RETURN-ENTRY RISK COMMUNICATION FOLLOWING 2012 HURRICANE SANDY

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Within risk communication, much is understood about pre-event warning related to evacuation and sheltering; however risk communication during the return-entry phase when ending evacuations has been largely under-studied in the disaster literature. Understanding of the return-entry risk communication process is important because returning early or prior to issuance of the all-clear message can make returnees susceptible to post-disaster risks, and also hamper post-disaster activities such as debris removal, traffic management, utility restoration and damage assessments. Guided by the Warning Components Framework and the Theory of Motivated Information Management, this dissertation focuses on risk communication as it pertains to organizational behavior during the return-entry process by examining how local emergency management organizations develop, disseminate and monitor return-entry messages. The data is collected through semi-structured telephone interviews with local emergency management organizations that managed return-entry following Hurricane Sandy. The findings of the study indicate that local emergency management organizations required information on post-disaster threats, damages, and utility and infrastructure condition in order to develop return-entry strategy for their community. Organizations improvised to their existing risk communication measures by adopting creative ways for information dissemination to the evacuees. They also utilized active and passive approach to monitor public response to the return-entry messages.

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CHAPTER 1

INTRODUCTION

Problem Statement

The return-entry movement is an important phase following a disaster, as it initiates the disaster recovery process by allowing the movement of individuals back to the evacuation zone. Nonetheless, the return phase is full of challenges, both for the evacuees and as well as for the emergency managers. For example, evacuees may face numerous challenges during the return trip, such as debris on the roads, downed power lines, and damaged structures when returning to disaster-stricken areas (Siebeneck & Cova, 2014). Similarly, the emergency manager also experiences challenges while regulating the return movement and administering post disaster recovery activities including debris management, damage assessment, and utility restoration (Siebeneck & Cova, 2014). In order to overcome these challenges and facilitate the return movement, return-entry plans are vital. Return-entry plans help to ensure the "safe and efficient movement of evacuees back to their homes", to coordinate traffic demands, and to ensure that the needs of returnees can be met (Siebeneck & Cova, 2014, p.158). However, research suggests that unless these plans are effectively communicated to the evacuated population, compliance with return-entry plans may be low, resulting in populations returning before it is safe to do so (Siebeneck & Cova, 2008, 2014).

In the aftermath of a disaster there may be uncertainty associated with the post disaster situation. In their study after Hurricane Katrina, Elloitt and Pais (2006) found that in the month following Hurricane Katrina, many evacuees expressed a significant amount of uncertainty regarding when they will return to their homes. Evacuees need information on the extent of damage to their homes and communities, the risks involved with returning, information about

whether it is safe to return home and when, status updates of key infrastructures such as roads, bridges, and lifelines including power, telecommunications etc. In absence of the risk information, evacuees may return early to their homes and put themselves in harm's way.

The March 1964 Crescent City tsunami is one example which demonstrates how retuning prior to an all-clear message can be dangerous. During the tsunami, some of the victims were the individuals "…who had prematurely returned to the evacuated area following the first waves because they thought the danger had passed" (Anderson, 1969, p.96). This case illustrates the need to inform evacuees of dangers of returning early and also the need to provide an all-clear message when the threat no longer persists.

One purpose of communicating a return plan is to achieve a successful public response. In the case of the return-entry movement, the desired response is to keep evacuees away from the evacuation zone until the danger is over. Communicating return plans is thus important to reduce post disaster uncertainty, to ensure safety of the evacuees, and to facilitate the return movement (Siebeneck & Cova, 2014). However, communication may itself be a challenge for emergency managers (Siebeneck & Cova, 2014). Siebeneck and Cova (2008, 2014), and Lin et al. (2013) describe problems associated with communicating return plans to the evacuees. In their study of return-entry processes following Hurricane Rita in 2005, Siebeneck and Cova (2008) found that communication of the return plan was very poor. Only about half of the evacuees (54%) received an all-clear message and even fewer (19.5 %) were aware of the TX DOT staged return-entry plan. Furthermore, only 46.4% evacuees complied with the official return plan during Hurricane Rita. Lin et al. (2013) on the other hand examined the reliance of evacuees on different information sources at the time they decided to return home following the aftermath of Hurricane Ike in 2008. The study found that no single information source resulted in greater compliance

with official reentry plans following the hurricane. They suggested that future research should therefore investigate the information sources that are effective in communicating return messages. This is important because improved knowledge of the most effective information sources may aid in increasing the likelihood of evacuees receiving the return message. Previous studies have found a significant relationship between receiving return messages and compliance to return plans following the 2008 Cedar River Flood in Iowa (Siebeneck & Cova, 2014). This finding underscores the need for emergency managers and local officials to ensure that all evacuees receive the return messages. Nonetheless, making risk information accessible to all evacuees during return phase is a significant challenge in itself, especially since evacuees are dispersed across a much wider geographic area after evacuation when compared to before the evacuation (Siebeneck & Cova, 2008). The studies discussed above indicate the challenges associated with risk communication during the return phase; however they are all examining risk communication at the household level. Return-entry risk communication at an organizational level has been largely under-studied. Thus there is a need to examine "…the paths by which information about reentry plans flows from local authorities to evacuees…" (Lin et al., 2013, p.880). This dissertation addresses this call and examines risk communication at an organizational level and aims to advance theory and understanding of the return-entry phase and challenges associated with communicating risk during the return. In terms of practical implications, this study provides insight into the risk communication process that will aid emergency management organizations in effectively managing the return movement and enhance compliance with future return plans.

Research Objectives and Questions

Guided by the theoretical frameworks put forth in the Warning Components Framework and Theory of Motivated Information Management (TMIM), this study examines the return-entry risk communication process of local emergency management organizations in the aftermath of 2012 Hurricane Sandy. The study concentrates on the "initial return", which is the time period when the evacuees first returned back to the evacuation zones after Hurricane Sandy. According to the Warning Components Framework (McLuckie, 1970), the disaster warning process includes three stages; assessment, dissemination and public response. Guided by McLuckie's framework, this study examines the process by which local emergency management organizations develop, disseminate, and monitor return-entry messages (or plans). During the return phase, emergency management organizations gather and assess information from various sources to reduce the uncertainty related to post-disaster conditions. The TMIM model (Afifi & Weiner, 2004), which focuses on uncertainty and information management, is used to examine emergency management organization's information seeking strategies during the risk assessment phase. Return-entry risk communication is examined by addressing the three objectives discussed below.

Information Management in the Assessment of Risks Post-Event

1. Examine how local emergency management organizations gather information in order to assess risks in the development of the return-entry strategy and messages.

The first objective of the study is to examine how local emergency management organizations gather information in order to assess risks prior to issuing the return-entry message. "Disasters are equivocal conditions that create specific informational needs related to

the event" (Veil, Reynolds, Sellnow, & Seeger, 2008, p.31) and in the aftermath of a disaster, emergency management organizations need to gather information about secondary threats, and post-disaster conditions in order to detect hazards that may threaten the returning population (McLuckie, 1970). This study uses Afifi and Weiners' (2004) Theory of Motivated Information Management (TMIM) to examine emergency management organizations' information seeking decisions and risk communication strategies. According to the TMIM model, individuals consider the costs and benefits associated with the information-seeking process and subsequent results, which in turn influences their information management strategy. In the return context, emergency managers may find official sources of information more reliable due to their perceived legitimacy as compared to informal channels such as social media which may or may not be credible. Thus, understanding why and the extent to which local emergency management organizations rely on some sources more than others can provide important understanding on the organizations' perceptions of various sources and their risk communication strategies. Moreover, coming up with decisions to extend evacuation orders or allow evacuees to return can be influenced by numerous factors. The understanding of these factors can shed light on important aspects related to extending the evacuation duration and issuing an all-clear message. This objective leads to the following research questions and sub-questions;

1. What are the information needs local emergency management organizations require in order to develop the return-entry strategy for their community?
    a. What risks and hazards in the aftermath of an event do local emergency management organizations consider when creating a return-entry strategy?
    b. What sources do they rely on for this information?
    c. What other information do they need in order to select and develop a return strategy?

Dissemination

2. Identify the strategies that local emergency management organizations use to disseminate return-entry information to the evacuees.

Providing information to evacuees regarding return-entry risks and/or return-entry procedures not only informs them about risks associated with returning to the evacuation area, but also provides direction on how to safely return home. In order for evacuees to respond accordingly during the return phase, they need to first receive the information. The second research objective thus aims at identifying risk communication strategies that local emergency management organizations use during the return-entry phase to communicate with evacuees. This includes development of message content, selection of information delivery channels, and timing of the warning message. Historically, "mass media has been the primary means to transmit risk messages to the public" (Sood, Stockdale & Rogers, 1987 as cited in Shklovski, Palen & Sutton, 2008, p.130). However, at present, with the advancement of information and communication technology, the use of social media, wireless emergency alert systems and cellular apps are also becoming increasingly popular during disasters (Liu, Palen, Sutton, Huges & Vieweg, 2008; Sutton, Palen & Shklovski, 2008). Some scholars (Palen et al., 2010; Sutton et al., 2008) believe that incorporating new technologies in disaster risk communication is likely to change the institutional and organizational arrangements during disaster response. As stated by Sorenson and Sorenson 2007 (p. 186), "at present the public does not rely on one single source of warning information; people have access and are forced to listen to multiple sources of information". In many instances, citizens themselves use new technologies and become active contributors of disaster information (Goodchild & Glennon, 2010). The ease of use and the

ability to reach millions of people in a limited amount of time has also increased the potential for use of new technologies during risk communication. Nonetheless, "…it is also important to acknowledge the existence of a "digital divide" where less-affluent citizens are likely to have limited access" (Gladwin, Lazo, Morrow, Peacock & Willoughby, 2007, p.90). Similarly, information sources can also be limited for those with hearing or sight disabilities, less-educated and people with language problems (Arlikatti, Taibah & Andrew, 2014; Gladwin et al., 2007,). For example, ethnic groups without English language skills may struggle to comprehend the message that is provided in English. Similarly, the poor and homeless lack access to information channels such as TVs, radio, and print media. Since disasters impact people of different background and resources, who differ in their ability to receive, heed and comprehend messages (Veil et al., 2008), it is therefore important for local officials responsible for communicating return messages to make information accessible and comprehensible to all the population at risk, and not only a selected few. This objective will be examined by answering following research questions;

1. What strategies do local emergency management organizations use in order to disseminate return-entry information to the evacuees?
    a. Following Hurricane Sandy, what channels did local emergency management organizations rely on to disseminate the return-entry message to evacuees?
    b. Of the channels used to disseminate the return-message, which ones did local emergency management organizations perceive to be most effective?
    c. What information was communicated in the return-entry message?

Public Response

3. Examine how local emergency management organizations monitor public response to return-entry message and make adjustments to them.

The desired consequence of issuing a return plan or message is to achieve a successful public response, which occurs only when population at risk receives, comprehends, and complies with the plan. In order to ensure that risk communication is effective, it is thus crucial to monitor public response to return-entry plan and messages. Monitoring public response enables emergency management organizations to evaluate the effectiveness of the original return plan and message put forward by the organization, and make adjustments to them as necessary. While many studies (Drabek, 1986; Gladwin & Peacock, 1997; Perry, Lindell & Greene, 1981; Whitehead et al., 2000) have examined evacuation compliance, there has been no research examining how local organizations monitor return-entry plan compliance. Specifically, it is important to understand what information is gathered, how the situation is monitored, and how the adjustments are made in terms of what is communicated to the public to ensure that maximum compliance and returnee safety is achieved. In order to examine how emergency management organizations monitor public response, following questions will be addressed;

1. How do local emergency management organizations monitor public response to the return-entry messages?
    a. What type of information do the organizations gather to monitor the public response to return-entry messages?
    b. What adjustments do the organizations make if they feel warnings are not being received or heeded?

Scope and Intellectual Merit

The understanding of the return-entry risk communication process is important because returning early or without the issuance of all-clear message can make returnees susceptible to post-disaster risks, and also hamper emergency management activities such as debris removal, traffic management and damage assessments (Siebeneck, 2010). Despite recommendation from scholars (Dash & Morrow, 2000; Quarantelli, 1984; Siebeneck & Cova, 2008; Sorensen, Vogt & Mileti, 1987; Stallings, 1991) to investigate return-entry process, the sole focus of current return studies has been on household behavior during the return-entry phase. The organizational level investigation in relation to return-entry phase is missing in the literature. Moreover, a gap in knowledge exists about the process by which organizations decide to issue "all-clear message" to terminate an evacuation (Stallings, 1991). This study addresses these gaps in the disaster literature, and advances knowledge in two specific research areas – return-entry and risk communication. Additionally, an examination of the information-management strategies of emergency management organizations during return is also noteworthy. This study is innovative in that it integrates information management strategies of emergency management organizations with their risk communication processes (assessment, transmission & public response monitoring). Furthermore, it also examines the role of technological and social changes on information management and risk communication. By doing so, the study aims to provide an integrated framework for return-entry risk communication at an organizational level.

The findings of this dissertation will have potential implications for the emergency management community. The study will provide an understanding on how emergency management organizations use information in the development of the return-entry message. Likewise, the study will also identify important strategies pertaining to return-entry risk

communication process. The understanding of risk communication strategies and delivery mode can help emergency management organizations implement more effective return-entry risk communication in the future, thereby enabling them to attain more compliance to the official return-entry plan. Furthermore, the study outcomes are also expected to aid emergency management organizations in indentifying challenges that can hinder the return-entry risk communication process. This will allow emergency management organizations to make prompt risk communication decisions, which are crucial to minimize risks to the returnees, and to facilitate the return movement with minimal social disruption.

CHAPTER 2

LITERATURE REVIEW AND BACKGROUND

This chapter reviews the literature pertaining to risk communication and return-entry. The chapter begins with an overview of disaster warning and current risk communication research. The second section concentrates on return-entry research, and the final section of the chapter describes the theoretical frameworks used to guide this dissertation.

Risk Communication

The U.S. Department of Health and Human Services (2000, p.4) defines risk communication as "…an interactive process of exchange of information and opinion among individuals, groups and institutions which often involves multiple messages about the nature of risk or expressing concerns, opinions or reactions to risk messages or to legal and institutional arrangements for risk management". Risk communication includes activities such as providing information on potential threats (hazard awareness), imminent threats, and protective actions to minimize impacts related to hazards and disasters (Lindell & Perry, 2004). For instance, risk communication for hurricane hazards can include actions such as providing the public with information on mitigation measures, disseminating warnings and initiating evacuations during response, and providing an all clear message after the threat is over. Communicating risk is crucial in all four phases of disaster management – mitigation, preparedness, response and recovery (Lindell & Perry, 2004). However, despite the importance of risk communication in all phases, the research literature on risk communication has primarily focused on warnings during evacuation (Dash & Gladwin, 2007). Hence, an opportunity exists to expand knowledge and

theory in this area through research of risk communication strategies, activities and challenges during the return-entry process following a disaster. Specifically, the examination of risk communication during the return-entry phase can provide valuable insights into how emergency management organizations manage, facilitate, and achieve effective risk communication during the return phase.

Disaster Warnings

Historically, disaster warning is one topic within risk communication that has generated significant interest among hazard and disaster researchers. Disaster warning is defined as an "…advance notification of the existence of danger, and also information about what can be done to prevent, avoid or minimize the danger" (McLuckie, 1970, p.3). Warning is an important aspect of risk communication because it has the potential to produce an appropriate response, and minimize negative impacts to people and property. According Mileti and Sorensen (1990) the warning message itself is one of the most important factors that influences the way people respond to hazards. Disaster research describes warning as a process comprised of three steps – assessment, dissemination and public response (McLuckie, 1970; Quarantelli, 1990). First, warning involves assessment of threats, where emergency management organizations are involved in the detection and evaluation of threats. The assessment of threats is followed by decisions to warn the population. If the probability of threat is high, organizations are involved in the development of warning messages which is then disseminated to the population at risk through various information channels. Lastly, the emergency management organizations monitor public response to the official warning messages and make adjustment to them if they feel that warnings are not being received or heed by the public.

As part of the literature that examines the warning process, studies have examined the process by which individuals receive and respond to warnings. For instance, Drabek (1999) used field interviews and existing literature to examine public response to disaster warnings. The study suggested that the first response by the public to any warning is denial, which is further accompanied by conformation or disconfirmation of the interpretation of the message. Lindell and Perry (2004) on the other hand indicated that response to a warning message is influenced by environmental cues, social context, information sources, information channel, message content and receiver characteristics. According to them the public undergoes a cyclical decision making process which involves the assessment of risk, available information, and protective actions. Finally, the result of the decision making process along with the situational facilitators and impediments leads to the behavioral outcome of the population at risk (Lindell & Perry, 2004). Disaster warning "…thus involves far more than a linear transmission of a message from a warning source to the public (Quarantelli, 1990, p.2). Many factors influence the public response to warning messages. Drabek (1999) suggested that message characteristics, contextual characteristics and event characteristics, and receiver characteristics influences the public response to warning. His study of the tourist industry and evacuation behavior suggested that women and those with strong social networks were more likely to respond to disaster warnings.

McLuckie (1970), Mileti and Sorensen (1990), and Aguirre (1994) examined the characteristics of an effective disaster warning message. McLuckie (1970) reviewed literature and documents related to warnings, and suggested that four aspects – degree of specificity, degree of urgency, projected consequences of the threat, and the probability of occurrence-related to warning content should be taken into consideration before disseminating warnings. He further stressed that effective warnings trigger populations undertaking appropriate protective

actions. While Mileti and Sorensen (1990) reviewed prior studies on disaster warnings, and examined disaster message effectiveness based on two aspects – message content and message style. They indicated that from a message content perspective, an effective disaster warning should contain information regarding hazard, location, guidance, time and source. Likewise, from a message style standpoint, disaster warnings should be specific, consistent, certain, clear and accurate. Mileti and Sorensen (1990) suggested incorporation of both message content and message style attributes were equally important for a disaster warning message to be effective Aguirre (1994) on the other hand reviewed literature on planning, warning, evacuation, and search and rescue, and provided some general findings and point of consensus among scholars in these topics. He stressed that effective warning systems should also consider local context such as the language of the population at risk, and consideration of people's awareness of risk. Since communities differ in their attributes (culture, language etc); there should be the congruence between the content, context, and the tone of the warning messages (Aguirre, 1994).

Disaster warnings have also been studied based on the event characteristics, specifically, the nature of disaster agent. Some researchers (Aguirre, 1988; Anderson,1969; Baker, 1991; Gladwin et al., 2007; Mileti & O'Brien, 1992; Saarinen & McPherson,1981) have examined warnings in the context of natural hazards, whereas, others (Aguirre, 2004; Mileti & Peek, 2000; Rogers, 1994; Rogers & Nehnevajsa, 1987; Stallings, 1991) have studied warnings pertaining to man-made hazards. It is important to consider the hazard type while studying disaster warnings because there are major differences between warnings during the two situations. For example, Rogers and Nehnevajsa (1987) posited that unlike natural hazards that can be detected through sensory observation, it is harder to detect radiological hazards without instrumentation. Thus, warning in case of technological hazards is often more problematic than in case of natural

hazards (Rogers & Nehnevajsa, 1987). Stallings (1991) also emphasized the complications that arise during technological hazards. Using the example of four disasters (natural and toxic) – the Flooding along the Lower Platte River , Three Mile Island , The BKK Landfill and Dioxin in Times Beach – Stallings (1991) examines the problem in terminating evacuations after toxic releases. According to Stallings (1991) issuing an all-clear message following chemical emergencies can be more problematic than compared to natural disasters. This is because, unlike natural hazards where evacuees can rely on sensory cues such as sight, sound , and smell to indicate whether the threat has passed, chemical releases can be odorless and unseen, therefore lacking environmental cues that can signal the danger has passed. Additionally, the lack of environmental cues related to the threat may have increased the lack of trust between public officials and evacuees, as it is harder to identify environmental cues and to ensure safety after a toxic release.

Disaster warning studies have also investigated the role of different factors on public response to warnings. Quarantelli (1990) specifically notes that there are variations between responses to short-term warnings (issued in a sudden crisis) and long-term threats (such as famines, droughts, long range earthquakes etc). While the response to long term warnings has not been well explored, there are ample studies that examine public response during short-term warnings. Drabek (1999) presented a summary of findings related to disaster warning responses by using literature review and field interview of locals in Sterling Colorado following a flooding, and interview of tourists, business travelers during three hurricanes - Hurricanes Bob, Andrew and Iniki. According to him, four types of patterns of consistency have been cross-validated in numerous studies related to public responses to warnings. The four characteristics that affect adaptive behaviors include receiver characteristics (eg. age, gender, education level, and

income), message characteristics (eg. consistency, specificity, clarity etc), contextual characteristics (eg. in case of hurricane – point of trip, place of stay) and event characteristics (eg. length of the forewarning and accessibility of escape routes). Public response to warning has also been studied in relation to evacuation (Aguirre, 1991; Perry, 1979; Quarantelli, 1990). While studying evacuation of populations in Cancun, Mexico during Hurricane Gilbert, Aguirre (1991) found that persons with low income and low quality housing were more likely to respond to disaster warnings, whereas gender, age, and marital status were not useful predictors of evacuation behavior. Perry (1979) also summarized the findings of disaster warnings in relation to evacuation. Unlike Aguirre (1991), Perry (1979) indicated that age influences response to warnings. He noted that older people were less likely to hear and respond to warnings. Furthermore, a person is more likely to respond to a warning if he/she personalizes a warning message, has had prior hazard experience, and knowledge about protective actions. All these studies suggest that differences in social and demographic characteristics are important aspects that can predict the public response to warnings; however they may not be consistent predictors of response across all hazards, locations, and events.

Contrary to studies that examine short-terms warnings , Mileti and O'Brien (1992) used the case of 1989 Loma Prieta earthquake (1989), and analyzed data from two counties with varying damage and media attention – Santa Cruz (experienced greater damage, less media attention) and San Francisco (high post-mainshock, media attention) - to study risk communication in the context of an ongoing community-wide emergency. They noted that risk perception, warning information quality and quantity, pre-event hazard salience and demographic characteristics have an impact on disaster warning response. The conclusion of the established principles of pre-disaster warning response also applied for public warning issued in

context of an ongoing disaster. A noteworthy finding was that there is a variation in the social psychological process of public responses to post-impact and pre-impact warnings (Mileti & O'Brien, 1992, p.53). Warnings are more important to survivors that experienced disaster loss, further increasing the likelihood to adopt protective actions to warnings. Alternatively, "little or no disaster impact may result in normalization bias (which constrains risk perception to damage and protective response to warnings) when interpreting post-impact warnings for subsequent risks" (Mileti & O'Brien, 1992, p.53).

Recent Risk Communication Research

At present risk communication research covers a variety of areas such as assessment of risk communication programs, reliance and preferences of information sources, adoption of new information channels, and examination of challenges and opportunities pertaining to risk communication. This section will examine recent topic related to risk communication such as 1) effectiveness of risk communication modes, 2) use of new information technology in risk communication, and 3) risk communication to special needs population.

Recent studies on risk communication have examined the effectiveness of risk communication modes utilized by the public authorities. For example, Arlikatti, Lindell, Prater and Zhang (2006) examined the risk area accuracy of people living in the Texas coastal areas. Using a black and white county hurricane risk area map and a two-page questionnaire, the study examined the extent to the maps were 1) effective in communicating hurricane risk and 2) the Texas coastal residents ability to comprehend the information presented on the maps. The findings indicated that only 36% of the participants were able to accurately identify their location within a specific risk zone on the maps. In addition, the study found low correlation between risk

area accuracy and demographic characteristics of the participants. While there was no correlation between risk area accuracy and evacuation expectation, the study indicated a negative correlation between risk area accuracy and participants' previous hurricane exposure. Based on the results of the study, Arlikatti and her colleagues recommended practitioners to use larger scale maps along with landmarks to aid risk area identification for the residents in future.

Newer warning technologies such as cell phone apps, 'e government', easy access to internet, private warning subscription providers, nationalization of news coverage, increased availability of visual images and information, and increased use of Global Positioning System (GPS) for alert and notification have expanded the horizons for disaster research. Crisis informatics is an area of research that examines the technical, social, and information aspects of disasters and crises (Palen, 2008, p.76). It focuses on the use of information technologies for data collection, data collation and information dissemination among various groups during disasters and emergencies. Within crisis informatics, many scholars have examined the increasing role of new technologies in risk communication (Goodchild & Glennon, 2010; Liu & Palen, 2010; Liu et al., 2008; Palen, 2008; Palen & Vieweg, 2008; Palen et al., 2010; Shklovski et al., 2008; Sutton et al., 2008). For example, Palen (2008) discusses the findings of three research studies conducted by her team on the use of social media during and after disasters. The first study conducted by Palen and her colleagues examined the use of social media (Facebook, MySpace, Orkut, Wikipedia etc) after the Virginia Tech Shootings. The study found that the information provided by users of social media allowed for quick identification of the victims of the Virginia Tech Shootings. For example, the information received through social media was compiled by the Virginia Tech University to identify and verify the names of the victims. The second study conducted by Palen and her team examined the use of social media such as Twitter, online

discussion boards, personal blogs during the 2007 Southern California wildfires. They found that the public used social media to share information on road closures, fire line encroachments, shelter openings and closings during the disaster. Lastly, the team also investigated the use of Flicker, which is an online photo sharing application, during six notable disasters that occurred between December 2004 and October 2007. The findings of the study suggest an online social convergence phenomenon during disaster response, where people created new Flicker groups as soon as a disaster became prominent. The new groups thus formed served as repositories for images related to the disasters. All the three studies conducted by Palen and her colleagues indicate a growing public participation on social media during disasters. Furthermore, it also suggests that social media is emerging as an important information source and dissemination channel for the public. Sutton et al. (2008) examined the role of cell phone and social media technology during the October 2007 Southern California Wildfires. Her team found that social media is gaining popularity among the public for information seeking and information sharing activities during disasters. The findings indicate that the majority of respondents used mobile phones, information portals, websites, news sources, individual blogs, discussion boards and photo-sharing sites such as Flickr and Picasa to seek information during the wildfire (Sutton et al., 2008, p.3). The study further suggests that social media also provided the public with the opportunity to share information with others. Similar to Sutton et al. (2008), Shklovski et al. (2008) also examined risk communication during the October 2007 Southern California wildfires, and suggested that the use of new information technology enhances disaster risk communication by utilizing the public as a source of community relevant information (p.127). Research has also revealed that technology has expanded peer-to-peer information-seeking behavior, and allowed distributed problem solving and collective sense-making among the public

(Liu & Palen, 2010). For example, while studying the Northern Illinois University (NIU) shootings in relation to the related activity that happened in response to the Virginia Tech (VT), Palen and Vieweg (2008) found that virtual public forums enabled connection between NIU and VT. The findings indicated that the public forums provided an opportunity for instruction and sharing of experience among the students and peers of the two universities.

The accessibility of technology such as digital cameras, camera-integrated cell phones, web mapping tools, social networking sites, photo-sharing websites etc has further resulted in the emergence of public participation via crowd sourcing information, and eyewitness photojournalism (Lin et al., 2008). Liu and Palen (2010) and Goodchild and Glennon (2010) examined the rise of public participation by focusing on *neogeographers,* which is defined as - "people using and creating their own maps, on their own terms, by combining elements of an existing toolset" (Turner 2006, p.3 as cited in Liu & Palen, 2010, p.70) in the context of disasters. Liu and Palen (2010) conducted interviews with the mashup developers to examine the motivation, process and decisions pertaining to map-based mashup creations. The study found that the development of neocartographic skills was motivated by personal benefit and enthusiasm, as well as willingness to expedite the accessibility of information to others (Liu & Palen, 2010). Unlike Liu and Palen (2010), Goodchild and Glennon (2010) focused on *volunteered geographic information* (VGI) during 2007-2009 Santa Barbara wildfires to examine the key issues associated with VGI and its potential role in disaster management. The study found that during the Santa Barbara wild fires, VGI quickly gained prominence among the citizens as they utilized VGI messages provided in different forms such as text reports, photographs, and videos to receive situational reports during the event. This enabled the public to

receive easily comprehendible and frequently updated information pertaining to the disaster (Goodchild & Glennon, 2010).

Despite of the many advantages of new technologies, "…it is however also important to acknowledge the existence of a "digital divide" where less-affluent citizens, and rural communities are likely to have limited access to a variety of state of the art technological services" (Gladwin et al., 2007, p.90). Information sources can also be limited for individuals with hearing or sight disabilities, for non-native English speaking, and for less-educated citizens (Gladwin et al., 2007). This is because these individuals may be unable to receive, heed, or comprehend a standard message and respond appropriately. Likewise, the current changes in U.S. demographics such as increasing diversity in terms of ethnicity and languages, rising number of single-parent households and increasing elderly populations - should also be considered in risk communication process. Some studies (Arlikatti et al., 2014; Benavides, 2013; Donner & Rodriguez, 2008; Gladwin et al., 2007; Lindell & Perry, 2004) have concentrated on risk communication in relation to the changing social context. These studies recognize that populations vary based on social attributes - socio-economic status, race, ethnicity, gender and educational attainment- and thus require unique risk communication strategies. For instance, Lindell and Perry (2004) discussed risk communication process from a multicultural perspective. They posit that ethnic groups vary based on their beliefs, values, norms (eg. family expectations and family role), language mastery and access to other community groups, which have implications for risk communication process. For example, people's safety can be endangered in the absence of a readily available bilingual person in a household where many members don't understand the language in which warning has been issued (Lindell & Perry, 2004, p.20). Lindell and Perry (2004) have also indicated that ethnicity is related to warning responses in that there

are ethnic variations in both the level of warning behavior and the types of sources contacted by warning recipients. For example, Perry and Lindell (1991) found that a slightly smaller proportion of whites attempted to confirm warning messages than did the African Americans or Mexican Americans (cited in Lindell & Perry, 2004, p.92). This may imply that the non-white populations were less able to comprehend the messages than the white population. In light of this finding, emergency management organizations should be considerate about the ethnic variations present in society and consider its influence on risk communication during disasters. Similar to Perry and Lindell (1991), Gladwin et al. (2007) also indicate the importance of social and cultural factors in risk communication. According to them "…if risk communication is to be effective, the experiences, values and beliefs of intended audiences must be understood", otherwise there could be a devastating impact to a community during disasters (p. 90). In particular, studies highlight the necessity for warning to be transmitted in languages reflecting those spoken within the particular warning area. Aguirre (1988) conducted field interviews with Saragosa tornado survivors, locals, emergency officials, media and utility personnel to understand the warning systems during the 1987 Saragosa Tornado. The study found that during the tornado, the emergency announcement was only communicated through a local English TV channel, however majority of the local population were of Mexican decent and were watching a Spanish-language TV channel which didn't broadcast the warnings. Furthermore, although the local English radio station provided warnings in Spanish, the translation was done incorrectly. The importance of communicating risk information in the language native to the population at risk is also reiterated by Benavides (2013). Using the case of four disasters (Saragosa Tornado, Hurricane Katrina, the 2003 Cedar Fire and the 2007 San Diego Fire), Benavides (2013) examined the role of Spanish-language media in disaster risk communication. Benavides (2013)

indicated that despite of ineffective communication during the past four events, the Spanish-language media is now embracing its role as an important information provider during disasters. The use of Spanish-language media has not only enabled Hispanic population to receive information in their native language but it has also fostered collaboration between the media and the government, which is crucial for effective risk communication during disasters (Benavides, 2013).

Risk Communication Studies at Organizational Level

In comparison to risk communication studies at an individual level, there are only few studies that have looked into risk communication from an organizational perspective. This includes the examination of risk communication activities, processes and experiences of emergency management organizations and officials. Among this body of research (McLuckie, 1970; Mileti & Sorensen, 1990; Stallings, 1971) are case studies that discuss communication structure and organizational functions during disaster emergencies. One study by Stallings (1971) categorized organizational communication structure into three types- internal communication, interorganizational communication and public-to-organization communication - and discussed the challenges in each type of structure. For example, Stallings (1971, p.22) referred to *interorganizational communication* as "the passing of message across organizational boundaries from individuals who represent a formally constituted group to those representing another". He further indicated the importance of inter-organizational structure as organizations are dependent on one other to receive necessary information, resources, services and personnel during disasters. Nonetheless, Stallings (1971) also recognized lack of coordination between

organizations to be a significant problem in interorganizational communication structure (Stallings, 1971).

Concomitant with Stallings (1971), Anderson (1969), McLuckie (1970) and Mileti and Sorensen (1990) all believed that a variety of organizations contribute to the disaster warning process. By reviewing literature and documents related to disaster warnings, McLuckie (1970) introduced a framework for warning process. McLuckie (1970) asserted that the warning process, at an organizational level, begins with detection of a threat, followed by decision making and dissemination of warning message, and is completed with adjustments to the messages in relation to the feedbacks received from the public. Mileti and Sorensen (1990, p.2-1) suggested that "the most effective structure for warning system is that of an *integrated system"*. According to them, *integrated system* comprises of three subsystems - the detection, management, and response subsystems - which are dependent on each other for the overall effectiveness of the whole warning system. The subsystems provided by Mileti and Sorensen (1990) are very similar to McLuckie's warning components framework. For example, the detection subsystem includes activities such as monitoring hazards, which is similar to McLuckie's risk assessment phase. Likewise, the management subsystem and response subsystem comprises of warning decision making, and public response to warning respectively, which are same as the dissemination and response phases discussed by McLuckie (1970).

Unlike McLuckie (1970) and Quarantelli (1990) who focused on adjustments to warnings during an event in order to maximize threatened populations to undergo protective action, Anderson (1969) and Saarinen and McPherson (1981) examined adjustment to warning systems after an event for improved warnings to future disasters. Anderson (1969) conducted interviews with public officials and scientists to examine the differences in the disaster warning adaptations

in two coastal cities - the communities of Crescent City, California and Hilo, Hawaii - after a major tsunami disaster. He focused on detection, information collection and decision making phases of the warning process. The study found that unlike Crescent City, Hilo underwent significant change and improvement in the warning procedure for transmitting tsunami warnings and information to the public. The findings suggested that the change to Hilo's warning system was a result of incorporation of feedbacks to the warning system that city officials received after 1960's Tsunami. The city officials received feedbacks from the public and scientific experts regarding the improvements to the existing warning system such as designation of evacuation zones, use of variety of mechanisms like public sirens, police sirens to disseminate warning message. Contrary to expectations, the study found less changes in Crescent City's warning system due to the lack of substantial feedback following the 1964 tsunami disaster. Based on the findings, Anderson (1969) further stressed the importance of feedbacks in order to evaluate as well as to increase the effectiveness of a warning system. Similar to Anderson (1969), Saarinen and McPherson (1981) analyzed the USGS's warning system and public responses to a possible landslide in Pillar Mountain in Kodiak, Alaska. Saarinen and McPherson (1981) conducted interviews with USGS personnel and the public to examine the effectiveness of the notices and warnings issued by USGS of possible landslide in Pillar Mountain in Kodiak. The study demonstrated conflicts between the USGS and the public due to the issuance of notices and warnings by the USGS. After conducting a technical survey, the USGS saw potential for a disaster and thus informed public officials, however the procedure alienated the community and drew bitter criticism from the public. The public felt that the USGS, by issuing the notification, had placed a "red flag" on Pillar Mountains and thereby threatened Kodiak's economic development and well-being. The findings reveled that the USGS notifications were disbelieved

because the local interest was very strong, and that the community did not accept the threat. Both of these studies indicate that risk communication at an organizational level can be a challenge. Seeking and incorporating feedbacks from the public and other organizations following an event are thus crucial in order to increase the effectiveness of risk communication for future disasters.

Return-Entry

Evacuation is an important protective action undertaken during many disasters (hurricanes, floods, tsunamis, volcanoes, chemical accidents etc). Evacuation is generally referred as the movement of people away from an endangered area whereas, return entry is "the movement of an evacuated population back to an area following the issuance of an all-clear message..." (Siebeneck & Cova, 2008, p. 91)

Some scholars (Sorensen et al., 1987; Stallings, 1991; Quarantelli, 1990; Siebeneck & Cova, 2012) describe evacuation as a cyclical process comprised of a round trip event that involves movements both away from as well as back to an evacuated zone. Return-entry is very important in emergency management because it is a necessary step that initiates the post disaster recovery process. Despite of this importance only few studies have focused on return-entry movement following disasters.

Recommendations to Study Return-Entry Phase

In 1984, Enrico Quarantelli made the seminal observation that "… to ignore the directed and roundtrip nature of the evacuation process is to miss much of what must be dealt with in practical terms" (Quarantelli, 1984, p. 154). This concern was again raised by Stallings (1991) who was the first scholar to conduct research related to return-entry. Stallings' study on ending

evacuations following chemical emergencies indicated that evacuees are less likely to return after toxic chemical spill than compared to natural disasters" (p.193). Evacuees are more skeptical in toxic events, as it is harder to perceive environmental cues, and to confirm the safety levels. Additionally, all-clear messages in toxic evacuations have less credibility than warnings in natural disasters because they tend to be more ambiguous. Due to all these reasons, ending evacuation in case of chemical emergency is more problematic than in case of natural hazards. Moreover, Stallings (1991) acknowledged the need to investigate return-entry phase, and encouraged researchers to study "the process by which organizations decide to issue an "all-clear" message to terminate an evacuation, and the process by which evacuated families decide to return to their homes" (p.183). Dash and Morrow (2000) on the other hand, recognized the need to study return-entry to be a recurring theme in the literature. They reiterated various reasons discussed by other scholars as to why return-entry should be studied. Some of these include the lack of understanding on return-entry process and the problems faced by the organizations while managing return-entry movement. Based on these suggestions on return-entry investigations, several scholars (Henry, 2013; Lin et al., 2013; Siebeneck & Cova, 2012, 2014, 2008; Siebeneck et al., 2013) have examined return-entry following an evacuation.

Recent Return-Entry Studies

One focus of recent return-entry research has been improving understanding of the factors that influence returnee compliance with reentry plans and social influences on the decision to return (Siebeneck et al., 2013). Siebeneck and Cova (2008, 2012) have examined the influence of different factors on return-entry compliance. Using the case of 2005 Hurricane Rita, Siebeneck and Cova (2008) examined the geographic aspects of risk communication, and

demographic factors that affect return-entry compliance rates. The results reveled that both evacuees compliance with the return-entry plan and communication of the return-entry plan were relatively poor during Hurricane Rita. Evacuees' compliance with the Hurricane Rita return-entry plan was only 46.4%, and there was no significant relationship between viewing the TxDOT return-entry map and return-entry compliance. The findings also suggested that distance evacuated was related to return-entry date, in that as distance evacuated increased, the return date also increased. Additionally, the findings indicated a relationship between scheduled return-entry date and compliance. Specifically, the study found higher compliance rate among the people scheduled to return to areas that sustained damages than those that were scheduled to return to undamaged areas (Siebeneck & Cova, 2008, p.103). Siebeneck and Cova (2008) also found two demographic variables -gender and educational attainment - to be significant predictor of return-entry compliance. Females and people with lower education levels were more likely to comply with return-entry orders than compared to males and people with high educational levels (Siebeneck & Cova, 2008, p. 102). Siebeneck and Cova (2008) specifically emphasized that evacuation and repopulation of an area are two separate processes, and the factors that affect compliance with the evacuation orders are likely to differ from those that affect return-entry compliance. Similar to Siebeneck and Cova (2008), Siebeneck and Cova (2012) also focused on factors that influenced return-entry compliance. Siebeneck and Cova (2012) examined the geographic and temporal dimensions of risk perception throughout the evacuation and return-entry process during the 2008 Cedar Rapids, Iowa Flood. The study found that risk perception influenced return-entry compliance. For example, the study indicates that having a higher perception of risk when deciding to return home increases the likelihood that evacuees will comply with the official return-entry orders than compared to those experiencing lower risk

perception levels (Siebeneck & Cova, 2012). The study also suggested that socio-demographic characteristics influenced the timing and characteristics of the return groups. For instance, having children in the household and having greater damages to the homes decreased the likelihood of returning back to the evacuation zone with the same evacuation groups. Siebeneck et al. (2013) examined return-related concerns that motivate households' compliance with reentry orders. Using survey data gathered following the 2008 Hurricane Ike, the study examined evacuees' compliance with official reentry plans, the concern they had pertaining to the return, and the degree to which they actually experienced those problems they expected to encounter. The evacuee concerns examined in the study included being stuck in traffic, physical risk associated with damaged structures, lack of utility service, looting and loosing income while away from work. The results indicated that minorities, those with lower education attainment, and lower income were associated with higher levels of reentry concerns and, to a lesser extent, with problems experienced after returning. The study also found that demographic variables were not correlated with compliance with official reentry plans, and only higher income predicted later entry. The study further indicated that the concerns about reentry traffic resulted in higher compliance to the return-entry plan, and the concern about physical risk was related to early return.

Several return studies (Dash & Morrow, 2000; Henry, 2013) have also looked into return-entry decision making. Henry (2013) looked into the factors influencing return-entry decision making of evacuees through a qualitative approach. Based on the interviews with the evacuees of Hurricane Katrina and Rita, and extensive fieldwork, Henry (2013) provided an inductive analysis of the decision of evacuees on whether to return or to relocate. The study found that evacuees' decision to return or relocate involves a rational decision making process which is

guided by variety of material as well as value-based factors that are interconnected to each other (Henry, 2013, p.311). The study further suggested that there are significant variations in evacuees' decision making process based on geographic area, homeownership, and type of decision.

Dash and Morrow (2000) used the survey data collected through a computer-assisted telephone interviewing system of both evacuees and non-evacuees during Hurricane Georges to examine the effects of heavily publicized media coverage delays in reentering the Florida Keys after Hurricane Georges on future evacuation intent. The findings suggested that despite of the possibilities of experiencing a return-entry delay, the public is likely to evacuate if they perceive that they are in danger (Dash & Morrow, 2000, p.127). The study further found that people who have seen media reports of past return delays are less likely to evacuate due to concerns of experiencing delay when returning home (Dash & Morrow, 2000).

Return-Entry Risk Communication

Within risk communication, much is understood about pre-event warnings related to evacuation and sheltering; however little is known about risk communication during the return-entry phase when ending evacuations (Stallings, 1991). The need for studies on this matter is evident as successful return-entry and recovery is impossible without effective post-disaster risk communication. Specifically, during the return movement, risk communication serves an important role in warning the returning population of secondary hazards and facilitating post disaster activities (debris management, damage assessment, utility restoration etc.). Additionally, understanding risk communication in relation to the return process is also crucial because communicating risk during return is challenging (Siebeneck & Cova, 2014). For example, unlike

pre-disaster warning situations (where populations are located around one area), evacuees are dispersed to a much wider geographic area after an evacuation which makes risk communication more problematic (Siebeneck & Cova, 2008). Emergency management organizations may thus face challenge while attempting to make return-entry information accessible to all evacuees. In cases where evacuees receive the return message, challenges can still arise due to evacuees' lack of reliance on information provided by the organization.

Some studies have examined risk communication during the return-entry phase. Using the survey of 340 households following 2008 Hurricane Ike, Lin et al. (2013) examined evacuees' household reliance on different information sources at the time they decided to return home. They found that no single information source produced greater compliance with official reentry plans and that reliance in sources shifted over time. For example, the reliance on local news media decreased and reliance on peers increased from the time of the evacuation decision to the time of the reentry decision. Likewise, although people rarely reported relying most on peers as sources of general emergency information until the day they decided to return home, they did rely the most on peers for reentry information. Siebeneck and Cova (2014) also focused on return-entry risk communication during the 2008 Cedar River Flood. They found that evacuees reliance on various information sources during the evacuation decision making process was highly correlated with the information relied upon during return-entry decision making (Siebeneck & Cova, 2014, p 160). Also, receiving the return message was related to return-entry compliance. Evacuees were more likely to comply with the return-entry plans if they received the return-entry messages. In addition to this, demographic variables such as gender, having children in the household and educational attainment levels were found to have a statistically significant relationship with reliance on return-entry information. Females and evacuees without

a college degree were more likely to rely on local authorities for reentry information than compared to males and people with a college degree respectively. Information from the peers was considered as a more reliable source by household with children than compared to households without children.

Warning Components Framework

The "Warning Components Framework" proposed by McLuckie (1970) and summarized by Quarantelli (1990) to understand risk communication during return-entry phase is the guiding theoretical framework utilized in this dissertation research. The framework, presented in Figure 2.1 aids in understanding risk communication process at an organizational level. According to the framework, warning systems consist of three components: assessment, dissemination and public response. Based on the framework, the first stage in the warning process is the assessment of risks related to threat. "Assessment involves those organizational activities taking place from the time of the detection of a specific hazard to the environment to the point at which some means, mechanical or otherwise, are used to convey a message to the threatened locality of the probable impact of the disaster agent" (Quarantelli, 1990, p.1). Assessment comprises of activities such as collection, collation and evaluation of threat data. The collection of threat cues, the collation of them, and an evaluation of their reliability, forces organizational officials involved to make a number of crucial decisions. Officials must decide if the general public and other organizations are to be warned, if so, how it should be done, and what specific information should be transmitted. There are also many factors –such as threat situation, damage levels, traffic conditions etc. - that influence a decision to issue a warning message (McLuckie, 1970). For instance, the probability of high risk levels and property damage during an event can result

in issuance of a warning message by emergency management organizations. Similarly, decision makers should also visualize the consequences of issuing delayed warnings and too many false warnings.

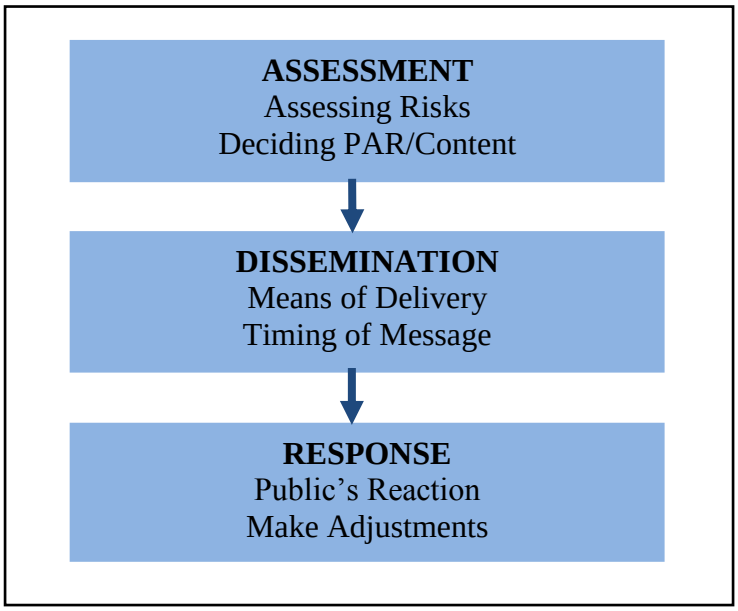

Figure 2.1 Warning Components Framework
Source: Adapted from Quarantelli (1990)

McLuckie (1970) suggested that with the decision to warn a community of an impending disaster agent, three community subsystems may be set in motion - interorganizational subsystem (between organizations), intraorganizational subsystem (within an organization) and general public alert subsystem (for public). Moreover, four aspects related to warning message or content should also be considered by the emergency organizations. These include the degree of specificity (to whom, what), the degree of urgency (need of immediate action), projected consequences of the threat, and the probability of occurrence.

Dissemination is the second stage of the warning process, and involves activities related to the issuance and transmission of a message (Quarantelli, 1990). During this stage,

organizations identify and use various information sources and channels to distribute the message to the population at risk. According to Quarantelli (1990), dissemination is often the least effective part of the warning process. The last stage within the warning components framework is public response. "It is the most important aspect of the total warning system because the effectiveness of warning is dependent upon the resulted response" (Quarantelli, 1990, p.2). Risk communication will only be successful when the threatened population adopts appropriate protective actions. Hence, organizations should monitor public response to warning messages. In case of noncompliance, organizations should make adjustments to their warning message, so as to ensure that the public is receiving as well as complying with the messages. The Warning Components Framework however does not capture why some organizations rely on some sources than others. This study therefore also utilizes the Theory of Motivated Information Management to examine risk communication during the return-entry phase.

Theory of Motivated Information Management

The Theory of Motivated Information Management (TMIM) is a social-psychological model that was propounded by Walid Afifi and Judith Weiner in 2004. The model provides a framework to understand the relationship between information-management and uncertainty. Fig.2.2 delineates the key components of the TMIM model. According to the model, the information-management process begins with interpretation phase that involves the assessment of uncertainty on an important issue. In the evaluation phase, individuals make judgment on whether or not to seek additional information. The evaluation phase comprises of emotions which contribute to individual's information-management decisions.

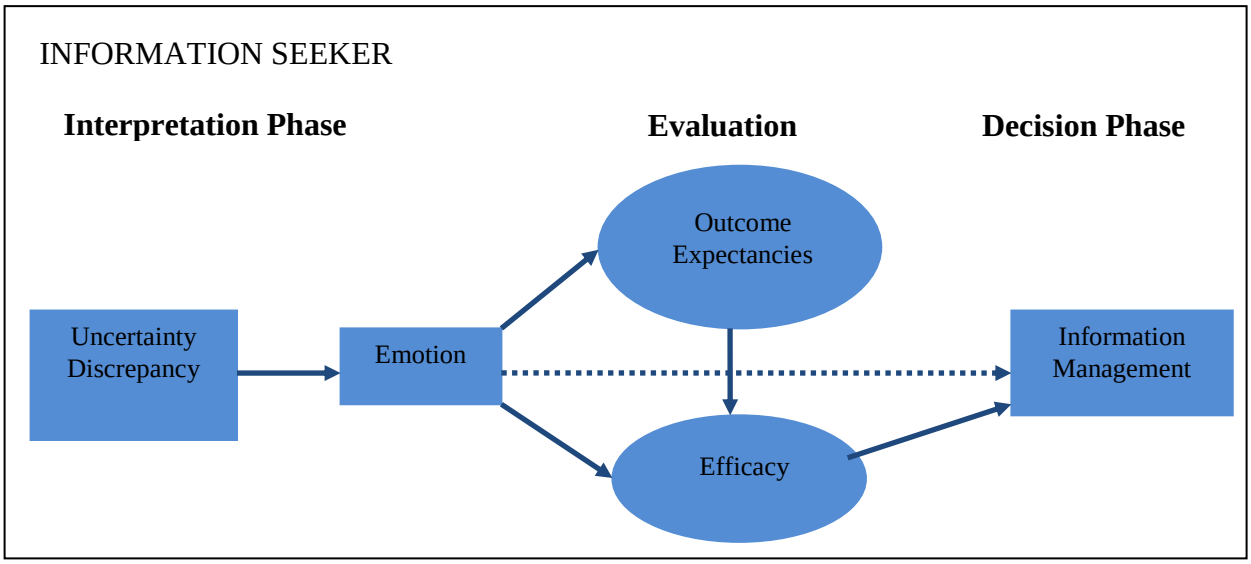

Figure 2.2 Framework for Theory of Motivated Information Management
Source: Adapted from Fowler and Afifi (2011)

Lastly, in the decision phase, individuals make decision on information-management options. Individuals –"seek relevant information, avoid relevant information, or cognitively reappraise the situation in order to manage uncertainty" (Afifi & Weiner, 2004, p.181). In this study, TMIM model can further the understanding on emergency managers perceptions (cost and benefit) on various information sources, and their decision to seek, avoid, and to rely information from different sources.

Guiding Conceptual Framework

This study is guided by two theoretical frameworks - "Warning Components Framework" and "Theory of Motivated Information Management" - to examine return-entry risk communication at an organizational level. The "Warning Components Framework" provides the basis to examine risk communication by dividing the process into three stages – assessment,

dissemination and public response monitoring, while the Theory of Motivated Information Management (TMIM) framework aids in understanding the information seeking decisions and risk communication strategies used by emergency management organizations. The TMIM framework has been primarily adopted prior to the assessment phase, where it can provide valuable insights on emergency management organizations information-management strategies. In addition to the theories, the study is also guided by disaster literature. For instance, the disaster literature (Dooner & Rodriguez, 2008; Galdwin et al., 2007; Lindell & Perry, 2004; Veil et al., 2008) has widely acknowledged that disaster population vary in terms of their social, cultural and economical aspects. The social demographic characteristics of evacuees can influence their ability to receive and comprehend risk information (Lindell & Perry, 2004). Similarly, the use of social media and new technologies for risk communication has transformed the way information is received and disseminated (Goodchild & Glennon, 2010; Liu et al., 2008; Liu & Palen, 2010; Palen, 2008; Palen & Vieweg, 2008; Palen et al., 2010; Shklovski et al., 2008; Sutton et al., 2008). All these aspects are also included in the guiding framework. The guiding conceptual framework for the study is shown in Figure 2.3. As presented in the figure, this dissertation is based on a framework that integrates these two models. While the TMIM model is divided into three phases – interpretation, evaluation and decision phase; the Warning Components Framework is comprised of three stages – assessment, dissemination and public response monitoring. However, the uncertainty and information management elements are common to both the frameworks. This integrated framework provides a guideline to study risk communication at an organizational level. In a return-entry context, the integrated model begins with information seeking activities of emergency management organization in order to reduce uncertainty related to the post-disaster condition, where the organizations strategically seek

information from some sources and avoid others. The information thus obtained is further utilized to assess risks in the aftermath of the disaster. The risk assessment activities further lead to dissemination activities where the emergency management organizations transmit return-entry messages to the public. Lastly, the dissemination activities are followed by public response monitoring to the return-entry messages.

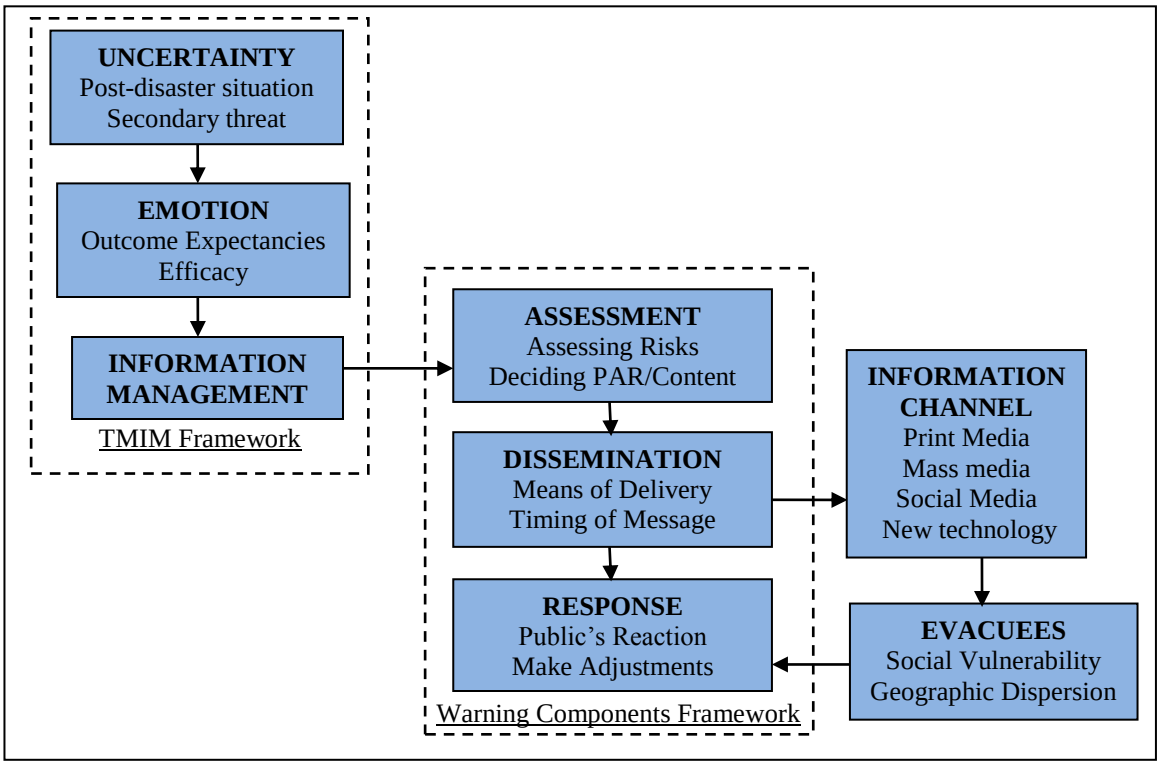

Figure 2.3 Guiding conceptual framework
Modified from TMIM Framework (Afifi & Weiner, 2004)
and Warning Components Framework(Quarantelli,1990)

CHAPTER 3

METHODOLOGY

This chapter describes the research methodology utilized for this study. The first section of this chapter begins by presenting a brief overview of Hurricane Sandy, followed by a description of the study area. Next, the overall research design is presented, in which the data collection procedure and the data analysis methodology used in this study are outlined.

Rationale for Studying Hurricane Sandy

This dissertation examines risk communication within emergency management organizations following Hurricane Sandy in 2012. Hurricane Sandy is selected for the study due to various reasons: 1) It is fairly a recent event, which allows emergency management personnel to more accurately recall the event and actions they took during return-entry phase, 2) Although Sandy struck in 2012, the delay in conducting interviews allowed emergency management personnel to witness or manage returns that occurred both immediately after the event as well as those that took much longer, 3) It also allowed interviewing emergency management organizations that are still recovering from the event, 4) In the aftermath of Hurricane Sandy, emergency management organizations used many strategies to communicate risk information to the public. For instance, the use of new technology such as Wireless Emergency Alert (WEA), social media, goggle crisis maps etc, were widely popular during and after Hurricane Sandy (Gabbatt, 2013). According to Jaime Ellertson, chairman and CEO of Everbridge, only 30 % of the 10 millions alerts disseminated by organizations and municipalities during Sandy were through SMS and emails (Savitz, 2013). This means that organizations used multiple forms of

communication to provide alerts and messages during Hurricane Sandy. Similarly, the public was also active in social media during Hurricane Sandy. The public used social media not only before and during the storm but also aftermath of the event to inform others about damages and utility conditions in their community ("Hurricane Sandy Update..Closed", 2012). Hurricane Sandy presents the ideal case study to explore the impact of new technologies on return-entry risk communication. In part, this dissertation investigates whether the use of new technologies by impacted residents augmented the risk communication process or created challenges for emergency management organizations.

There were also numerous challenges experienced by emergency management organizations and the public during and in the aftermath of Hurricane Sandy that warrants study. Some of these challenges included power outage issues, downed power lines, and lack of information from utility companies (Halpin, 2013). The report by Hurricane Sandy Rebuilding Task Force (2013, p.22) indicates that about 48,000 trees had to be removed or trimmed in New Jersey alone to restore power aftermath of Hurricane Sandy. From a return-entry perspective, the local emergency management organizations adopted a variety of return-entry plans in the aftermath of Sandy, such as permanent, temporary, and staged return strategies. This provides an opportunity to examine how risk communication varies given the selection of a specific return-entry strategy. For example, risk communication strategies may differ for communities that were allowed to return early when compared to those that had extended evacuation orders. Likewise, the risk communication challenges for these communities may also vary significantly. In additional to this, aftermath of Sandy, local emergency management organizations experienced problems due to sightseers ("Storm-damaged neighborhoods", 2012). This problem may be related to the effectiveness of the return-entry messages, and thus can provide valuable insights

on the factors that influence compliances with the official return-entry messages or plans. Moreover, there was also evidence of disagreements between the local government and Governor's Office on return-entry issues in that despite of some counties requests to initiate reentry post Sandy, the governor rejected reentry to some barrier islands in New Jersey, further extending mandatory evacuation order for some evacuees (Acampora, 2012). Due to all these reasons Hurricane Sandy provides a good opportunity to study different facets of risk communication, and further aids in identifying risk communication strategies, challenges and opportunities related to return-entry phase.

Hurricane Sandy

Hurricane Sandy was the most destructive and costliest hurricane of the 2012 Atlantic hurricane season. Hurricane Sandy is referred to by many names such as "Superstorm Sandy", "Post Tropical Cyclone Sandy", and simply as "Sandy". The different names given to the disaster event comes from the variety of forms the storm took throughout its formation on October 22, 2012 to its final landfall on October 29, 2012. Sandy formed in the Southwestern Caribbean Sea on October 22 and became a Category 1 hurricane on October 24. The same day, Sandy made its first landfall as a Category 1 storm in Jamaica. On October 25, Sandy made its second landfall in Cuba as a Category 3 hurricane, and passed through Cuba as a Category 2 hurricane. Thereafter the hurricane weakened to a Category 1 and moved north over the Atlantic Ocean (Federal Emergency Management Agency [FEMA], 2013). Throughout late October 28 to early afternoon on October 29, Sandy intensified to a post-tropical cyclone (Blake, Kimberlain, Berg, Cangialosi & Beven, 2013). On October 29, 2012, at approximately 7:30 pm Sandy made landfall in Brigantine, near Atlantic City, NJ (FEMA, 2013). Figure 3.1 shows Hurricane

Sandy's path as it makes landfall in the U.S (also see Table 3.1 for timeline of events associated with Hurricane Sandy).

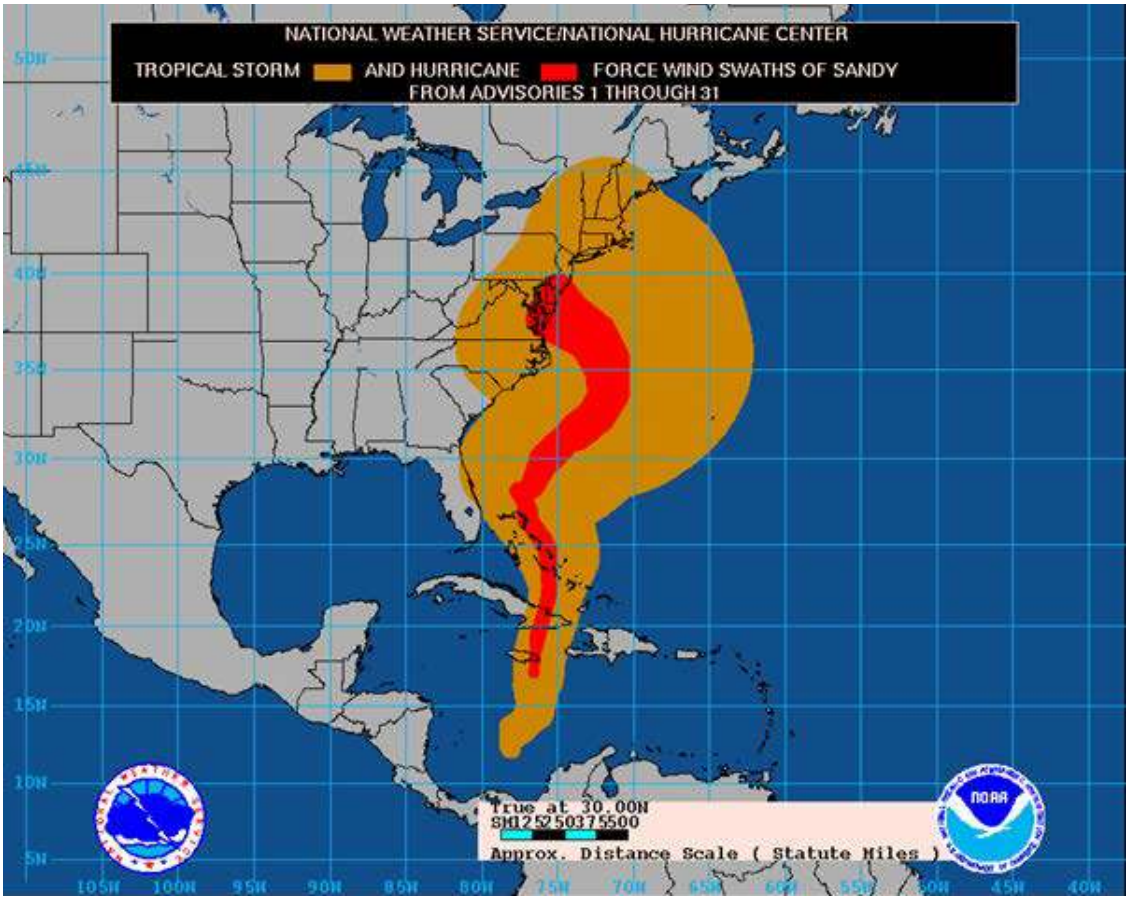

Figure 3.1 Hurricane Sandy's path
Source: Hurricane Sandy FEMA After-Action Report, 2013

In the United States, the effects of Sandy were felt in 24 states extending from Florida to Maine, as well as states as far inland as West Virginia, Ohio, and Indiana (FEMA, 2013). The main areas of impact were the New Jersey coasts and the New York metropolitan area, which experienced heavy rain, winds, and a record storm tide that approached 14 feet in some areas (FEMA, 2013). Major disaster declarations were made for 13 states – Connecticut, District of Columbia, Delaware, Massachusetts, Maryland, New Hampshire, New Jersey, New York, Ohio,

Pennsylvania, Rhode Island, Virginia, and West Virginia (Hurricane Sandy Rebuilding Task Force, 2013). The hurricane resulted in 157 direct deaths, destroyed at least 650,000 houses, and resulted in property damage of more than 65 billion (Hurricane Sandy Rebuilding Task Force, 2013, p.22). The secondary impact of Sandy included raising flood waters, fire, hazardous spills resulting in water pollution, and abnormal blizzard conditions. Additionally, the storm also resulted in extensive power outages, liquid gas shortages, and impacted critical infrastructures such as transportation facilities and hospitals, further resulting in a huge loss in economic activity. According to FEMA (2013, p.1) "in the immediate aftermath of Sandy, there were over 23,000 people who sought refuge in temporary shelters, and over 8.5 million customers who were left without power".

Figure 3.2 Hurricane Sandy satellite image
(Captured by NOOAA's on Monday Oct.29 at 9:10am)
Source: FEMA, 2013

Study Area

The study area for this research was limited to all counties and municipalities in the state of New Jersey. Situated in the northeast region of the United States, the state of New Jersey is surrounded by New York State on the north and northeast, the Atlantic Ocean on the east, Delaware on the south and southwest, and Pennsylvania on the west. New Jersey has a total area of 8,204.37 square miles, out of which 7,504.8 square miles is land area and 699.57 square miles is water (The State of New Jersey, 2015). The state has a varying topography that comprises of mountains, highland regions, valleys and coastal plains. The state's highest elevation lies in the Kittatinny Mountains, which is 1,803 feet above sea level. The Atlantic Coastal area covers the two-third of the state, and comprises of a peninsula that is more than 5 miles long. With 1,195.5 persons per square mile in 2010 (United States Census Bureau, 2015), New Jersey is the 11th most densely populated state in the United States. The state is comprised of 21 counties and 565 municipalities, and had an estimated population of approximately 8,864,590 in July, 2012 (United States Census Bureau, 2012) and has a very diverse population with both permanent as well as seasonal inhabitants of many races, ethnicities, religions, and cultures. Cape May, Atlantic, Ocean and Monmouth counties are most vulnerable to hurricanes due to proximity to the coast, and high population density (PBS&J, 2007).

Evacuation and Return-Entry

Specifically, local communities along the Atlantic Coast, Delaware Bay, and Hudson River that experienced evacuation and administered return-entry plans were included in the study area. Before the arrival of Hurricane Sandy, Governor Chris Christie declared a statewide state of emergency for New Jersey on October 27. With this announcement, four counties in New

Jersey – Atlantic, Cape May, Monmouth, and Ocean – initiated the Governors mandatory evacuations of the barrier islands. Some communities that were under mandatory evacuation in these counties included Long Port, Margate City, Brigantine, Ventnor City, Atlantic City, Cape May City, Wildwood, North Wildwood, Wildwood Crest, Sea Isle City, Ocean City, Stone Harbor, Strathmere, Avalon, Belmar, Manasquan, and Long Beach Island ("Situational Report # 4", 2012). Apart from the four counties, Hudson and Union Counties also issued mandatory evacuation for some flood zone areas such as Jersey City, Hoboken and Cranford. A voluntary evacuation was also issued by Cumberland and Salem County. Beginning on October 28, New Jersey counties that were under both mandatory as well as voluntary evacuations opened shelters for evacuees ("Situational Report #4", 2012).

As Sandy made landfall in New Jersey on October 29, communities in close proximity to the Atlantic Coast, Delaware Bay and Hudson River sustained the worst damage. In New Jersey, the major hazards due to the storm were damaging winds, high flood waters, falling trees, flying debris, downed power lines, gas leaks and fire. According to the New Jersey Governor's office "…approximately 346,000 housing units were damaged or destroyed in the state with 22,000 of those units being uninhabitable" (Blake et al., 2013, p.17). In addition to this, over 2.6 million (65 %) customers in New Jersey experienced power outage due to Hurricane Sandy (Mansfield & Linzey, 2013). Monmouth County experienced the longest power outage (an average of 10 days) followed by Somerset and Union Counties (an average of 9 days) and Ocean County (an average of 8 days) in the immediate aftermath of Sandy (Halpin, 2013, p.14). The power outages hampered day-to-day activities, cable services and telecommunication systems all over New Jersey further creating challenges for communication during and after Sandy. Furthermore, the storm also impacted almost all forms of transportation services such as toll roads, bridges and

tunnels, ferry system, airports and mass transit in New Jersey ("Situational Report #15", 2012) . According to the situational report (#15) provided by New Jersey State Emergency Operations Center on November 2, 2012, the Teterboro Airport, Essex County Airport, NJ Holland Tunnel, NY Waterway, NJ TRANSIT's rail lines operated only for limited day light hours due to power outage and/or damages aftermath of Sandy. As a result of the damage, President Obama issued a major disaster declaration on October 30th, declaring all 21 counties in New Jersey eligible for FEMA individual and public assistance (U.S. Department of Commerce, 2013). Table 3.1 presents a timeline of events associated with Hurricane Sandy, specifically noting the sequence of events pertaining emergency management-related activities.

Table 3.1

Timeline of Events Associated with 2012 Hurricane Sandy

Date	Event
Monday, October 22	Storm forms in Southwestern Caribbean Sea
Wednesday, October 24	Storm becomes a hurricane
	Sandy makes its first landfall in Jamaica as a Category 1 hurricane
Thursday, October 25	Sandy makes its second landfall in Cuba as a Category 3 hurricane and passes through Cuba as a Category 2 hurricane
Friday, October 26	Sandy weakens to a Category 1 hurricane and moves north over the Atlantic Ocean, parallel to the southeastern United States
Saturday, October 27	New Jersey Governor Chris Christie declares statewide state of emergency
	Atlantic, Cape May, Monmouth and Ocean Counties initiate the Governors mandatory evacuations of the barrier islands
Sunday, October 28	First Shelter opens in New Jersey
	President Obama signs emergency declaration for New Jersey

Table 3.1 (*continued*)

Date	Event
October 28 - October 29	Sandy intensifies to a post- tropical cyclone
Monday, October 29, At 7:30 PM	Sandy makes landfall in Brigantine, NJ as a post-tropical cyclone
Tuesday, October 30	The storm weakens as it moves west across southern Pennsylvania
	President Obama authorized major disaster declaration for New Jersey and New York
	FEMA begins Individual Assistance registration
Wednesday, October 31	The storm dissipates over western Pennsylvania
	Preliminary Damage Assessment for Individual Assistance & Public Assistance begins
Thursday, November 1	Winds and rains from the storm diminishes across the affected states
	FEMA begins Transitional Shelter Assistance Program
Friday, November 2	First Disaster Recovery Center opens

Source: Information taken from a variety of sources (including FEMA, New Jersey State Emergency Operations Center Situational Reports, NHC Tropical Cyclone Report for Hurricane Sandy and New Jersey Transit Corporation's Hurricane Sandy After Action Report)

Post-storm damage assessments showed the counties that experienced the greatest impacts of Hurricane Sandy in New Jersey were Monmouth, Ocean, Atlantic, Cape May, Hudson, Middlesex, Somerset and Bergen Counties. The northern portions of the Jersey Shore in Monmouth and Ocean counties experienced the highest water levels and were the hardest hit among the counties (Blake et al., 2013). In Ocean County, the impact of Sandy was worst in areas of Toms River, Long Beach Township, Seaside Heights, and Mantoloking. In Monmouth

County, Sea Bright and Union Beach suffered extensive damage. High storm surge and large waves from the Atlantic Ocean caused flooding and breaching in some areas of the barrier islands (Blake et al., 2013). Likewise Long Beach Island also experienced significant damage, along with other communities in Union Beach, Sea Bright, Jersey City, and Hoboken. Furthermore, Little Ferry and Moonachie in Bergen County were inundated resulting in significant property damage. Figure 3.3 presents the New Jersey towns that were most affected by Hurricane Sandy based on the damages to the structures. As indicated in the figure, Toms River in Ocean County was the most impacted town with total damaged structure above 7,000. Based on the damage to its structure, the second, third and fourth most impacted towns in New Jersey included Long Beach Township, Ocean City and Atlantic City. The impact of Sandy was further worsened by prolonged power outages, fuel shortage, inaccessible roads, and power lines in these areas (Halpin, 2013).

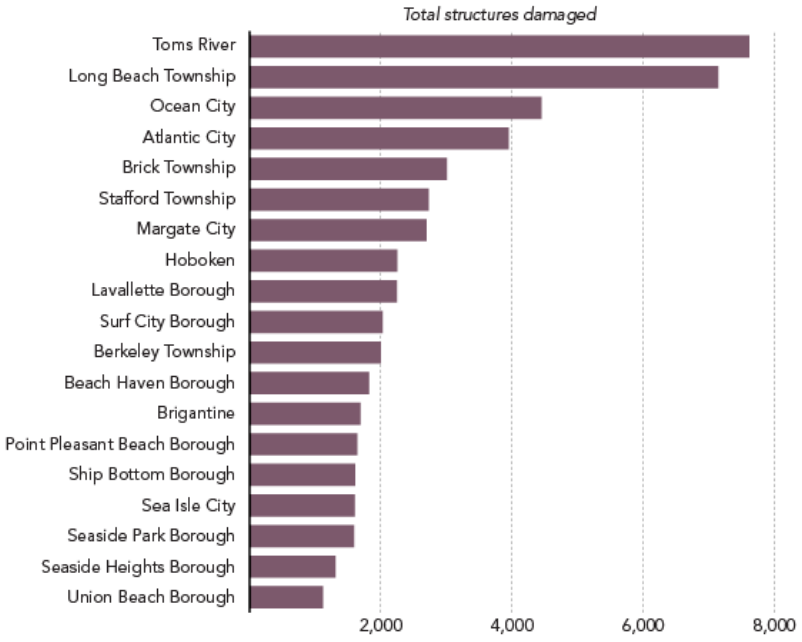

Figure 3.3 New Jersey towns most affected by Hurricane Sandy
Source: FEMA cited in Kirkham & Rudolf (2012)

Halpin (2013) examined the impact of Hurricane Sandy on various New Jersey counties and municipalities by utilizing the Community Hardship Index. The Community Hardship Index adopted in the study measured the economic and physical damage in the aftermath of Hurricane Sandy. This technique controls for population difference and specifically quantifies damage through examination of various elements such as power loss, residential, commercial and municipal damage, emergency shelters established, and gasoline shortage (Halpin, 2013, p.12). Halpin (2013) found that the top three counties that ranked highest on Community Hardship Index based on damages were Monmouth (1^{st}), Ocean (2^{nd}), and Somerset (3^{rd}). Likewise, the communities of Mantoloking (Ocean County), Moonachie (Bergen County) and Rumson (Monmouth County) were found to be the top three hardest hit municipalities based on the Community Hardship Index (Halpin, 2013).

Before, during and in the aftermath of Sandy, there were many evacuees that took shelter throughout New Jersey. As of November 2, 2012, there were 6,922 evacuees and 48 pets that were being cared for in 104 shelters in New Jersey ("Situational Report #15", 2012). In New Jersey, the reentry strategies after Sandy varied depending upon the extent of damage. These strategies fell into three categories– permanent, temporary, and staged. Communities that issued voluntary evacuations or experienced little damage had reentry within 24 hours of Sandy, whereas communities with severe damage restricted return-entry for extended periods (Hutchins, 2012). Moreover, some communities in the barrier islands were under lockdown and initiated curfew hours, whereas others opened entry for limited day-light-hours for weeks. For instance, Ortley Beach in Toms River Township restricted reentry of residents for more than two weeks and later initiated a staged return (Viscount, 2012). Long Beach Island on the other hand permitted a "grab and go" (temporary return) one week after Hurricane Sandy to enable its

residents to gather personal items and evaluate damages to their properties ("Hurricane Sandy update", 2012). The prolonged restrictions in accessing homes in some barrier island communities made residents furious and frustrated with government officials (Viscount, 2012). While the extended period of evacuation in some communities was due to significant damage to infrastructure and roads, in others it was due to the Governor's restrictions on the return-entry movement. Despite the request from emergency officials from counties such as Cape May to allow reentry on October 31 (Acampora, 2012); Governor Christie did not lift the mandatory evacuation order in the county until November 2, 2012, further extending the evacuation period ("Situation Report #15", 2012). All the municipalities and counties in New Jersey that experienced return-entry in the aftermath of Sandy were considered for this study. The data collection for the study is further discussed in the section below.

Data Collection

This study employs qualitative research methods to examine the return-entry risk communication process. There are two primary reasons as to why qualitative research techniques are employed in this study. First, qualitative approaches are useful to describe and explain the process involved in some aspects of social life (Phillips, Neal & Webb, 2012). In this dissertation, qualitative method helps to explain the communication process by which return-entry messages flows from the local emergency management organizations to the public in the aftermath of a disaster. Secondly, qualitative studies are useful to understand new areas of study that have not been well explored (Straus & Corbin, 1990). The examination of risk communication pertaining to return-entry is an under-studied area in the disaster research, specifically as it pertains to communication at the organizational level. The use of qualitative

methods expands understanding of this new research area. It also provides research flexibility by allowing a greater spontaneity and adaptation of the interaction between the researcher and the study participant which is also well suited for a post-disaster environment (Phillips et al., 2012). In this study, the use of semi-structured interviews and open ended questions provide flexibility in data collection, and allow for thoughtful and in-depth conversations with the participants.

Participant Recruitment

A purposive sampling strategy was used to target local emergency management organizations that managed the return movement following Hurricane Sandy. This technique enables the researcher to gain insights from relevant participants who have knowledge and experience pertaining to risk communication during the return-entry movement. The data for this study was collected through semi-structured telephone interviews with local emergency management personnel (or those in charge with managing the return) who served as informants for their respective emergency management organization. The term "informants", rather than "respondents" is used in this study because the emergency personnel provided insights into how their organizations functioned during the return-entry period, rather than providing descriptions of their own personal views and activities.

After acquiring approval of the recruitment documents and interview protocol by the University of North Texas Institutional Review Board on January 20, 2015 (IRB No: 14519), semi-structured telephone interviews were conducted with the emergency management personnel of the local municipalities (city, borough, towns, and townships) and counties. A list of potential participants with contact information (name, formal position, email and telephone number) was created by reviewing online directories and/or websites for the counties and municipalities, and

the most appropriate informants of the emergency management organization was identified for the telephone interview. For those organizations without detailed information on emergency management personnel, telephone calls were made to identify and recruit participants who were involved in managing return-entry movement in the aftermath of Hurricane Sandy. The telephone script used for recruiting participants is included in Appendix B. After identifying the informants for each of the participating local emergency management organizations, interview invitations (included in Appendix A) and informed consent notices were sent via email. After the verbal consent was obtained, semi-structured telephone interviews were conducted with the local emergency management personnel. The interviews were audio recorded and transcribed for data analysis.

Description of the Study Sample

The informants interviewed in this study work for local emergency management offices located in the following nine counties illustrated in Figure 3.4 (Atlantic, Bergen, Cape May, Essex, Middlesex, Monmouth, Morris, Ocean, and Somerset). Data collection was completed when theoretical saturation was attained and after no new themes emerged from the data. According to Charmaz (2008, p.167), "*theoretical saturation* occurs when gathering more data sheds no further light on the properties of a theoretical category". For this study, the theoretical saturation was reached after 25 interviews. Among the 25 informants, 4 were county emergency management personnel and the remaining 21 were municipal emergency management personnel.

Figure 3.4 Map showing the counties included in the study

The emergency management personnel interviewed for the study held professional titles including emergency management coordinator, deputy emergency management coordinator, and emergency management director for municipalities and counties in the state of New Jersey. The interviews almost exclusively covered emergency management organizations that experienced evacuation and return-entry processes, except for three interviews where the emergency management organizations did not experience return-entry movement. They nonetheless provided useful information on risk communication during Sandy. The telephone interviews were conducted over a four month period starting on February 5, 2015 and concluding on May 19, 2015. The interviews ranged approximately from 25 to 55 minutes long, and were audio

recorded in order to allow for transcription. The interviews included ten open ended questions that enquired about the Hurricane Sandy return-entry experiences, risk communication strategies, challenges, and solutions implemented. Following the Warning Components framework, the interview questions were divided into three categories; assessment, dissemination and public response. Additionally, questions also asked what information management strategies these organizations had used (based on TMIM model) and the different risk communication strategies. The interview questions are included as Appendix C.

Data Analysis Procedure

This study uses a deductive approach of grounded theory to analyze the data. Grounded theory was first introduced by Glaser and Strauss in 1967 in their book "The Discovery of Grounded Theory: Strategies for Qualitative Research". At present, there are two major perspectives on grounded theory, one provided by Glaser (1978, 1992) and the other furthered by Strauss and Corbin (1990, 1998). The grounded theory approach delineated by Glaser (1978, 1992) focuses on inductive analysis and theory generation. According to Glaser, grounded theory comprises of analytic processes where focus should be placed on the emergence of categories derived from the data. The concept of "emergence" is thus central to Glaser's version of grounded theory. Contrary, the approach outlined by Strauss and Corbin (1990, 1998) relies less on emergence than does Glaser's version, and is a more flexible view of grounded theory (Charmaz, 2008). The flexibility comes from the grounded theory proposed by Strauss and Corbin, as it allows for numerous ways to generate categories/themes, sub-categories and permits the identification of the relationship among them, rather than solely focusing on emergence of categories from the data. For example, according to Strauss and Corbin (1990, 1998) data

analysis involves interplay between researchers and the data, which is further influenced by various other factors such as the researcher's professional experience, professional exigencies, and previous ideas etc. (Strauss & Corbin, 1990, 1998, as summarized by Charmaz, 2006). This study adopts a variation (modified version) of grounded theory, in that, the study draws upon McLuckies' (1970) Warning Components Framework, and Afifi and Weiners' (2004) Theory of Motivated Information Management to guide the research in the development of the research and interview questions. The grounded theory used for this dissertation is similar to the one articulated by Charmaz (2006, 2008). She provides a constructivist grounded theory perspective, which is a revised version of the grounded theory delineated by Glaser and Strauss (1967) and Strauss and Corbin (1990, 1998). According to Charmaz (2006, p.10), "…the experiences shared by research participants are constructions of reality, and thus grounded theories are constructed through our past and present involvements and interaction with people, perspectives and research practices". The grounded theory proposed by Charmaz concentrates on flexible guidelines to collect and analyze data rather than on theory generation.

As discussed by Charmaz (2008, p. 163), "four grounded theory strategies – *coding*, *memo writing*, *theoretical sampling* and *theoretical saturation*" - are used in this study for data analysis. After data collection, the semi-structured telephone interviews were transcribed verbatim. The interview data was then coded in two phases – *initial* and *focused coding*. Firstly, *initial coding* was done by undertaking *line-by-line coding*, in which each line was named with a code. The initial codes formed were provisional, comparative, and grounded in the data further providing valuable insights on emergency management organizations risk communication activities. Since every line may not contain important information, *line-by-line coding* compels the researcher to remain open to the data and see nuances in it. The initial codes developed

through the *line-by-line coding* process were then examined by using a *constant comparative analysis*, whereby the data was compared within and across interviews in order to find similarities and differences. This is particularly important as it helps in *focused coding*. After completion of the *initial coding*, the second phase of coding -*focused coding* - was undertaken. "*Focused coding* involves using the most significant and/ or frequent earlier codes to sift through larger amounts of data" (Charmaz, 2006, p.57). Throughout the research process, analytic notes (memos) were written in order to provide a framework for exploring, checking, and developing ideas. Once the analytical categories were fully developed, those memos were used to conduct theoretical sorting, a process which seeks to determine the theoretical links between categories and their relationships. *Theoretical sampling*, which is a "method of sampling data for the development of a theoretical category" (Charmaz, 2008, p.166), was adopted for this study. *Theoretical sampling* helps the researcher to "create tentative interpretations, then return to the field and gather more data to check and refine their categories" (Charmaz, 2008, p.167). Finally, the data collection was guided by *theoretical saturation* of the data (i.e. saturation of the properties of a theoretical category). Once theoretical saturation was achieved, data collection was concluded.

The next chapter provides the results of the qualitative data analysis for the study.

CHAPTER 4

INFORMATION MANAGEMENT IN THE ASSESSMENT OF RISKS POST-EVENT

This chapter presents the findings pertaining to the information needs of local emergency management organizations in order to assess risks and develop the return-entry strategy for their community following Hurricane Sandy. Specifically, this objective aims to answer the following research questions: 1) What risks and hazards in the aftermath of an event do local emergency management organizations consider when creating a return-entry strategy?; 2) What sources do they rely upon for this information?; 3) What other information do they need in order to select and develop a return strategy? Analysis of the 25 interviews yielded five themes related to the information needs local emergency management organizations required in their assessment of risks in the aftermath of Hurricane Sandy. These five themes identified in the qualitative analysis are defined and presented in this chapter.

For this study, the data analysis yielded five themes – *information need*, *information source*, *information seeking behavior*, *information exchange*, and *applying information for return-entry decisions* – as directly relating to the information management activities in the assessment of risks post-event (illustrated in Figure 4.1 and defined in Table 4.1). The following sections present these five themes and include supporting quotes generated during the data analysis in order to provide a holistic perspective of information needs during the risk communication assessment phase.

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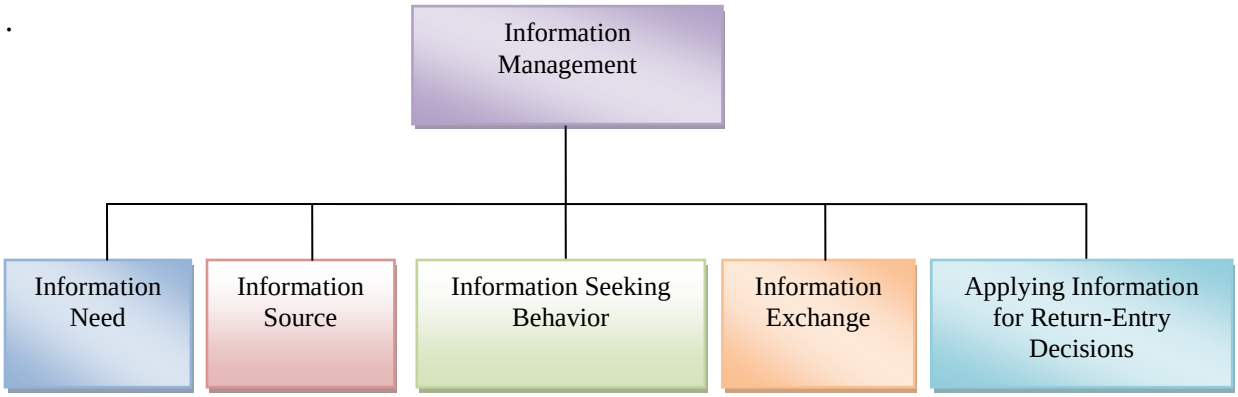

Figure 4.1 Information management themes

Table 4.1

Description of Information Management Themes

Themes	**Definition**	**Sub Themes/Examples**
Information Need	The information emergency management organizations require in order to assess the risks present in the impacted areas, to ensure the safety of evacuees, and to guide the creation and implementation of return-entry decisions.	Threat Information, Damage Information, Infrastructure and Public Utility Information
Information Source	The individuals, groups, organizations and other entities that provide disaster information to the local emergency management organizations.	Official Sources such as FEMA, NJOEM, EM staffs Unofficial Sources such as public, social media outlets
Information Seeking Behavior	The actions of the local emergency management organizations pertaining to information seeking activities.	Information Reliance Information Avoidance Information Verification
Information Exchange	The sharing of disaster information among various individuals, groups, organizations and the public.	Inter-Organizational Intra-Organizational Information Exchange with the Public
Applying Information for Return-Entry Decisions	The use of disaster information in order to guide return-entry decisions.	Applying disaster information to decide return-entry timings, location and strategies

Information Need

Disasters by nature create uncertainties about risks and safety (Reynolds & Seeger, 2005; Veil et al., 2008). In the context of return-entry, there is uncertainty related to the nature of risks in the aftermath of a disaster that returnees experience upon returning back to their homes. Since emergency management organizations have the primary responsibility to ensure the safety of evacuees (Federal Emergency Management Agency [FEMA], 2006), organizations seek information to reduce these uncertainties. Emergency management organizations thus gather information pertaining to post-disaster conditions to assess risks and to enhance the safety of the returnees. This information is further utilized in the formulation of return-entry strategies or plans. In this dissertation, "*Information Need*" refers to the information emergency management organizations require in order to assess the risks present in the impacted area, to ensure the safety of evacuees, and to guide the creation and implementation of return-entry decisions.

The data analysis suggests that local emergency management organizations primarily required information on post-disaster threats, damage, infrastructure and utility conditions, number of evacuees, and resources in order to develop the return-entry strategies aftermath of Hurricane Sandy.

Threat Information

The first information need identified in the data analysis pertains to information related to threats present in the community. During the Hurricane Sandy return-entry phase, both municipal and county emergency management organizations required information on post-disaster threats in order to develop return-entry strategies for their community. The post-disaster threats included primary as well as secondary hazards. "Primary hazards" are the threats that are directly related to the disaster; whereas secondary risks are the potential threats that occur due to the impact of

the disaster event" (Siebeneck, 2010, p. 43). In this study, informants indicated that many hazards were present in the aftermath of Hurricane Sandy. Four informants noted the following:

> We had massive-massive tree damage because during Hurricane Sandy we had extremely high winds, much higher winds than we had probably in the last ten years. So as a result of that, any tree out there, that was delisted or dried out or whatever, came down. And we literally had tens and thousands of trees down all over the place. They blasted up the utility poles, they blocked the roadways, and they fell on houses. (Municipality #18)

> …we had a lot of power lines down and a lot of trees were down. So a lot of the main primary roads into the residential area were blocked. That took about a day and half or so to clear. And then basically once we had an idea that that was pretty much well now safe, even though there still had to be a lot of restoration. We didn't have power in the area for about 14 days. (Municipality #6)

> The only actual hazard that we had was we had a bunch of trees that were down. Power was out so what was happening was our major hazard was every time the power company was trying to turn the power back on, they didn't know which lines were live and which ones weren't . We actually started getting some lines that would start to sparkle. We had some fire calls because of the lines and trees. That was our immediate hazards - trees down and wires down. (Municipality # 16)

> We had sanitary issues with sewage. We had buildings that were compromised and weakened. We had no utilities, no power, no electricity. The schools were closed. We had downed trees and downed power lines. We had roads blocked. (Municipality #12)

During Hurricane Sandy the primary hazards reported by the local emergency management organizations included flooding, fire, and gas leaks. Similarly, downed power lines, falling trees, damaged structures, and contaminated water were some secondary risks mentioned by local emergency management organizations aftermath of Sandy. In referencing to the need for post-disaster threat information in order to asses risks in the development of reentry strategies, two informants from municipal emergency management organizations said:

> We had a lot of natural gas leaks up in the town all over. So we wanted to make sure that the gas situation was fixed. And we actually finally turned all the gas off for the whole island. So that was fine. But then the power was also turned off, again no power and no gas. So before the power could be turned back on, the gas

> had to be worked out. And it took basically a little bit of time. It took about 2 or 3 days to get that work. And then the power came up and there was still no natural gas for people for heat. But we did allow people back on with that and so the gas and the heat. And then the debris in the roadway was the other thing. In some areas the roads were full of sand and other debris. And so we had to make sure that the roads were passable. (Municipality #2)

> And in a lot of cases the homes in that area…the electric meters were very low. So a lot of the meters were under water. It all had to be inspected and replaced before you could return to your home. (Municipality # 5)

According to these informants gas leaks and downed power lines were the main hazard that had to be addressed prior to allowing return-entry movement. As gathered through the interviews, this threat information was received from the public, law enforcement, public works department and from utility companies. The need for threat information was also mentioned by the county emergency management organizations. One informant described:

> The county OEM coordinator will work with the municipal OEM coordinators based on damage, threats; you know what dangers there are. I know that one or two towns in the northern part of the county had major flooding and there were electric lines that were down for about a day… two days. There were gas leaks that were continuous in various residences. So those two towns actually would have been held off from any reentry. (County # 1)

For this county that had a mandatory evacuation during Sandy, the nature of the threat was an important factor for the selection of return-entry strategies. According to this informant, if the threats were considered significant, return-entry would be delayed by local emergency management organizations. This also suggests that identification of threats required information related to risks and hazards aftermath of Hurricane Sandy. This informant stated that the threat information was primarily received through damage assessment teams. However some informants also hinted that threat information was crucial even before any post-disaster activities could be undertaken. According to the

informants, threat information was important to ensure the safety of both the management as well as the evacuees. As stated by three informants:

> As soon as the sun comes out and it's safe to get people on the road, we had strike teams developed to clear roadways for our public works crews and our damage assessment crews, so that they could go in and evaluate the situation. You know they make determination on what needs to be done before we can begin the reentry. (County #4)

> We need time to go down there, assess the situation and see whether it's safe for anyone…residents, media to go in there. (Municipality #5)

> You know most of the towns worked hard because you know electrical power was shut. Making sure that they could get you know…electrical engineers and electrical contractors to go make sure the electric was safe. And that was usually the biggest problem once stuff gets flooded. So they were checking numerous homes. (County # 2)

Damage Information

Informants also suggested damage information was another priority in terms of information needs that the local emergency management organizations required for their post-event risk assessment. According to the data analysis, the municipal emergency management organizations were looking for information on damages to homes, buildings, transportation and utility infrastructure in order to assess risks and safety of their evacuees. The county emergency management organizations also sought damage information from the municipalities within their county in order to be acquainted with the situation. Before the return-entry process could be initiated, local emergency management organizations required information about any damages sustained to infrastructure such as roads, bridges, power stations. When asked about what information they required to develop their return-entry strategies, two informants said the following:

> Well, the information…the initial part of reentry is to do a complete survey of damage and infrastructure within our town to determine whether we have a severe

> damage, a severe loss of utilities. You know power lines down, safety issues to make sure that our police, fire, emergency, medical technicians and basic infrastructure…water, sewage etc is intact. And if it is intact and if there is no safety issues moving forward then we would consider reentry. (Municipality #17)

> Well, it all depended on the amount of damage they had. And what area of the township they were in. We had people that were right on the let's say the beach front and had severe damage and were not allowed in for a long period of time. Other people were able to clean up and move back in within a day or two. (Municipality #5)

In addition to return-entry decision making, one informant indicated the need for damage information in order to notify the residents about the condition of their property. As described by this informant:

> You know part of that too is before we can even initiate the reentry plan we tried to identify which areas were impacted- severely impacted, moderately or not impacted at all, just to keep the residents minds in ease or to give them some idea on what they would be coming home to.(County #4)

According to this informant, who belonged to a county that sustained varying degrees of damage due to Hurricane Sandy, damage information was provided to the evacuated residents in order to allow them to anticipate the condition of their property prior to returning back to the evacuation zones. This allowed returning residents to prepare for hazards associated with retuning home and take any necessary precautions to prevent injury or loss of life when returning home.

Infrastructure and Public Utility Information

Local emergency management organizations also indicated the need for information on critical infrastructure and public utility conditions in order to develop return-entry strategy for their community. Specifically, organizations needed to know if the infrastructure and utilities were operational following the disaster event. In cases where infrastructure and utilities were not

operational, organizations looked for information on the timeline for restoration of these services. According to the informants, organizations required information on the status of transportation infrastructure and public utilities such as water, gas and electricity in the evacuation zone. This information was important because without the availability of transportation and utility services, evacuees could not return to their homes. As explained by an informant:

> …in certain areas where the electric meters or you know utility services were disconnected, obviously people would not be able to…they could go back to their homes just to check for damage but…(County #3)

One informant from a municipality that experienced an extended power outage that lasted for several weeks discussed the importance of utility restoration prior to return-entry of the evacuees. According to the informant, the proper functioning of utility services was essential in order to facilitate the daily routine of the evacuees. Being specific to electric utilities, this informant noted:

> But we were also looking to bring in the insurance adjusters and surveying teams and whatever else was needed to make the town safe because without the power nobody really had heat or anything in their homes. So it was difficult for people to stick around in their house because it was cold. We had Nor'easter that followed in a couple of days later. So it was a difficult time to do it. (Municipality # 6)

In areas where power was out, interviewees suggested that having a timeline for power restoration was important. This information was not only needed for the development of return-entry strategy, but it was also vital when addressing any questions the public had related to power outages in their areas. Local organizations sought this information from power companies. However getting this information was in itself a challenge for the organizations. As explained by one informant:

> …primarily information was the delivery of information from the utilities, specially the electric utility to the borough. Because the people in this town were

> clamoring for information about "when they would have their electricity restored?" And we were not getting timely information from the local electric utility. (Municipality #20)

Other Information

Besides information on threats, damages, and public utility and infrastructure conditions, county emergency management organizations specifically mentioned the need for information on 1) the number of evacuees and 2) the resource needs of the municipalities. County informants mentioned that this information was vital in order to provide assistance to municipal emergency management organizations prior to the return-entry movement. For instance, before return-entry could be initiated, it was crucial to conduct damage assessments of the evacuation area and clear the road ways of hazards such as downed power lines, falling trees and debris that could subject evacuees to risks while returning back to their homes. Hence, identifying the resource needs of municipalities allowed counties to provide necessary assistance to the municipalities in order to successfully conduct post-disaster activities. As implied by three informants from county emergency management organization:

> We actually kept requesting all [X number] of our municipalities to keep us abreast with what's going on. You know what infrastructure was damaged, how many people were being sheltered, what supplies are being needed. You know any help…you know all that stuff. That was constantly ongoing. We kept our EOC running for almost three and half weeks. (County #2)

> We try to require them [municipalities] to give us a preliminary damage assessment immediately after the storm. And if they have substantial damage, then we will go in. And if they need resources for example we got the state urban search and rescue teams, task force that we can call on if they need help. We can bring in building inspectors, fire inspectors, from other towns. You know we get into the county if they ask for resources. (County #1)

As suggested by the informants, damage, number of evacuees, and resource needs information were used to determine the allocation of resources and the potential needs of the

municipalities. In cases where municipalities struggled with resources, county emergency management organizations supplemented their needs by providing staffing, equipments and other resources.

Information Source

Local emergency management organizations depend on various individuals, groups and organizations such as local, state, and national agencies, first responders, damage assessment teams, non-governmental organizations, and utility companies to receive post-event disaster information. These organizations act as the information sources for the local emergency management organizations. In this study, "*Information Source*" refers to the individuals, groups, organizations and other entities that provide disaster information to the local emergency management organizations. These information sources vary in the nature of information they provide to the local emergency management organizations. For example, first responders such as law enforcement officers provide information on injuries and damages whereas; utility companies provide information on utility operations and utility restorations. Currently, apart from traditional sources of information, the public is also emerging as an active information source as citizen journalists through the application of social media outlets (Pechta, Brandenburg & Seeger, 2010; Sutton et al., 2008). The data analysis indicates that local emergency management organizations received information from both official as well as unofficial sources. These sources further varied in the nature of information they provided to the local emergency management organizations.

Official Sources

Official sources are defined as individuals, groups and organizations that have authority and expertise related to hazards and disasters. During the Hurricane Sandy return-entry phase, the official sources that provided information to the local emergency management organizations include federal and state organizations such as the National Weather Service (NWS), the Federal Emergency Management Agency (FEMA) and the New Jersey Office of Emergency Management (NJOEM). Information was also received from experts working in the county and the municipal organizations such as municipal engineers, building inspectors, damage assessment teams, law enforcement personnel, and health officials. As explained by three informants:

> The damage assessments come from the local OEM coordinators. And we also had a damage assessment task force that we assembled at the county which included FEMA, NJOEM and local officials, you know building code officials and public safety officials and emergency management officials that went to the areas that were the hardest hit by the storm to make preliminary damage assessments. (County #3)

> I get most of my information about weather emergencies from variety of sources. One is the National Weather Service. The other is….the State of New Jersey Office of Emergency Management sends out bulletins. And those are my primary sources. (Municipality #20)

> … there was some information given from FEMA.. (Municipality #3)

For the county emergency management organizations, the major information sources consulted, included the Federal Emergency Management Agency, the New Jersey Office of Emergency Management, other counties, and municipal emergency management organizations. Similar to counties, some of the information sources for municipal emergency management organizations were FEMA, the New Jersey OEM, the National Weather Services, and their county's office of emergency management. Apart from these sources, emergency management

organizations also received information from utilities, local officials, media and the public. As stated by five informants:

> During the whole response phase of the storm, from landfall and immediately after, we had our municipalities reporting damages that they were identifying as they occur. We also have our utility representatives in EOC, the gas company, electric company. Those providers so as they are getting reports of damages to their infrastructure we were made aware of them. (County #4)

> Outside of that, the only inter-county other information we are in contact with would be the utility companies, and that includes our local electric utility which is [Company A]. And we got a representative from their organization sitting right here in my EOC, the water utilities which is [Company B] and [Gas Company C]. All the three utilities are represented here. (County #1)

> Well we had our three utility. We had our [electric company]. I had constant contact with them on where they would be turning on the electric. The water company came in with a giant map and every day they would highlight exactly where they were turning on the water. And then the gas company they were in constant communication via email with me. And then anything that came down from the state OEM, the county OEM would send to me personally. (Municipality #14)

> All the primary hazard information came from [County A] Emergency Operation Center, through…actually from the state through the county, and then down to the local emergency managers. And it may sound like a long involvement process but it's actually not, it's pretty quick. (Municipality #21)

> Some [information] was through public. Some [information] was through law enforcement that was out in the road working and everything. And then we had to meet with the gas company and the electric company. And then the local road departments for the local town… the public works department. They also knew about the debris on the roads and so forth. (Municipality #2)

According to McLuckie (1970), during and aftermath of disasters, emergency management organizations are in contact with their own staff and other departments, such as police, fire, public works departments for gathering information. The data analysis indicates that during the Hurricane Sandy reentry phase, municipalities received information from first responders such as fire and law enforcement personnel. In addition to the first responders, the public works department, the health department, and damage assessment teams also provided

information to the municipal emergency management organizations. As mentioned by three informants:

> [Information received] Just from phone calls from first response agencies out in the field, from the police out in the field, from the fire you know and periodic damage assessment teams going on, you know evaluating the situation. (Municipality #9)

> …..all the information that was coming into our office was either from the fire department or from the police department. (Municipality #16)

> That information [information on road closure, injuries and other post-disaster situation] comes to our emergency operation center from the police department and the fire department. They would either telephone the information to me or I would get it by monitoring their radio frequencies. (Municipality #20)

The above excerpts illustrate that first responders provided preliminary information on damages and casualties to the municipalities through telecommunications and radio operations. Moreover, the municipal emergency management organizations also received information on property damage and infrastructure conditions through emergency management teams and damage assessment crews on the ground. Several informants said the following:

> Well, we basically conducted a field survey immediately after the storm. So we knew exactly what areas were damaged and what areas were unsafe. So we kind of knew that just via by visual survey. (Municipality #1)

> Well, pretty much we need to do… let's say a windshield survey of the areas. And we list both what we can see visually on a drive by as most severely damaged properties. (Municipality #5)

> …the town engineers went out after they were able to get out. They were the ones that checked the roads…the infrastructure. (Municipality #8)

> We had a team put together…engineers again videotaping, taking things, helicopter flyovers. We did all that documentation. We also had our engineers go in and make up a map of which houses were gone and which houses were damaged. And they did the assessment and just provided to us. (Municipality # 10)

> On site, we would go out and do our own surveys. So it was basically what we see and what we observed. You know we have obviously small area, [X square miles]

> and I would have to say that our area that was affected was obviously close line or bay front areas which is…our population in that area is somewhat around [Y thousand people] or [Y thousand homes] I should say. So pretty easy to get handle on things to see where and how we should allow people back in. (Municipality #15)

> Well, we would drive around to see what the situation was personally and do our own surveying. That was the quickest and easiest thing to do. So, we did preliminary damage assessment that's what we refer to it as...we go out see how bad it was, see where the trees were down, where power lines were down. (Municipality #6)

The above excerpts illustrate that damage assessment processes conducted by municipal emergency management organizations varied widely, ranging from visual windshield observations to detailed field surveys and inspections by town engineers and building inspectors. Some informants mentioned that damage assessments were conducted, as it was the easiest and quickest way to get information. For instance, informants noted that by simply driving around the disaster area, they were able to gather preliminary damage information related to infrastructure and properties. This enabled organizations to determine the extent of damage in their community and subsequently guide the return-entry decision. For some municipalities, damage assessment was the only way to gather information related to the disaster zone. As noted by one informant:

> Well, field visit really is the only way you can get your information. You need to physically go there to see what happened in a particular area and see what damage was done to properties. (Municipality #5)

For this municipality that had a mandatory evacuation during Hurricane Sandy, damage assessment was the only way to gather post-disaster information required for the development of return-entry strategies. This was mainly because the municipality was severely damaged along the coast, and thus information collection through any other sources such as first responders, media or the public was impossible because the area was closed off for safety reasons.

Unofficial Sources

Although local authorities mainly seek information from official sources, unofficial sources are also important for information gathering. Unofficial information sources are defined as sources that lack expertise and authority pertaining to hazards and disaster. Unofficial sources include the public, social media outlets, and other non-governmental sources. When asked about information received through the public, the local emergency management organizations varied in their responses. Some counties and municipalities received information from the public while others did not. In reference to information gathered from public, three informants mentioned the following:

> Residents were posting on Facebook trees that were down blocking roads, electric wires that had fallen into the road, and trees that had fallen into homes, electric outages throughout the town. They were very good about it. And they were also posting when these situations were resolved. So if the public utility turned the electricity back on an area town somebody would post that on Facebook. (Municipality #20)

> …there were some people who reported things to us through social media also if they found there were problems. (Municipality #2)

> Let's say a tree came down and brought down electrical wiring. We could receive as many as 12-15 calls for the same incident. People reporting that the wires were down; their power was out so on and so forth. (Municipality #13)

As stated in the excerpts, many municipalities received information on damages, power outages, and situational updates from the public through phone calls and social media outlets. However, the data analysis further suggests that information from the public was hindered due to evacuation. For example, some municipal emergency management organizations did not receive information from the public because the public had evacuated from the disaster zone. In reference to evacuation and information from the public, three informants said the following:

> The public wasn't permitted into these areas. So the only way to get the information was from touring them ourselves. (Municipality #1)
>
> … the public wasn't even over there at that point. So, most of it came from our engineering staffs who surveyed it before the public were even back over the barrier islands. (Municipality #10)
>
> I would say all of our information for the reentry came strictly through our own observations and patrols….. That's because people had left. (Municipality #15)

The interview data further indicated that, for these municipalities, the inaccessibility of the public to the evacuation zone made the public an active "information seeker" rather than an "information provider". In alluding to public as "information seeker" four informants expressed the following:

> We weren't getting information on the disaster area from the evacuees, no, because they weren't there. The ones that were there we weren't listening information from. We were getting questions coming in from evacuees regarding reentry, but not getting information from them about the disaster zone. (Municipality #1)
>
> We give information to the social media rather than get it from them. I mean as I said, in some cases where we were severely damaged along the coast, those areas were closed off to the public and social media. (Municipality #5)
>
> We were pretty active from our town on social media. So that we put out…we actually gave out a lot of information to residents as far as the conditions of properties and so forth. (Municipality #2)
>
> …people came to borough hall looking for assistance. (Municipality #8)

Informants also indicated that the public was mainly looking for information on damage to their property and the reentry procedure. In order to get this information they were contacting the emergency management organizations through face-tot-face interaction, telephone, and social media.

Information Seeking Behavior

During the Hurricane Sandy return-entry phase, while many emergency management organizations were optimistic toward information received from all types of sources, there were also some counties and municipalities that were strategically seeking information from some sources, while neglecting others. "*Information Seeking Behavior*" is thus one of the themes under information management strategies of local emergency management organizations. In this dissertation, "*Information Seeking Behavior*" refers to the actions of the local emergency management organizations pertaining to information seeking activities. The data analysis suggested three distinct information seeking behaviors – *information reliance*, *information avoidance,* and *information verification* - pertaining to the return-entry risk communication process.

Information Reliance

According to McLuckie (1970), while searching for information, responsible organizations determine the reliability of information sources. The phone interviews also suggested "information reliance" as one aspect related to information seeking behavior. "*Information Reliance*", in this study, is defined as the dependence or the trust of the local emergency management organizations on the information received from other sources. The county and municipal emergency management organizations relied more on the official sources of information rather than other sources such as mass media, public and social media. The official sources of information comprised of information received through government sources such as state, county and local officials. For example, two informants said:

> We get our information directly from National Weather Service and the National Hurricane Center, and that's what we transmit out. (County #1)

> I mean from the government sources, the public works crews, the damage assessment teams that we put out on the fields, the information was very reliable and as well as our partners from any utilities. There was a lot of speculations and calling on social media about the amount of damage. So a lot of the larger things that we were seeing on social media were mostly unfounded. (County #4)

As suggested by these informants, the local emergency management organizations considered the information received from the official sources to be very reliable and thus depended on these sources to gather information following Sandy. On the contrary, the local emergency management organizations found the information coming from the public, specifically through social media, as deceiving and inaccurate.

Information Avoidance

Some municipalities and counties viewed information coming from the public, and more specifically information received via social media, as unreliable. During the Hurricane Sandy return-entry phase, this perceived unreliability of information resulted in unwillingness of some local emergency management agencies to seek information from the public and mass media, further resulting in "information avoidance" behavior. For this dissertation, "*Information Avoidance*" refers to the local emergency management organizations' act of avoiding information received from certain sources. The avoidance to social media, for example, is clearly indicated in the statements below:

> I don't really listen to social media. I receive….I base my decisions on hard facts and those facts come from my county emergency management office as well as verified weather and flood information. (Municipality #17)

> I didn't receive any information via social media in Sandy. I think [information received via social media]…not very credible or somewhat credible but not credible enough for me to take action. (Municipality #17)

> We don't listen to The Weather Channel. We don't listen to the weather on the ground. We don't listen to all the amateurs that are sitting out there. (County #1)

Several local emergency management organizations describe credibility as one of the factors that resulted in information avoidance from social media. According to one informant, the anonymity of the information provider in social media outlets such as Facebook and Twitter makes the information less credible. As stated by this informant:

> I don't put any faith or trust in social media. I don't know where the information is coming from. Like you could have some knucklehead writing you know like… We had this happen in the past, where people putting on Facebook or putting on Twitter or whatever, "it's great down here, come on down, everything is fine," and it's not. Or the other way round "it's not fine" and it is. So as a result I don't put faith in that. (Municipality #17)

Information Verification

"*Information Verification*" is another subtheme under information seeking behavior. In this study, "*Information Verification*" refers to the local emergency management organizations' act of verifying the information received from information sources. While some emergency management organizations completely ignored information from social media, there were other organizations that utilized information received from social media, but only after verifying it. In reference to information verification, three informants said the following:

> …..I would not act on information on social media unless I verified it independently. So for example, if somebody on social media told me that there was a tree down in the middle of the road. I wouldn't report it as a fact. But I would send a police car out to check the situation. (Municipality #20)

> We do monitor social media. You know obviously the media is a big help to us as well. What we do as we do receive those reports is we have them field check verified by the people that are actually in the field. So we are not making decisions just strictly based on information received through social media. (County #4)

> Any time the stuff that was coming in through Facebook accounts, even though our county at that time did not have Twitter or Facebook accounts, several people that were working here had accounts. So anytime they heard anything, they would check it out and we would make sure the information was coming in, and then going out. (County #2)

As stated in the quotes above, some county and municipal emergency management organizations were monitoring social media during the Hurricane Sandy return-entry phase. The local emergency management organizations utilized information only after verifying it. For instance, after receiving reports of damage or injuries on social media, some organizations sent emergency management crews or staffs to check the situation in the field. Thus information was verified by the local emergency management organizations in order to dispel rumors and to ensure that the organization is utilizing and disseminating accurate information. As noted by one informant:

> …that [information received from social media] was one of the things that we always worry about…the social media gets things wrong. So we were trying to make sure that the right information to get out. (County #2)

Information Exchange

Information exchange is important for monitoring and updating disaster situation (Comfort & Haase, 2006). "*Information Exchange*" is one of the themes that emerged from the qualitative data analysis. For this dissertation, "*Information Exchange*" refers to the sharing of disaster information among various individuals, groups, organizations and the public. The interview transcripts indicated a wide range of information exchange between local, state and federal levels of government. Additionally, there was also information exchange between the local emergency management organizations and the public. The information exchange theme can be categorized under three subthemes – *inter-organizational information exchange, intra-organizational information exchange,* and *information exchange with the public*.

Inter-Organizational Information Exchange

"*Inter-Organizational Information Exchange*" simply means the exchange of information between organizations. In the immediate aftermath of a disaster, local emergency management organizations gather information from various sources in order to develop return-entry strategies (As discussed under *Information Source*). Similarly, local emergency management organizations also provide situational updates and other information to utility companies, mass media, and state and federal organizations. Local emergency management organizations are therefore involved in inter-organizational information exchange during and after a disaster. This type of information exchange occurs through various means such as face-to-face, telephone, emails, and technologies such as 800 megahertz radios, computer database systems etc. In the context of this study, the findings indicate that there was extensive information exchange among the local emergency management organizations and other organizations. As stated by three informants:

> Each municipal coordinator has his team, and they are gonna go through the damage assessments and they report back to us [county]. And we pass that information onto the state headquarters. (County #1)

> We allowed the emergency managers the next morning to give us a report. If they had no damage we wanted to allow the people back to those towns. (County #1)

> Whether it was email, telephone calls, we actually had daily calls to the mayors from our free holding board, to make sure that the mayors knew everything that was going on too. So nobody was out of loop. So it was actually…we worked with all, even the mayors and their business administrators through one daily phone call, or I worked through all my local emergency management coordinators which actually got out to all the emergency services you know fire, EMS and police. (County #2)

> We coordinate with the county on an hourly basis, or you know couple of hours. But we were always putting updates in there. And there is an electronic or web application called E Team that we can update our situation status reports and resource request through. (Municipality #9)

According to the excerpts, there was frequent information exchange between county and municipal emergency management organizations during the Hurricane Sandy return-entry phase. Municipalities utilized various means such as teleconferencing, emails, and electronic web application such as E Team to report damage information to the county. The information thus received by the county was further being forwarded to the New Jersey Office of Emergency Management. Similarly, at the municipal level, there was also information exchange with other municipal emergency management organizations. For example, different towns that were located near each other communicated frequently and exchanged information. This type of information exchange occurred through various means such as emails, telephone conversations and face-to face meetings. For instance, three informants mentioned the following:

> We met with [Town A, Town B and Town C]. Those are the three towns that surround us and we all were on the same page. And then we were all in constant communication working together……if there was any kind of issues or you know another town needed some kind of equipment or you know supplies or what not that we had or vice versa, then there was constant communications through that. But prior to that we had multiple meetings … so we were all in the same page on what we were going to do with evacuation and what we were going to do you know ahead of time. So everybody in the three towns were on...you know...the same page that we all did the same thing. (Municipality #14)

> We had our representatives –mayors and public information officers and law enforcements in those meetings, so we could square things away. But the general information, we were trying to operate with one voice …we would put everything up on [webpage C]. And then they get through [Town B's] Twitter and Nixle accounts and things like that. I mean we mirrored a lot of it, I mean it went out on their account, went out on our accounts. But it was all centralized; it all came from one point of the island. (Municipality #21)

> ……when 5 out of the 6 towns that will rely on your communication, then that's when at 8 am....7 am probably those reps meet in the morning from each town. At 4 pm we meet so we had basically what are the issues of the day, what are we gonna do, what our needs are. End of the day 4 o'clock and that certainly wasn't the end of the day but it was another meeting time. It was a matter of okay where should we be tomorrow, what have we accomplished today. (Municipality #4)

Municipalities exchanged information related to resources such as equipment, staff and supplies. Some municipalities participated in joint meetings to share information and to come up with joint decisions related to evacuation and return-entry. Besides government organizations, there was also information exchange between the local emergency management organizations and the private sector entities such as utility companies and mass media. This type of information exchange is clearly indicated in the following statement by three informants:

> In this area we worked very closely with all the utility companies – [Company A], Gas Company, Water Company. And we go back and forth with information. So there is a constant information feed from all the utilities companies in time of a major emergency. (Municipality #5)

> I was in constant contact with our power and light company to try to…you know find out and work with them to get our most serious locations back on power first. You know our gas stations and our major food stores and things like that. So I was working with them to try to get that done. (Municipality #18)

> We held press conferences for the media like about probably every four hours, before the storm and just after the storm. (County #1)

For emergency management organizations, the information exchange between utility company and mass media was important mainly for two reasons. First, it was important for organizations to comprehend disaster condition. For example, in order for return to occur it was crucial to ensure power and other utilities were functioning. Constant communication with the utility companies helped counties and municipalities to know when the utilities such as power, water and gas would be available in the evacuation zones. Second, information was needed to notify and update evacuees about the ongoing situation. Evacuees frequently contacted the organizations to get information related to their property and utility conditions. The information received about the utilities, damage and other post-disaster situation was continuously provided to the media through press releases and social media in order to disseminate it to the public.

Although most of the local emergency management organizations reported frequent information exchange with other organizations, there were also some municipal and county organizations that complained about lack of information from higher authorities mainly the state organizations, and from the power companies. In referencing the lack of information flow from electric utility, two informants noted:

> The major-major frustration I had was with the power company. They were just absolutely terrible, they were in total chaos. They couldn't provide any information. (Municipality #15)

> They [Power Company] didn't provide immediate answers to you know town specific questions. Just kept telling people you know "we are working on that" and people in that area said, "Okay I know...we get it, we are just looking for something concrete". You know we have [X number of] workers at substation A and we are hoping to have that next one come online. And eventually I think they [Power Company] got there near the end of the process but in the first week it was rather chaotic. (Municipality #19)

As described by these informants, the municipalities struggled to get information from power companies. Informants complained that the power companies were unable to provide detail information in a timely manner to the local emergency management organizations. Similarly, some informants also indicated delay in response from the higher authorities. For instance, one informant indicated:

> If we made a request to them [state organization], they had to shift it up to their higher command, and it would take hours for a response. So there was a huge disconnect in how quick we could get things accomplished because of the layers of structure above them that they had to get through before it came down. (Municipality #6)

According to this informant, the information flow was impacted by the organizational chain of command. Municipalities had to wait for long period of time to get response from the higher authorities. This delay in response also impacted the post-disaster activities of the local emergency management organizations aftermath of Sandy.

Intra-Organizational Information Exchange

The second subtheme under information exchange is "*Intra-Organizational Information Exchange*". This type of information exchange occurs when information is shared within an organization. According to the data analysis, during the Hurricane Sandy return-entry phase there was frequent information exchange within the local emergency management organization. For example, following the storm, meetings and face-to-face interactions were conducted among emergency officials within the organizations to understand the damage situation and status of utilities. These meetings allowed officials to formulate strategies to overcome challenges and to bring disaster area back to normal conditions. As indicated by two informants:

> And by the second day we had set up a system in the township where every morning at 10 o' clock I would meet with all the department heads that would be the police chief, the fire chief, the first aid squad, the township administrator, the school superintendent. Everybody in town that's on my staff, I would call them at 10 o'clock in the morning. And we would have a briefing. And at that briefing we would discuss what we accomplished the day before, what we have hoped to accomplish from here on or what was still left to accomplish, and what we plan to get done for that day. (Municipality #18)

> ….we would have like a little briefing of you know what was going on. And the police department … we worked together in the mobile command. So I knew you know we had different troopers from different areas helping us for security, so they would check in with me and we would know how many officers, and such…what kind of equipment we had in town at all time. (Municipality #14)

The above excerpts suggest that information exchange with staff and other emergency response departments enabled the local emergency management organizations to understand the resource distribution in various areas following Sandy. This was crucial to identify any resource needs required to initiate return-entry movement. Similarly, information sharing also helped different emergency service functions (ESFs) to gather information in order to complete their respective tasks in the aftermath of Sandy. For

example, the information received from the emergency management officials guided the police departments' activities related to public safety and security of the evacuated areas. As mentioned by one informant:

> You know in consultation with emergency management...you know to decide when the areas were okay for people to come back in. In other words, we had demands to check in the neighborhoods, and once we saw flooding was down, debris was cleared off the streets, power lines were pulled off the roads, any debris was removed, we then notified emergency management and they made the decisions. (Municipality #8)

According to this informant, who served as a deputy emergency management coordinator as well as the police chief for the same municipality, information exchange guided the actions of both the emergency management and the police department. The emergency management officials depended upon the police department to assess the safety of the disaster areas. Likewise, the information pertaining to risks gathered by the police department was provided to the emergency management officials in order to make return-entry decisions following Sandy.

Information Exchange with the Public

The data analysis also reveals information exchange occurred between the public and the local emergency management organizations. Both the public and the local emergency management organizations shared information related to damages, post-disaster situation and utility services. In alluding to information sharing with the public, four municipal informants suggested:

> …we also drew up like a progress kind of report everyday if something was you know final we would post it over in our fire station. And everybody in town knew to check in over there and you know take a look at what's new for the day. Like I said, we did also have council meetings that our residents you know if they needed to voice their opinion, they would come to the council meetings and then we took care of any problems that arose. (Municipality #14)

> …..at 2 o'clock we had a public meeting. We got the word out to all in our town. There's about [Y number of residents] in our town. So we got the word out to all of our residents. And every day at 2 o'clock in the afternoon at town hall we would have an update meeting for the people. And I was really surprised because these meetings went extremely well. (Municipality #18)

> We also had a call-in telephone number the residents could call us. But a lot of our evacuees were in our regional shelter and I would brief them at least twice probably more but at least twice a day. I would brief them on what we found, what was going on, what our plans were, when reentry was gonna be possible. (Municipality #15)

> We also had people calling borough hall and calling our staff, and our staff was verbally telling them on the phone what the situation was. (Municipality #17)

As stated in the statements above, the emergency management organizations held meetings and information briefing sessions to provide information to the public. Additionally, the public also contacted the local emergency management organizations for general inquires about post-disaster situation, reentry information, and for other assistance. Similarly, as discussed under *Information Source*, the public were also sharing information with the local emergency management organizations by reporting damage, injuries, utility and other post-disaster situations.

Applying Information for Return-Entry Decisions

Simply gathering information is insufficient to manage emergencies and disasters. Organizations should utilize information to comprehend the disaster situation and to guide future actions (McLuckie, 1970; Quarantelli, 1990). The data analysis indicates that counties and municipalities utilized information pertaining to the hazard threats, damage, and utilities to assess post-disaster situation and to make return-entry decisions. This information ultimately influenced the timing and location of the return, and the selection of return-entry strategies and

procedures. For example, in alluding to use of threat information on return-entry timing and return decision, two informants said the following:

> And the reentry again, before you could reenter, you know we were really thinking again safety-safety-safety, preservation of life, preservation of property. We can't have anyone come in when they are gonna be harmed. So, across the board everyone sitting there, all the experts said we have a safe community or at least part of our community is safe to reenter. So we identified the areas that were safe for reentry as well as identified areas that were not safe for reentry. And then as a group decided to allow reentry more than roughly 8-10 hour period for the purpose of getting your medication, safe keeping of your property and your documents, and again to the best they could secure their property briefly. (Municipality #4)

> The streets were not flooded. There was no water in roadways. And the individuals were told to get to their homes. (Municipality #11)

As indicated in the above statements, the municipal emergency management organizations utilized threat information to assess the risks and ensure the safety of evacuees. Officials from various departments and in some cases different towns were involved in making the return-entry decisions as a group. According to the informants, return-entry was delayed until the evacuation zones were deemed to be safe for evacuees. For instance, emergency management organization would restrict return if risks of returning were considered to be high. On the contrary, if the risks were considered minimal, return-entry would proceed in the evacuated zones. Some informants also suggested that in addition to the threat situation, the utility conditions also influenced the timing of the return. The proper functioning of power, gas and water was crucial to allow return-entry. Therefore the sooner the utility was restored the quicker evacuees could return to their homes. As suggested by two informants:

> We had some areas that were flooded for almost a week. Other areas had…probably most of the town had no power. And then once power was on, the flooding went down, then we were able to bring people back in. (Municipality #8)

> And so it was a matter of…I guess…focusing get the communities safe, get these people back here, have them safe for their interest, get them back out. Now let's

> get them repopulated when the health department says the water is good. When you have gas actually going into homes, and its safe. Electricity going into homes, and its safe etc. (Municipality #4)

Another informant said:

> I mean we are not gonna let people come back in if there is you know broken gas flowing in people's homes and stuff like that. We wanna make sure that the area is secured…safe for people to reenter. And then you know if we wanna phase it in, depending upon how many people were evacuated, you know we may phase in certain areas first and then we can do like a second phase. But all those decisions would be based out of executive meetings out of the emergency operations center. (Municipality #9)

In addition to threat and utility conditions, this informant also suggests that the number of evacuees also influences the return-entry decisions. For instance, if the number of returnees is large, then the return-entry was undertaken in phases. This may be the case because allowing a large number of the population to return at once requires significant resources and increases the probability of traffic and credential verification problems.

Information was also used to determine the location of return-entry. During the Hurricane Sandy return-entry phase, the municipal emergency management organizations applied information pertaining to damages to determine the areas for return. As described by three informants:

> It [return-entry] depended on which town had the most damage. We the southern town hadn't had any damage at all. What we tried to do was open up the… in other words we allowed the emergency managers the next morning to give us a report. If they had no damage we wanted to allow the people back to those towns. (County #1)

> As soon as the storm had passed we realized that there was no damage, there was no flooding, and everybody was allowed back in. (Municipality #9)

> Our town had very little damage and then all systems were operational. And that let people know that they could come back to the town. (Municipality #17)

As indicated in the above excerpts, damage information influenced the return location and the selection of return-entry strategies. The magnitude of damage created different risks and safety conditions in the evacuation zones, which ultimately guided return decisions. According to the informants only the evacuation areas that had little or no damage were allowed for return-entry. Damage information also influenced the timing of the return. In referencing to effect of damage magnitude on return-entry timing one informant mentioned:

> Well, most of it was done in stages. And that depended on individual residents. And that depended on you know what areas of township they were in, and the extent of damages to their homes. In a lot of cases there were power outages. There were cases were houses were knocked off their foundations. So, all those homes had to be inspected before anybody could return. You had people that could return to their homes after 2 hours Sandy was over. And you had people that were still out of their homes. (Municipality #5)

For this municipality that underwent phased return, the extent of damage influenced the return-entry timing. According to the informant, if the damage was extreme it would take time for inspection and restoration, which would cause delay in return-entry. The evacuees would thus have to wait to get access to their homes. However, if there were little or no damages to homes and infrastructure, a quick return-entry was possible.

Summary

The data analysis suggested five themes that highlighted the information needs the local emergency management organizations required in order to assess risks in the development of the return-entry strategy for their community following Hurricane Sandy. The five themes included *information need*, *information source*, *information seeking behavior*, *information exchange* and *applying information for return-entry decisions*.

The interviews with emergency management personnel indicated that in the aftermath of Hurricane Sandy, municipal emergency management organizations needed information about hazards, damage, and utility and infrastructure condition to develop reentry strategies. In addition to this information, the county emergency management organizations also required information related to evacuees and resource needs from the municipalities. Both the county and municipal emergency management organizations received information from various sources such as the National Weather Service, the Federal Emergency Management Agency, the New Jersey Office of Emergency Management, and within their own organizations. Although some of the local emergency organizations received information from the public through phone calls and social media, the use of these sources was minimal. Majority of the organizations did not receive information from the public and social media because the public had evacuated away from the disaster zone, so the public was seeking information rather than providing information. The findings further suggested that the counties and municipalities mostly relied on official sources of information. Further, while some local emergency management organizations avoided information through social media and the public, others used information from these sources only after verifying it. There was also frequent interaction and information exchange between the local emergency management organization and other information sources through different means such as meetings, teleconferencing, email communication and so forth. Finally, the information gathered from various sources was used to assess risks and to make return-entry decisions.

The next chapter of this dissertation provides the results of risk communication during Hurricane Sandy. Specifically, the findings related to dissemination of return-entry messages and public response monitoring is discussed.

CHAPTER 5

DISSEMINATION AND PUBLIC RESPONSE

The purpose of this chapter is to present the findings pertaining to two research objectives of the dissertation. First, this chapter presents the findings on the strategies local emergency management organizations use in order to disseminate return-entry information to the evacuees. Specifically, this objective aims to answer the following research questions: 1) Following Hurricane Sandy, what channels did local emergency management organizations rely upon to disseminate the return-entry message to evacuees?; 2) Of the channels relied upon to disseminate the return-entry message, which channels did local emergency management organizations feel were most effective?; 3) What information was communicated in the return-entry message? Second, this chapter presents the findings pertaining to how local emergency management organizations monitor public response to return-entry messages and make adjustment to them. Specifically, this second objective aims to answer the following research questions: 1) What type of information do the local emergency management organizations gather to monitor the public response to return-entry messages?; 2) What adjustments do the local emergency management organizations make if they feel messages are not being received or heeded?

This chapter presents the findings of qualitative analysis used to identify and explain the strategies local emergency management organizations use in order to disseminate the return-entry information to the evacuees. In additionally to this, Chapter 5 also presents the findings on how local emergency management organizations monitor the public response to return-entry messages and make adjustments to them. Analysis of the 25 interviews yielded nine themes

pertaining to the return-entry message dissemination, and two themes pertaining to the public response monitoring to return-entry messages. These eleven themes identified through the qualitative analysis are defined and presented in this chapter.

The warning process is comprised of activities such as risk assessment, dissemination and public response to the messages (McLuckie, 1970; Quarantelli, 1990). The risk assessment activities of the emergency management organizations are followed by the dissemination activities in which emergency management organizations transmit warning messages to the public through various channels. In the aftermath of a disaster, although there is no longer an immediate sense of threat, continuous communication remains important as to notify the public about potential secondary hazards and to take protective actions accordingly (Reynolds & Seeger, 2005). In the absence of return-entry messages, the evacuees can return early and put themselves in harm's way. The dissemination of return-entry messages is therefore an important aspect prior to initiating the return-entry movement. In addition to providing risk information, the return-entry messages enable the evacuees to understand the procedures to safely return back to their homes. Since public interpretation to the official messages can vary from those sources who provide the messages (Quarantelli, 1990), it is vital to monitor public response and make adjustments to them accordingly. Moreover, emergency management organizations should also continuously update information in order to provide the evacuees an understanding on the ongoing post-disaster condition and return-entry protocols.

For this study, the data analysis yielded nine themes - *use of multiple channels*, *improvisation, joint communication, communication with special needs population, perception of effective channel for message transmission, perception of effective channel for evoking positive response, communication of post-disaster condition, communication of all-clear information,* and

modifying protective action- as directly relating to the return-entry information dissemination activities (illustrated in Figure 5.1), and two themes - *monitoring strategies* and *adjustments to return-entry message* - as directly relating to the public response monitoring activities that occurred during the return-entry phase following Hurricane Sandy (illustrated in Figure 5.2). These eleven themes are defined and interpreted in the subsequent sections through the use of supporting quotes provided by the study informants. These themes along with their definition and examples are presented in Table 5.1. The subsequent section of this chapter details the formulation of these themes generated through the interviews and concludes with an overall summary of the findings.

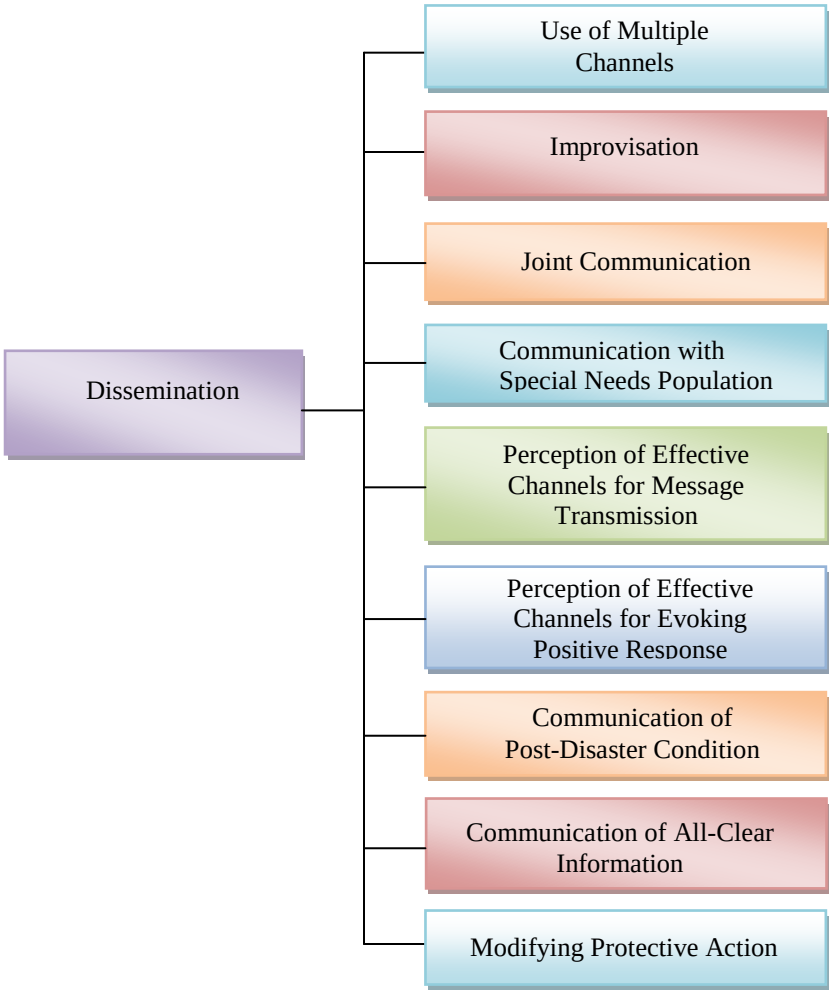

Figure 5.1 Dissemination themes

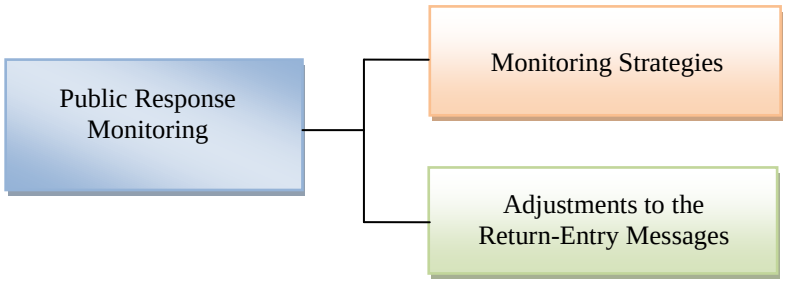

Figure 5.2 Public response monitoring themes

Table 5.1

Description of Dissemination and Public Response Themes

Themes	Definition	Examples
Dissemination Process		
Use of Multiple Channels	The application of all forms of communication channels by the local emergency management organizations in order to disseminate return-entry messages to the evacuees.	Mass Media Reverse 911 System Official Websites Social Media Face-to-Face Interaction
Improvisation	The unscripted activities and improvised behavior of the local emergency management organizations related to the return-entry message dissemination.	Hand out bulletins and flyers Post messages in public areas Changed internet provider Used loudspeakers
Joint Communication	The collaborative effort among the local emergency management organizations to disseminate return-entry information to their evacuees.	Joint Command Structure Joint Website
Communication with Special Needs Population	The dissemination strategies that target special needs populations.	Special Needs Registry Language interpreters Language Line

Table 5.1 (*continued*)

Themes	Definition	Examples
Dissemination Process		
Perception of Effective Channels for Message Transmission	The subjective assessment of the local emergency management organizations pertaining to the effectiveness of dissemination channels for getting the message out to the evacuees.	Face-to-Face interaction Reverse 911 System Radios Social Media Using Multiple Channels
Perception of Effective Channels for Evoking Positive Response	The subjective assessment of the local emergency management organizations pertaining to the effectiveness of dissemination channels for evoking positive response among the evacuees.	Reverse 911 System Face-to-Face interaction
Communication of Post-Disaster Condition	The dissemination of post-disaster information by the local emergency management organization in the return-entry messages.	Threat information Utility and infrastructure condition Damages Status of government services
Communication of All-Clear Information	The dissemination of all-clear information and the return plan by the local emergency management organization in the return-entry messages.	Roads are clear. Safe to return Return dates and timing, location and procedure
Modifying Protective Action	The guidance provided by the local emergency management organizations in the return-entry messages in order to encourage evacuees to adopt protective actions when returning back to their communities.	Take caution while returning. Stay away from downed power lines. Be careful of mold.

Table 5.1 (*continued*)

Themes	Definition	Examples
Monitoring Process		
Monitoring Strategies	The strategies that the local emergency management organizations implement in order to know if the public is receiving and heeding with the official return-entry messages.	Passive Monitoring Active Monitoring
Adjustment to the Return-Entry Messages	The changes to the original return-entry messages made by the local emergency management organizations when they believe that the official messages are not being received or heeded by the public.	Changes to the original messages Updates to the original messages

Use of Multiple Channels

The analysis of the phone interviews indicates "*Use of Multiple Channels*" as one of the themes related to return-entry message dissemination. For this dissertation, "*Use of Multiple Channels*" refers to the application of all forms of communication channels by the local emergency management organizations in order to disseminate return-entry information to the evacuees. According to the informants, the local emergency management organizations used multiple forms of information channels that were available to them in order to disseminate return-entry information to the evacuees in the aftermath of Hurricane Sandy. As articulated by four informants:

> …for the communication system we really push all forms of communication to the public. Pre-event, during-event and post-event there is a significant demand for information, again- pre, during and post. So we use all kinds of

> [communication]…from Twitter to Facebook to media to emails to town websites. (Municipality #4)
>
> …we did activate all of those forms of information. We had [information] on our TV channel. We had information that you know log on to [Township website B] for updates and information. And so then we informed them that we had the Nixle Alert and you know we would be sending them [alerts]. (Municipality #13)
>
> We were putting information out through variety of sources including Nixle, Facebook, Twitter, pretty much any of the general social media outlets. (Municipality #21)
>
> Here in [Municipality A], we used Reverse 911, we also have an altering system where our residents can sign up for alters for [Municipality A] which they can receive on their television, on their home phone, also on their cell phone, email and Facebook. (Municipality #5)

As indicated in the passages above, the local emergency management organizations used numerous forms of information dissemination channels such as the mass media, official websites, township alerts, emails, Reverse 911 System and social media outlets. Besides these channels, face-to-face communication, billboards, and bulletins were also utilized by some of the local emergency management organizations in order to provide return-entry information to the evacuees. For instance, three informants mentioned the following:

> They [volunteers] were helping us to get information out. These people [the public] came to the shelter. We had information session that people could come to and get information. (Municipality #6)
>
> Then what we did once things start to calm down a little bit…we sent representative from [Organization A] out to the shelters that were extended out. And again whether they were special needs or just our normal citizens…regular citizens, we sent in-person reps out to keep them updated. (Municipality #4)
>
> We do have our own AM radio station…limited in scope; it basically covers our Bay Shore area. It's the area that we are most concerned during Hurricane Sandy type incidence. We have our own radio station on [AM Station D] and we can read our messages over that. We have signs up…we have three large signs along the Bay Shore area with the light on them and advertises on the sign, "when this light is blinking tune to [AM Station D] for emergency messaging". (Municipality #5)

> …we produced bulletins and handed people where to get food, where to get clothing..…We posted stuffs like poster boards in Wawa's, in 7-Eleven's and convenient stores because you know people had to go there to get coffee, to get information. (Municipality #10)

As suggested by the informants, the face-to-face communication occurred in the shelters where volunteers disseminated information to the public. Similarly, billboards and bulletins were also used by some of the local emergency management organizations to provide information on how to get resources and additional assistance following the disaster. The above excerpts thus highlight the use of different forms of communication during the Hurricane Sandy return-entry phase. Two informants specifically discussed the importance of using multiple means of communication. As mentioned by the informants:

> …you can't rely on it solely. I mean ultimately any communications program for emergency messaging needs to be made up of multiple redundant ways to get the information out. And it should definitely include social media, and in fact that should be one of the primary means. (Municipality #1)

> …we found over the years that we can't rely on one specific way to get information out that we have to make sure that we use as many channels as possible to get the information out to the residents. (County #4)

According to the informants emergency management organizations should use multiple forms of communication to disseminate information to the public following a disaster. Although not clearly stated by them, one reason to have multiple redundancies in the communication systems may be because during and in the aftermath of disasters, there can be widespread power outage which can impact the availability and effectiveness of some dissemination channels that require electricity. Thus the informants suggest that using multiple channels increases the accessibility to the return-entry messages for the public. Two informants noted:

> We tried to do as much as a 911 Reverse System as we could, thinking that somewhere along the line people would get it or the messages would be passed on face-to-face. So that was about the best we could do. I mean I had…one of our council people is really big with Facebook. So anything that I passed along, he

> would post on Facebook and there was about somewhere about 900 people on Facebook. So I don't know how many actually got it, but we tried to do as much as we can. The mayor had a twitter account, so he tried to do as much as he could with that. (Municipality #6)

For this municipality, Reverse 911 System and social media outlets were used to disseminate information following Sandy. The informant further suggested that the use of variety of dissemination channels increases the likelihood that information will be received and passed on to other individuals, further increasing the availability of the information for wider population. This is in line with the findings provided by Lindell and Perry (2004). According to them, after the issuance of warning message the public engages in confirmation of warnings message by interacting within their social networks. Therefore if multiple information channels are used it is more likely that the information will be received by many evacuees who will further be engaged in the process of confirming what they have received or heard from the official sources. This will allow the warning message to spread among a wider population.

Improvisation

The second theme under dissemination is "*Improvisation*". According to Webb and Chevreau (2006) improvisation is "…the situation-based alteration of the social activities that are generally performed in routine, typical, or expected ways" (p.67). During disasters there is a lot of uncertainty which requires improvised ways to address various situations. Improvisation in the emergency management context is thus generally associated with flexibility, creativity and adaptability to emergency operations (Webb & Chevreau, 2006). This is important because effective response requires "…unscripted activities, improvised behaviors, and emergency organizational structure" (Webb & Chevreau, 2006, p.67). For this dissertation, "*Improvisation*"

is defined as the unscripted activities and improvised behavior of the local emergency management organizations related to the return-entry message dissemination. During the Hurricane Sandy return-entry phase, some of the local emergency management organizations utilized improvisation strategies while disseminating return-entry information to the evacuees. Hinting to risk communication improvisation, three informants expressed the following:

> …using social media was tough because the power was down, people's batteries were low. We couldn't use it. So we tried to put things on the message board as much as we could to let people know. So if they drove by they would see it, if they came to the shelter they would be able to get the information there. We had information posted that way. (Municipality #6)

> Well you got to remember half of the county was still without electric so you know you say computer, most of it actually goes out like cell phones. So what we did was in some of the areas we actually went and we had bulletins made up that we handed out at sites. So if there were people you know we would hand it out at the…there were kitchens made up for food, there were donation centers. So at those places we posted information and made people available to them. And that seemed to work fairly well for us. (Municipality #10)

> … you know we had no internet so that one became a problem. You know we could not get those messages out until we restored. We actually had to switch like a cable type system to a Version Fios, which was operational. You know with our computers being out and cable being out, we used the reverse notification system and I think that worked pretty well. (Municipality #7)

As described in the above statements, during the Hurricane Sandy return-entry phase, there was widespread power failure and internet connectivity issues in many communities, municipalities, and counties. Majority of the local emergency management organizations therefore could not implement their initial plans pertaining to risk communication. For instance, local emergency management organizations had plans to disseminate information through mass media, social media and other sources. However, the lack of power and network connectivity inhibited the use of existing channels such as text messaging, mass media, and the internet. This required emergency management organizations to improvise risk communication activities by

utilizing creative ways to disseminate return-entry messages to the evacuees. According to the informants, some of the local municipal organizations improvised risk communication by utilizing printed bulletins to provide information to the public. For example, when communication via electronic means was not possible, some of the municipal organizations distributed printed bulletins with necessary information to the public by visiting places where people congregated after Hurricane Sandy. Similarly, in order to address the network connectivity issues, some organizations changed their internet provider to facilitate risk communication throughout the power outage period. Other improvised dissemination strategies were also mentioned. As expressed by two informants:

> Once the power went out and we couldn't do it by phone or radio. We actually had a central location. We had flyers printed up. We had two central locations, one was the library, one was the municipal building. And we just run around on foot or over loud speakers letting people know that there is information at the library or the municipal building. They will go pick it up and it will explain to them where we are at, what we are doing. And that's how we got the information out. We just basically did it the old fashioned way by foot. (Municipality #16)

> ….it became very difficult. Without any electricity we had absolutely no internet, we had no TV and we had no radio other than the people sitting in their car…….. ……We went around to places where people would gather. Like some of our little stores had like gas so they would have like coffee for people or something like that. But it wasn't anything like you could sit down and have breakfast; you know what I'm saying. Like a hot cup of coco or hot cup of tea or coffee and that was about it. And everyplace where they were, we would have people take these handouts out and we would post around them like put in on the door or wall. You know "if you don't have power please tell this person to contact us", or tell something like that. (Municipality #18)

The above excerpts suggest that the initial plan of these emergency management organizations was to disseminate information through phones, T.V. and other sources that operated using electricity. However, Hurricane Sandy resulted in extended power outages in many areas, which hampered the use of the predetermined information channels. The local emergency management organizations improvised their information dissemination strategies by

adopting creative ways to provide messages to the public. Some printed flyers, and disseminated messages through face-to-face mode, while others posted bulletins in areas such as libraries, town halls, and convenient stores where the public gathered. Some local emergency management organizations also utilized loud speakers to provide information to the public when the power was out.

Joint Communication

The data analysis also yielded "*Joint Communication*" as another theme related to the return-entry message dissemination. In this dissertation, "*Joint Communication*" refers to the collaborative effort among the local emergency management organizations to disseminate return-entry information to their evacuees. In their interviews, some of the informants reported that the municipal emergency management organization collaborated with the other municipal emergency management organizations in order to set up a joint command system. The command system thus formed was utilized to make return-entry decisions and to disseminate return-entry information to the public. As indicated by three municipal informants:

> And one of the things that we found to be very effective because there are [X number of towns] in this [Z mile island] was that [5 of the Y towns] used a joint command. And so we were coordinating things together pre, during and post storm. And one of things that we came up with is [Webpage A]. And like I said [X towns in Z miles], there is a lot of common interest. So there was one message sent out using those primarily means that we could as a group with common interest, common problem, common solutions effectively get out to the communities. (Municipality #4)

> But what happened was there are five municipalities in [Location D]. All [Y number] of us got together and formed a joint emergency operations center. We had regular meetings any way with all our emergency managers because we are dealing with the same stuff. It just makes it easier for everybody. And as a matter of fact we actually formulated a reentry plan and variety of other plans. So when the storm hit we all met in the [Town E], which is our neighboring emergency operations center. (Municipality #21)

> We are a part of an island off of New Jersey, so that the mayors and emergency management officials from all the towns got together as a group and decided when people are coming back. (Municipality #2)

As described by these informants, five municipalities came together and worked throughout the Hurricane Sandy return-entry phase in order to share resources and to respond to the event. The organizations collaborated prior to the initiation of the return-entry movement. Before the event, some of the municipalities worked together in order to create a joint return-entry plan. In additional to collaborative planning, the towns also established a joint command structure and a joint communications system. The informants further mentioned that this type of joint structure was beneficial as it allowed participating municipalities to address their resource needs, and also helped to facilitate the return-entry movement after Hurricane Sandy. Moreover, these municipalities also used one shared website in order to disseminate return-entry messages to their communities following Hurricane Sandy. As noted by three informants:

> The [B Joint Emergency Management Office], there's five of us; they got together and we had a webpage with information. (Municipality #21)

> We actually formed a website that comprised of a group of towns and so that we had joint information on our website also. (Municipality #2)

> …we set up jointly, the five town saying, "we gonna have this [Website A]", where one message went to our community (Municipality #4)

As suggested in the above excerpts, some of the municipal emergency management organizations came together and formed a website. This website was used to provide joint information to the public from the respective municipalities. Some of the informants further suggested that the use of joint communication system was not only beneficial to disseminate the return-entry information to the public, but it was also helpful in communicating with other entities. As articulated by one municipal informant:

> And one of the main things is with the five towns in [C Location], by having one communication center all the other bigger entities didn't have to make five separate contacts to help us. It was a matter of five number of the [Y number of towns] saying, "we are in together, we gonna use [C communication system], we gonna have a shared command where we gonna make decisions together, we gonna make decisions with equal representations, and all of our needs gonna go through that communication center". And so when you have the New Jersey National Guards, the New Jersey State Police, the New Jersey Natural Gas, Atlantic City Electric, the Board of Health, when you have all of these outside agencies, I mean FBI you name it, it was…they so much appreciated the 5 towns that were in it together so that they didn't have to make…they made one phone call where they had one meeting and they saw the key players who agreed to work together and communicated once, made decisions once. (Municipality #4)

> Because you are talking about reentry with five of towns in [Location D] if we were all running a separate game plan people would be overwhelmed, confused, it would not have went as well. (Municipality #4)

> …we started through that joint or that shared command working together with all the utility companies, the outside entities that came to help, whether it was electric, gas, water, the health department, military. (Municipality #4)

According to the informant, the joint communication system enabled entities such as the Federal Emergency Management Agency, the New Jersey State Office of Emergency Management, the Federal Bureau of Investigation, and the utility companies to efficiently interact with the municipalities as a group, rather than dealing with each of them separately. These organizations were able to communicate with one group and identify their needs and problems quickly allowing both other municipalities and organizations save significant time and speed up the response and recovery activities in the immediate aftermath of Hurricane Sandy, as they had encountered similar problems.

Communication with Special Needs Population

Disasters and emergencies impact people with diverse needs and backgrounds which in turn influences their capacity to receive and comprehend risk information (Veil et al., 2008).

Emergency management organizations should acknowledge this variation, and use appropriate risk communication strategies in order to make messages available and comprehensible to all the population at risk. For instance, many Spanish language speakers prefer receiving risk messages in their native tongue (Arlikatti et al., 2014; Benavides, 2013). Providing the return-entry messages in Spanish can therefore increase the likelihood that these speakers will comprehend messages and comply with them.

"*Communication with Special Needs Population*" is another theme under return-entry message dissemination. In this dissertation, "*Communication with Special Needs Population*" refers to the dissemination strategies that target special needs populations. During the Hurricane Sandy return-entry phase, some of the local emergency management organizations utilized dissemination strategies that were specific to the needs of various populations. Specifically, they utilized targeted dissemination strategies to provide return-entry information to their elderly populations, people with medical needs and disabilities, and non-native English speakers. For instance, according to the informants, organizations utilized special database to disseminate information to their elderly population and the people with medical needs and disabilities. As indicated by several informants:

> Each one of the municipalities keeps a database on special needs. It could be a senior citizen that's living alone, that can't drive, who is on life support, kidney dialysis, oxygen that type of thing or special needs. They keep the database and if there is an evacuation order they know who they are and they have to go get them. And we provide special sheltering to them. (County #1)

> We have people with visual, hearing and a variety of other deficits and medical needs. We actually maintain a couple of different plan that overlap…that make sure that we have adequate cover. For anyone who might be hearing, mobility impaired, visually impaired with that type of special needs, and anyone with the medical needs, we try to make arrangements before coming into the storm. Like remember specifically setting or calling around the nursing homes…..so we did a lot of that…we have a lot of alerting plans, special notification plans for our

hearing impaired and actually we refer to them as "disabled functional needs". (Municipality #21)

We have up here what's referred to as "New Jersey Register Ready". And it's a program that the state has that allows people who are elderly or have medical or any type of problem that they can register. And that information is available to the emergency manager to see exactly who is in his town that may have those problems such as the Jersey Central Power has one and it also refers to people that would have emergency like they have oxygen concentrators in their home and if the power goes out they will put on a priority list for restoration and we would get a copy of that. So we would have a copy of people who would be on like those electrical issues. And then the "Ready Register" we could generate a list and we send people out to check on them. (Municipality #6)

We know those people [special needs population] before the storm, we have a list. We used the list and so most people were contacted. Anybody that has a special needs issue…medical…those people were advised that they should leave way before the storm. So, one of the officers actually called each individual person. (Municipality #8)

We have a state wide database that's called "Register Ready" which we manage for the county. The Municipalities all have access to their local population. We also use our "Register Ready" to develop our call list for emergency messaging both pre and post storm. (County #4)

The fire department maintains a database of people that they check on a daily basis. And we also have… [The municipality G] uses the state-wide special needs registry, which we have [X number of] residents registered. And they are people that are either wheelchair bound or on oxygen or some other you know issues that will require special help for them. So one of the first things we do activate is we pull up that special needs registry we print out all the people that are in that special needs registry and we make individual phone calls to each one of them. (Municipality #9)

We have a registry and we go check on them. We call, email or finally we actually check on them. They go to our priority list to make sure when we are doing it to make sure they are okay. (Municipality # 10)

…we use Register Ready. Now again that will be the first thing that we go to to see where our population that need to be evacuated in the event. And again we have to always think upfront because that is the thing we have around here that we evacuate for… make sure those people where they live, that's what we do with our Register Ready. We check them first make sure those people are ready to go in case we have to get them out. And so we utilized that well. (Municipality #16)

> We have a…I maintain a database. It's a private database for our borough of all people in our community that have medical needs that require things like oxygen or you know other special medical equipments or handicaps and so forth. And we literally make phone calls to each one of those people, both before the storm comes and afterwards. Our staff reaches out to them individually as best as possible. So we make verbal communication. (Municipality #17)

> …pre-event, and it's all part of planning, we have a special needs list through the [Municipality E's heath department]. They work with community members who want to be identified as special needs. And so pre-event we worked on evacuation, making sure that they were out of here. Whether we had to assist or whether you know they had family members etc to take them off. And then you know obviously sheltering where they were gonna go was part of the plan. So we track them basically and if they ended up with the government entity…the government shelter …anyone frankly whether they were special needs or not, we communicated to them. (Municipality #4)

As suggested by the informants, all of the local emergency management organizations had a pre-existing database on their special needs population. Each of the municipal emergency management organizations maintained a record of the special needs population such as elderly, people with medical needs, and people with disabilities. A copy of this database was also available to the electrical companies and the fire department. Prior to an event, organizations utilized the database to communicate risk messages to their special needs population. It was also used to provide any further assistance needed by the population. This database was referred to with many names such as "New Jersey Register Ready", "Special Needs Registry" and "We Care".

The special needs databases allowed pre-identification of the people with medical and other special needs and helped prioritize them during an evacuation. It was used in order to make phone and email contacts with the specials needs population suggesting they evacuate prior to the storm. In the cases where such populations were unable to evacuate on their own, assistance was provided to move the population away from the potential impact area. The evacuated population were further moved to special needs shelter or medical shelters, where the return-

entry information was provided to them through face-to-face communication. As indicated by five informants:

> Anyone who had medical needs, we were able to get them to a medical shelter and their needs were met there. (Municipality #3)

> Our shelter for them [special needs population] was in another town; actually a little bit away. So we would send the information to the shelter. The shelter would have briefing everyday often to tell residents on what was going on in each town they were from (Municipality #2)

> We operate a number of…all of our shelters provide services for individuals with access and function needs. And we had also operated medical needs shelter. So the people who were under our care at each of these sites, they had either direct government staff or our key volunteer leadership working with them to make sure they understood what was happening. (County #4)

> We have in [County D] an entity that's called [Health Commission D]. And they have a special needs and medical needs sheltering support services that they provide. And that's basically initiated and ultimately facilitated through the local health officers in each town. Up here in New Jersey each town and the county has a local health officer. And those local health officers basically become the liaison between the people in the shelters with special or medical needs, and they facilitate those. (County #3)

> We would communicate by phone to the shelter, arrange a time where those [X number of] people from our community could gather on the phone and we would give them the update by the phone as they hobbled around the speaker phone. Then what we did once things start to calm down a little bit what we did…we sent representative from [Organization A] out to the shelters that were extended out. And again whether they were special needs or just our normal citizens…regular citizens, we sent in-person reps out to keep them updated. And then we felt that it was very important to get them closer to home. So we came up with a plan and again whether it was a special needs or regular evacuees or regular citizens to get closer [to the municipality]. So we actually sent buses out to the shelters that were 40- 50 miles away and it was all planned to coming back closer. And we were able to reestablish most of those people probably within 5 miles of their homes (Municipality # 4)

The above excerpts indicate that some of the municipal emergency management organizations provided post-disaster information directly to the shelter which was forwarded to those with special medical needs. Return-entry messages and other information were also

provided to the evacuees through face-to-face communication and teleconferencing sessions. For example, the municipal emergency management organizations made phone calls to the shelter to inform the evacuees about the post-disaster situation and answered to any question the evacuees had pertaining to the disaster areas. Furthermore, according to some informants they also sent representatives to the shelters in order to disseminate return-entry information to them. These representatives provided information pertaining to the damages, post-disaster situation and anticipated return-entry timeline to the evacuees. Specifically, if the population had any special needs, their needs were also addressed by the municipal representatives that went to those shelters. For example, some special needs populations residing in the shelter had access to the local health officers who addressed their needs in the shelter. Finally, when it was safe to initiate return, the local emergency management organizations also made transportation arrangements to bring the special needs population back to their homes.

Some informants also suggested dissemination strategies targeted to non-English speaking population. According to the informants, they used interpreters in order to transmit return-entry messages to these evacuees. In referencing dissemination strategies specific to people with special language needs, one informant expressed the following:

> [Municipality D] has a minimum of 27 different languages that are spoken in town. We provide all of our reentry messages primarily in English and Spanish. But what we have done is we partner with various community organizations and one of our local unions has representatives in [Municipality D]…has representatives who speak all of those languages. So we make sure that our message gets presented to those groups for dissemination to their constituents. (County #4)

> In our shelter sites we had English and Spanish speaking personnel. (County #4)

For this county which has a diverse population with different language needs, message dissemination arrangements were made prior to the event in order to provide information to the

people with different language needs. Apart from English, return-entry messages were also provided in Spanish. In addition to this, the county emergency management organization also sent their English and Spanish speaking personnel to the shelters in order to disseminate information to their evacuees who were in the shelter. For languages other than English and Spanish, local representatives from different community organizations translated messages for the people with special language needs. One informant suggested that the municipalities could make requests to the county emergency management organizations for language interpreters. As indicated by this municipal informant:

> We can request for interpreters, whether in person or we use "The Language Line", a paid service. (Municipality #4)

Additionally, some informants indicated that the local emergency management organizations also utilized what they referred to as the "Language Line" for translating the messages into different languages. As noted by two informants:

> And in cases where another language was used we were using the "Language Line" which provides us translation services into multiple languages. (County #4)

> …we also have the "Language Line" where you tell them what language you needed, they get an interpreter in line. Municipality #4)

When probed about the "Language Line", two informants mentioned the following:

> The "Language Line" is a service that is basically a translation service we use it for all emergency services. We can dial into an inter-language line; identify what type of language we need interpretation into. And they will provide us with interpretation into that language for us. (County #4)

> The "Language Line" is a line that's available to the police department 24/7, and they have many-many operators. And if we have a 911 call or if we have an arrestee and we have anybody that we need to interpret, we would call this line, and whatever language we need, somebody will get on the line and interpret for us back-and-forth. (Municipality #15)

As noted by the informants, the "Language Line" is a paid language interpretation service that was used by the local emergency management organizations to get translation service for its special language needs population during the Hurricane Sandy return-entry phase.

One informant further added:

> Anybody that had a question when they came to headquarters…we would get into the "Language Line" and communicate with them. (Municipality #11)

> ….if we didn't have the ability to communicate with the people [in English], we would call the "Language Line". We would have the direct line to the "Language Line" and they would speak to these individuals and we have three way conversations. (Municipality #11)

As described by this informant, the Language Line was utilized when evacuees with special language needs contacted the emergency management organization in order to receive information from them and/or when the organization came across the evacuees who had a special language needs. The local emergency management organizations could use this service by making telephone calls to the Language Line service provider who would then translate the messages for both the local emergency management organization and the evacuees.

Perception of Effective Channels for Message Transmission

"*Perception of Effective Channels for Message Transmission"* is another theme identified when examining the dissemination of return-entry plans. For this study, "*Perception of Effective Channels for Message Transmission"* refers to the subjective assessment of the local emergency management organization pertaining to the effectiveness of the various dissemination channels for getting the message out to the evacuees. The local emergency management organizations utilized various channels such as mass media, official websites, municipal alert systems, Reverse 911 Systems, face-to-face interaction and social media outlets etc. to

disseminate the return-entry messages to the evacuees in the aftermath of Hurricane Sandy. Nonetheless, the local emergency management organizations varied in their perceived effectiveness of the various channels for getting the message out to the evacuees. When asked about which channel they felt was the most effective in disseminating return-entry messages to the evacuees, the local emergency management organizations mostly indicated official websites, Reverse 911 System, face-to-face communications, radios and social media outlets to be the most effective. For example, in alluding to official websites and Reverse 911 System to be the most effective channels, three informants said the following:

> I think the Reverse 911 (was the most effective in getting information out) because we were dealing with telephone calls…direct telephone calls, that's where you know we call in your telephone number and we give you a message. And why do I say that was the most effective because most of our residents maintained telephone contact throughout the duration of the storm. (Municipality #13)
>
> I think our borough website was very effective (in disseminating the return-entry messages) and I think that was the probably the most effective. Falling behind is the Reverse 911. (Municipality #17)
>
> We used a reverse emergency notification system; we utilized Code Red because of our system where people will receive messages. And we usually utilize that pretty often during the storm to update people on what was happening prior to the storm and after the storm. So we use that and it was very successful. (Municipality #7)
>
> You know with our computers being out and cable being out we used the reverse notification system and that went pretty well. (Municipality #7)
>
> … I would have to say that [the most effective was] the Reverse 911 System… (Municipality #6)

` According to these informants, the Reverse 911 System was the most effective channel primarily because this system allowed dissemination of the return-entry messages to all the evacuees that had provided their contact information to the organization, regardless of their location. For instance, the local emergency

management organization sent return-entry messages to the cell phones and email addresses of the evacuees who had registered themselves to receive the emergency notification during emergencies and disaster. According to some of the informants, the Reverse 911 System was more effective than other channels also because it was operational even when the power was out.

However, some of the informants considered face-to-face interaction to be the most effective means for return-entry message dissemination. As indicated by two informants:

> In that case it [face-to-face] was the most effective because we had no…the way peoples' phones are these days, it's not like the old days when even the power went out you still had the phone service. Now everybody has phones in their houses that are phones hooked up to receivers and once the power goes out you lose your phone service. And that's the way Verizon does it over here. (Municipality #16)

> I think regardless of social media, I think the best way to communicate…the things that helped us the most was the face-to face communication. You know our firefighters, our first aid members, our police officers getting out there and getting the right information to the residents and telling them, "listen go to police headquarters if you need a place to stay we will help you find a place to stay, if you need health department, go to borough hall and speak with the health department". (Municipality #11)

For these informants, power outage inhibited the use of phones, mass media and social media for the return-entry information dissemination. Face-to-face communication was thus the most effective channel to disseminate the information to the evacuees. As stated in the excerpts above, the face-to-face interaction allowed local emergency management organizations to put reliable and accurate information out to the public directly through the officials that were on the field. Moreover, informants also believed that the face-to-face interaction allowed evacuees to get any additional information that they needed to know about the post disaster situation.

Yet others considered the radio as another channel that was the most effective means of getting the return-entry messages out. For instance, two informants said:

> I learned as a victim in North Carolina where I sat through three hurricanes and the best thing you have is a FM radio. Radio is the best thing because people can get in their car. You know we had people that were getting into their cars to find out what's happening. So we basically…in the future I would tell the people that they should listen to the local radio. We should be making reports on the local radio. That is the best thing because people could have a 9 volt battery…get a local radio going, but they may not have lights or enough electricity for their…you know… for their refrigerator…(Municipality #10)

> Well initially the AM radio station [was the most effective] because it was the only method to communicate information. But as far as effectiveness social media was probably the most effective but that was later on in the process once utilities were restored. You know without internet access we couldn't communicate but it is more effective if you have internet access. (Municipality #1)

As explained in the above statements by the informants, radio is more effective than other channels because it can operate even during power outages. The local emergency management organizations therefore relied on FM and AM radio stations to provide return-entry information to the public. Specifically, one informant mentioned that the radio is the most effective channel as anyone can easily get access to it. As noted by this informant:

> AM radio was what we used. It was running off of a generator…well initially of a battery backup and then a generator. But we had no power, we had no internet, no cell phone service, no landline phone service, so the only means to get any emergency information out for many days was simply an AM Radio. And you know fortunately people…you know you could say "well some people don't have an AM radio". It's true but most people have a vehicle, almost everybody got a vehicle, or certainty knows somebody that does. And those vehicles have AM radios on them and they don't require any power. So you know it's a very effective means getting messaging out when all others fail. (Municipality #1)

According to this informant, the public can easily access the radio in their vehicles, which can be a valuable source of information during and in the aftermath of a disaster even when there is no power and internet.

In their interviews, some informants indicated that social media was the most effective channel to disseminate return-entry messages during the Hurricane Sandy return-entry phase. In alluding to social media as the most effective means for information dissemination, some informants suggested the following:

> I found that Facebook was extraordinarily effective. It was actually surprisingly effective. People really were not sure where to turn for information. And we had established a Facebook account…it must have been in 2011 that we started it. So by that time we already had…we had developed the following for the municipal Facebook account. And during the hurricane we had an exponential growth in people that were following both the Facebook page and the twitter account. We had posted big numbers in both of the social media accounts because people were obviously looking for a source of reliable information. And after the hurricane when we get our after action review you know people were very-very thankful that they were able to look to those social media account, and they knew what was going on. (Municipality #20)

> The quickest way to get short bullets of information out or for quick updates is through social media. (County #4)

> I will have to say social media [was the most effective] in the long run…because people that were talking to each other were able to pass the information around. (Municipality #12)

In the above statements, the informants suggested that the official social media accounts such as the Facebook and Twitter accounts allowed for an effective information exchange between the public and the local emergency management organizations during the Hurricane Sandy return-entry phase. Official social media outlets were followed by many of the public which enhanced information dissemination during Hurricane Sandy. In addition to this, social media was very quick in disseminating messages to the public, and enabled information

distribution within the public. One informant in particular described the advantage of social media over other channels specifically the radio. As noted by the informant:

> **…**as the time went on we could get more information out through social media…pictures and stuff that you just can't communicate on the radio station. (Municipality #1)

For this informant who initially used radio for information dissemination during Hurricane Sandy due to power outage, the ability to send visual images such as photographs and maps was one of the advantages of the social media over other channels, specifically the radio. The data analysis also indicates that although some of the informants believed social media to be the most effective channel, they also acknowledged the limitations pertaining to the social media. As noted by two informants:

> I feel that social media is extremely effective source of communication for emergency managers, as long as you have access to it. When you have these major disasters and you lose internet the communication…you can't get that message out. (Municipality #1)

> I mean obviously the quickest way for us to get the information out these days is through the social media. Off course you are limited in the amount of information and in the way people interpret the information on social media. But that is absolutely the quickest way to get it out. (County #4)

According to the informants, the effectiveness of social media is dependent on the post-disaster situation. For example, if there are internet connectivity issues or power outages in the aftermath of a disaster, social media may not be an effective channel to disseminate information to the evacuees. One informant specifically stressed that although social media is quick in disseminating messages, the messages provided are also subjected to personal interpretation influencing the effectiveness of the messages provided.

As discussed under Section 5.1, some informants indicated the use of multiple channels to be the most effective means in getting the information out to the evacuees. In addition to the

use of multiple channels, informants noted that advising evacuees to pass information to others was an effective way to get the message out to a wider population during the Hurricane Sandy return-entry phase. .

One informant noted:

> One thing that we did specify in every email, every Revere 911every bit of communication that we said that… we stressed, "Please notify your neighbors". And you know we advise that "what you have received they might not have received it", and we found that to be extremely helpful. (Municipality #13)

> You are calling a house that they [public] have already evacuated but again it came back to, "if you received this message please notify your neighbors". And people were able to communicate with their neighbors even though they had evacuated whether it was through telephone or you know through smart phones, they had computers that they were able to keep, whether it was through a generator or whatever. But the word did get out and we were quite surprised ourselves. (Municipality #13)

As stated in the excerpts, those that had received the information were advised to pass it along to others. This made the return-entry information available even to those that did not have access to phones, computers or other forms of information channels.

Perception of Effective Channels for Evoking Positive Response

The data analysis yielded "*Perception of Effective Channels for Evoking Positive Response*" as one of the themes related to dissemination. For this study "*Perception of Effective Channels for Evoking Positive Response*" is defined as the subjective assessment of the local emergency management organizations pertaining to the effectiveness of dissemination channels for resulting positive response among the evacuees. According to the qualitative analysis the local emergency management organizations considered Reverse 911, mass media, social media and face-to-face communication as the most effective channels for evoking positive response among the evacuees.

In their interviews, some of the informants indicate that the Reverse 911 System and the mass media were the most effective means that generated positive response among the evacuees. As described by one informant:

> In this particular case I think we posted…..and there was an evacuation required. We used Reverse 911, I would think that the reason whoever left…..some people didn't leave okay…. so whoever decided to leave probably listened to Reverse 911 and then followed by the media reports of the situation. (Municipality #17)

According to this municipal informant the evacuees relied on the information received through the Reverse 911 and mass media and followed the evacuation order provided in the messages.

Another informant mentioned:

> … I think the majority of people utilize traditional media. For post incident information we also use our Reverse 911 system. So that literally touches every household and every business in the county. (County # 4)

Another channel evoking positive response among the evacuees was the Face-to-Face communication. In alluding to this, one informant described:

> …. in our town where we are like [X square mile]…we are a densely populated town and I still think that face-to-face communication is the best. When you are out there in an emergency and you see emergency patrol car coming down the street. And he has lights on and he is on a PA system and telling you to evacuate, you know it's a real deal. And you know you better get out of there because it is a problem. But again the social media did help out somewhat but again you also had some false stuff put on the social media. (Municipality #11)

According to this informant who belonged to a municipality that had a small land area, face-to-face communication is the most effective channel for evoking a positive response among the public. It allows the public to gauge the urgency and significance of the situation during events and encourages protective action among the public.

One informant specifically mentioned that the evacuees were simultaneously paying attention to multiple communication channels during the Hurricane Sandy Return-Entry Phase. As mentioned by this informant:

> Well, I think what they relied the most was the radio. And those when they would go to the center… some TVs…they would be watching TV videos. They did watch newspaper reports. Whenever you went to a shelter to look at the people you know they actually ask question, "can you go about my house, can you do this, and can you do that". … But I think they were paying attention to all forms of media. But again their lives were topsy-turvy for one-two-three months you know. (Municipality #10)

In their interviews, some informants indicated the evacuees relied on their social networks such as relatives, friends and family for information rather than the official sources. One informant noted:

> Not one in particular source [was effective in communicating messages] because like I said people were not paying attention to the official websites and stuff……. So we try to instill upon the people to pay attention to the official websites and Facebook bulletins. And they will go by what your cousin and best friend is telling you basically. (County #1)

As explained in the above statement, some informants considered social networks to be the most effective means in evoking response, and complained that evacuees believed their friends and family more and ignored official warning messages put forth by their organizations.

Communication of Post-Disaster Condition

"*Communication of Post-Disaster Condition*" is another theme under the dissemination process. For this dissertation, "*Communication of Post-Disaster Condition*" is defined as the dissemination of post-disaster information by the local emergency management organization in the return-entry messages. In their phone interviews, some informants indicated that the local emergency management organizations provided information on the post-disaster condition in

their return-entry messages. The return-entry messages included information on post disaster situations such as threats, damages, utility and infrastructure conditions and government services.

During the Hurricane Sandy return-entry phase, the return-entry messages disseminated by the local emergency management organizations contained threat information. The threats included in the messages were flooding, downed power lines, falling trees and contaminated water. As stated by two informants:

> You know we let people know that you know power was still out, and that there was flooding in certain areas…water system could be contaminated. "You might not have resources if you are coming back". You know "stay away from power lines, they could be alive, they could be turned on at any time". So the stuff related to the public safety… (Municipality #7)

As described by this informant, the organization provided threat/hazard information in their return-entry messages to the evacuees as a means of keeping the evacuees out of the evacuated areas. For example, evacuees were informed of the flooding and contaminated water problems in the evacuation zone. Likewise, evacuees were also notified about the lack of power in the evacuation zone and the problem that could arise for the evacuees if they returned to their homes. The inclusion of post-disaster information in the return-entry messages therefore also served as a means of keeping evacuees away from their homes until the danger was over. One informant specifically said:

> Again, we tried to tell people that not to come back until they heard that things were okay for them to come back….. And we were doing Reverse 911. (Municipality #6)

As stated by this informant, the local emergency management organization advised evacuees to stay away until they received messages from the organizations saying it was safe for

them to return to their homes. Besides information on threats and hazards, damage information was also provided in the return-entry messages. For instance, one informant said the following:

> And then after the storm, we were telling them exactly what damage there was in what areas, and what areas were not safe to go back into. (County #1)

As noted by this informant, the local emergency management organizations disseminated information about damages to the property and infrastructure following Sandy. Besides verbal and written messages, some of the local emergency management organizations also disseminated the damage information through visual aids, specifically photographs. As indicated by three informants:

> **…** once we had the internet restored, after the storm about a week after, we posted pictures of different properties. We tried to post as many pictures as we could so people could get an idea. Because certain people weren't allowed into their property for you know I guess it was at least a week. So people were concerned about the status of their homes and what not. (Municipality #1)

> There were photographs uploaded in social media. General condition like beach dunes, how high the water was, just things of that nature, unusual things like a boat in the middle of [street A] which is one of our bay side roads, things of that nature. (Municipality #21)

According to the informants, the local emergency management organizations posted photographs of the damages on their official social media outlets. This enabled evacuees to get a sense of the amount of damages in their area prior to their return. Other information that was present in the return-entry messages was information on utility and infrastructure conditions as well as the status of government services. As mentioned by some informants:

> We would communicate when we found out certain areas of town…when there water was coming back on; we would let them know you know from one street to the next. The same is with the gas, we would also let them know if they needed any kind of inspections, you know that they would call the borough hall and talk to our building inspector. So, pretty much anything they knew they needed to know at that time, we updated it as often as we could. (Municipality #14)

> Mostly information about road closures, wires down, whether or not school was going to be held that week, trash and recycling collection, debris removal, safety information about using generators and carbon monoxide dangers. When the electric utility gave us information about their anticipatory restoration schedule on a particular neighborhood, we let people know that. (Municipality #20)

> …along with some of the messages there was additional messages included about schools are being closed, parks being closed, some public buildings remain closed or had limited services specific to the…you know the recovery. (County #3)

> We told them about the utilities, when we expected utilities to be back on. We told them about road closing. Where they could get water, or where they could get ice, things like that. (Municipality #12)

> There was information out like power was back and flooding was down. (Municipality # 8)

As indicated in the statements above, information on the status of utility services and the restoration timeline was also provided to the evacuees. Similarly, information on governmental services such as mail, schools, parks and governmental offices were also forwarded to the public.

Communication of All-Clear Information

"*Communication of All-Clear Information*" is another theme pertaining to return-entry message dissemination. For this study, "*Communication of All-Clear Information*" is defined as the dissemination of all-clear information and the return plan by the local emergency management organization in the return-entry messages to the evacuated public.

In their interviews, some informants suggested that the local emergency management organizations provided all-clear information to their evacuees when the disaster areas were considered to be safe for return-entry. It further provided additional information on the return-entry protocol such as the location, dates and timing of return. In referencing the all-clear information in their return-entry messages, four informants noted:

> They [return-entry messages] were just saying, "If the roads are open, you could return to your home". (County #2)
>
> We just let the people know that they could go back to their houses, the areas of town that was open, the certain areas that was open. (Municipality #8)
>
> At that time we just put it on the television that you know "it is safe to go back into your home if you choose to do". (Municipality # 13)
>
> …on our borough website we had a message that told people that our town was safe for reentry… (Municipality #17)

As indicated in the above excerpts, the all-clear information also included details on the accessibility of different transportation routes for returning back to the evacuation zones, and details of the return-entry dates and timings, location and return-entry procedures. As noted by some informants:

> We provided dates, times and locations, when things will be opening. You know best ways to travel. We did have some roads that were not passage due to the sand so we told them to avoid things like that. (County #4)
>
> Reentry time, places and what they needed for reentry…they needed to have those placards for reentry, what areas they could return to…we had some curfews for some period of time that information was put out on social media. (Municipality #2)
>
> As soon as we were able to go out and assess the damage, we told them [evacuees] what damage we had found, and what our plan was for reentry and the approximate timeframe it was gonna take to reenter. (Municipality #3)
>
> The information that we would give out was on what time we would open it up, what the restrictions were because like initially we would allow people to go in the affected area for a period of time, let's say 5 hours. You are allowed to go in, check the properties and secure what you could. But you had to leave, you couldn't stay there. So it was basically checks. So we would put out all the pertinent information as to the regulations for the reentry. And you know that's the type of information like where you can be, what time it will start, how it would go, what you needed to show for proof of residency and/or ownership and…basically that was the information. (Municipality #16)
>
> …and information on how to…what information they needed to bring to get into town and we let them know… we were updating that once a day twice a day and

> after few days everybody kind of got the gist of what was going on. After about 10 days we were able to open the town fully when all the power was restored. (Municipality #7)

As suggested in the above statements, the return-entry messages contained information on the return-entry plans/strategies of the organizations, information on the locations that evacuees were allowed for return and the date and time the areas will be open for return-entry. Some of the municipalities that had initiated temporary return and/or restricted the access to disaster areas also included curfew timings in their messages. Furthermore, some organizations also provided detail procedures for return-entry including credential verification process and the documents needed to get access into the evacuation zones.

Modifying Protective Action

In addition to information on post-disaster condition and all-clear information, some of the local emergency management organizations also provided guidance on the things that evacuees should be careful while returning back to the evacuation zones and/or things that needs be considered after the return. "*Modifying Protective Action*" is thus another theme within dissemination. In this study, "*Modifying Protective Action*" is defined as the guidance provided by the local emergency management organizations in the return-entry messages in order to encourage evacuees to adopt protective actions when returning back to their communities. The guidance information mostly included protective action information that enabled evacuees to be safe from post-disaster hazards and threats. Some informants stated the following:

> Our main message getting to the public was "stay away from downed power lines and if the trees are down, we will send experts to cut up, pick up and haul away and get your powers restored as soon as possible". (Municipality #16)

> …our health office actually started putting a lot of information out. You know "if your house is flooding you know be careful, be careful of mold". And that

> constantly went out…And those information sheets were published to put it in the town halls, put it in the public libraries, and in any community centers. So that stuff was always there and anybody could pick of sheets on any of that stuff…mold, things to look for, damage to your homes all that stuffs. (County #2)

> Dangers of fires with peoples using candles for light; sources of gasoline because many of the gas stations in the area were closed because they didn't have electricity. So people were looking where they could get gasoline. We opened a place where people could go…it turned cold within a week after the hurricane. And we were letting people know where they could go to charge their portable electronic devices and also to warm up if they wanted to get out of their house. (Municipality #20)

> …since there was no power we let the people know that, "if there are power lines down in your area don't go near them even though the power is out they are still unsafe". "Try not to cut… you know the trees are down, leave them down, the professionals will come in because the wires are entailed with the trees", they could get themselves electrocuted. (Municipality #16)

> We would have any specific messages you know like "go back to your home but you know please remain inside after the day light hours", something like that in effect and that was due to the amount of power lines down and some of the wires still being alive and the public service and the utility company not being able to completely verify that you know all the lines were safe or dead. (County #3)

> Through the social media there was information put out, "okay you are going home; you need to have an inspection on your house". Say, "if you have power your meter was under water; you needed to have electrical service taken care of. There was information supplied for everyone's need in a particular situation. (Municipality #5)

As described in the above excerpts, the local emergency management organizations advised evacuees to be cautious while returning back to their homes. They urged evacuees to stay away from downed power lines and falling trees. Information was also provided on how to inspect homes for safety. For example, emergency management organizations suggested home owners to have inspected their homes for molds, wet wires and gas leaks. Some local emergency management organizations also provided guidance on where evacuees could get additional information or whom they should contact for further assistance.

Monitoring Strategies

Public response monitoring includes implementing various strategies in order to know if the public is receiving the message and interpreting it in the correct way, making adjustments to the original messages when it is perceived that messages are not being received, or heeded by the public. The data analysis yielded "*Monitoring Strategies*" as a theme related to public response monitoring during the Hurricane Sandy return-entry phase. "*Monitoring Strategies*" is defined as the strategies that the local emergency management organizations implement in order to know if the public is receiving and heeding the official return-entry messages. The data analysis suggests that the local emergency management organizations were involved in two types of monitoring strategies –*passive monitoring* and *active monitoring*. In this dissertation, "*Passive Monitoring*" refers to the monitoring strategies where the local emergency management organizations passively observe public response to the return-entry messages, without interacting with the public. As indicated by two informants:

> Well, the Reverse 911 System gives statistical information about how many people received the messages. So we can put it on an automatic recall process. And we were getting a pretty good percentage of people who were getting the information whether it was getting them directly or being put on their message machine…somehow they were getting the message. Other than that I couldn't tell you how we were getting it back. (Municipality #6)

> When a call goes out, it logs every call that was either answered, went to an answering machine or it tells you…it actually tells you how long the people stayed on the line. So yeah we could go in and we could run the report. And it will tell us you know how the calls went out, how they were handled and which people actually listened, which one didn't. The system does work well. Let's say over 70 % of the population actually does pick up their phone and listen to the message. (Municipality #16)

> Public response was also monitored through the use of computer programs, statistical software and so forth. (Municipality #15)

> We had a computer program specifically for social media that would monitor Facebook, Twitter and some other accounts in there too. You could sit there on the screen and see the different accounts and what people were posting about and what we put out. ((Municipality #2)

> Just through social media. We also had you know anecdotal report on what was going on in our traffic control points; you know how much volume was coming in? That's pretty much we were able to monitor that. (County #4)

As explained in the above statements, the local emergency management organizations utilized computer programs and statistical tools to examine if the public was receiving the return-entry messages. Computer and statistical programs specifically allowed them to count the number of people that had received and listened to the messages on their phones. Similarly, some of the organizations also passively monitored social media using specialized computer softwares. This allowed them to determine if the public interpreted the return-entry messages correctly and complied with them.

"*Active Monitoring*" is another subtheme under "*Monitoring Strategies*". In this dissertation, "*Active Monitoring*" refers to the public response monitoring strategies of the local emergency management organizations where the organizations are involved in an active interaction with the public. Contrary to the passive monitoring, active monitoring enables the emergency management organizations not only to determine if the public is receiving and interpreting the messages correctly, but it also allows for opportunities to clear any misinformation or rumor the public has through a two-way interaction. In addition to this, the public can also ask questions and get additional information from the emergency management organizations. The data analysis indicates that during the Hurricane Sandy return-entry phase, active monitoring occurred through social media, phone conversations and face-to-face interactions, where both the local emergency management organizations as well as the public were engaged in a two-way communication. As indicated by two informants:

> …social media allowed for back-and-forth and we tried to address any question or concern that came in there. We also established a phone hot line that residents could call in and ask questions and we would respond to them directly. We also had a walk-in disaster recovery center established that would allow people to walk in and ask questions as well. (Municipality #1)

> 24/7 we were monitoring the message that was going out. We would you know correlate with the reentry teams…the people, officers that were out on the scene. And that was a fluid messaging going back-and-forth so that we could stay with the plan. (Municipality #15)

> We also had a phone line too that people could call in for questions. And we had someone on there not 24 hours a day but probably 12 hours a day during the day time. (Municipality #2)

As discussed in the above excerpts, the local emergency management organizations monitored the public response to the return-entry messages through two-way communication via face-to-face, telephone and social media outlets. They frequently monitored social media and replied to the questions that were posted by the public. Social media outlets enabled wide-scale interaction among the public, and also allowed for opportunities to clear any rumor and/or misinformation the public had related to the post-disaster situation. Monitoring was also done through feedbacks received from the return-entry teams that were on the field. For instance, return-entry teams who were interacting with the public or observing public behavior were reporting the local emergency management organizations through radio communications.

Adjustment to the Return-Entry Messages

Making "*Adjustments to the Return-Entry Messages*" is another theme under public response monitoring to the return-entry messages. For this study, "*Adjustments to the Return-Entry Messages*" refers to the changes to the original return-entry messages made by the local emergency management organizations, when they believe that the official messages are not

being received or heeded by the public. "*Adjustments to the Return-Entry Messages*" includes both the change as well as the update to the original return-entry messages.

The data analysis suggests that during the Hurricane Sandy return-entry phase, some of the local emergency management organizations made changes to their original messages. As indicated by one informant:

> As far as reentry is concerned, some of the challenges that we did experience was we would have people lining up on our state highway hours before reentry. You know they wanted to be the first in the line. And at times we would experience 5-6 miles of cars stopped…people sleeping in their cars…so they would be in line, looking for bathroom usage and things like that. That occurred pretty quickly. And then we would quickly try to adapt that for the next time when we made an announcement for reentry, "the cars would not be permitted to line up you know shortly an hour before reentry". So we wouldn't have them sleeping in the street all night long. (Municipality #15)

As explained in the above statement, after the dissemination of the first return-entry message, this municipal emergency management organization experienced challenges associated with the evacuees. Hours before the return-entry could be initiated, evacuees lined up in their cars to get access to their homes. This resulted in traffic congestion, further hindering effective return-entry movement. In order to avoid such situation in the future, the local emergency management organization therefore made changes to their original messages.

Besides changing the return-entry messages, some organizations also indicated that the information was continuously updated. As noted by some of the informants:

> The information going out was updated you know every couple hours. So as new issues arose and new things were brought to our attention they were addressed. They were going out in the messaging. That same messaging was also delivered to our people that were in our hotline phone and the disaster recovery center. So we had consistent responses for all the issues that came up. But I would say this information was updated initially probably every few hours. (Municipality #1)

> We were just updating the status of the town, people's homes, areas that had received more damage than others. Just to help residents and home owners who

> weren't around the town to understand what was going on here. And you know to keep the people away while we began clean up. (Municipality #7)
>
> You know if we do one step of reentry where they could go in for so many hours to secure their personal properties or in case they…the next day obviously it would be a different area. So we would have to update that. Then eventually progress to where we allow them in longer. So yes we would update them daily whatever situation fit the need for the people going back in. (Municipality #15)
>
> …we were attempting to update the messages as much as we could. And again not having power, it was a moot point to try to keep updated the things. So if anything changed we would get the messages out through the mayor and the council people. And they would actually go out and try to canvass the areas. And if it was something big we would actually put the police department out on a loud speaker. (Municipality #16)

The above excerpts suggest that the local emergency management organizations continuously updated their information based on the changing situation in the disaster areas. As the conditions of the utility and infrastructure changed in the disaster areas, the local emergency management organizations provided updated messages to the public to keep them acquainted with the current situation. The local emergency management organizations also updated on damages in order for the residents to comprehend the condition of their homes. For the counties and the municipalities that underwent a phased return, updated information was also provided to the public on return-entry location, dates and timings.

One of the important findings from the data is the cyclical link of the public response monitoring to the risk assessment activities of the local emergency management organization. The data analysis indicates that the public response monitoring activities of the local emergency management organizations connects into the risk assessment activities of the organization. For instance, while monitoring the public response to messages, organizations assessed the information needs, and made changes to the return-entry messages which once again underwent

dissemination through various channels. In hinting to this feedback loop, two informants mentioned:

> I don't know that we had real valuable information coming from social media or public. ..the information that we did get that was valuable from social media and the public was what information was important to them that we could then put together and release either back through social media or out through general press release and things like that. (Municipality #21)

> Whatever feedback we would get from the public that would come back to the EOC so that we could adapt to the needs of the people. I mean it was minimal but... certainly we had feedback and we had some people that were happy and some people that were very unhappy. But whatever the feedback was it would come back to our EOC so that we could adapt to the needs of the people as best as we could. (Municipality #15)

As indicated in the above quotes, some of the emergency management organizations re-assessed the information needs of the evacuees while monitoring public response to the messages. The needs of the public thus identified were once again used by the local emergency management organizations to gather information. Thereafter, changes were made to the original messages and then re-distributed to the public through various dissemination channels.

Summary

The data analysis suggested eleven themes that concentrated on the return-entry message dissemination and the public response monitoring of the local emergency management organizations. The data analysis yielded nine themes - *use of multiple channels, improvisation, joint communication, communication with special needs population, perception of effective channels for message transmission, perception of effective channels for evoking positive response, communication of post-disaster condition, communication of all-clear information,* and *modifying protective action* - as directly relating to the return-entry message dissemination, and

two themes –*monitoring strategies and adjustment to return-entry messages* - as directly relating to the public response monitoring following Hurricane Sandy. The findings indicated that in the aftermath of Hurricane Sandy, the local emergency management organizations utilized variety of strategies in order to disseminate return-entry messages to the evacuees. These strategies included *use of multiple channels*, *improvisation*, *joint communication* and *communication with special needs population*. Furthermore, the local emergency management organizations also varied in their perceived effectiveness related to the various dissemination channels. Among all the channels, face-to-face communication, Reverse 911 System, radio and social media were considered to be the most effective channels for getting the return-entry message out to the evacuees. Similarly, the data analysis suggested that the Reverse 911 system, mass media, and face-to-face interaction were considered to be the most effective means for evoking positive response among the evacuees. Furthermore, the informants indicated that the return-entry messages disseminated by the local emergency management organizations included information on post-disaster situation, all-clear information, return-entry details and protective action guidance. The return-entry messages that were disseminated to the evacuees were further monitored by some of the local emergency management organizations. The public response monitoring activities comprised of both the passive as well as active monitoring strategies. Finally, based on the public feedback to the return-entry messages and changing situation on the disaster zone, information was continuously updated and disseminated to the evacuees.

The next chapter of this dissertation provides the results of risk communication challenges faced by the local emergency management organizations during the Hurricane Sandy return-entry phase. Specifically, the findings related to the challenges pertaining to the

development of return-entry strategies, dissemination of return-entry messages and public response monitoring is discussed.

CHAPTER 6

RETURN-ENTRY RISK COMMUNICATION CHALLENGES

The purpose of this chapter is to examine risk communication challenges faced by local emergency management organizations during the return-entry phase. Specifically, this chapter presents the findings of qualitative analyses conducted to identify challenges local emergency management organizations experienced while developing, disseminating and monitoring public response in the aftermath of Hurricane Sandy. Analysis of the 25 interviews yielded four themes - *information challenge*, *technological challenge*, *organizational challenge* and *social challenge* - related to the challenges local emergency management organizations experienced following Hurricane Sandy. These four themes are defined and discussed in this chapter and provide valuable insight into some of the challenges emergency managers faced while managing the return movement.

Communication is one of the most vital elements in emergency management. Nonetheless, it poses some of the greatest challenges to emergency managers as they strive to minimize risks of hazards and disasters. The challenges of communication and its role in emergency response activities are evident from disasters such as Hurricane Katrina and 9/11 terrorist attacks (Comfort & Haase, 2006; Manoj & Baker, 2007). Beginning from information collection to message dissemination and public response monitoring, emergency management organizations face many challenges related to the risk communication process. During disasters, organizations struggle to find relevant and good information (McDonnell, Perry, McLaughlin, McCurdy & Parrish, 2007). This problem is even worse when information should be gathered in

the aftermath of a disaster. For instance, post-disaster situations such as inaccessible roads, secondary hazards, lack of power and connectivity complicates information gathering aftermath of disaster (Day et al., 2009; McDonnell et al., 2007). The inaccessibility to disaster zones, power outages and lack of radio interoperability inhibits information collection and communication among various organizations involved in emergency management.

Challenges are also experienced by emergency management organizations while disseminating risk messages. For example, the use of new information technologies increases the likelihood of information overload and misinformation (Quarantelli, 1997). Similarly, unlike pre-disaster warning situation (where populations are congregated around one area), evacuees are dispersed to a much wider geographic area after evacuation (Siebeneck & Cova, 2014). This is problematic for emergency management organizations as they are required to make return-entry messages accessible and available to all evacuees, regardless of location. Moreover, if return-entry message is not received by the evacuees, it can effect compliances to return-entry plans (Siebeneck & Cova, 2014). This further hampers post-disaster activities and subjects evacuees to multitude of risks.

This chapter presents findings on challenges faced by local emergency management organizations while developing, disseminating and monitoring public response to return-entry messages following Hurricane Sandy. As presented in Table 6.1, the qualitative data analysis suggested four main challenges – *information*, *technological*, *organizational*, and *social challenges* - related to return-entry risk communication. These challenges are further discussed in the sections below.

Figure 6.1 Risk communication challenges themes

Table 6.1

Description of the Risk Communication Challenges

Themes	**Definitions**	**Examples**
Information Challenges	Challenges associated with gathering and/or receiving information from other sources.	Lack of information from utility companies Lack of information on evacuees' evacuation destination
Technological Challenges	Challenges resulting due to technical issues such as power outage and lack of connectivity to internet, cell phones and cable networks.	Power outage problem Network connectivity issues
Organizational Challenges	Challenges related to organizational structure and capacity.	Command and control Bureaucracy/ red tape Resource constrains
Social Challenges	Challenges pertaining to evacuees or when interacting with the evacuees.	Lack of compliances to return-entry messages Misinformation and rumor formation

Information Challenges

For this dissertation, "*Information Challenge*" refers to the challenges associated with gathering and/or receiving information during return-entry phase. The data analysis for the study indicated that municipalities and counties faced challenges while gathering information during return-entry phase. Approximately eleven informants (44 %) hinted on information challenges during the Hurricane Sandy return-entry phase. One informant mentioned:

> Again getting good accurate information…knowing if the houses were livable, safe or not, finding out when the powers would be restored. Those were some of the challenges with information. (Municipality #12)

As indicated in the above quote, information about community conditions, such as the safety and livability of homes and availability of utilities, was difficult to obtain in the aftermath of Hurricane Sandy. Inaccessibility to disaster zones due to damaged roads, closed bridges, downed power lines, high flood water level may have contributed to challenges in gathering post-disaster information. Such information is crucial because in absence of this information local emergency management organizations are unable to fully comprehend the post-disaster situation and develop return-entry strategies effectively. In addition to the development of return-entry strategies, the lack of disaster information can also impede the formulation and/or effectiveness of return-entry messages, further compromising return-entry information dissemination processes of the organizations.

One informant from a municipal emergency management organization explained the information challenge multiple times. As indicated by this informant:

> The problem really was in the sense that everybody was clamoring for information, and it was hard to get. Good information was extremely difficult to get. (Municipality #19)

> You know during the storm there was…. it was just a lot of people finding information, lot of cross information, maybe there was not one voice speaking for everyone and that was probably a problem too. So people were saying different things and throwing different things out there. You know playing the game on telephone, someone said something and I heard something, somebody else said something else so what's true? (Municipality #19)

> The problem with the utility companies were that you weren't getting information from let's say your district guy or whatever …your immediate contact. So we were trying to reach someone else and may be that someone else was not the right person to talk to because may be they did not know what's going on in our town. And the other guy was covering 12 towns and he wasn't just able to get to you. So you take whatever information you can get. It was coming from a source inside the utility company and you just use that source because it is just all you had. And then they were also having conference calls with higher ups and I don't think those were productive also. (Municipality #19)

For this municipal emergency management organization, insufficient and inaccurate information created problems during the post-disaster situation. Their organization struggled to get accurate information from the utility companies in order to disseminate it to the evacuees. The absence of reliable sources and good information impacted the dissemination of messages to the public and also resulted in rumor formation and misinformation among the public.

Several of other emergency management organizations also expressed their disappointment over power companies because of the lack of relevant and timely information from them. One informant complained:

> We had lot of people without power for between 10-14 days and you know after a week into it we started getting a little better about okay this area will be coming on next once it calmed down little bit…you know this area should receive power next but again we were little bit shy about releasing the information because we didn't trust it because of the previous week of bad information. So that was kind of interesting. People kept calling "when was my power coming back on?" and we were like… we kind of had an indication but we were not sure of what to say because that will just make things worse right. It will be worse if we were wrong so anyway that was another perspective. (Municipality #19)

In the immediate aftermath of Hurricane Sandy, many counties and municipalities in New Jersey experienced power outage for an extended period of time (Halpin, 2013). The local

emergency management organizations were therefore constantly seeking information from power companies on power restoration schedules in order for them to disseminate that information to the public. In absence of this information, they were furious with the power companies. As two informants described:

> Our utility company dropped the ball. That was [Company C] and they really dropped the ball. And I let them know that it was an absolute disgrace. We did not have a single power and light crew in our town for four days. On the fourth day they had two crews show up that was it. (Municipality #18)

> We thought people need to know "this is what we were told", and let's put it out. And lot of that was bad information; it was misinformation because it's nothing worse knowing the only thing...lessons learnt….the only thing worse than no information is bad information, and that didn't help. That didn't sit well with the residents. (Municipality #19)

As mentioned by the informants, the power companies were slow in responding to the queries put forward by the emergency management organization. Likewise, the informants also complained that when a response was received from the power company, it was mostly unclear and lacked in detail. Receiving information from the power company was therefore one of the information challenges for the local emergency management organizations.

Another information challenge reported by the informants was the "lack of evacuee information". According to the data analysis, absence of evacuee information, specifically their evacuation destination, made it difficult for some organizations to track their evacuees. As indicated by three informants:

> In all cases you have to stay in contact as much as possible with your evacuated people. Sometimes it's difficult because they [county] will take folks to a shelter and at some point they [evacuees] will be picked up by family members or friends and you can lose contact with them [evacuees]. (Municipality #5)

> We are doing things where we have our people coming to register you, so we will know because part of the problem was we didn't know where the people were. (Municipality #10)

For these municipalities keeping track of their evacuees was a problem. As clearly indicated by the first informant, many evacuees were picked up from the shelter by their friends and relatives. Since many of these evacuees did not provide contact information to the emergency management organizations it was difficult for organizations to identify the evacuation destination of the evacuees in the aftermath of Hurricane Sandy. The unwillingness of evacuees to provide their personal information to the emergency management organizations is further discussed under *Social Challenges*. The lack of evacuee information further hindered information dissemination activities for some local emergency management organizations. For instance, since some of the emergency management organizations did not have the contact addresses of their evacuees; they assume that reentry messages were only available to the people that had provided their contact information. As indicated by two informants:

> If they did not notify us that they were leaving the area, there was no way to contact them. What we did was if people were leaving the area and going to stay with relatives in another state, we were telling these people, "listen give us some contact information…whether the cell phone or telephone line or something we can communicate with you", because there was no other way to do it. But we did have that happened …some people just left the area. In apartments they just left up and left and just left everything. And yeah, that did happen. (Municipality #11)

The above excerpts illustrate that some of the local emergency management organizations advised their evacuees to provide their contact details before leaving the evacuation area. This was suggested so that the organizations could communicate information with the evacuees even after the evacuation. Nonetheless, there were evacuees who did not provide their contact information to the local emergency management organizations. This made the dissemination of return-entry messages less effective and a challenging task for the organizations. Some informants further noted that there were also some evacuees who were

contacting the organizations to receive information pertaining to the post-disaster situation. For instance, one informant said:

> Actually we had no way to communicate with them [evacuees]. You know we had …they just ended up calling here to see if somebody answered the phone for example and then asking you know "shall I come back now?"(Municipality #13)

For this municipality, contacting evacuees was difficult due to the lack of contact information related to the evacuees. As a result the evacuees themselves called the organizations in order to inquire about return-entry information following Hurricane Sandy.

Technological Challenges

Technology both fosters as well as hinders risk communication activities. On one hand, technology has increased information dissemination channels for local emergency management organizations. Currently, organizations utilize many technologies such as cellular apps, Wireless Emergency Alerts, social media outlets, and websites that have the capability to send messages easily and quickly. Contrary, when disaster strikes, technology may often be prone to disaster impacts. Similarly, interoperability among organization is another technological impediment that hinders effective communication during disasters (Comfort & Hasse, 2006; Manoj & Baker, 2007). For this dissertation, "*Technological Challenges*" are defined as the challenges resulting due to technological failures or due to issues related to technology. In their phone interviews, approximately twelve informants (48%) reported technical challenges affecting the communication of risk during Hurricane Sandy. The technological challenges reported by the local emergency management organizations primarily resulted from widespread and lengthy power outages and lack of internet connectivity.

During Hurricane Sandy many communities in New Jersey lost power due to strong winds, falling trees, damaged substations, and downed utility poles (Halpin, 2013). Some municipalities also had to intentionally shut down power due to the risk of electrocution resulting from secondary hazards such as downed power lines and fire hazard. The extended power outages had a profound impact on risk communication activities of the local emergency management organizations. According to some informants wide spread power outage created obstacles for information gathering and message dissemination activities during and aftermath of Sandy. As mentioned by four informants:

> **"**What do you do when all communications fail?" And really that's what happened in Sandy, we couldn't communicate to cell phones, certain carriers didn't work. Even though we had some phone service, we didn't have all phone service. And so to even to this day "what do you do when all communications fail and you still have to go back to some pencil and paper or town boards or you know just the word out" and we talked about that too. You know that might have to be one of the last resorts of to get the word out on what's going on if all communications fail. (Municipality #19)

> Well we had no power almost for a week so obviously everything was impacted but now we have a Facebook page. Once again I don't know how good that is once the power goes out. You know we have a Reverse 911, same thing if you have a regular landline it should work on a regular telephone, but if you have a cell phone that might be an issue you know power being out. (Municipality #8)

> After the storm hit we had a wide spread power failure that in some parts of town were as long as 7-10 days. And as a result our access to local media was restricted because our cable television system was down. (Municipality #20)

> Just the lack of power and the internet connection to get the information out…at times that was the only challenge that we had. We tried to innovate. We didn't have a router internet in-house system and we had to use cell phone internet type connections and computers that weren't equipped that way, which did happen but we had never planned for that before. (Municipality #2)

For these municipal emergency management organizations, information dissemination channels were limited due to widespread power outage during the Hurricane Sandy return-entry phase. Similar to the organizations, power outage and connectivity issues also impacted

evacuees. The hurricane force winds impacted communication infrastructures such as cell phone towers, and cable TV networks, and resulted in lack of network connectivity. The connectivity issue and its impact to risk communication were mentioned by many informants. In alluding to connectivity issues, some informants noted:

> Again we tried to tell people that not to come back until they heard that things were okay for them to come back. The problem was with the power failures that we were having for such a long time. A lot of people lost connectivity and so if they didn't get to a location where they could charge their cell phones they didn't get anything, so that was an issue. (Municipal # 6)

> I feel that social media is extremely effective source of information for emergency managers as long as you have access to it. When you have these major disasters, you will lose internet, so you can't get that message out. (Municipality #1)

> In the beginning of the storm we lost cell towers, we lost power; we lost internet capability, lost radio communications. (County #2)

> ..people couldn't get to the internet because their computers were down. (Municipality #6)

> Almost all of the TV's in the town are run through a cable TV. And stuff like that was down. All the power in the entire township was off. (Municipality #18)

The above quotes demonstrate that power and connectivity problems hampered all forms of communications such as Reverse 911 System, social media outlets, and mass media in some way. The impact of power outage on risk communication is a notable one, because if public don't have access to their cell phones, TVs or other means, they are not going to receive return-entry messages. As explained by four informants:

> Well, I think the biggest challenge would be whatever means we used to broadcast the message, whether it was radio, television, social media, you know traditional media, that the folks who needed to get the message may not have been able to receive it because of the extended power outage. (County #3)

> The problem was with the power failures that we were having for such a long time, a lot of people lost connectivity and so if they didn't get to a location where they could charge their cell phones they didn't get anything, so that was an issue. (Municipality #6)

> We have Verizon and it's a …you know you need power to run the box that's in your house, once the power goes out, your phones are down. So of course they [evacuees] had no radios. If we put the message out and the peoples cell phones aren't in our system so they are not going to get our message. (Municipality #16)

The above statements demonstrate that power failure had an adverse impact on risk communication. This is because evacuees were constrained to few information sources to receive return-entry messages, which decreased the likelihood of information accessibility among evacuees. The inaccessibility to return messages may have impacted other issues such as early return and lack of compliances to official return-entry orders for some municipalities, which is discussed in Section 6. 4. Social Challenges.

Organizational Challenges

Risk communication activities are also dependent on various organizational factors such as organizational structure, culture and resource capabilities. For instance, bureaucratic organizational structure which focuses on hierarchy and strict compliances to rules and regulations often hinder information sharing within and outside the organization (Neal & Phillips, 1995). Similarly, the "command and control view" of emergency management emphasizes centralized control of an event which can inhibit decision making and communication during emergencies and disasters (Phillips et al., 2012). Moreover, resource capabilities of an organization such as communication infrastructure and tools, man power, financial capabilities are also crucial for effective risk communication activities. For this dissertation, "*Organizational Challenges*" are defined as risk communication challenges resulting from organizational structure, culture and capabilities. Approximately nine informants (36 %) expressed organizational challenges during the Hurricane Sandy return-entry phase. According to the informants, local emergency management organizations faced challenges due to

command and control approach, bureaucratic structure, and constrained resources. Each of these challenges is further discussed below.

A successful management of disaster requires an integrated emergency management which focuses on coordination and collaboration among all parties involved in management of hazards and disasters. However, despite of the recommendations from scholars to incorporate integrated emergency management, "the command post" view of emergency management still persists in practice. The command post view of emergency management focuses on a command and control management approach where a designated leader attempts to centralize control of a scene or an event (Philips et al., 2012. p. 248). This type of approach hinders communication and coordination between individuals, groups, and organizations involved in emergency management. For instance, the command post approach views "an individual as a commander who establishes firm control over a situation and unilaterally issues orders to others" (Philips et al., 2012, p. 252). This can be problematic because it undermines the importance of communication and coordination needed during emergencies and disasters.

Some of the local emergency management organizations included in this study reported the command and control approach to be one of the challenges to risk communication in the aftermath of Hurricane Sandy. According to the informants, local emergency management organizations made requests to the New Jersey Governor's office to allow return-entry to the communities that had minimal damages. However, the governor rejected the requests and delayed return-entry movement. The governor's decision to restrict return-entry indicates the command post view of emergency management, where the governor established a firm control over the return-entry movement. According to the organizations the governor's order to delay

return-entry created challenge for them. In alluding to the challenges due to governor's command and control approach, three informants said:

> The governor issued an evacuation order and he would not lift it. It took us [X days] to get him to lift it. Now because it was such turmoil on the highways coming back into the counties, which started to get out of control. Some of the towns were just sort of like "let the people in any way", you know what I mean. (County #1)

> The biggest stumbling block to reentry was actually the governor's order. In our particular case the governor's order to evacuate and keep the coastal communities in barrier islands evacuated which theoretically prohibited reentry. (Municipality #17)

> The governor basically said "open up the roads", and that created the storm of people to trying to get home, so that you know practically negated most of our reentry plan…. They [local municipalities] were also hampered with reentry by the governor's declaration….. Due to the governor's declaration of closing the island we were prohibited from opening anything until he lifted his declaration. (County #4)

As stated by the informants, the governor strictly stood by his orders and did not consider the request for reentry movement. The restriction to return-entry in certain areas delayed return-entry, created traffic problems and negated return plans of the local emergency management organizations. The informants further stated that instead of coordinating and communicating with the local emergency management organizations, the governor single headedly made decisions on return-entry movement. This centralized control initiated by the governor thus represents a command and control perspective of emergency management.

Some local emergency management organizations also expressed their disappointment over governor's actions, and criticized the command and control approach of the governor. Two informants said:

> Our governor decided to micromanage the whole event, and he would not lift the evacuation order for like "Y" days. (County #1)

> Like I said, the governor's office decided to intervene, that kind of micromanaged all the things. (County #1)

> New Jersey is a home rule state so it's up to the municipalities, and ultimately the counties if it is a regional event on the basis of decisions. Unfortunately that power was taken away from us by the governor's office through executive order. (County #4)

As expressed in the above excerpts, these informants were frustrated over governor's action and even viewed the order as overriding of power structure. Another informant described the impact of governor's order on risk communication, specifically message dissemination. As mentioned by the informant:

> …in a typical situation we have prepared messages that go out and those messages were going out regarding the reentry, until we were cut short by the governor's office. And once he made the decisions to keep the islands closed, all of the communications came out of the state office of emergency management…the governor's office. And quite frankly we heard about lifting of the restriction on the island from the media before we heard it from the Governor's Office. (County #4)

For this county, the return-entry messages had to be constantly changed and revised based on the governor's decisions to allow and/or restrict return-entry. Moreover, communication structure also changed as the state office of emergency management took over the county emergency management offices to disseminate reentry information to the public. The above quote also highlights the lack of communication and coordination among the state and local governments. As described by the informant, state officials were not providing information to the county emergency management organization, so the organization received its information from other sources such as the mass media. Due to all these reasons, command and control approach undertaken by the governor created a huge challenge for risk communication activities aftermath of Sandy.

Government organizations have a bureaucratic organizational structure which is characterized by clear-cut hierarchies, standard procedures, and centralization. This bureaucratic structure requires employees to follow organizational chain of command and comply with formal rules and regulations. According to the data analysis, some informants from municipal emergency management organizations expressed challenges due to bureaucratic structure during and aftermath of Hurricane Sandy. The informants indicated that strict hierarchy in the organization structure along with adherence to rules and regulations delayed response from the higher authorities such as county and state organizations. For example, two informants described:

> If we made a request to them [state organization] it had to be shifted to their higher command and it would take hours for a response. So there was a huge disconnect on how quick we could get things accomplish because of the layers of structure above them they had to get through before it came down. (Municipality #6)

> But resources were tight the first three or four days, so you know you could have put the request but you didn't get an answer with whatever you needed for few days. So we kind of basically…if we needed something we kind of find it in a local grocery store or at the local big box store. Some things like that which is something that we had to do. (Municipality #6)

As mentioned by this informant, municipal organizations had to wait for a long period of time in order to access information and resources from higher authorities such as county and state organizations. The requirement to report requests to a higher chain of command along with standard procedural compliances resulted in delay of services from county and state. The municipal emergency management organization therefore had to make its own arrangements to get resources such as equipments, food supplies and other resources until they got response from higher authorities. The bureaucratic structure of organizations was thus a challenge for local emergency management organizations, particularly the municipalities.

Resources are important in order to respond effectively to hazards and disasters. However, resources are often overwhelmed and organizations are inevitably stretched thin while responding to emergencies and disasters (Goodchild & Glennon, 2010). The return-entry phase comprises of various activities such as security of the disaster zone, clean up, damage assessment, and utility and infrastructure restoration. Adequate resources such as staff, equipment, and funds are crucial to conduct return-entry operations. Furthermore, the availability of resources also influences the issuance of all-clear messages and return-entry decisions of emergency management organizations (Siebeneck, 2010, p. 46). Resource constraints were one of the challenges related to return-entry process post-Hurricane Sandy. According to the informants, counties and municipalities did not have enough staffing, equipments and monetary resources for security and risk communication activities. As suggested by three informants:

> Just staffing was a big challenge for us. Like we said, we had a pretty relatively robust emergency planning staging areas identified. We had control points identified that was all in place and that worked. And again because of the magnitude of the event and how much area was impacted, staffing was so to speak was extremely thin in some areas. (County #4)

> Well, like I think it would have worked except that we didn't have enough man power to handle it. The other problem was trying to educate the public prior to the event and we wanted to have brochures made up but we didn't have enough money to have it get it done….I know it was a difficult time for everybody, and we had some limited resources. (Municipality #6)

> At that point we didn't have any type of control. Not having the enough man power to do anything; it became an issue of just monitoring the situation as we could with National Guard present and our own police department. There was not just enough man power to deal with the situation. (Municipality #6)

> You know things were stretched in…personnel and equipment.... (Municipality #8)

Another informant from a small city noted:

> You know there are not enough fulltime employees. (Municipality #9)

Many of the informants specifically complained about lack of man power for security of evacuation zones. Local emergency management officials struggled to find sufficient law enforcement officials and other staff to operate security check points and conduct credential verification. Some informants also mentioned lack of full time employees in their organization. The interviews also indicated that local organization staff did not have separate personnel designated for risk communication activities. As risk communication activities require time and effort, the need to multitask during and aftermath of Hurricane Sandy may have also hampered risk communication activities of emergency management personnel. Some informants also believed that resource constraints were exacerbated due to the severity of the disaster. Hurricane Sandy impacted almost the entire state of New Jersey therefore the demand for resources was above average during the event. As a consequence, organizations at higher levels such as the state and county emergency management organizations were overwhelmed with resource requests, and couldn't deliver resources to municipalities on time. Hence, resource constrain was one of the problem experienced by local emergency management organizations in New Jersey.

Social Challenges

The effectiveness of risk communication activities is also dependent on public's behavior. For example, disaster warning messages are ineffective if people ignore messages and/or fail to undertake protective actions. Problems can also arise as public does not always wait for guidance from the government (Quarantelli, 1990). In case of return-entry this can result in early return of evacuees further leading to other problems. For instance, evacuees may return early and hinder post-disaster activities such as debris management, utility restoration and damage assessment. In addition to this, arrival of huge-influx of people at once can create traffic

issues, and even result in violent confrontations between security personnel and returnees (Tobin & Whiteford, 2001). For this dissertation, "*Social Challenges*" are defined as the challenges that emergency management organizations experienced pertaining to evacuee actions or when communicating and/or interacting with the evacuees aftermath of Hurricane Sandy. Approximately, nine (36 %) of informants reported experiencing social challenges during return-entry phase. The social challenges experienced by the local emergency management organizations during Hurricane Sandy return-entry phase include evacuee's unwillingness to provide information and non-compliance to the official messages.

One of the social challenges reported by local emergency management organizations was evacuees' unwillingness to provide their contact information. According to some informants, many of the evacuees were hesitant to provide their contact information, including information about their evacuation destination. This resulted in information challenge (as discussed in *Information Challenge*) for disseminating return-entry messages. The absence of information on evacuation destination, phone number, email address etc of the evacuees thus hindered effective communication of return-entry messages. For instance, two municipal informants mentioned:

> We reached out to these people to give us their information. Quite often these peoples don't want to give us their information because they for whatever reason they don't want to. I don't know if they just don't want to be involved or they feel funny about letting you know what's going on. (Municipality #11)

> There were a lot of folks that had ability for emails, texts and so on. Someone wouldn't give you that information. Whatever information evacuees will give us to contact them, we will use. (Municipality #5)

Receiving evacuee information by local emergency management organization is particularly important because evacuees were more likely to receive information if they had provided their contact information such as cell phone numbers and emails to the organizations. This is clearly expressed in the following statements:

> So again if you gave us a number to reach out to you, we would do that. If you signed up for alerts, you would get that. If you walked out of shelter and didn't tell where you were going, then we wouldn't be able to reach out to you. (Municipality #5)

> ....we notified people that [reentry]. But you know of course unless they have given us their cell phone numbers … (Municipality #13)

> …but to receive alerts and information from us in an emergency, you do need to sign up for "B". And you will get that information as I said in your home phone, cell phone, emails, text messages, Facebook and those types of things. (Municipality #5)

As described by the informants in the above quotes, municipalities and counties maintained records of evacuee phone number and other contact details before, during and aftermath of Hurricane Sandy. Although many evacuees signed up for preexisting community alert systems, there were also others that did not provide any information to the organizations. Thus, return-entry messages were inaccessible and unavailable for those that were hesitant to provide their information to the emergency management organizations.

Some local emergency management organizations also complained about the challenges that resulted due to evacuee actions. According to informants, some evacuees were ignoring official messages put forward by the local emergency management officials, and hindering return-entry operations in the aftermath of Hurricane Sandy. One informants' frustration on this point was palpable in the following statements:

> I think the challenge was dealing with the people rather than communicating with them. We were trying to get these people to understand, to help us here, "we will give you help, you just got to let us know what you need". (Municipality #11)

> I mean a lot of them [evacuees] wanted to get in and clean, and get things out. We even tried to advertise in the website how you plow and pile your stuff on the curb line so that it can be picked up and taken care of because of the recycling needs that existed. But we had that in the website along with the diagrams. But how effective was that I don't think people cared. They just piled the stuff outside, eventually what we did was took it to a location where it was all separated and trucked away. (Municipality #6)

As indicated in the above quotes, municipal and county emergency management organizations provided information on post-disaster process and activities, but the public was not complying with the official orders. One informant specifically explained about the problems due to sightseers' aftermath of Sandy. As noted by this informant:

> All in all, probably the biggest problem we had was with the sightseers. You know people that lived miles from the storm, after the storm they all showed up and they decided that they will drive through it and lack of better term - they were all pain in the neck. You know you got all these people and nobody lives here… like "what are you doing…get the hell out of here, go home". You know they wanted to see the storm, what was the end result of the storm I should say. (Municipality #8)

According to this informant, the sightseers were not only putting their lives at risk but also hampering return-entry operations of the organizations. The sightseer problem was further exacerbated due to misinformation through social media. For example, some informants reported that rumor formation and misinformation from the public was also another challenge experienced aftermath of Hurricane Sandy. According to the informants, some of the members from the public were creating rumors related to the nature of the disaster, its impact and post-disaster condition. In referencing to rumor and misinformation from the evacuees, three informants said:

> So we try to instill upon the people to pay attention to the official websites and Facebook bulletins. And they will go by what your cousin and best friend is telling you basically. (County #1)

> Social media is what killed us. We tried to put it on our website what towns…what was…you know anything that was going on step by step. But yeah people on Facebook, Twitter, they were ignoring it and they were just putting up their own bulletins. (County #1)

> There were some rumors that came from the public and in fact turned out to be a lot of them not to be reliable. The public had a lot of stories about looting, stealing and even dead body at one point that was all untrue. (Municipality # 2)

According to the above statements, evacuees were not only neglecting official messages but also relying on unofficial messages put forward by relatives and friends in the social media outlets. The interaction of evacuees in social media resulted in potential amplification and attenuation of post-disaster risks and conditions. In cases where social media acted as a risk attenuation station, people were underestimating risks and returning homes early. As stated by one informant:

> we had… social media killed us because everyone in the southern part of the county was texting and emailing their friends in Philadelphia, Delaware and Maryland, "Oh its beautiful down here, the sun's out, no damage at all, come on down...". There were cars backed up on the park way three-four-five miles. There were fist fights with Sherriff deputy trying to keep them off the island. (County #1)

As stated by this county informant, rumor formation and misinformation through social media led to the problems of sightseers in the disaster zone. The social interaction among the evacuees thus complicated risk communication actions of the emergency management organizations and further created other problems such as – noncompliance, traffic problems, and confrontation between management and the evacuees.

Summary

This chapter presented the results of the study related to return-entry risk communication challenges. The qualitative data analysis indicated that during the Hurricane Sandy return-entry phase local emergency management organizations experienced four main challenges related to risk communication. First, municipal and county emergency management organizations experienced information challenges due to lack of information from utility companies and evacuees. Utility companies, mainly the power companies, were unable to provide good and relevant information to the emergency management organizations. Likewise, the public was also

hesitant to provide contact information which was needed to receive reentry messages. Furthermore, the absence of contact information also made it difficult for emergency management organizations to identify the evacuation destination of some evacuees during return-entry phase. This hampered the information dissemination activities of the organizations. Second, the risk communication activities were hindered due to technical issues such as power outages and network connectivity. The extended power outages and lack of connectivity forced some organizations to utilize only limited dissemination channels, which may have decreased the accessibility to information for some evacuees. Third, return-entry risk communication activities were also impacted by organizational challenges such as strict command and control, bureaucracy, and resource constraints. Some of the local emergency management organizations complained that return-entry risk communication was hindered by governor's strict command and control over return-entry decisions. Moreover, the organizations also noted that resource constraints such as limited staffing, equipments and communication tools served as an impediment for effective communication. Finally, evacuees' behavior during return-entry was also reported to be one of the challenges pertaining to risk communication. According to the informants, evacuees neglected the official messages and return-entry orders, causing other problems associated with compliance, safety and traffic management.

The next chapter of this dissertation presents discussion of the results related to return-entry risk communication during Hurricane Sandy. The chapter also provides some recommendations to overcome risk communication challenges faced by the local emergency management organizations during the return-entry phase.

CHAPTER 7

DISCUSSION

This chapter presents a discussion of the findings and is divided into three sections. First, the chapter discusses the findings on information management, dissemination, and monitoring public response. The second section discusses the findings pertaining to risk communication challenges experienced by emergency management organizations during Hurricane Sandy and provides recommendations for overcoming the challenges identified in the study. Finally the third section proposes a new framework for understanding risk communication during the return-entry phase.

Discussion of Information Management Results

The first objective of this dissertation was to examine how local emergency management organizations gather information in order to assess risk when developing return-entry strategies and messages. This section discusses the information needs of local emergency management organizations when developing these strategies for their community, the risks and hazards they considered, and the information source they relied on during the Hurricane Sandy return-entry phase.

Information Needs

The first research question pertaining to information management was "What are the information needs local emergency management organizations require in order to develop the

return-entry strategy for their community?" Open ended questions were asked of the informants to understand the information needed to develop the return-entry strategies for their community. The results indicate that both municipal and county emergency management organizations needed information on post-disaster threats, damage, and public utility conditions in order to develop reentry strategies and messages during Hurricane Sandy. This information was gathered from various sources such as federal and state organizations, utility companies, first responders, and the public. The results of this dissertation further suggest that information received from these sources was utilized by local emergency management organizations to assess the risks, safety and the extent of damage pertaining to returning back to the evacuation zones, which ultimately influenced the return-entry decisions of the organizations. For example, after assessing the risks, if the local emergency management organizations believed the risks of returning to be very minimal, they would initiate return-entry back to the evacuated areas. Similarly, if the magnitude of damage in evacuation zone was extreme, return-entry was more likely to be delayed. In addition to the threat level, damage, and utility conditions, county emergency management organizations explicitly indicated the need for information on the number of evacuees taking refuge in shelters, and resource needs of municipalities from the municipal emergency management organizations. The evacuee and resource information was required to inform the allocation of resources and to identify resource assistance municipal organizations required from the county organizations to conduct return-entry operations.

The findings of this dissertation related to "information needs" support the arguments made by Siebeneck (2010) that threat levels, damages, public utility availability, number of evacuees, resources, safety and security are important factors in the creation and implementation of return-entry strategies. Following Hurricane Sandy local emergency management

organizations needed information on all these factors in order to create their return-entry strategies. In addition to these factors, Siebeneck (2010) also indicated that the size of evacuation zone was also a crucial factor in the development of return-entry strategies. Understanding of the *size of the evacuation area* is important because it has implication for traffic management, security, and credential verification operations of emergency management organizations (Siebeneck, 2010). Though this factor was not explicitly identified by the informants as being an information need, as local emergency managers probably already know the size of the evacuation zone of their community, it is one factor that should be considered, as during Hurricane Sandy evacuation orders were issued for a large geographic area within New Jersey. Emergency management organizations thus need this information in order to facilitate return movement and to avoid traffic problems caused by a large influx of residents returning at once. Hence, *size of the evacuation zone* could be one of the information needs of local emergency management organizations during the Hurricane Sandy return-entry phase. One way to identify the size of the evacuation zone is by using mapping software such as ArcGIS. Emergency management organizations can use ArcGIS to identify the evacuation area.

Risks and Hazards

The second research question for this study was "What risks and hazards in the aftermath of an event do local emergency managers consider when creating a return-entry strategy?" The study shows that emergency management organizations considered many risks and hazards in the development of return-entry strategies. Immediately in the aftermath of Hurricane Sandy, local emergency management organizations identified both primary and secondary hazards that could subject returnees to a multitude of risks. The main primary hazards that local emergency

management organizations considered were high winds, flooding, fire, and gas leaks. The secondary hazards reported by informants included falling trees, downed power lines, debris, water contamination, carbon monoxide poisoning, and damages to homes, buildings and infrastructure. These hazards posed many risks for the returnees, and were considered by the local emergency management organizations when making return-entry decisions. For example, the existence of downed power lines on the streets put returnees at risks of getting electrocuted if they re-entered the evacuation zone too soon. As a result, some local emergency management organizations delayed return until roads were cleaned up and power lines were deemed safe. Similarly, some informants expressed their concern about returnee health due to water contamination. These informants believed that contaminated water increased the likelihood of health hazards among the evacuees in their community. This finding suggests that the nature of risk and hazards experienced during a return-entry phase is diverse. Hence, local emergency management organizations may need to consider and educate the public on risks and hazards beyond primary hazards when managing return-entry movements. This further underscores the importance of effective risk communication during the return-entry phase.

The results from this dissertation found that local emergency management organizations received risk and hazard information from first responders, damage assessment teams, engineers, building inspectors, and local health departments. Likewise, the public also provided information on risks and damages to the local emergency management organizations through various means such as phone calls, social media outlets, and face-to-face interaction. These findings are similar to previous studies on risk communication (Lindell, Prater & Peacock, 2007; McLuckie, 1970; Mileti & Sorensen, 1991; Stallings, 1971) which indicate that emergency management organizations receive information from various sources. For example, Lindell, Prater, and

Peacock (2007) suggested that during a hurricane, local emergency management organizations monitor the National Hurricane Centers' (NHC) impact projections in order to receive a continuing stream of information on storm behavior (path and wind swath of the hurricane). The local emergency management organizations are thus in direct contact with the NHC and other local weather services and receive information from them (Mileti & Sorensen, 1991). Being specific to the disaster warning process McLuckie (1970) notes that information is also received from other sources such as the police and fire departments, mass media, and the public. The findings of this dissertation indicate that these sources were also valuable providers of information during the return entry phase, and that emergency managers rely on similar information sources during the return phase as they do during the evacuation phase.

The results of this dissertation also provide insights on risk assessment during the return-entry phase. As discussed in *Information Need*, post-disaster threat information was crucial in order to evaluate potential risks to returnees and to guide return-entry decisions. Similarly, the findings from Chapter 4, Information Management also suggests that local emergency management organizations utilized information on threat, damage, utility functionality, and infrastructure to make return-entry decisions. Finding emphasize the importance of providing information about risks and hazards during both evacuation as well as return. In the context of evacuation, the risk and hazard information focus on potential threats and impacts a community may experience. However, during the return-entry phase this information pertains to the experienced impacts. There is also challenge related to the risk and hazard information during both evacuation and return-entry phase. For example, during evacuation, there is uncertainty about the potential for impact, whereas during return there is uncertainty due to damage and impacts that may hinder the availability of risk and hazard and impact related information.

Additionally, in the case of return-entry, the study found that risk and hazard was not only crucial for informing return-entry decisions, but it was also important information when ensuring the safety of the emergency management teams and personnel who were involved in managing the post-disaster situations. Hence, even before conducting damage assessments and other immediate response activities, threat information seem to be vital for local emergency management organizations to make important decisions related to safety of their first responders.

Information Sources

The findings of the dissertation indicate that during the Hurricane Sandy return-entry phase local emergency management organizations received information from official as well as unofficial sources. Emergency management organizations exchanged information within and outside of their organization and the public acted as both information receivers and providers in the aftermath of Hurricane Sandy. The results of the dissertation indicated three types of information exchange – intraorganizational, interorganizational, and information exchange with the public. This finding is consistent with previous research that examined organizational communication pertaining to disasters. For example, when focusing on natural disasters, Stallings (1971) found that emergency management organizations are involved in three types of communication relationships - internal communication which occurs within an organization; communication with other organizations, and communication with the public. This research supports the findings noted in Stallings's research on organizational communications in natural disasters by demonstrating these same types of communication relationships remain during the return-entry phase.

The study also found that emergency management organizations varied in their information seeking behavior based on their evaluation of various information sources. This finding is consistent with the "Theory of Motivated Information Management" (Afifi & Weiner, 2004) in that emergency management based their decisions to seek or avoid information from certain sources upon their evaluations of the cost and benefit of seeking information from these sources. In this study, some local organizations believed information from social media to be deceitful due to the possibility of misinformation and rumor formation, so these organizations avoided information from social media. However, other organizations considered social media to be advantageous, and used information received from social media after confirming it. Although the reliance on traditional sources is understandable, it is also important to acknowledge the emerging role of public and social media in risk communication arena. Many studies (Palen, 2008; Palen et al., 2010; Shklovski et al., 2008; Sutton et al., 2008) have highlighted the impact of the public and new technology in disaster risk communication. For instance, Sutton et al. (2008) argued that social media has enabled the public to contribute in emergency response by providing information which could be hard to obtain by local emergency management organizations themselves. Shklovski et al. (2008) stressed that the public can provide community-relevant information during disasters which could be utilized by emergency management organizations. This means that emergency management organizations should identify and collect information from all credible sources (Haddow & Haddow, 2013).

Discussion of Dissemination Results

The second research objective of the study was to identify the strategies that local emergency management organizations use to disseminate return-entry information to the

evacuees after Hurricane Sandy. This section discusses the results pertaining to information dissemination strategies of the local emergency management organizations, information dissemination channels, and return-entry message content during the Hurricane Sandy return-entry phase.

Dissemination Strategies

The second research question for this study was "What strategies do local emergency management organizations use in order to disseminate return-entry information to the evacuees?" The findings suggest that local emergency management organizations adopted four types of dissemination strategies – *use of multiple channels, improvisation, joint communication* and *communication with special needs population* – during the Hurricane Sandy return-entry phase.

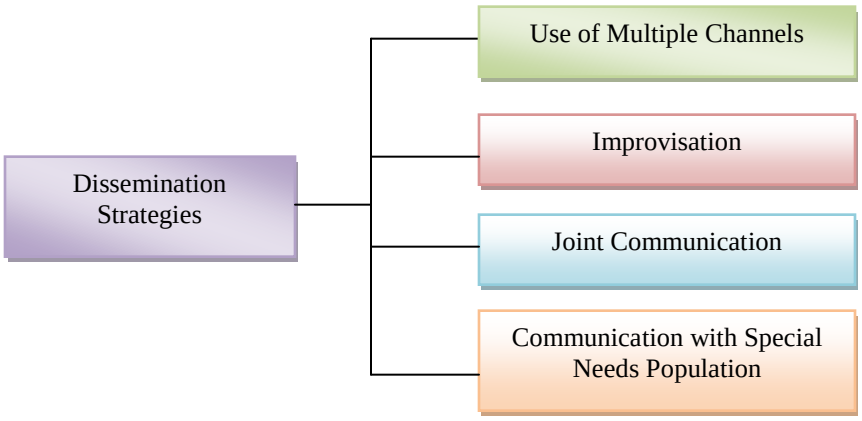

Figure 7.1 Dissemination strategies adopted by the organizations

The results from this dissertation suggest that local emergency management organizations relied upon various forms of information dissemination channels to transmit return-entry messages to evacuees. The findings further indicated that local emergency management

organizations utilized multiple channels because they believed that messages will propagate if disseminated through multiple forms. This dissemination strategy adopted by the emergency management organizations follows the recommendations made by disaster scholars. Specifically, previous research (Haddow & Haddow, 2013; Nathe, 2000; Strawdean, 2012) suggests that emergency management organizations should use all reasonable forms of available mechanisms in getting information out to the population at risk as it increases the likelihood that information will be received and passed along to a wider population. For instance, Strawdean et al. (2012) notes that receiving the same information from multiple channels serves as message confirmation for people who are considering the severity of the hazard. However, it is also possible that the use of multiple channels may not have been guided solely by the motivation to make information accessible to all evacuees. One possibility for use of multiple channels may be due to power outage and lack of connectivity issues. For example, according to the informants, many of the predetermined channels for information dissemination such as mass media and social media were non-operational due to extended power outage following Hurricane Sandy, so other forms of communication, specifically face-to-face and written communication, were utilized as a substitute to these channels.

The results of the study suggest that local emergency management organizations also improvised their risk communication activities to facilitate the information dissemination process. During the Hurricane Sandy return-entry phase, the local emergency management organizations were unable to use information channels as planned due to power outages, and hence had to adopt new and creative ways for message transmission. Similar to Waugh & Streib (2006), Webb (2004) and Webb and Chevreau (2006) who noted that flexibility is required while responding to a disaster, so may be the case in risk communication during the return-entry phase.

Since it is impossible to plan for every contingency that can arise during and after a disaster, successful risk communication during the return phase may require improvisation. One of the interesting results of this dissertation is the concept of *risk communication improvisation*, which has not been discussed in the literature. This study found that *risk communication improvisation* was one of the strategies that the local emergency management organizations implemented in order to disseminate return-entry messages to their communities. In this study, when local emergency management organizations could not use the preplanned information channels due to power outage, they improvised risk communication activities by handing out flyers, communicating through face-to-face interaction, posting bulletins in public places, changing cell phone carrier etc. This finding thus indicates that improvisation is an important action during and after disasters. Organizations should work on scenario building for improvisations instead of just focusing on structured response.

Joint communication was another strategy utilized by some municipal emergency management organizations in order to disseminate return-entry messages to their evacuees. As explained by the informants, there was collaboration among some municipalities to utilize a joint command system. The joint command system was a command structure created by the municipalities where emergency managers from the participating municipalities shared authorities and made joint decisions related to return-entry phase. This joint command structure was leveraged to create a joint website which was used to disseminate information during the return-entry phase. Collaboration during the return-entry phase is not a new phenomenon in disaster research. For example, while studying response and recovery during the San Bruno Explosion, McEntire, Kelly, Kendra and Long (2013) found that different organizations collaborated during the return-entry phase in that organizations collaborated while assessing

hazard conditions, checking the status of utility services, and checking credential verification. While collaboration among municipalities during the return is not uncommon; the collaboration among municipalities as it relates to the dissemination process is an interesting facet examined in this dissertation. The establishment of a joint website to disseminate return-entry messages to the evacuees of different communities was an innovative approach. This was because instead of using prior dissemination strategies where each municipalities disseminated messages separately, according to the informants, the participating municipalities used one website to disseminate return-entry information to all the communities for the first time. It is important to note that this strategy was not employed by every municipality and county. In the case of some communities examined for this dissertation, this type of joint communication strategy may have been possible due to the size and proximity of the municipalities that participated in the communication system. For example, the municipalities that came together to establish a joint command system were smaller in size and were in close proximity to one another. Moreover, the communities that collaborated with one another were all situated within the same county so it may have been more feasible for them to establish a joint command system. Another possible explanation for this type of joint communication is the collaboration prior to the event. In this study, the participating municipalities indicated that they collaborated in order to create a joint return-entry plan prior to the event. The implementation of such joint plan may have also enabled the organizations to provide message through a joint website. The collaboration among organizations is a good approach to overcome risk communication challenges and to facilitate return-entry process. Organizations that experience resource constraints during disasters can specifically benefit a lot from such collaborative efforts.

Research has emphasized the need to consider special needs populations during the risk communication process (Benavides & Arlikatti, 2010; Eisenman et al., 2007; Lindell & Perry, 2004; Phillips & Morrow, 2007). The results of this study reveal that the local emergency management organizations adopted dissemination strategies that targeted special needs populations during the return-entry phase. For example, contact information for special needs populations such as elderly, disabled, and people with medical issues were kept in a special needs database to ensure these populations were communicated warnings before and after Hurricane Sandy. The study also found that some local emergency management organizations had bilingual officials and personnel from different ethnicities in their workforce who served as interpreters for people with special language needs. Apart from English, some organizations also put their return-entry messages in Spanish. During Hurricane Sandy, some organizations utilized Language Line services to communicate with people for whom English was not their primary language.

In their interviews, although some informants mentioned the use of news media to disseminate return-entry messages to the evacuees, they did not specify its use to communicate with the evacuees who have special language needs. Research shows that use of news media other than English can be helpful to disseminate information to the people who have special language needs. Benavides and Arlikatti (2010) and Benavides (2013) particularly focused on Spanish-language media and noted that public service announcements made in Spanish helps to disseminate warning information to a wider Hispanic minorities. The Spanish-language media can also be used for risk communication during return-entry phase. Since Spanish-language media has advanced in many ways such as number, coverage, technology etc (Benavides & Arlikatti, 2010) it may be helpful in disseminating return-entry information to the evacuees that

are dispersed to a wider geographic location during return. Emergency management organizations can also utilize English–language media to disseminate return-entry messages in other languages that are specific to their community. However one should be cautious while translating the messages in other languages so that the meaning and urgency is not lost in translation. This is because incorrect translation can cause misunderstanding about the risks and put evacuees in further danger. For example, during the 1987 Saragosa Tornado in Texas the local radio station disseminated warning messages in Spanish with incorrect translation of the word "warning" which was one of the reasons for warning failure during the disaster (Aguirre, 1988).

This dissertation identified four dissemination strategies that the local emergency management organizations used during the Hurricane Sandy return-entry phase. Some other strategies that could be used to enhance the dissemination and the overall risk communication process during return are using visual aids to support audio and written messages. In their interviews, some informants mentioned that they used maps to communicate the return-entry process. While this study did not conduct an assessment specifically on how maps were used or how effective they were in communicating the return message, they could be a useful tool in communicating return strategies if designed carefully. Emergency management organizations may increase the effectiveness of their return-entry message by providing visual aids such as return-entry location maps to the returnees along with the audio and written messages. Moreover, it is also important that emergency management organizations examine the effectiveness of such maps (Arlikatti et al., 2006; Zhang, Prater, & Lindell, 2004). A study by Arlikatti et al. (2006) on hurricane risk area maps suggest that effectiveness of maps can be increased by avoiding clutter and by including key landmarks on the maps. This may be applicable for return-entry maps as

well. Using maps that contain landmarks, less clutter, and clearly delineated return entry dates and routes may enable returnees to comprehend return-entry plans more accurately. Organizations may also post photographs of the damages and post-disaster areas to provide visual understanding about the risk and hazards in the disaster area. This may further motivate the returnees to comply with official return-entry plans.

Perceived Effectiveness of Dissemination Channels

The findings of the qualitative analysis reveal that local emergency management organizations differed in their perceptions of effective dissemination channels. According to the findings, Reverse 911 Systems, radio, face-to-face communication and social media outlets were perceived to be the most effective channels for getting the message out to the evacuees. The local emergency management organizations' perception on effective channels was based on the number of people it could reach, the speed of the information dissemination, and degree of message distortion. The findings of this dissertation indicate that some local emergency management organizations considered Reverse 911 System to be the most effective channel because it allowed for information dissemination to all the evacuees that had provided their cell phone numbers. Similarly, some local emergency management organizations mentioned social media as an effective channel in getting the message out due to the coverage, speed of dissemination, and ability to disseminate wide forms of messages. For instance, social media not only allows quick message delivery but it also enables receivers to spread the information to others through re-tweets or by sharing the post. Contrary to social media, face-to-face communication was considered as the most effective means in getting the message out as it provided the opportunity to the public to verify information with emergency personnel.

The results of the study further indicated that the Reverse 911 Systems, mass media, and face-to-face channels were perceived to be the most effective channels in evoking a positive response among the residents during the evacuation process. As several participants suggested, Reverse 911 System was most effective because they believed that most of the evacuations during Hurricane Sandy were triggered by warnings provided through the Reverse 911 System. This assumption of the study participants is consistent with the study conducted by Strawderman, Salehi, Babski-Reeves, Thornton-Neaves and Cosby (2012) that found Reverse 911 Systems as the most effective channel in achieving the highest evacuation rates during the 2007 San Diego Wildfires. Specifically, Strawderman et al. (2012) found that the warning disseminated through the Reverse 911 System was able to convince more people to evacuate when compared to other channels.

The findings of the study further suggest that local emergency management organizations believed that evacuees highly relied upon Reverse 911 Systems, social media, mass media and their peers for return-entry information. According to the findings, local emergency management organizations believed that the evacuees actively followed these channels. For example, in their interviews, some organizations suggested that evacuees were active on social media. Similarly, some organizations also mentioned that evacuees in the shelters were constantly watching TV. Apart from these channels, the findings also indicate that some local emergency management organizations considered that the evacuees mostly relied on their peers. According to them the public did not heed official messages and instead followed information provided by their friends and relatives. This behavior of the public is consistent with the previous research on return-entry. For example, Siebeneck and Cova (2008) found reliance on peers to be a common activity while making return-entry decisions during Hurricane Rita. According to their study younger people

and people with children were more likely to rely on their peers for all-clear information than compared to old and people without children. This suggests that emergency management organizations should continue to be cognizant of how demographic factors can influence risk communication channel preferences for return information, and use strategies to enhance public's reliance on official sources.

Return-Entry Message Content

The findings of this dissertation indicated that during the Hurricane Sandy return-entry phase, local emergency management organizations communicated post-disaster information, all-clear information, return-entry plan and guidance information for modifying protective actions to their evacuees. According to the informants, the emergency management organizations provided post-disaster information to their evacuees. The dissemination of post-disaster information such as threats, damages, infrastructure condition was provided to the returnees to update them about the situation in the evacuation zone. This information was also communicated to inform returnees about the risks prevalent in the disaster zone and to motivate them to stay away from the evacuation zone. This is in line with the previous research on evacuation warning. For example, Mileti and Sorensen (1990. p.9) indicate that "if a warning message describes an impending hazard people are able to understand the logic of protective action". The communication of post-disaster information in the return-entry message may be an action taken by the emergency management organizations to inform residents of the risks present in the area and to encourage returnees not to return before the evacuation order is lifted. The all-clear information provided to evacuees following Hurricane Sandy was vital. The all-clear information was further followed by return-entry details such as location, time, and procedures for the return.

The local emergency management organizations communicated return-entry plans such as location, time and procedures to their evacuees. This information was provided in order to avoid reentry of huge influx of population at once and to avoid other issues such as traffic jam and security.

Another reason for communication of return entry plan was to facilitate phased return. Hurricane Sandy had a differential impact to the communities in New Jersey. The municipalities varied in the extent of damage, post-disaster and utility condition. The dissemination of return-entry time and location thus specifically played an important role on the communities that had adopted phased return-entry plans. Furthermore, some of the emergency management organizations also informed their returnees about the documents (drivers' license, tax papers, utility bills etc.) that they required in order to reenter into the evacuation zones.

The findings also showed that local emergency management organizations provided guidance information to the evacuees during the Hurricane Sandy return-entry phase. The communication of guidance informed returnees on things that they should do to ensure their safety during and after the return. This finding is similar to the guidance information in a disaster warning. For example, Mileti and Sorensen (1990) suggest that warning should contain guidance information in order to inform people on what they should do to maximize their safety during an impending hazard (p.9). However, unlike disaster warning where emergency management organizations notify the population at risk to adopt protective action, the guidance during return is the modification to the original protective action. In case of return, the returnees modify their initial protective action- evacuation- to some other protective actions such as taking caution while returning, checking for molds, wet wires etc. The local emergency management

organizations must recognize this possibility and communicate evacuees where they can report problems in their community and find more information.

Discussion of Public Response Monitoring Results

The third objective of this dissertation was to examine how local emergency management organizations monitor public response to return-entry messages and make adjustments to them. This section discusses the type of information the local emergency management organizations gathered to monitor the public response to return-entry messages, and the adjustments they made if return-related messages are not being received or heeded.

Information Gathered To Monitor Public Response

The findings from this study provide insight into the process by which local emergency management organizations monitored public response during the return-entry phase. Similar to the evacuation process where emergency management organizations monitor the public's response to evacuation orders (McLuckie, 1970; Mileti & Sorenson, 1990), so do they monitor public response after dissemination of the return-entry message. In the case of Hurricane Sandy, two distinct monitoring strategies utilized by the local emergency management organizations during the return phase were identified: - (1) *passive monitoring strategies* and (2*) active monitoring strategies*. Both during evacuation and return-entry, some local emergency management organizations gathered statistical data on the number of residents that received official messages and/or listened to their messages and passively monitored public response. Contrary to passive monitoring, some organizations were involved in public response monitoring through two-way interaction with the public using social media, phone calls and face-to-face

communication. By adopting active and passive monitoring strategies the organizations sought to confirm whether the public repeated the messages (for example on social media) put forward by the organizations, and if those messages were accurate. Furthermore, some organizations monitored public response by observing the public's behavior following Hurricane Sandy. For example, if the public complied with the return-entry plans then the organizations assumed that the messages were received and understood by the public. These findings on public response monitoring during return are similar to Mileti and Sorensen (1990) who provide different methods to monitor public response during disaster warnings. Mileti and Sorensen (1990) suggest three ways for monitoring public response - *communication lines to the field*, *systematic observation* and *unobtrusive measures*. *Communication lines to the field* refer to the monitoring strategy that comprises of the reporting from emergency officials who are on the field observing the behavior of the public. *Systematic observation* involves designating personnel to observe and/or measure human response. *Unobtrusive measures* for monitoring response include monitoring use rates of utility consumption to examine if public have evacuated. In case of return-entry *unobtrusive measure* may be used to examine if evacuees complied with the official return plans. For example, by monitoring utility use rates organizations can identify if residents have returned back to their homes. In this study, the difference in the monitoring strategies of the local emergency management organizations may have resulted due to the variation in organizational capabilities and the available time for these organizations. For instance, it is possible that some organizations may not have been involved in active monitoring due to lack of time and work force that is required in order to conduct a two-way interaction with the public. It is also possible that organizations with technological sophistication such as statistical softwares and monitoring devices might have considered passive monitoring sufficient to understand the

public response to official messages. One possible explanation for passive monitoring strategy may be lack of resources and time. For example, organization that lacked on man power may not have been able to designate separate personnel to monitor and respond to the questions of the evacuees. One way to overcome issues related to lack of man power can be through the use of community emergency response teams (CERT) or community volunteers. By providing training to these individuals and utilizing them during disasters, emergency managers can enhance public response monitoring during and after disasters. Furthermore they can also serve as a valuable information source during the return-entry risk communication process.

Adjustments to Return-Entry Messages

The findings show that local emergency management organizations made adjustments to their return-entry messages. According to the findings, the major adjustment made during the Hurricane Sandy return-entry phase was updating the return-entry messages. Almost all of the organizations mentioned that they updated the original return-entry message as the post-disaster conditions changed. The update was important because many communities implemented phased returns after Hurricane Sandy which required organizations to frequently communicate about the return-entry time and location for different zones. Another adjustment made by the local emergency management organizations was changing the message content. The findings suggest that organizations also made changes to their original return-entry messages when they experienced challenges during return such as traffic congestion, non-compliance etc.

In addition to the adjustments identified by the informants as being made during the return, other adjustment strategies that can be used by emergency management organizations are changing tone and clarity of the message (Mileti & Sorensen, 1990). The research on disaster

warning indicates that message style such as clarity and tone influences the effectiveness of a warning message. This may also hold true for a return-entry message. By changing the clarity and tone of original return-entry messages, organizations may increase compliances to return-entry plans. Depending upon the return-entry decision (allow return or extend evacuation order) the message tone may enhance effectiveness of a return-entry message. For example, if the purpose of a message is to keep evacuees away from their homes then organizations should provide the message in a tone that emphasizes the risks and dangers of returning too early. Alternatively, if a message is put forward to encourage evacuees to return, then the message should project confidence that the post-disaster conditions are under control and it is indeed safe to return home. Another strategy that the local emergency management organizations may use to adjust public response is changing the frequency of message dissemination (Mileti & Sorensen, 1990). Increasing the frequency of message dissemination may enhance effectiveness of return messages. Utilizing media markets that include locations where evacuees are located to disseminate return messages may also increase the accessibility of return messages to evacuees who may have moved further away from the evacuation zones.

This study applied McLuckie's (1970) Warning Components Framework to examine the risk communication process during the return-entry phase. The overall findings of the study indicate that many of the strategies noted in communicating warnings are similar to the return-entry risk communication process. Information sources and channels used during both warning and return-entry risk communication processes are the same. Similarly, the communication structure (internal communication which occurs within an organization; communication with other organizations, and communication with the public) that is formed during warning process also applies for return (interorganizational, intraorganizational, and communication with the

public). The updates and changes made during public response monitoring to warnings are also common to adjustments made to the return-entry messages. However, the findings do suggest some differences between warning and return-entry risk communication. Specifically, the information on risks and hazards during return-entry phase differs from that during an evacuation. The risks and hazards during an evacuation warning are related to potential impacts, whereas in case of return it is due to an experienced impact following a disaster. The dissemination strategies, specifically risk communication improvisation that occurred during Hurricane Sandy was a result of the circumstances created by the post-disaster condition such as power outage and network connectivity which may not apply for a warning process.

Overcoming Challenges

In addition to the risk communication process, this dissertation examined the challenges that the local emergency management organizations faced when communicating risk during the return-entry phase. The findings from the study identified four themes of communication challenges faced by local emergency management organization following Hurricane Sandy: – *information, technological*, *organizational* and *social challenges.* This section will discuss each category of challenges and provide recommendations to overcome them.

The results of this dissertation identified *information challenge* as one of the risk communication challenges faced by the local emergency management organizations during Hurricane Sandy. Primarily, participants indicated that lack of information pertaining to utility restoration timelines and status updates from the power companies was problematic. This finding is similar to findings noted in a study conducted by Halpin (2013) after Hurricane Sandy. In her study, Haplin (2013) found that many municipalities in New Jersey were disappointed with their

power companies due to lack of effective communication during and after Hurricane Sandy. According to the study 53% of the municipalities that were surveyed for the study reported the quality of communication with their power company as poor or fair (Haplin, 2013, p.38). Haplin further found that infrequent and inaccurate information hampered post-disaster activities such as clearing roads, setting up shelters and communication with the residents. It is therefore important to overcome this challenge in future. One approach to overcoming this challenge can be through communication activities prior to the disaster. Regular communication may allow organizations such as emergency management organizations and utility companies to build and maintain a good working relationship with each other before, during and after an event. Communication can also be cultivated through participation in disaster exercises, collaboration on Emergency Operations Plans and during the return-entry planning process. As a result, these activities may serve to enhance response and recovery capabilities during an actual disaster by facilitating information exchange between the organizations (Haddow & Haddow, 2013; Veil et al., 2011). The findings of this study suggested that information challenges during Hurricane Sandy resulted because emergency management organizations were unsure of whom to contact from the power companies, and the utility companies did not know the grid structure of the city or county that they were serving. Hence, regular communication and effective planning among the organizations prior to a disaster may eliminate this type of information challenge in future.

Another information challenge identified by this study was the lack of information about the evacuation destinations of the evacuees. This challenge resulted partially due to evacuees' hesitancy to provide their contact information (specifically information on evacuation destination) to the emergency management organizations. According to the findings, the local emergency management organizations faced challenges while disseminating return-entry

information to evacuees that had not provided their contact information to the organization. This problem was exacerbated if these evacuees had moved further away from the disaster zone. This finding supports the assertion made by Siebeneck and Cova (2008, 2014), who posit that risk communication during return-entry is challenging due to the dispersion of evacuees across a wider geographic area. One way to overcome this challenge would be through public education and awareness. Educating the public on why it is important to provide contact information to the local officials can help to overcome this challenge. For example, informing the public that they are more likely to receive alerts, warning and return messages if they provide their contact information to the officials may be one way to increase the awareness of the public. This type of awareness can be provided through TV or radio advertisements, notices, and/or face-to-face communication. Notifying the public about different official information sources and encouraging them to be familiar with the sources may also help to tackle information challenge during return (Lin et al., 2013). For example, educating and encouraging the public to sign up for township and/or county alerts may also be one way to increase the return-entry message accessibility for those evacuees that are hesitant to provide their information to the organizations.

The results of this dissertation also identified *technological challenges* as one of the risk communication challenges faced by the local emergency management organizations. During the Hurricane Sandy return-entry phase, local emergency management organizations reported widespread power outages that hindered effective communication of return-entry messages to the evacuees. This finding supports the claims made by Halpin (2013) on the impacts of power outage during and after Hurricane Sandy. The results of the dissertation also suggested lack of network connectivity as another technological issue that hindered risk communication during return. These technological challenges stress the need to mitigate for communication failures.

One approach can be through planning and preparedness. Purchasing generators, satellite phones and having back-up plans for information dissemination by the emergency management organizations may facilitate communication even during a power outage. Another possible way to overcome technological challenges may be by developing and integrating a specific return-entry communication plan within an Emergency Operations Plan. Such a communication plan can include strategies to disseminate information in case of a power outage. It can also identify multiple redundant ways to disseminate risk information to the public both with and without special needs. Moreover, improvisation to the communication plan and activities can help to adapt the plan according to the changing disaster situation and facilitate risk communication with the evacuees and other organizations.

This study also identified *organizational challenges* as another type of challenge pertaining to risk communication local emergency organizations experienced during the return-entry phase. The organizational challenges experienced by the local emergency management organization during the Hurricane Sandy return-entry phase stemmed from issues related to the command and control approach, bureaucracy, and resource constraints. The command and control approach was one of the organizational challenges that hindered risk communication during the return-entry phase. According to the study, the governor's strict order to prohibit return-entry to some coastal counties hindered the risk communication process. For example, some local emergency management organizations mentioned that they had to change their return-entry messages due to the governor's order. This resulted in disappointment among the municipalities as they could not initiate return-entry even though their municipalities were safe for return. The strict, rigid and centralized approach related to command and control model and its impact on risk communication and return-entry process is consistent with Neal and Phillips

(1995) comments pertaining to the use of the command and control approach during the disasters. Neal and Phillips (1995) compared two models – *command and control model* and *emergent human resource model* - to disaster response by providing examples of Loma Prieta Earthquake and Hurricane Andrew. The study found that by adopting emergent norms approach that focused on flexibility and emergent structure, the American Red Cross was better able to provide effective service delivery during the disasters. Furthermore, the study also indicated that command and control approach manifested in bureaucratic structures of some of the organizations hampered response and recovery efforts after Hurricane Andrew. Thus challenges related to command and control approach should be addressed to better facilitate disaster management activities including risk communication. One approach to overcome this risk communication challenge due to command and control mentality is by coordination (Philips et al., 2012). By viewing themselves as a coordinator rather than authoritative personnel, local emergency managers and/or those in higher authorities can overcome command and control mentality (Philips et al., 2012). As these entities view themselves as a coordinator and embrace flexibility and decentralization, it may provide opportunities for discourse. As a result they may exchange ideas and problems and achieve consensus on return-entry decisions. This can eliminate any misunderstanding and negativity to one another, as seen during Hurricane Sandy between the emergency management organizations and the governor's office, and further facilitate risk communication process during return.

The findings also indicate risk communication challenges stemmed from bureaucracy. The local emergency management organizations indicated that there was a delay in getting information from higher authorities due to the long chain of command. This risk communication challenge that arises due to bureaucracy can be addressed by improvising organizational work

processes. For example, by modifying bureaucratic decision-making processes organizations can reduce delays related to resources and information. Risk communication challenges due to bureaucracy may also be addressed by using collaborative technological tools such as mobile application, Web-based email, softwares such as Groove and E Team (Farnham, Pedersen & Kirkpatrick, 2006; Manoj & Baker, 2007). The use of such communication tool enables data flow and communication between different organizations and between different levels of hierarchy further facilitating risk communication during return-entry phase.

The findings also suggest that during the Hurricane Sandy return-entry phase the local emergency management organizations faced challenges due to resource constrains specifically lack of man power. According to the informants there was no single individual who was fully responsible for risk communication. Similarly, some organizations also indicated that they did not have resources to monitor public response. This impacted the return-entry risk communication activities of the organizations. The risk communication challenges due to resource constrains can be addressed through collaboration (Kapucu, Arslan & Demiroz, 2010; McEntire, 2002). For example, some of the municipalities in the study collaborated and formed a joint website to communicate with the public. This not only helped them to get resource help from other participating municipalities, but it also facilitated the risk communication with other larger entities such as the FBI, FEMA, NJOEM and others.

The results of this dissertation indicate that *social challenge* was also one of the challenges experienced by the local emergency management organizations during the Hurricane Sandy return-entry phase. Social challenges in part occurred due to rumor formation and misinformation among the public, and due to the lack of compliance with return-entry plans. The findings indicate that rumor formation and misinformation specifically through social media was

one of the social challenges experienced by the local emergency management organization during the Hurricane Sandy return-entry phase. This finding is consistent with the study conducted by Gupta, Lamba, Kumaraguru and Joshi (2013) on Hurricane Sandy. Gupta et al. (2013) found that social media was exploited by malicious entities to spread rumors and fake pictures during Hurricane Sandy. The study examined online social networking website "Twitter" during Hurricane Sandy and identified 10,350 unique tweets containing fake images which circulated on Twitter. Furthermore, the study also indicated that 86 % tweets were circulated as a result of retweets. Overcoming challenges due to rumor formation and misinformation is important because false information and rumor can cause risk amplification or attenuation among the public. For example, the findings from the study indicate that there was rumor and misinformation on social media sites about the condition of evacuation zones post Sandy. Some of the people posted false messages encouraging others to return back to their homes. As a result, it led to problems such as traffic congestion, confrontation between management and the evacuees, and noncompliance to return-entry plans. One way this problem may be addressed is by providing clear, concise and accurate information to the evacuees as early as possible (Rosnow, 1991). The early information from the emergency management organization may decrease the chances for rumor formation and misinformation. Similarly, emergency management organizations may also address this challenge by monitoring social media websites and mass media to detect and debunk rumors and misinformation. Furthermore, encouraging evacuees to rely on official sources of information before, during and after a disaster may also minimize possibility of rumor and misinformation among the public.

Another social challenge identified by this study was lack of compliance with return-entry plans and messages. This finding is in line with Sorensen et al. (1987) who posit that

evacuees' return prior to the issuance of all-clear message is one of the most common problems pertaining to return-entry. The finding of this dissertation suggested that local emergency management organizations perceived that lack of compliance with return plans resulted from misinformation and rumor formation among the returnees. While this may be one of the reasons for noncompliance, there may also be many other reasons that may have led to this social challenge. For example, it is possible that noncompliance may have also resulted due to ineffective risk communication measures of the local emergency management organizations. For example, in their study on Hurricane Rita, Siebeneck and Cova (2008) found that local authorities were unable to effectively communicate return-entry plans to the evacuees dispersed to a wider geographic location, which resulted in lack of return-entry information among the evacuees. This further led to low level of compliances with reentry plans during Hurricane Rita (Siebeneck & Cova, 2008).

Another reason for noncompliance may be associated with demographic factors. Siebeneck and Cova (2008) found that certain demographic factors such as education level and gender influences compliances to return-entry plans. In their study on Hurricane Rita, Siebeneck and Cova (2008) found that individuals without a college degree, and females were more likely to comply with return-entry plans than compared to those with college degree, and those who were males. Another possible explanation for noncompliance is the evacuees' concerns that motivate them to return early. It is possible that similar to other events noted in the literature, (Siebeneck & Cova, 2012; Siebeneck et al., 2013) evacuees were worried about looting at their homes, lost income, and traffic jams which may have influenced the compliances to return plans. For instance, Siebeneck et al. (2013) found that returnees' concerns about being stuck in traffic were associated with early reentry following Hurricane Ike. Non-compliances may have also

resulted due to risk perceptions of the evacuees. For instance, Siebeneck and Cova (2012) examined return-entry during the 2008 Cedar River Flood in Iowa and suggested that evacuee risk perception influenced return-entry compliance. Siebeneck and Cova found that greater levels of risk perception of the evacuees were associated with compliance to official plans during the flood. Regardless of the reasons, noncompliance is an important issue that should be addressed. Return-entry noncompliance not only creates security and traffic management problems but it also puts the evacuees in danger to secondary hazards. The noncompliance issue may be addressed by identifying effective means to communicate with the evacuees and by educating and motivating evacuees to comply with the official plans (Lin et al., 2013; Siebeneck & Cova, 2008). For example, educating the evacuees on the risks and dangers of returning early may motivate them to comply with official return-entry plans. Distributing printed brochures with return-entry information such as risks of returning early, return-entry information sources, credential verification process, return-entry procedure etc to the public prior to an event provides information on why, when and how pertaining to return-entry compliance (Lin et al., 2013). As a result it may increase compliance to the official return-entry plans following disasters.

Lastly, learning from previous events can be an effective way to overcome all these challenges and failures for future disasters. It is important for organizations to identify lessons learned and gather feedback from multiple stakeholders after a disaster in order to enhance emergency management activities in future. For example, Anderson (1969) found that there was significant improvement in the warning system for the City of Hilo after the 1960 Tsunami due to the incorporation of feedbacks received from the scientific experts and the public. This type of feedback and/or after-action reports allows emergency management organizations to evaluate

their current risk communication strategies and make improvements to enhance risk communication for future disasters.

Return-Entry Risk Communication Framework

The theoretical implications of this study are many. The guiding conceptual framework for the study was based on two models – *Theory of Motivated Information Management* (Afifi & Weiner, 2004) and *The Warning Components Framework* (McLuckie, 1970). This study integrated the two models in order to examine return-entry risk communication at an organizational level. The results of this dissertation suggest that risk communication during the return-entry process may differ from the warning process, and therefore a new framework related to the risk communication process is proposed. This new framework is illustrated in Figure 7.2.

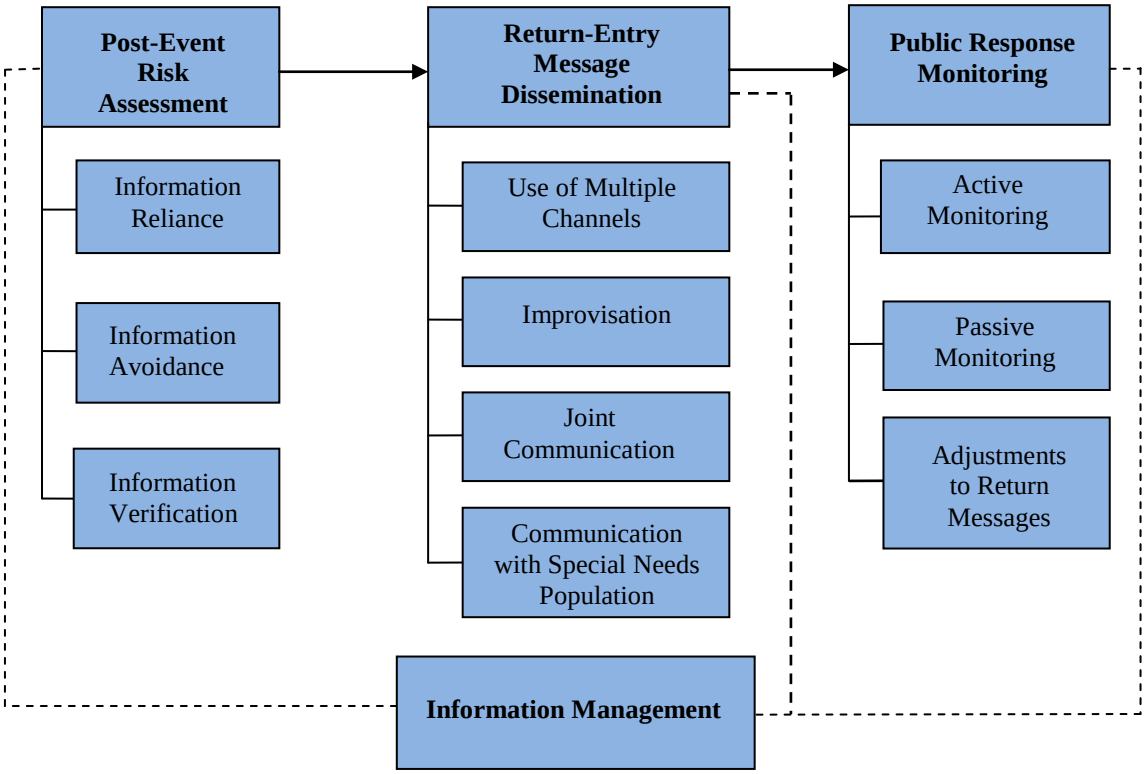

Figure 7.2 Risk communication process during the return-entry phase
Modified from Warning Components Framework and TMIM

According to the data analysis, organizations are involved in a cyclical process while communicating risk to the evacuees during the return-entry phase. This cyclical process is comprised of three stages – 1) Risk Assessment, 2) Dissemination, and 3) Public Response Monitoring that are linked through information management activity during the return-entry phase. In this proposed framework, risk communication begins with risk assessment stage where an emergency management organization is involved in information management activities. The emergency management organization seeks information from various sources in order to reduce uncertainty related to the post-disaster condition. The information seeking behavior of the organization is guided by the assumptions made in the Theory of Motivated Information Management [TMIM] (Afifi & Weiner, 2004). As suggested in the TMIM model, the emergency management organization strategically seeks or avoids information from various sources based on their evaluation of those sources. For instance if the organization believes that a source is reliable it will seek information from that source. Contrary, a source that is perceived as unreliable will result in information avoidance. Specifically for the return-entry movement, organizations seek information on post-disaster threats, damages, and utility conditions in order to develop return-entry strategies for their community. Such information is gathered from both official as well as unofficial source depending upon the organizations' reliance on these sources. The information thus collected is used in order to assess risk and to make decisions on the return-entry process. The risk assessment stage is then followed by the dissemination stage (McLuckie, 1970).

In the dissemination stage the emergency management organization provides return-entry messages to the evacuees by adopting various information channels. The organization is once

again involved in information management activities where they (as an information provider) seek to reduce uncertainty of the evacuees pertaining to the evacuation zone. Furthermore, the selection and use of the dissemination channel is also a strategic behavior based on the perceptions of the effectiveness of the various sources. This dissemination stage then leads to public response monitoring stage (McLuckie, 1970).

In the public response monitoring stage, the emergency management organization seeks to reduce uncertainty related to public response to return-entry messages. In order to reduce this uncertainty the organization is involved in active and passive monitoring strategies where information is gathered to determine if the public received, understood and complied with the messages disseminated by them. During this process, the organization also identifies additional needs of the evacuees. In order to address this information need of the evacuees, the organization once again involves in information management activities. The public response monitoring stage then feeds into the risk assessment stage and the cycle continues.

The proposed framework for risk communication during return-entry phase is similar to the Warning Components Framework (McLuckie, 1970) to some extent because all the three stages of the warning process are also applicable for risk communication during return. For example, the emergency management organization also goes through risk assessment, dissemination and public response monitoring stages during the return-entry risk communication process. However, there are also differences between the proposed framework for return and the Warning Components Framework. The main element that makes this proposed framework different from the Warning Components Framework is the inclusion of the information management activity in the risk assessment, dissemination and public response monitoring stages (as shown in the Figure 7.2). In the proposed model, all the three stages focus on reduction of

some kind of uncertainty and involve information management activities of the emergency management organization. The proposed framework further suggests that unlike the warning process depicted in the Warning Components Framework, risk communication during return-entry is a cyclical process where risk assessment, dissemination and public response monitoring stages feed into one another.

The final chapter of this dissertation provides an overall summary of the findings and limitations of this research. The chapter also discusses the theoretical and practical implications of this study. In addition to this, future research directions are also identified.

CHAPTER 8

CONCLUSION

The purpose of this dissertation was to examine risk communication during the return-entry phase from an organizational perspective. This research was guided by three questions: 1) What are the information needs local emergency management organizations require in order to develop the return-entry strategy for their community?; 2) What strategies do local emergency management organizations use in order to disseminate return-entry information to the evacuees?; and 3) How do local emergency management organizations monitor public response to the message?

In order to answer these questions, semi-structured telephone interviews were conducted with 25 local emergency management organizations in the state of New Jersey. The data obtained was analyzed using a grounded theory approach. The study identified five themes - 1) Information Needs, 2) Information Source, 3) Information Exchange, 4) Information Seeking Behavior, and 5) Applying Information for Return-Entry Decisions - related to information management during risk assessment process following Hurricane Sandy. According to the results the local emergency management organizations needed information on hazards, damages, utility and infrastructure condition in order to develop return-entry strategies for their community. This information was received from both official and unofficial sources based on the evaluation of these sources made by the emergency management organizations. The information gathered was further utilized by the organizations to make return-entry decisions following Hurricane Sandy.

In addition to this, the findings also show that local emergency management organizations used four dissemination strategies - 1) Use of Multiple Channels, 2) Improvisation, 3) Joint Communication and 4) Communication with Special Needs Population- to provide the return-entry messages to the evacuees following Hurricane Sandy. The return-entry messages communicated post-disaster information, all-clear information, return-entry plan and guidance information to the evacuees. Furthermore, the study also identified two themes related to the monitoring process – 1) Monitoring Strategies and 2) Adjustments to Return-Entry Messages - during the Hurricane Sandy return-entry phase. The findings suggest that local emergency management organizations monitored public response to the return-entry messages by adopting active and passive monitoring strategies. The emergency management organizations also made adjustments to their original return-entry messages by changing the message content and by updating the messages during the return-entry phase.

The study identified four categories of challenges related to risk communication – 1) Information Challenge, 2) Technological Challenge, 3) Organizational Challenge and 4) Social Challenge – faced by the emergency management organizations during the Hurricane Sandy return-entry phase. The study found that risk communication during return-entry phase is a challenging task for emergency management organizations. Specifically, emergency management organizations not only experience problems due to wide geographic dispersion of the evacuees during return but they also face additional challenges due to lack of information, power outage, network connectivity issues, organizational structure, resource constrains and evacuee behavior. The findings of this study have both theoretical and practical implications which are further discussed in the following sections.

Theoretical Implications

This dissertation contributes to the disaster literature by advancing the knowledge and theory in two areas –the return-entry phase and risk communication. First, this study focused on return-entry phase following a disaster, which is an under examined area in the disaster research. Despite of the many recommendations from scholars to investigate return-entry phase, very few studies have examined return-entry following a disaster (Dash & Morrow, 2000; Quarantelli, 1984; Sorensen et al., 1987; Stallings, 1991). Furthermore, those studies that have examined return-entry phase all focus on the individual and household level. This research thus fills that gap in knowledge and expands the understanding on return-entry phase by examining risk communication during return-entry phase at an organizational level from the perspective of the emergency manager.

A second significant contribution of this research is the development of a new risk communication framework. This study integrated two existing frameworks - Theory of Motivated Information Management (Afifi & Weiner, 2004) and the Warning Components Framework (McLuckie, 1970) - to introduce a new framework that examines risk communication process at an organizational level. The study indicated that risk communication during the return-entry phase comprises of risk assessment, dissemination, and public response monitoring stages, and involves information management activities of the emergency management organizations. The results also suggested that risk communication during return-entry phase is a cyclical process where risk assessment, dissemination, public response stages feeds into one another and are repeated as necessary.

This study also advanced the knowledge pertaining to the risk communication process during the return-entry phase. For example, the study provides understanding on the type of information communicated by the emergency management organization in the return-entry messages. The understanding on the return-entry message content provides opportunities to examine the ways to increase the effectiveness of the message. For example, this study indicated the information that is provided in a return-entry message, future research can explore the ways to put forward this information in an effective way that motivates the evacuees to comply with the official return-entry plans. According to this study return-entry messages communicate a variety of information such as post-disaster information, all-clear information, return-entry plan and guidance to the evacuees, the identification of ways to make these information more specific, clear, and accurate can enhance the effectiveness of the messages further increasing the compliances to return-entry plans.

This study also introduced a new theoretical concept– *risk communication improvisation* – that has not been discussed in the disaster literature. This new concept is a theoretical contribution to the emergency management scholarship because it can provide a new conceptual way to understand and examine risk communication strategy of the local emergency management organizations. The findings of this study provided insight into the adaptations and creative thinking emergency management organizations utilized in order to communicate risk to evacuated populations. This is specifically important because emergency management organizations can experience challenges due to unexpected situations during the return-entry phase such as power outage and internet connectivity etc. which requires improvisation to the existing risk communication plans. Furthermore, the study also identified collaborative risk communication activities among emergency management organizations during return. This

finding provides understanding on why and how organizations work together during the return-entry phase. For example, according to the proposed framework emergency management organizations work with other organizations and information sources in order to assess risk, disseminate return-entry messages and to monitor public response to the return-entry messages. The selection and use of these information sources are based on the strategic behavior of the emergency management organizations. The emergency management organizations are involved in information management activities where they seek information only from those sources that they believe to be reliable. Furthermore, the selection of the dissemination channels is also based on the organization's perception on the effectiveness of those channels.

Another contribution of this research is that it is one of the first studies that provide empirical evidence suggesting that risk communication during return-entry phase is problematic for the emergency management organizations. This study supports the findings of Siebeneck and Cova (2008) that focused on individual and household level. In their study on Hurricane Rita, Siebeneck and Cova (2008) indicated that risk communication during return-entry phase is a problem for emergency managers because the evacuees are dispersed to a wider geographic location. This study not only provides empirical evidence to support risk communicating during return-entry phase is challenging but it also identifies other reasons on why communicating risk during return-entry can be problematic. For example, this study found that lack of information, power outage, organizational structure and evacuee behavior creates additional problem for emergency management organizations when trying to communicate with the public during the return-entry phase.

Practical Implications

McLuckie (1970) posits that disaster agents generate numerous secondary threats that can subject the public to multitude of risk for a long period of time. This means that emergency management organizations have an important role in the communication of risks not just during but also in the aftermath of a disaster. However, communicating risk in the aftermath of a disaster, specifically during return-entry phase, can be a challenge for emergency management organizations (Siebeneck & Cova, 2014, p.2). The findings of this dissertation provide some implications for the emergency management organizations and practitioners.

First, the study findings suggest that emergency management organizations require information from both official and unofficial sources in order to develop return-entry strategies for their community. This means that emergency management organizations should establish and maintain a good working relationship with all credible sources before an event. This will facilitate information gathering during and after a disaster. Organizations can also include communication plan within their existing Emergency Operations Plan, which can be activated during an actual disaster.

Second, the study found that risk communication can be hampered due to power and connectivity issues following a disaster. This technological failure can hinder the use of existing communication channels and impact risk communication activities during return. Emergency management organizations should thus consider these scenarios during the planning process. Improvisation to existing plans may also be necessary to facilitate communication during such conditions.

Third, the study also found a lack of communication between state and local emergency management organizations during the Hurricane Sandy return-entry phase. Since effective risk

communication requires sincere desire to solve problem, organizations should communicate with each other regularly. These organizations can adopt collaborative technological tools such as mobile application, Web-based email, softwares such as Groove, Web EOC and E Team to overcome communication barriers among them.

Fourth, as Siebeneck and Cova (2008) and Lin et al. (2013) note, making return-entry messages available to all evacuees is a difficult task for emergency management organizations due to the wide geographic dispersion of the evacuees during return. Emergency managers can thus encourage the public to identify the official sources of information prior to an event. This may help the public to understand where to find reliable information following a disaster. Providing brochures, conducting preparedness programs, advertising in TV and radio can be an approach to make public aware about official sources of information.

Fifth, the study suggested that risk communication during the return-entry phase is complicated due to evacuee behavior. Rumor and misinformation, lack of compliance to return-entry plans were some of the challenges related to risk communication during Hurricane Sandy. In order to overcome these challenges, emergency managers can adopt the risk communication strategies identified in this study. Emergency management organizations should use multiple redundant ways to provide information to the evacuees. They can also use dissemination strategies such as special needs databases, interpreter, Language Line, Spanish-Language media, etc. that target special needs population. Providing information in different forms such as maps, photographs, audio and written form can help evacuees to interpret the messages correctly.

Finally, the finding on information avoidance indicates emergency management organization's skepticism on information received from the public, specifically via social media. This underscores the need to build and maintain trust between the organizations and the public.

By encouraging citizen participation in disaster management activities, organizations can promote a good relationship with the public. Organizations can also collaborate with CERT teams and neocartographer to facilitate risk communication during the return-entry phase. CERT teams can be utilized to provide risk information to the evacuees. Similarly, information received from the public, specifically from neocartographers (Volunteered Geographic Information), can be a valuable information source to the organizations following a disaster.

Research Limitation and Future Research Directions

This dissertation has some limitations which should be acknowledged when considering the findings. First, the study area for this dissertation is New Jersey; however Hurricane Sandy was a broader regional disaster that caused devastation in many areas, particularly the New York Metropolitan area. Caution should be taken while generalizing the findings of this study. This is because the organizational relationships between the local and state emergency management organizations may vary from state to state. This study found that there was a conflict among the local and state emergency management organizations during the Hurricane Sandy return-entry phase in New Jersey, which may not always be the case in other locations and events.

Another limitation of this dissertation is the scale at which risk communication was examined. Although this study examined risk communication at an organizational level, it only focused on local organizations. The study did not examine the dynamics of if and how communication occurred regionally (eg. across the state boundaries) during the return phase. Moreover, the study also did not examine the role of the federal government in the risk communication process during the return-entry phase. Future studies should investigate the

communication process between states and also examine the role of the federal government in the risk communication process during the return-entry phase.

There are also some methodological limitations related to the study. For example, the data was collected through semi-structured telephone interviews with the informants. The limitation arises as the researcher did not personally visit the study area. Similarly, there may be a social desirability bias among the respondents of the emergency management organizations, resulting in over reporting good things and/or under reporting bad things pertaining to the interview questions which may influence the findings of the study.

This study examined the information needs of local emergency management organizations during return-entry phase, and the information sources from where they gathered the information. However, the study did not examine the quality of information received from the various sources. The quality of information received from various sources may influence the information management behaviors of the emergency management organizations. Future research should therefore examine the quality of information local emergency management organizations receive from various sources, and its role on information management behavior of the organizations.

This dissertation has also revealed many areas in risk communication during return-entry phase that needs further investigation. For example, the results of this study suggested that local emergency management organizations utilize information received from various sources to develop return-entry strategies. It is important to understand how and in what ways this information is utilized during the decision making process. Future research should investigate the return-entry decision making process and identify the factors and challenges that influence the process. For example, future research should be undertaken to examine how different factors

influence the decision on the selection of return strategies (permanent, temporary, phased etc) and the timing of return.

Research (Mileti & Sorensen, 1990; Sorensen, 2000) has suggested that both content and style influences the effectiveness of a disaster warning message. This may be true for a return-entry message as well. This study identified the contents of a return-entry message as described by the emergency management organizations; however it did not examine style attributes (specificity, clarity, consistency, certainty and accuracy) of the return-entry message. Future research should examine if content and style of the return-entry messages influences evacuee compliances to official return order.

Stallings (1991) found that ending evacuation for toxic and chemical disasters is more complicated than for natural disasters. According to the study, the uncertainty on safety issues related to toxic disasters creates more conflict among the public and the local authorities than the natural disasters. It is possible that the type of disaster agent may influence the information needs and message content during the return-entry phase. Future research should examine if return-entry information needs and message content varies depending upon the type of the disaster agent.

Social media is gaining prominence as an important information source for the public. The public is increasing using social media for information gathering, information sharing and information storage purposes (Palen, 2008; Sutton et al., 2008). The emergency management organizations should integrate social media as a communication mechanism to keep up with the changing social and technological environment. Future studies should thus investigate if and how emergency management organizations are using social media prior, during, and after disasters. Studies should also examine the impact of social media use on the risk communication process.

The findings related to information management indicated that some local emergency management organizations completely avoided information from social media as they believed this information to be unreliable. However, this study did not examine the social media skepticism of the local emergency management organizations. Future research should thus investigate the social media skepticism among emergency management organizations and its impact on risk communication before, during and after a disaster.

This dissertation identified the risk communication challenges faced by local emergency management organizations during the Hurricane Sandy return-entry phase. The study also provided some recommendations to overcome the challenges. Future research should investigate other strategies to address these challenges, and provide suggestions to enhance risk communication activities prior, during, and in the aftermath of a disaster.

This dissertation was set out to examine the risk communication process during the return-entry phase. The study identified the information need, dissemination and monitoring strategies of the local emergency management organizations during the Hurricane Sandy return-entry phase. The study also found that risk communication during return-entry phase is a challenge for the emergency management organizations due to lack of evacuee information, power outage, resource constrains and evacuee behavior. The findings of this study advance the knowledge on risk communication and return-entry phase and also provide implications for the practitioners. Future research is needed to further understanding of risk communication during the return-entry phase.

APPENDIX A

INTERVIEW INVITATION LETTER

Interview Invitation Letter

Dear Mr./Ms. _____ (Name of the EM personnel)

I am a doctoral student at the University of North Texas and I am working on a research that investigates return-entry risk communication after Hurricane Sandy. The study titled, "RETURN-ENTRY RISK COMMUNICATION FOLLOWING 2012 HURRICANE SANDY**"**, specifically looks at the strategies, challenges and opportunities pertaining to return-entry during return-entry phase following Sandy. The study aims to examine risk communication during return-entry phase by learning from experts such as yourself. Of the area of study identified for this study is _____ (Municipality / County Name). As part of the study I want to conduct a telephone interview with you. In our discussion, I would like to understand your prior return-entry risk communication experiences during Sandy, and therefore would like to set up an appointment to interview you. The interview is not expected to take more than an hour of your time. Please let me know the best time that works for you.

I thank you in advance for your time and look forward to talking to you and obtaining your insights about the same.

Sincerely,

Rejina Manandhar
PhD Student
Department of Public Administration and Management
University of North Texas, Denton TX 76203-0617

APPENDIX B

TELEPHONE (ORAL) RECRUITMENT SCRIPT

Telephone (Oral) Recruitment Script

Hello, my name is …….. and I am a PhD student from the Department of Public Administration and Management, at University of North Texas. I'm calling to talk to you about participating in my research study. I am conducting a study on "Return-entry risk communication following 2012 Hurricane Sandy" which involves examination of the process by which local emergency management organizations develop, disseminate, and monitor return-entry messages and plans.

I learned about your emergency management organization from your municipalitys'/countys' website. I was hoping to speak with the person who was primarily involved in managing return-entry movement following Hurricane Sandy. Is that you?

I would like to learn about your experiences during Hurricane Sandy. Your participation would involve being part of a semi-structured telephone interview. The interview will be approximately 45 minutes to an hour long and will be audio recorded.

This study is not expected to be of any direct benefit to you, but we hope to learn more about hazards and disasters, which will broaden disaster scholarship. Additionally, the study is also expected to help emergency managers in identifying challenges and strategies related to return-entry risk communication.

Please remember, this is completely voluntary. You can choose to be in the study or not. If you'd like to participate, we can go ahead and schedule a time for me to meet with you to give you more information. If you need more time to decide if you would like to participate, you may also call or email me with your decision.

Do you have any questions for me at this time?

If you have any more questions about this process or if you need to contact me about participation, I may be reached at [Phone: …….. email: ……...].

Thank you so much.

If Yes:

- When is it convenient for you to participate in the telephone interview?
  Date:_____
  Time:_____

- *If a telephone interview is arranged*: Is this the number at which I can reach you?
  Phone Number: _____

- I look forward to talking to you more about your experiences (at this date and time)_____.
  Thank you for participating.

If No:

- Thank you for your time and consideration.

APPENDIX C

DATA COLLECTION QUESTIONNAIRES

Questionnaire for Emergency Management Officials

Date:_____

City/County Name:_____

Name of Personnel Interviewed and Designation:_____

Interview Guide

Introduction Script: *Before we begin, I want to make sure that you are comfortable with few things. Are you comfortable with being interviewed regarding your experience for managing return-entry phase post Hurricane Sandy; that your participation in this project is voluntary; that you can let me know if you want to stop participating anytime; you will be anonymous and your confidentiality will be strictly maintained, and that your interview is going to be digitally recorded. Please let me know if you have any questions before we begin our conversation.*

Note: The questions will be asked in relation to initial return, the first return-entry movement of the evacuees back to their homes after Hurricane Sandy.

I. Context

Main Question:

1. How soon after Hurricane Sandy did you allow residents to return?
2. Who decides what the return-entry strategies are?
3. Who decides how the return-entry strategy is communicated?
4. Did your jurisdiction have a plan for reentry prior to Hurricane Sandy? Yes/ No. If Yes, how did you adapt it to Hurricane Sandy? If No, what have you learnt? How important do you think are the plans?

II. Information Management

Main Question:

5. What information did your organization require in order to develop the return-entry strategy for your community after Hurricane Sandy?

Probing Questions:

d. What risks and hazards in the aftermath of Sandy did you consider when creating a return-entry strategy?
e. From where did you receive information related to post disaster situation (casualties & property damage, utility and traffic conditions)?
f. From where did you receive information related to secondary hazards? [*Secondary Hazards are the sources of danger that had potential to impact population aftermath of hurricane Sandy such as hazardous spill, contaminated water, fire, co poisoning, flooding etc*]
g. Was there any information that you needed but you didn't get?

Main Question:

6. Which sources did you rely for or seek information from? and why?

Probing Questions:

a. How difficult was it to gather information from these sources?
b. How reliable did you find the information that you received from the various sources? Did you find any information not to be reliable?
c. Did you seek information from the public? If yes, what kind of information were you asking them to provide? How useful did you find the information that you received from the public?
d. Did you consider information gathering from social media? Yes/ No. Why? How credible did you find the information that you received via social media?

III. Dissemination

Main Question:

7. Following Hurricane Sandy, how did you communicate the return-entry plan to the evacuees from your community?

Probing Questions:

d. What channels did you use to disseminate the return-entry message to evacuees? and Why?
e. Of the channels relied upon to disseminate the return-message, which channels did you feel were most effective? What channels do you think evacuees rely the most?
f. What kind of information was communicated in the return-entry message?
g. How did you select the information communicated in these return-entry messages?
h. In what ways did your organization communicate return-entry plan or messages to the community? Did you provide any maps or visual aid along with the return-entry message?
i. In how many languages did you provide return-entry messages or Public Service Announcements (PSA)?
j. What were your strategies to communicate with people evacuated a significant distance away from the evacuation zone?
k. Who are the vulnerable populations in your jurisdiction? ("OR" Do you have highly vulnerable population in your jurisdiction? If yes who are they?) What strategies did you use to provide return-entry information to vulnerable populations in your jurisdiction?

IV. Monitoring Public Response

Main Question:

8. Did you monitor public response to return-entry message? Yes/ No. How?

Probing Questions:

- What type of information did you gather to monitor the public response to return-entry messages?
- From where did you receive information on public response?
- Did you look for public feedback to the original return-entry message? Yes/ No. Why?

Main Question:

9. Did you make any changes to the original return-entry message at any time? Yes/ No and Why? "OR" What adjustments did you make if warnings were not being received or heeded by the public?
10. In your opinion, how successful was your organization in communicating the return entry plan to evacuees? Did you experience any challenges? If you were to administer process of communicating the return plan all over again, what would you do differently?

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