergencies. The development of COOP for retail food chain systems enables these systems to "identify, assess, and validate their essential functions" (FEMA, 2013a, p. 1.1). To accomplish this feat, EHFSP must become familiar with emergency management principles inclusive of the all-hazards approach. Second, understand the purpose of COOP inclusive of COOP principles and procedures. Third, develop strategies for implementing COOP in retail foodservice facilities — strategies such as formulating a focus group of stakeholders to define those elements within the retail food community that requires continuity during the response phase of an event.

These actions will alert EHFSP to the usefulness and application of COOP during an emergency. Doing so will enlighten EHFSP to the convergence of food safety and economic resiliency before and during an emergency; thus, establishing a sense of normalcy to their operational procedures.

Theme 6: Routine Versus Holistic Approaches to Emergency Management

The interviews conducted with EHFSP concluded that some states receive grants to perform RRT activities. Currently, under the mandate of the FDA, "RRTs are multi-disciplinary, multiagency teams that operate using Incident Command System (ICS)/NIMS principles and a Unified Command structure to respond to human and

animal food emergencies"(*Rapid Response Teams*, 2018). This mandate indicates that RRTs operate best during an event, not necessarily before an event occurs. These RRTs typically comprises the conventional approach of EHFSP to emergency preparedness.

What is noteworthy is that few EHFSP staff in an organization operate under the auspices of the RRT. To operate under the RRT means EHFSP working outside the RRT concept have limited prevention, protection, and mitigation capabilities. This approach compels those EHFSP not involved with the RRT to maintain their routine food safety activities. In contrast, interviews with emergency management officials indicated a holistic view of emergency management to include the whole community approach.

The findings suggest that EHFSP working outside the RRT has limited familiarity with emergency management operations. The failure to have on hand trained and ready EHFSP may impact the response to a retail food emergency. RRTs staffing levels under the FDA mandate may be inadequate to meet the demands of the whole community approach and capacity building required for retail food chain resiliency purposes. EHFSP organizational entities must take proactive measures to increase staffing levels of RRTs to meet the goal of the resiliency of the retail food chain. Meeting the goal of the resiliency of the retail food chain includes the need for the federal government to improve funding to those states receiving grants and increase the number of states receiving grants.

To meet resiliency goals, augment RRTs activities related to food emergencies, with the Centers of Excellence to remove them from the regulatory environment. The U.S. Department of Homeland Security (USDHS, 2015a, p. 1) defines the DHS S&T

COE as a means “to develop multidisciplinary, customer-driven, homeland security science and technology solutions and help train the next generation of homeland security experts”.

Additionally, removing RRTs from the regulatory environment improves the ability to utilize the RRTs methodology and the whole community concept across the professional and retail food community. The addition of the whole community approach to the RRT methodology ensures a community centered response to a retail food emergency. These actions will allow EHFSP to focus their expertise and skill set on the community in need rather than the regulatory community it now serves.

Theme 7: Collaborative Differences of Opinion Versus a Gap Versus Working Together.

EHFSP understand the need to include as many partners as possible in the emergency management process. Emergency management officials expressed identical sentiments. The study results indicate that EHFSP and emergency management officials are not collaborating at an optimal level, and that there is room for improvement concerning collaboration efforts. Interviews also uncovered the feeling of EHFSP that lack of available staff contributes to the lack of collaborative opportunities.

The findings suggest that the lack of an effective response to a retail food event exist because of a lack of collaboration. The assumption is that collaboration is a given because NIMS is the operational arm of emergency response. However, to meet resiliency goals, collaboration must occur before the initiation of NIMS. Thus, the whole community approach must be in place before the introduction of NIMS. The whole

community approach will usher in "informed, shared understanding of community risks, needs, and capabilities" (FEMA, 2011a, pp. 3–4). The whole community approach establishes the need for adequate resources (staffing) to meet the needs of the response. Consequently, the required collaboration occurs, before an event because of the embrace of the whole community approach in retail food emergencies.

Theme 8: More Similarities Than Differences Exist

The interviews with EHFSP and emergency management officials made it clear decision-making occurs during the event through the initiation of NIMS. However, these perspectives say little about pre-event decision making. The findings from resiliency and whole community perspective suggest a need to have those conversations before the event. The NIMS structure of command and control restricts opportunities for the whole community approach to take root during an event. The rationale is because the whole community approach relies on developing relationships and cooperative programs pre-event, decisions are compatible with the community's needs. FEMA (2011a, pp. 7–8) expresses the sentiment best by stating "a community's needs should be defined by what the community requires without being limited to what traditional emergency management capabilities can address."

Theme 9: Lack of Assessing the System

The interviews with EHFSP and emergency management officials concluded that unknown vulnerabilities of the retail food chain might exist because of a failure to evaluate the retail food chain system. Thus, the concept of vulnerability requires that additional scrutiny of the retail food chain must be comprehensive and encompassing.

EHFSP and emergency management officials should jointly assess the retail food system within their communities. The vulnerability assessment focuses on principles inherent in critical infrastructure threat assessment tools.

There are examples available that assist in assessing the vulnerabilities of retail food safety entities such as The FDA Food Defense Plan Builder (*Food Defense Plan Builder*, 2017). The Food Defense Plan Builder has a vulnerability assessment section. The use of The Carver Plus Shock method (Walls, 2007) is another tool developed for vulnerability threat assessments. Additionally, consultation with Fusion Centers focusing on threat assessments will improve the resiliency of communities.

The tools outlined above will assist EHFSP and emergency management officials with the information needed to build a resilient infrastructure capable of fomenting operational practices without the loss of functionality.

Implications for Further Research

This study examined EHFSP and emergency management officials' perspectives regarding resilience and vulnerability of the retail food chain at the state level. Other governmental jurisdictions (i.e., municipal, federal level) and other sectors including industry and private sector communities should consider conducting similar studies to see if common themes in food defense emerge.

This study denotes a compulsory paradigm transfer within the EHFSP approach to emergency management activities. A paradigm shift will allow future research to dwell on the nuances of resiliency, or vulnerability in retail food chain systems either as individually or collectively themed entities.

One such shift could be organizational. Schein (2010), the author of *Organizational Culture and Leadership*, put forth the premise that "all group learning reflects someone's original beliefs and values, his or her sense of what ought to, as distinct from what is" (p. 25). This statement is an indication of how beliefs and values cannot be divorced from “ideology or philosophy”(p. 26) of EHFSP.

Consequently, the efforts of future research on resiliency and retail food systems can and should focus on how organizational culture within the food safety community affects the ability to institutionalize resiliency within the EHFSP emergency management processes.

Another potential area of research is the burgeoning field of cottage foods. Recent statistics indicate that the cottage food industry is reaching above "$20 billion by 2019" (Rice, 2018, p. 4). The cottage food industry typically targets the retail food safety chain such as restaurants because the food is locally grown and produced (p. 4). The inducements provided through a locally produced product has created a void in food safety because of the lack of oversight by regulatory authorities (NEHA, 2018, p. 1). This assertion is validated as evidenced by a 2014 outbreak in which food prepared at an unlicensed home kitchen resulted in one case of botulism and one case of Guillain-Barre Syndrome (p. 1).

Another area of potential research is the “sharing economy also known as collaborative consumption.” Collaborative consumption came to life because of the innovations created by "information and communication technologies" (Hamari, Sjoklint, & Ukkonen, 2016, p. 1).

Collaborative consumption is a societal transformation process in which there is "peer to peer activity of giving, obtaining, and sharing access to goods and services" through an online format (p. 1). The sharing economy is also a $3.5 billion revenue-generating enterprise that investors view as the new "mega-trend of economic activity (p. 2).

Because the cottage food industry and collaborative consumption phenomenon are growing, there is a need regarding the resiliency of their food systems. Studying the dimensions of resilience in other facets of the farm to table food system improves the overall farm to table food safety system, thus ensuring a safe and healthy food supply.

Implications for Practice and Recommendations

The conclusions of the study provide ample evidence for EHFSP, emergency management officials, academia, and policymakers inside and outside these disciplines to consider the implications of the study to ongoing emergency preparedness efforts. The data collected and analyzed for the study has validated what is needed to meet resiliency goals of the retail food chain system.

To meet the goal of exploring the resilience of the retail food chain, we must answer the overarching research question of how do the policy counter-narrative(s) encapsulate the perspective of EHFSP regarding the vulnerability and resiliency of the retail food chain.

However, the policy narrative driving the dominant narrative of the study from the standpoint of EHFSP focus on the idea that EHFSP is not connected to the emergency preparedness process (Gamboa-Maldonado et al., 2012). Therefore, what the study found,

is that resiliency is a novel concept in EHFSP practice. Consequently, to realize the goal of institutionalizing resiliency in EHFSP emergency preparedness practice the current EHFSP emergency management practices must overcome conceptual, operational, and policy challenges.

EHFSP practice embodies the regulatory process. Regulatory agencies require actions that are legally binding to prevent harmful acts on the part of regulated entities (United States Government Accountability Office, 2014, p. 5). To meet this mission requires promulgating rules, establishing standards for the industry, establishing standards for EHFSP, and maintaining a culture in which the regulatory process can flourish. As such, the difficulty for EHFSP to refocus on resiliency from a conceptual and operational perspective is problematic.

Conceptually, resiliency forces EHFSP to think creatively about the practice of environmental health food safety during emergency events. Therefore, EHFSP practice has to go beyond the inner workings of the regulatory process toward a preventive perspective inclusive of the societal needs of the community. At the municipal level (city/county) the community has no geographic or demographic boundaries. At the state level, the limitations include those agencies, organizations, groups, individuals outside the usual cadre of EHFSP practice. Consequently, creative thinking includes incorporating the whole community approach to environmental health food safety emergency preparedness.

Engaging the whole community approach enables EHFSP to practice in an interdisciplinary, intersectoral manner with the community. Thus, practice establishes a

relationship with the community heretofore non-existent. It is possible these activities will create opportunities for engagement with the community that allows the benefits of food safety to extend beyond the regulatory boundaries of EHFSP practice.

What is needed is an approach to emergency preparedness that combines the core capabilities enshrined in the National Preparedness Goal FEMA, 2011b), the National Response Framework (FEMA, 2013b) with the interdisciplinary, community based objectives of the whole community approach (FEMA, 2011a, p. 3). These actions provide the foundational leverage for resiliency to take hold in EHFSP practice.

Operationally, EHFSP is adept at the evaluation and analysis of food safety (Ryan, Milligan, Preston-Thomas, & Wilson, 2013, p. 2). However, as long as EHFSP emergency management operates within the confines of a regulatory framework, the goal of obtaining a resilient retail food chain becomes obscure and problematic. This assertion rests on the prima facie evidentiary information of what regulatory agencies are tasked to perform. Currently, EHFSP practice focuses on those actors and entities that form the regulated stakeholder's group consisting of governmental agencies, industry, and to a lesser extent, consumers.

Additionally, many EHFSP at the local, and state levels of government are attached to regulatory agencies such as state or local Department of Health, or the State Department of Agriculture. At the federal level of government, many EHFSP works with the U.S. Food and Drug Administration. U.S. Department of Agriculture. Though the CDC is not a regulatory agency, many EHFSP is working at CDC.

As purveyors of the regulatory system, EHFSP ultimate goal is the health and welfare of the public. Thus, the public expects the retail food chain to be safe (Wilcock & Ball, 2014). Accomplishing the safety of the retail food chain occurs through the routine engagement of EHFSP and the community they serve.

There are policy challenges associated with establishing resiliency in environmental health emergency preparedness food safety practice. These challenges include the conceptual and operational challenges discussed previously in the chapter.

Incorporating the whole community approach involves changes in budgetary, operational and organizational policy. The method also requires a review of where EHFSP emergency preparedness activities fall on the organizational alignment of an agency or organization. Where EHFSP operate within an organization has a bearing on the budgetary needs of EHFSP emergency preparedness practice.

In this respect, the RRT concept may play a prominent role. A review of the RRT concept should include the consideration of expanding the current configuration of the RRT to include an emphasis on developing a resilient retail food chain. A resilient retail food chain will happen, only if the integration of the whole community approach and the RRT process and policies governing its implementation coincides at the same time. Essentially, this means looking at the removal of EHFSP from the regulatory process and make EHFSP emergency preparedness practice an integral component of emergency management or as part of the COE discussed previously in the chapter. It is without a doubt that such a move is a paradigm shift from current practice. These actions will result in the denigration of silos, more attention paid to community stakeholders and a

coordinated system of emergency management officials, EHFSP practitioners, community stakeholders, academia, the industry, and consumers.

These actions will expose EHFSP to the numerous projects targeting countermeasures to terrorism. FBI field offices, Federal Sector-Specific Operations Centers, Fusion Centers, Information Sharing and Analysis Centers, Information Sharing and Analysis Organizations and Infraguard (DHS, 2016, pp. 21–40) are a few of the projects available to EHFSP engaged in resiliency for emergency preparedness operations.

Social Change Implications

The recommendations provided in this study promotes positive social change on various fronts. If followed, they can save lives, reduce costs associated with food safety emergencies, and help officials develop countermeasures to intentional contamination of the retail food chain. Also, building a resilient retail food chain provides the public with the certainty that despite what is going on, governmental jurisdictions along with the industry and community shall maintain the integrity of the retail food chain. Foremost, if EHFSP policymakers and practitioners were to adopt the integration of the whole community concept and the principles of resiliency outlined in the study, the retail food chain is not only safe but viable and functioning during a contamination event.

The practical implications of a resilient retail food chain go beyond the provision of a safe product during emergency times. Resiliency provides economic, psychological and societal benefits that assure the public, EHFSP, emergency management practitioners, that the food safety critical infrastructure is intact and operating.

What cannot be lost within the social change implications of the study is the potential for a paradigm shift in retail food safety generally. Operating a resilient retail food chain based on what the affected community desires and need during a food emergency, ensure the integrity of the system during non-emergency times.

Conclusion

Exploring resiliency of the retail food chain resulted in several elemental facts; thus fundamentally, there is a lot to learn regarding the resiliency of the retail food chain. One lesson worthy of noting is that resiliency is an essential adjunct to the food safety emergency preparedness process. The concept of resiliency will not replace the existing food safety emergency management process. Instead, the study of resiliency opens the door for an improved and proactive policy of the food safety emergency preparedness process.

Typically, EHFSP responds to an unintentional food emergency event retrospectively with little information on the antecedent causes of the event. The proactive nature of resiliency is a countermeasure to intentional contamination that if placed in policy, will provide a retail food chain system unaffected by disruptions or attacks. As a countermeasure, the chances are that through the use of available tools such as the CDC National Environmental Assessment Reporting System (NEARS)(CDC, 2015), the discovery of antecedents during unintentional events may lead to the understanding of antecedents possibly present during intentional contamination events.

There is also the fact that resiliency requires EHFSP to understand the societal and psychological implications of a food safety event. The knowledge gained is useful for

non-emergency events in that understanding the mechanics of the retail food system expands beyond the regulatory framework in which it resides at the moment. The regulatory process, though necessary for the prevention of practices leading to illness, is constraining and inflexible. Unintentional and intentional contamination events are fluid and require judgments unimpeded by regulatory nuances and requirements.

The study of resiliency forces EHFSP collaborative opportunities with the community as a whole, not just segments of the community. Collaborative opportunities with the industry, emergency management officials, law enforcement, academia, consumers and community organizations and leaders are by-products of the resiliency process. These collaborative opportunities have the potential benefit of informing the community on issues related to food safety generally. Additionally, the possibility exists for the community, along with the retail food chain to comprehend the depth of vulnerability of the retail food chain and the perspective of responders regarding measures that will keep the community safe.

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Appendix A: Resiliency Factors and Criteria

Resiliency Criteria	Resiliency Factors			
	Robustness	Redundancy	Resourcefulness	Rapidity
TECHNICAL	Damage avoidance and continued service provision	Backup/duplicate systems, equipment and supplies	Diagnostic and damage detection technologies and methodologies	Optimizing time to return to pre-event functional levels
ORGANIZATIONAL	Continued ability to carry out designated Functions	Backup resources to sustain operations (e.g., alternative sites)	Plans and resources to cope with damage and disruption (e.g., mutual aid, emergency plans, decision support systems) Plans and resources to meet community needs	Minimize time needed to restore services and perform essential response tasks
SOCIAL	Avoidance of casualties also, disruption in the community.	Alternative means of providing for community needs.	Plans and resources to meet community needs	Optimizing time to return to pre-event functional levels
ECONOMIC	Avoidance of direct and indirect economic losses.	Untapped or excess economic capacity (e.g., inventories, suppliers).	Stabilizing measures (e.g., capacity Enhancement, demand modification, external assistance, optimizing recovery strategies)	Optimizing time to return to pre-event functional levels

Appendix B: Resiliency Factors and Criteria

Resiliency Criteria	Resiliency Factors			
TECHNICAL	ROBUSTNESS	REDUNDANCY	RESOURCEFULNESS	RAPIDITY
refers to the ability of physical systems (including components, their interconnections and interactions, and entire systems) to perform to acceptable/desired levels when subject to forces caused by an intentional contamination event.	strength, or the ability of elements, systems, and other units of analysis to withstand a given level of stress or demand without suffering degradation or loss of function	the extent to which elements, systems, or other units of analysis exist that are substitutable, i.e., capable of satisfying functional requirements in the event of disruption, degradation, or loss of functionality	the capacity to identify problems, establish priorities, and mobilize resources when conditions exist that threaten to disrupt some element, system, alternatively, another unit of analysis	the capacity to meet priorities and achieve goals promptly in order to contain losses and avoid future disruption
ORGANIZATIONAL	ROBUSTNESS	REDUNDANCY	RESOURCEFULNESS	RAPIDITY
refers to the capacity of organizations that manage critical facilities and have the responsibility for carrying out critical disaster-related functions to make decisions and take actions that contribute to achieving the properties of resilience	strength, or the ability of elements, systems, and other units of analysis to withstand a given level of stress or demand without suffering degradation or loss of function	the extent to which elements, systems, or other units of analysis exist that are substitutable, i.e., capable of satisfying functional requirements in the event of disruption, degradation, or loss of functionality	the capacity to identify problems, establish priorities, and mobilize resources when conditions exist that threaten to disrupt some element, system, alternatively, another unit of analysis	the capacity to meet priorities and achieve goals promptly in order to contain losses and avoid future disruption
SOCIAL	ROBUSTNESS	REDUNDANCY	RESOURCEFULNESS	RAPIDITY
consists of measures specifically designed to lessen the extent to which communities stricken by an intentional contamination event and governmental jurisdictions suffer negative consequences due to the loss of critical services because of an intentional contamination event.	strength, or the ability of elements, systems, and other units of analysis to withstand a given level of stress or demand without suffering degradation or loss of function	the extent to which elements, systems, or other units of analysis exist that are substitutable, i.e., capable of satisfying functional requirements in the event of disruption, degradation, or loss of functionality	the capacity to identify problems, establish priorities, and mobilize resources when conditions exist that threaten to disrupt some element, system, alternatively, another unit of analysis	the capacity to meet priorities and achieve goals promptly in order to contain losses and avoid future disruption
ECONOMIC	ROBUSTNESS	REDUNDANCY exist that are	RESOURCEFULNESS	RAPIDITY
refers to the capacity to reduce both direct and indirect economic losses resulting from an intentional contamination event.	strength, or the ability of elements, systems, and other units of analysis to withstand a given level of stress or demand without suffering degradation or loss of function	substitutable, i.e., capable of satisfying functional requirements in the event of disruption, degradation, or loss of functionality	the capacity to identify problems, establish priorities, and mobilize resources when conditions exist that threaten to disrupt some element, system, alternatively, another unit of analysis	the capacity to meet priorities and achieve goals promptly in order to contain losses and avoid future disruption

Note. Adapted from Bruneau, M., Chang, S. E., Eguchi, R. T., Lee, G. C., O'Rourke, T. D., Reinhorn, A. M., … von Winterfeldt, D. (2003). A framework to quantitatively assess and enhance the seismic resilience of communities. *Earthquake Spectra, 19*(4), p. 14.

Appendix C: Resiliency Factors

Technical Robustness: What measures/plans are in place to ensure damage avoidance, certainty regarding the safety of the retail food chain, and continued food safety service provision?

- Technical Redundancy: What measures are in place that would provide backup/duplicate systems, equipment, and supplies? (mutual aid agreements)?
- Technical Resourcefulness: What are the diagnostic and damage detection technologies and methodologies in place?
- Organizational Robustness: How would you assess the ability of the food system to carry out routine designated functions?
- Organizational Redundancy: What are the backup resources available to sustain operations (e.g., alternative sites)?
- Organizational Resourcefulness: What plans and resources are in place to cope with damage and disruption (e.g., mutual aid, emergency procedures, and decision support systems)?
- Social Robustness: What measures or plans are in place that would avoid casualties and disruption in the community?
- Social Redundancy: Are there alternative means of ensuring food safety during such events?
- Social Resourcefulness: What plans and resources are available to meet the food safety needs of the community?

- Economic Robustness: What methods are in place to help the food safety communities avoid direct and indirect economic losses?
- Economic Redundancy: Is there untapped or excess financial capacity available for the food safety community?
- Economic Resourcefulness: What stabilizing measures are in place? i.e., capacity enhancement, outside assistance, optimizing recovery procedures).
- Technical, Organizational, Social and Economic Rapidity: What methods are in place that would minimize the time needed to restore food safety to pre-event levels and perform critical response tasks.

Uncertainty Factors

- Describe the Public Health Emergency Preparedness System in your state? How does it work, what are the structural components of the system? Is the system capable of identifying contributing factors that might be a potential reason(s) for an intentional contamination event involving the retail food chain? If so, explain how? If not, why not?
- Describe the Emergency Management System in your state? How does it work, what are the structural components of the system? Is the system capable of identifying factors (from the perspective of emergency management) that might be a potential reason(s) for an intentional contamination event involving the retail food chain? If so, explain how? If not, why not?
- Describe the food safety system in (participating state) How does it work? How does it operate? What are the structural components of the system?

- Collaboration: When preparing for the possibility of intentional contamination of the retail food chain, describe the level of collaboration, between your department and state emergency management. During these types of events, what are the strengths, weakness of the collaboration? Which partners are involved?
- Decision-making: Describe the nature of decision-making during customary emergency conditions (such as foodborne disease outbreak investigations).
- Resiliency: When you hear the word resilience, what comes to mind immediately? How about emergency conditions/events?
- Vulnerability: When you hear the word vulnerability, what comes to mind immediately? How about emergency conditions/events?

Appendix D: Interview Guide

Participating State-Participating Agency

Mr./Mrs./Dr._____. Thank you for agreeing to speak with me regarding the public health/emergency management system in (participating state). As I stated during our conversation leading up to this meeting, I am conducting research on the relationship between the vulnerability and the resilience of the retail food chain to intentional contamination.

Please be advised that there is a recording or transcription of this interview for playback and analysis purpose. No identifying information about you or anyone in your organization will appear in any document or report relating to this discussion.

I will ask questions relating to the emergency response, planning, and management system in your organization. It is possible I will ask additional questions during this interview for clarification or review. It is also possible I will request you examine the interpretation of the answers to ensure reliability and accuracy of the interview process.

If you have any questions, before we start the questioning, please ask at this time.

1. Describe the Public Health Emergency Preparedness System in (participating state) [to emergency management, food safety, and public health emergency agencies].

   How does it work, what are the structural components of the system?

Is the system capable of identifying contributing factors (from the perspective of public health emergency) that might be a potential reason(s) for an intentional contamination event involving the retail food chain? If so, explain how? If not, why not?

2. Describe the Emergency Management System in (participating state) (to emergency management, food safety, and public health emergency agencies). How does it work, what are the structural components of the system? Is the system capable of identifying factors (from the perspective of emergency management) that might be a potential reason(s) for an intentional contamination event involving the retail food chain? If so, explain how? If not, why not?
3. Describe the food safety system in (participating state) [to public health emergency and food safety agencies only]. How does it work? How does it operate? What are the structural components of the system?
4. Before or during a widespread intentional contamination event. (to emergency management, food safety, and public health emergency agencies).
    a. What measures/plans are in place to ensure damage avoidance, certainty regarding the safety of the retail food chain, and continued food safety service provision.
    b. What measures are in place that would provide backup/duplicate systems, equipment, and supplies? (mutual aid agreements).

What are the diagnostic and damage detection technologies and methodologies in place? How would you optimize the time to return to pre-event functional levels?

c. How would you assess the ability of the food system to carry out routine designated functions?
d. What are the backup resources available to sustain operations (e.g., alternative sites)?
e. What plans and resources are in place to cope with damage and disruption (e.g., mutual aid, emergency procedures, and decision support systems)?
f. What methods are in place that would minimize the time needed to restore food safety to pre-event levels and perform critical response tasks.
g. What measures or plans are in place that would avoid casualties and disruption in the community?
h. Are there alternative means of ensuring food safety during such events?
    a. What plans and resources are available to meet the food safety needs of the community?
i. What methods are in place to help the food safety communities avoid direct and indirect economic losses?
j. Is there untapped or excess financial capacity available for the food safety community?
k. What stabilizing measures are in place? i.e., capacity enhancement, outside assistance, optimizing recovery procedures)

5. When preparing for the possibility of an intentional contamination of the retail food chain, describe the level of collaboration, between your department and state emergency management. During these types of events, what are the strengths,

weakness of the collaboration? Which partners are involved? (To public health emergency, and food safety agencies only).

6. When preparing for the possibility of an intentional contamination of the retail food chain, describe the level of collaboration, between your department and state health. During these types of events what are the strengths, weakness of the collaboration. Which partners are involved? (To emergency management agency only).
7. Describe the nature of decision-making during customary emergency conditions (such as fire, etc.). [To emergency management agency only].
8. Describe the nature of decision-making during routine emergency conditions (such as foodborne disease outbreak investigations). [To public health emergency, and food safety agencies only].
9. When you hear the word resilience, what comes to mind immediately? How about in relation to emergency conditions/events?
10. When you hear the word vulnerability, what comes to mind immediately? How about in relation to emergency conditions/events?