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Communication Matters: A Study of Communication Between Emergency Managers and Water Systems Professionals Regarding Insufficient Access to Drinking Water

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COMMUNICATION MATTERS: A STUDY OF COMMUNICATION BETWEEN EMERGENCY MANAGERS AND WATER SYSTEMS PROFESSIONALS REGARDING INSUFFICIENT ACCESS TO DRINKING WATER

A Dissertation Submitted to the
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ABSTRACT

In 2021, the United States – specifically the U.S. Bureau of Reclamation – declared its first-ever drinking water shortage for the Colorado River and the Hoover Dam, resulting in cuts to water access for the southwestern United States. Unfortunately, incidents like this one are increasingly likely to occur as access to drinking water has become a more pervasive issue that not only impacts the work of water systems professionals, but also impacts the field of emergency management and its practitioners. In addition, these incidents underscore the need to put a spotlight on communication processes between water systems professionals and emergency managers.

This study has the following aims. First, to explore the communication processes between emergency managers and water systems professionals to better understand and learn if and how the two groups communicate about their respective organizational efforts regarding insufficient drinking water access. Second, to determine that if the two groups *ar*e communicating, then what are their current communication processes and how are their communication processes working to collaborate with each other to coordinate efforts. And to determine if the two groups *are not* communicating, then what can both groups respectively do better to create efficient and effective communication process. These aims focus on the distinguishing role of each practitioner group in dealing with the issue of insufficient access to drinking water.

This explorative case study uses semi-structured, qualitative interviews with two respective groups of study participants – emergency managers and water systems professionals – and a document review of public-facing government documents to

explore communication channels between these two groups to learn more about if and how they communicate regarding the mitigation of issues associated with insufficient access to drinking water. Findings from this study may be useful to better inform the practice of emergency management, as well as for the practice of water systems management.

iv., 238 pages

Keywords: water, drinking water, risk communication, emergency management

DEDICATION

I dedicate this to all of my family, and extended family and friends who supported me through this process. Thank you. You know who you are. I dedicate this to all who served as allies, advocates, etc. on my behalf throughout this process. Thank you to you too. You know who you are. I dedicate this to Tulane University, my alma mater, that gave me financial support to help me complete the dissertation research. Finally, I dedicate a few words of wisdom to all doctoral students: Don't let the perfect get in the way of the good, and *a good dissertation is a **done** dissertation.*

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ACRONYMS

100RC	100 Resilient Cities
AWWA	American Water and Wastewater Association
BRIC	Building Resilient Infrastructure and Communities
EM	Emergency Manager
EMA	Emergency Management Agency
EOC	Emergency Operations Center
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
IAEM	International Association of Emergency Managers
IRB	Institutional Review Board
NIMS	National Incident Management System
MSA	Metropolitan Statistical Area
RQ	Research Question
SARA	Superfund Amendments and Reauthorization Act
SCT	Social Cognitive Theory
WARN	Water/Wastewater Agency Response Network
WS	Water Systems Professional

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CHAPTER 1: INTRODUCTION

The Federal Emergency Management Agency (FEMA) supports people, emergency managers, and other stakeholders to increase the nation's capacity to deal with disasters and the hazards that cause them. (USA.gov, 2022). As one of the FEMA's Community Lifelines, water access is an integral part of keeping communities safe before, during, and after disasters occur, aiding in the continuity of regular, daily operations and life (FEMA, 2020). Safe drinking water access is defined as the percentage of people who have access to drinking water sources (Centers for Disease Control and Prevention [CDC], 2017). These drinking water sources include protected springs, rainwater collection, and a piped household water connection (CDC, 2017). Unfortunately, lack of water access is a growing and complex problem in many areas, tied to daily life, disasters, and water shortages.

In 2021, the United States – specifically the U.S. Bureau of Reclamation – declared its first-ever drinking water shortage for the Colorado River and the Hoover Dam, resulting in cuts to water access for the southwestern United States (British Broadcasting Corporation News [BBC News], 2021). Unfortunately, declarations like this are more likely to occur as access to drinking water has become a more prevalent and problematic issue to address.

Problem

A drinking water shortage is defined as a lack of safe drinking water resources to meet a population's water needs. (Information on Multilateral Environmental Agreements [InforMEA], 2021; United Nations, 2021). Sufficient water for an individual is defined as

enough water to prevent dehydration (Law Insider, 2013), which is about 15.5 cups (3.7 liters) each day for men, and about 11.5 cups (2.7 liters) each day for women (Mayo Clinic, 2020).

A lack of water access is a problem that is the result of multiple factors. First, insufficient water access can be the result of an actual physical shortage or scarcity of water, failures in existing water infrastructure to provide sufficient drinking water supply, or a combination of both (United Nations, 2021). Second, water can be commodified or transformed into a tradable good on the market, resulting in increases to the price of water that can be unaffordable to those who have less-wealthy populations (Wutich & Beresford, 2019). As a natural resource, when water is commodified, it is also privatized – this is tied to the cost of water extraction, and its supporting infrastructure has its own cost as well (Babidge & Bolados, 2018; Bakker, 2010; Ballestero, 2015; Derman & Ferguson 2003; du Bray et al., 2018; O'Connell et al., 2017; Ragusa & Crampton, 2016; Schnegg & Kiaka, 2019; Trawick, 2002, 2003; Wutich & Beresford, 2019).

Regardless of the reason for decreased water access, a key factor is the realization that lack of access is a problem which has the potential of impacting communities. "Sufficient" drinking water is defined as enough water for an individual prevent dehydration and continue normal functioning (Law Insider, 2013; Mayo Clinic, 2020; Spector, 2020). On an even larger temporal and spatial scale, water access issues can become a humanitarian disaster similar to a drought if it is not addressed, which is considered one of the costliest climatic disasters (Wilhite, 2000). Effective cognition of the risk of a hazard becoming a disaster – when that hazard impacts human populations – is one of the first steps that leads to communication as one of the activities to mitigate

disaster risk (Comfort, 2007a) and without which insufficient drinking water access becomes a disaster (Fraser & Kirbyshire, 2017). Adding to this urgent need for communication is the drought example – a disaster type that can be lessened through effective emergency management hazard mitigation efforts and plans (Wickham et al., 2019).

The Environmental Protection Agency (EPA) defines and recognizes insufficient access to drinking water as a concern that must be a part of emergency response plans in order for state and federal government agencies and local and regional utilities to be better prepared for disasters associated with it (Environmental Protection Agency [EPA], 2011). While the provision of the country's drinking water supply is the legal responsibility of water utilities, this provision also requires communication between multiple agencies within the government (EPA, 2011). Examples of multi-agency communication efforts regarding drinking water supply include the development of local utilities' emergency drinking water plans, identification of water infrastructure system redundancies, and distribution of water to customers (EPA, 2011).

Instances of drinking water contamination and pollution – as in Flint, Michigan and Jackson, Mississippi (Duhigg, 2009) in the United States, and also across the globe in the Islamic Republic of Pakistan (Aziz, 2005; Daud et al., 2017; Goodman, 2022) and Puerto Rico (Lakhani, 2022; Schmidt, 2018) – are studied more often than the issue of drinking water access. This is despite the potential for water access to become a bigger problem in the future, with drinking water access and scarcity being the biggest water problem across the globe. (Aziz, 2005; Butler et al., 2016; Daud et al., 2017; Duhigg, 2009; Goodman, 2022; Jury & Vaux, 2005; Lakhani, 2022; Morckel, 2017; Schmidt,

2018; Pauli, 2020). This study focuses on adding to the existing literature gap by contributing to the discussion of water access beyond issues of water pollution, particularly important given that there is not enough water in the world to meet the growing demand for it (Jury & Vaux, 2005). There are also a growing number of news reports on the urgency of the problem, pointing to the need for more extensive research and in-depth examination.

For instance, in 2017, Cape Town, South Africa reported that the city could run out of its potable water supply, a so-called "Day Zero" when a decreased water supply would shut down the city's water network, leading to severe decreases in water access (Dana, 2021). In July 2022, in the City of Monterrey, Mexico, one of the country's wealthiest cities that is located just two hours away from the southern United States border, a drought emergency was declared that resulted in neighborhoods entirely lacking drinking water or being limited to just a few hours of access each day by the city's water utility (Linthicum, 2022). And in August 2022, in France, over one hundred towns ran out of drinking water, with local municipalities forced to truck water in since there was no water left (BBC News, 2022). International organizations like the United Nations have documented that access to drinking water is a growing, global problem, reporting that there could be a global water crisis as soon as 2030 (United Nations, 2015b).

Drinking Water Access: The Case for Shared Communication and Responsibility between Emergency Managers and Water Systems Professionals

As a field of practice, emergency management works and functions to manage disasters and other incidents to protect people, property, and the environment. (National Fire Project Association [NFPA], 2019). In terms of mitigation, the goal is to focus on

long-term planning for disasters to decrease resources needed for the subsequent emergency management phases of preparedness, response, and recovery (El-Masri & Tipple, 2002). Emergency management's first priority is to protect life, while also mitigating – or lessening the impact of – the hazards that cause disasters that can harm life (Waugh, 2006).

In emergency management, drought is defined as a hazard that occurs when there is not enough water for human needs, but decreased or insufficient drinking water access is not. Even though decreased drinking water access is not categorized as a hazard in emergency management (Cutter, 2002; Lindell & Tierney, 2001; Pearce, 2000), there is a shared expectation of responsibility – and an expectation of communication – between emergency managers and water systems professionals to communicate with each other to maintain drinking water supply.

Since it is important to be explicit about what we mean when we use terms, the following terms are also defined for this study: communication is defined as how people share information to understand each other, as well as how policies and other human experiences impact that sharing of information between people and within organizations. (Kapucu et al., 2010). To clarify for this study, an emergency manager is defined as a professional who prepares plans and procedures for responding to natural disasters or other emergencies, and also helps lead the response during and after emergencies (Bureau of Labor Statistics [BLS], 2022); and a water systems professional is defined as an operator who manages systems of machines at water and wastewater treatment plants to transfer or treat water or wastewater (BLS, 2022).

According to federal guidelines, maintaining drinking water supply includes a shared responsibility between water utilities and all government levels across multiple agencies (Environmental Protection Agency, Department of Homeland Security, Local Emergency Planning Committees) to mitigate the impact of drinking water access issues (EPA, 2011). Furthermore, emergency management, as a practice, has some specific responsibilities regarding the mitigation of drinking water access issues. First, water (along with food and shelter) comprises one of the Federal Emergency Management Agency's (FEMA) Community Lifelines to ensure that essential health, safety, and security measures are met to maintain continuous business and government functions (FEMA, 2020). When drinking water access is disrupted, emergency managers must stabilize drinking water supply to not only save human lives, but also keep government and business safe (FEMA, 2020). Second, drinking water access is an integral part of keeping communities safe before, during, and after disasters occur, aiding in the continuity of regular, daily operations and life (FEMA, 2020). Furthermore, drinking water resources are quickly depleted during emergency situations (Huang et al., 2016), creating their own type of "secondary" indirect disasters that must be mitigated to stabilize "primary" direct disaster events (FEMA, 2020). Ideally, EPA, FEMA, and other agencies should have common, shared principles and practices to ensure drinking water access as part of the process of maintaining continuity of operations, and to enhance capacity to mitigate insufficient drinking water access (Alberts & Papp, 2001; Comfort, 2007b; Salas & Klein, 2001).

However, as a hazard mitigation concern to address, insufficient drinking water access might not have established start- and end-points to make it easier to determine its

scope (Mishra & Singh, 2010; Wilhite, 2000). And as was previously noted, insufficient drinking water access is not defined as a hazard or disaster to be addressed; and it is the responsibility of local water utilities and systems, not FEMA or emergency management agencies. However, other governmental agencies like FEMA must also communicate with their peers in the water systems industry to deal with the issue of drinking water access. Since water is necessary for life to exist, not having enough water is a dangerous situation that must be managed and mitigated by water systems professionals, as well as by emergency managers (Resilient Cities Network, 2022). Cities must realize water access is a complex challenge that requires multiple stakeholders – including emergency mangers – to develop innovative approaches to water management (Resilient Cities Network, 2022; Rockefeller Foundation, 2019a).

Experts foresee a growing number and scale of disasters in the future, as well as newer categories of concerns, such as insufficient drinking water access. When we conceptualize all of these issues together, it becomes clear that everyone involved in problems relating to water access inside and outside of currently conceived times of disasters must reconsider and better plan for water access solutions. Indeed, when different stakeholders, such as emergency managers and water systems professionals, communicate with each other, they learn more about insufficient drinking water access as a concern and threat, and can transform these learnings into knowledge to benefit city residents (Resilient Cities Network, 2022).

Critically, related to this, as disasters such as tornadoes, hurricanes, fires, and floods have become more prevalent, emergency managers must often "do" more with fewer resources (Coronese et al., 2019; Krueger et al., 2009; Thomas & Lopez, 2015).

Emergency managers must also be prepared for newer challenges in the future (FEMA, 2012). And the future holds newer categories of concern, such as cyber-attacks, and of course insufficient drinking water access, that have emerged over time.

Purpose

The purpose of this study is to explore communication processes between emergency managers and water systems practitioners regarding insufficient drinking water access with the overarching goal of uncovering official communication protocols and procedures, as well as addressing gaps in the literature regarding a systems theory analysis of such communication data. Ideally, these two groups of practitioners should have common, shared principles, and practices to ensure continuity of operations to increase effectiveness to mitigate the issue of drinking water access. This must be done before the problem becomes worse and transforms into a hazard, similar to a drought. In addition, joint efforts between the two practitioners-groups will allow for an understanding of the complexities of the involved communication activities across emergency management and non-emergency management spaces (Alberts & Papp, 2001; Comfort, 2007b; Salas & Klein, 2001).

Gaining a better understanding of the kind of communication that exists between these two groups of professionals is critical to learning more about the potential risks that exist with insufficient drinking water access and how emergency managers and other professions respond to those problems. This is the first step towards improving communication processes between emergency managers and water systems professionals. Achieving a better understanding of these interactions will help emergency managers

reduce the impact drinking water access by being more proactive before water access issues begin instead of just dealing with consequences after they occur (Waugh, 2009).

Research Question

This study explored the following question: What are the communication processes between emergency managers and water systems professionals regarding insufficient drinking water access? The following sub-questions were also explored:

a. For emergency managers: what are the communication processes with water systems professionals about insufficient drinking water access?

b. For water systems professionals: what are the communication processes with emergency managers about insufficient drinking water access?

c. What role do perceived barriers play in communication processes between emergency managers and water systems professionals?

d. What role does self-efficacy play in communication processes between emergency managers and water systems professionals?

e. What role does the work situation (e.g., work conducted at an emergency management agency or water utility) play in communication processes between emergency managers and water systems professionals?

f. What role does social support within the work environment play in communication processes between emergency managers and water systems professionals?

The research question and its sub-questions are informed by Bandura's the Social Cognitive Theory (SCT) framework (1989), specifically focusing on how four constructs of SCT – namely, perceived barriers, self-efficacy, cognition of situation, social support –

can be used as measures of the communication processes between emergency managers and water systems professionals. These four constructs are used to provide a linkage between this study's theory and its aforementioned research question and sub-questions. Specifically, the research question and its sub-questions are directly linked to the four SCT constructs included in this study, as evidenced by Table 1: SCT Connections to Research Question, Sub Questions, and Interview Protocol, in Appendix A.

SCT is a complex construct with a variety of sub-topics, all of which are defined throughout the literature and can be linked to the research question and its sub questions being asked in this work. Due to this nuance and complexity, it is important to consider the linkages across the existing literature and where this addresses questions about real situations relating to drinking water access, communication between emergency managers and water systems professionals, and, more broadly, gaps in the literature. Table 1 (Appendix A) introduces a basic overview of these theoretical and practical connections, which are also presented in more depth in the following chapters. A more detailed overview of SCT, its four constructs used, and its use in this study is provided in Chapter 2.

Significance

The results of this study will be used to provide both groups of professionals with information that can help them make more effective, collaborative decisions on how to mitigate insufficient drinking water access and communication concerns. Gaining a more holistic and practical understanding of the different kinds of interactions between emergency managers and water systems professionals is a critical part of improving communication between both groups, enabling them to better understand and mitigate the

risk of insufficient drinking water access – and its potential to directly and indirectly lead to disasters – more effectively. These findings may be used to encourage more active participation of both water systems and emergency managers in communication procedures.

Summary

This introduction to the study in Chapter 1 introduces the problem addressed in this study: the issue of insufficient drinking water access, and how the term is defined. This chapter provided multiple factors that are associated with this issue, including actual physical shortages or scarcity of water, failures in existing water infrastructure to provide sufficient drinking water supply, and commodification of water. This chapter also noted that this problem is a hazard that can become a disaster (similar to drought) if it is not addressed, and this issue's importance to the practice of emergency management.

The purpose of this study is to explore communication processes between emergency managers and water systems practitioners regarding insufficient drinking water access by researching the following question: What are the communication processes between emergency managers and water systems professionals regarding insufficient drinking water access? and its sub-questions. The significance of the study is that its results will be used to provide both groups of professionals with information that can help them make better, more collaborative decisions on how to mitigate this water access concern.

The following is an overview of subsequent chapters. Chapter 2 of this study is an existing review of the literature to provide information regarding communication between emergency managers and water systems professionals. Chapter 3 provides an overview of

the methodology used in this study. Chapter 4 provides an overview of the analysis conducted in the previous chapter, Chapter 5 provides the overall results of the study and next steps to take in the continuation of the research process, and Chapter 6 provides a conclusion for the study.

CHAPTER 2: LITERATURE REVIEW

Introduction

As noted in Chapter 1, this study focused on communication processes between water systems and emergency professionals. This is an emerging issue that should be of concern for the field of emergency management and practice. There is a shared expectation of responsibility – and therefore a related expectation of communication – between emergency managers and water systems professionals to maintain drinking water supply access to people in disasters and daily life. However, as evidenced from the following literature review, there are gaps in existing knowledge on this issue, making it difficult to determine if communication processes do exist, do not exist, or are problematic if they do exist.

The purpose of this literature review was to learn more about the existing body of literature on communication processes between water systems and emergency professionals regarding insufficient drinking water access. A literature review provides a description and evaluation of existing literature resources and how they relate to a study's research question, The intent here is not only to determine how the current research fits within the larger field of emergency management, but also to determine if answering the research question helps to fill any existing gaps of knowledge in the field of study (Fink, 2014). A literature review provides a way to determine where the research conducted in this study "fits" within the context of existing literature (Fink, 2014). Results of a literature review can help to better inform how a research question or questions are created, tying research questions to existing literature while also providing the

opportunity to frame research questions to help fill any knowledge gaps within the body of existing literature. This review of the literature was conducted using specific academic databases, search engines and keywords, which is discussed in detail later in this chapter.

This chapter also contains an overview of this study's theoretical framework, which provides further justification for why the study is being conducted using its research question and sub-questions. Social Cognitive Theory is used in this study to provide a framework upon which to research communication processes between the two groups of professionals. The next section of this chapter focuses on the development of this study's theoretical framework.

Theoretical Framework

For any study, using theory to support its research provides a framework for defining its research questions and sub-questions, while also describing and identifying its limitations. A theory-driven framework provides an approach for the study, giving the study a well-defined basis for argument for the research and its results and outcomes. By its name, a theoretical framework provides structure (a framework) for this study.

The field of emergency management research includes multiple, diverse academic disciplines and is a new field; there are, therefore multiple types of relevant theories to access for this study. These theories also emerge and build from a range of other disciplines, including sociology, geography, psychology, public administration, and more (Coetzee & Van Niekerk, 2012; Drabek, 2004; McEntire, 2004). The use of other academic disciplines within emergency management is in part because it is a new academic field (Waugh, 2006).

While development of the theoretical framework for this study was rooted within this complex overlay of different approaches, it focused primarily on how systems theory relates to communication-based theory. It involved the process of understanding how the communication process works as a system, determining how that communication system functions as a part of the human experience and behaviors, and an overview of how the importance of systems- and communication-based frameworks provided a pathway to choose a theoretical framework for the study that took into account both of these frameworks: i.e., Social Cognitive Theory. This decision was made based on the need to better understand the previously discussed changing needs and realities of communication among emergency managers and their non-emergency counterparts, particularly in situations like water access issues where disasters and non-disaster contexts, planning, and needs overlap. This need directly leads into key research and sub-questions such as asking what the existing communication processes between emergency managers and water systems professionals regarding insufficient drinking water access are, as a starting point, as well as more nuanced layers of this discussion from the perspectives of both emergency managers and water systems professionals.

Systems Theory

By the 1970s, systems theory was eagerly embraced by organizational researchers partly due to the realization that classical models were inadequate in accounting for complex organizational behaviors (Lai et al., 2017). Systems theory avoids this inadequacy by focusing on multiple levels of observations: environmental, organizational, and human. A system's elements are the individual components that comprise the entire system and can be either tangible or intangible including, but not

limited to, people, organizations, the natural and built infrastructure, technology (both hardware and software, and data), and any processes, instructions, policies, and procedures used to provide services to users.

Compared to previous existing classical models that emphasize minimization of interactions and autocracy, systems theory is based on the premises of *maximization* of interaction and democratic governance (Scott, 1974). Moreover, the adoption of systems theory was fueled by the increasing realization of the complex and rapidly changing nature of organizational environments and a series of seminal works closely tied to organizational communication (Ashmos & Huber, 1987; Farace et al., 1977).

The Role of Communication in Systems Theory

In explaining organizations specifically, the open systems view holds dual emphases of understanding the relationship between organizations and the environment, as well as the process of communication in helping organizations respond to people's interactions with the environment. An organization can be defined in terms of processes of organizing, which are directed toward information processing, and in particular, removal of equivocality in the information environment enacted by actors of the organization (Weick, 2015). Weick's systems view contends that the environment exists through actors' retrospective interpretations of actions/retrospective attentional processes. Hence, actors adapt to the environment that they create. Moreover, the processes of organizing rely on interlocked behaviors where individual behaviors are contingent on the behaviors of others. Such interdependent and interlocked behaviors are critical in resolving equivocality, which requires actors to interlock sets of their behaviors in order to produce certainty. Here, then, we must understand how – or if – emergency managers

and water systems professionals interlock their communications-related behaviors to produce more certainty, in general, and specifically in emergency-related situations. This need for understanding ties directly to research questions such as, for emergency managers, what are the communication processes with water systems professionals about insufficient drinking water access? and, from the other perspective, for water systems professionals, what are the communication processes with emergency managers about insufficient drinking water access?

In this context, it is also essential to understand communication between people that may shape such behaviors. Under this view, communication is the substance of organizing, becoming a foundational force of constructing shared reality and thus the system of meanings. Using a more systems-based view of communication is especially important for governments (who are their own self-contained system) to determine how the communication process must be deconstructed – if at all – to find out how to initiate or improve communication between stakeholder groups (Dryzek & Pickering, 2017; Huitema et al., 2011; Olsson et al., 2014). Thus, this systems-based perspective is also helpful to stakeholders as the communication process has transformed from being one-way to two-way – from only disseminating information about disasters to having two-way, bidirectional communication with professionals from other sectors and with the populations that emergency managers serve. With both emergency management and non-emergency management practice-based fields being more accustomed to one-way communication between the sender (emergency managers) and receiver (population-at-risk), considering their work from a systems-based approach and understanding how they do – or do not – communicate in a systems context is an essential step in understanding

what communication realities and gaps exist in the current system. As Lovari and Bowen (2019) note, "two-way communication, emphasizing listening, is an integral part of the … process that can be conveyed to risk, crisis, and disaster communication". Again, here, this leads directly into the research questions that explore what the communication processes each group uses are.

As its own, unique system, the communication process and the people involved in it are integral components of emergency management practice, inside and outside of systems theory. Communication builds stronger partnerships and networks, builds trust among stakeholders, and facilitates better flexibility, promoting shared understanding among stakeholders, and addressing disasters and challenges better and faster (Fraser & Kirbyshire, 2017; O'Brien et al., 2012; Tanner et al., 2009). In this space, communication processes become a key part of activities to communicate with multiple stakeholder groups at each government level to more effectively understand how a better understanding of risk can lead to more effective and efficient operations (Djalante et al., 2011). Djalante et al. (2011) also note that there is increased efficacy with increased communication among stakeholder groups. Thus, for issues associated with insufficient drinking water access, stakeholder groups should include emergency managers as well as water systems professionals.

Furthermore, as underscored in the literature, this communication process should remain open outside of the disaster context, so that people can exchange their ideas and opinions to establish a formally and informally communicate in an open manner across stakeholder groups (Armitage, 2008; Berkes, 2017; Lebel et al., 2006; Tai, 2015). This

open communication system also leads to stakeholders being better prepared to analyze and debate different scenarios to act collectively as a whole (Hordijk et al., 2014).

In order to understand the value of this communication and how it works across networks of people, it is reasonable, per the literature, to study this communication as a related system. When asking what the communication processes between emergency managers and water systems professionals regarding insufficient drinking water access are, it is important to understand this work within the context of the larger literature and to view it as an interrelated system rather than simply one isolated issue. This is reflected in the research sub-questions which explore the perceived barriers, self-efficacy, cognition of situation, and social support of their situations, something explored more deeply using SCT later in this chapter, further linking these literatures and theoretical concepts.

Communication Process as a System

According to Meadows (2008), from a systems-thinking perspective, the communication process itself is a system with the following three parts: elements, interconnections (i.e., relationships), and function (i.e., purpose). Interconnections are the relationships that serve as "glue" to hold the elements of a system together and, as Meadows (2008) notes, information is an important part of any system, because information is the proverbial glue that holds the system and its interconnections together. These interconnections and flows of information are often expressed based on commonly shared knowledge, thus differing by stakeholder group. For emergency managers and water systems professionals, these interconnections and relationships are simultaneously different from one another and especially important because these practitioner-groups

both serve an increasingly diverse group of residents and stakeholder groups whose own knowledge and beliefs often differ from each other.

The strength of the communication channels between emergency managers, water systems professionals, and diverse groups of residents and other stakeholder groups shapes the quality of interconnections and relationships within the system, and that information must efficiently flow among multiple stakeholders and participating agencies, a system we must understand (Comfort et al., 2010). The quality of the communication process as a system has a practical use in emergency management practice because communication is a system. Viewing communication and these larger processes as a system provides emergency managers and water systems professionals with the opportunity to learn from each other, providing clarity as to which roles and responsibilities different stakeholders have in the disaster mitigation process, and to more effectively conduct efforts to develop future mitigation system redundancies to lessen the impact of disasters, as well as an important understanding of how these processes work in relation to one another (Dryzek & Pickering, 2017; Huitema et al., 2011; Olsson et al., 2014).

Social Cognitive Theory and Communication Processes between Emergency Managers and Water Systems Professionals

Beyond systems theory, other theoretical literature has explored communication, its impact on behavior, and how to contextualize communication in larger systems in different ways, if not explicitly described as systems. Social Cognitive Theory (SCT) was developed by Albert Bandura between the 1960s and 1980s, and was first used in 1986 as a tool to model how people learn and change in a social context and more specifically

how personal, individual and group changes can lead to behavioral change, as well as how environmental and social forces impact these changes (Bandura, 1989). According to SCT, human beliefs and competences are formed from social interactions that activate reactions and actions (Bandura, 1986). SCT includes the following constructs: perceived barriers, self-efficacy, cognition of situation, and social support (Dewar et al., 2012; Romeo et al., 2021). Research has shown that the constructs used in SCT – specifically perceived barriers, self-efficacy, cognition of situation, social support – are applicable in studies that involve not only understanding how communication impacts behavior, but also understanding how these constructs impact changes in behaviors within systems (Dewar et al., 2012; Romeo et al., 2021). SCT's focus on the importance of cognition – or the capacity to recognize risk and to act on that information (Choi & Kim, 2007; Coelho, 2013; Comfort, 2007b) – in the communication process has practical implications in disaster science and emergency management research and practice.

Since cognition is an integral part of effective emergency management practice (Comfort, 2007b; Cho & Kim, 2007; Coelho, 2013; Moon et al., 2017), it is logical to utilize Social Cognitive Theory in this study, building on the initial discussions of systems theory as a broader base that roots communication as a system of relationships. SCT allows for this research to move beyond that initial base into a deeper understanding of the practicalities of those systems. In short, SCT allows this research to ask the overarching question: What are the communication processes between emergency managers and water systems professionals regarding insufficient drinking water access? The application of Social Cognitive Theory also facilitates varied layers of this study's research question from both the perspectives of emergency managers and water systems

professionals, and to ask about the role of specific nuances like perceived barriers, self-efficacy, cognition of situation, and social support, because it acknowledges the importance of contextually shaped communication rooted in relationships.

SCT has been used in previous emergency management research (Burns, 2014; Ejeta et al., 2015; Paton, 2003). As a practice, emergency management must be both collaborative and coordinated in its activities, including communication efforts with stakeholders from organizations and stakeholders outside of emergency management agencies (EMA), such as water systems professionals. Exploring the communication processes between emergency and water systems professionals is important because emergency managers have increased their efforts to mitigate water and other hazards to reduce risk, even though water systems professionals still have the principal responsibility of managing water utilities (Waugh & Streib, 2006). In addition, multi-organizational, intergovernmental, and intersectoral efforts have become more of an established norm to reduce risk, conduct preparedness activities, and be more proactive in emergency management operations (Waugh & Streib, 2006). SCT's consideration of constructs like perceived barriers and situational contexts allows for an expansion on the initial systems theory analysis and a broader understanding of a literature that includes differences within a system (Dewar et al., 2012; Romeo et al., 2021).

SCT guides this study to assist in the process of the research being used to better inform practice. Unfortunately, even experienced emergency managers face a gap between research, planning, and practice, leading to less stable operating conditions and lower levels of continuity of operations (Axelrod & Cohen, 2000; Comfort, 1994, 1999; Kettl, 2006; Kiel, 1994). Using a cognition-based theoretical framework like SCT can

generate research more effectively to bridge – and ideally decrease – the communication gap, better preparing emergency managers to communicate with water systems professionals to mitigate drinking water access-based issues (Bishop et al., 2000; Paton, et al., 2001a; Paton et al., 2001b). Social Cognitive Theory accounts for how two different types of factors, personal and environmental, impact behavioral change (Pajares, 2002). Research has shown that the constructs used in SCT – specifically the personal factors of perceived barriers and self-efficacy, and the environmental factors of cognition of situation and social support – are applicable in studies that involve not only understanding how communication impacts behavior, but also understanding how the aforementioned constructs also impact changes in behaviors as a result of communication of information (Dewar et al., 2012; Romeo et al., 2021).

This study focuses on how both personal factors (perceived barriers, self-efficacy) and environmental factors (cognition of situation, social support) impact the communication processes between emergency managers and water systems professionals to mitigate the issue of insufficient drinking water access. What follows are the respective definitions of perceived barriers, self-efficacy, cognition of situation, and social support as well as how each SCT construct applies to this study.

Personal factor: Perceived barriers

A perceived barrier is a mental block that can occur that disrupts the cognition process, and prevents people like emergency managers and water systems professionals from communicating with each other. These barriers create challenges and obstacles that impede effective communication (Lovari & Bowen, 2019). In addition, according to the model of the communication process that was discussed earlier in this chapter, perceived

barriers are an example of “noise” in the communication process, which can negatively impact messages between the sender and the receiver of a message (Daft, 2013).

From an emergency management perspective, any perceived barrier to the communication process can change how a person interprets risk from hazards, for example the issues associated with insufficient drinking water access. This change can then impact how a person copes with the consequences of this issue (Ejeta et al., 2015). Furthermore, perceived barriers exist in both an individual – an emergency manager or water systems professional for this study – and as a part of the situation or environment in which the person works (Bandura, 2004). Thus, it is important to understand what perceived barriers exist in a system, and to then determine if and how these barriers can be overcome to increase communication efforts between emergency managers and water systems professionals, a common endeavor in SCT work (Romeo et al., 2021). This leads to the question: What role do perceived barriers play in communication processes between emergency managers and water systems professionals?

Personal factor: Self-efficacy

Self-efficacy is defined as an individual's belief that they have capacity to reach specific goals. For this study, self-efficacy is specifically defined as a person’s belief that they can perform a task well. The specific task in this study is communication between emergency managers and water systems professionals about issues associated with drinking water access, focused on an ultimate goal of improving respective communication efforts to mitigate insufficient drinking water access issues before they transform into a hazard that can cause a disaster. In order to accomplish this task, emergency managers and water systems professionals must believe that as individuals

they can effectively communicate with their peers in a separate industry in order to conduct their efforts, they must be motivated to continue an open dialogue with their peers, and they must develop and continue a routine. For example, they must participate in joint meetings on a regular basis to communicate efforts across both professions, building communication deeply into a system in advance of a disaster unfolding (Bandura, 1997; 2004).

In addition, self-efficacy determines how a person perceives barriers, obstacles, and impediments to joint efforts between emergency managers and water systems professionals. For example, a person with high self-efficacy may think that any perceived barriers to communication are easy to overcome to succeed in achieving one's goals, while a person with low self-efficacy believes these perceived barriers to be insurmountable (Bandura, 2004). Understanding self-efficacy in the context of a larger system and within the framework of SCT and its varied factors allows for a more nuanced understanding of not only the ways in which communication should ideally work between people and agencies on paper and in plans, but also the points at which it may fail, a critically needed understanding in advance so that situations may be avoided and responded to adroitly as needed. This leads to the question: What role does self-efficacy play in communication processes between emergency managers and water systems professionals?

Environmental Factor: Cognition of Situation

It is important for stakeholders, such as emergency managers and water systems professionals, to realize that insufficient drinking water access is a hazard that can become a disaster, similar to a drought, if it is not addressed. This cognition of the risk of

insufficient drinking water worsening and becoming a disaster (Comfort, 2007a) is key to the communication process between emergency managers and water systems professionals. It is important to understand, first, if they are communicating at all, and if not, then why not. And second, if they are communicating, what potential problems exist with knowledge- and information-sharing as a part of their communication processes.

Cognition describes the identification of an emerging risk to begin emergency response (Comfort, 2007a, 2007b). As a measure of the effectiveness of communication efforts and processes, cognition is important for this study because effective cognition is necessary for emergency managers to function within the complex environment of dealing with emergencies and other types of issues associated with disasters (Axelrod & Cohen, 2000; Comfort 1994, 1999; Kettl, 2006; Kiel, 1994). As Comfort notes, without cognition, emergency response is incomplete and is more likely to fail (Comfort, 2007a, 2007b).

Cognition is an important part of understanding how intergovernmental agencies and their public servants – such as emergency managers and water systems professionals – function and operate before, during, and after disasters and associated issues occur (Alberts & Papp, 2001; Salas & Klein, 2001). Once this common operating picture has been established (which is based on cognition of the situation), there is an opportunity for stakeholders to engage more effectively in mitigating risk, while also improving preparedness, response, and recovery efforts and activities to disasters associated with threats.

This cognition of the situation within which this study's issue occurs is also dependent upon a proper risk assessment of the hazards and other concerns and threats

that can cause problems in the first place. This is because each type of risk, and its corresponding threat, requires an informed response (Axelrod & Cohen, 2000; Comfort, 1994, 1999; Kettl, 2006; Kiel, 1994). However, because each threat has its own probability and likelihood of occurrence – and its own socio-cultural issues to address – one size does not fit all threats for risk assessment. Take insufficient drinking water access, for example, where both emergency managers and water systems professionals must take steps to identify the hazard, recognize its risk to the community, and reduce that risk (Axelrod & Cohen, 2000; Comfort, 1994, 1999; Kettl, 2006; Kiel, 1994).

Understanding these issues associated with insufficient drinking water access – and the effects they have on decision making –is important to understanding the communication processes between emergency managers and water systems professionals or, in other words, this research asks: What role does the work situation (e.g., work conducted at an emergency management agency or water utility) play in communication processes between emergency managers and water systems professionals?

Environmental Factor: Social Support

Social support is defined as assistance individuals receive from others. This social support can be emotional, instructional, and informational. As a form of social support, information exchange between two people is also a form of communication that can increase awareness of a specific issue, such as insufficient drinking water access. Social support also has an emotional component in that supportive guidance and reinforcement from peers can function as catalysts to not only exchange information, but also to use that information to change behavior (Bandura, 2004; Dewar et al., 2012). Social support is one of the measures that is included in Social Cognitive Theory, which supports its

inclusion in this study. In other words, we must ask: What role does social support within the work environment play in communication processes between emergency managers and water systems professionals?

At a macroscopic level, the communication process is its own system with its respective parts. More specifically, SCT is a way to take the communication process down to the level of emergency managers and water systems professionals to better understand their respective communication processes. SCT is "a system within a system," specifically its own system within the communication process system. Systems theory is a broader framework for the communication process; SCT is a narrower, more specific framework for the communication process. Thus, SCT builds on systems theory as it applies to communication processes in this study. Again, SCT provides a way for this study to narrow its focus to examine successes and failures in the communication processes between these two groups of professionals regarding the issue of insufficient access to drinking water.

The takeaway from the exhaustive review of these theories for the purpose of this study is that it is important to design a methodology that effectively answers a study's research questions and sub-questions. For this study's research question – What are the communication processes between emergency managers and water systems professionals about insufficient drinking water access?, and its sub-questions – it was important to understand systems theory to appreciate how communication processes, in general, function as a system. Furthermore, it was important to understand that because of the broadness of communication processes as a system, it was necessary to narrow the theoretical framework down from systems theory specifically to SCT (which functions as

a system within the communication process) to have a more focused lens through which to more effectively explore this study's research question. Interweaving these theories through the research questions ensures that the questions are firmly grounded in the existing literature and simultaneously reach beyond it, applying it to this specific critical issue.

Methods of Searching

In order to identify the most relevant articles on communication processes between water systems and emergency professionals, the following keywords were searched: communication, emergency managers, emergency management, water systems professionals, water systems, water utilities, drinking water infrastructure, drinking water systems, drinking water access, drinking water disasters, and drinking water emergencies. These keywords and phrases were chosen because they represent the respective components of the overall research objectives for this study. For example, this study focuses on both emergency managers and water systems professionals, so both of these types of professions were used in the literature search to find articles that include research on both professionals, and information on their joint communication and work efforts. Because of the interdisciplinary nature of this study's research objective, it was necessary to conduct a scoping search of the literature in this manner to help uncover potential overlapping features of literature from multiple disciplines. Studies that relate to the research question were also included. Studies that did not meet these criteria were excluded.

Because emergency management is a relatively new academic discipline, and due to the interdisciplinary nature of the research topic, the literature review used a variety of

different databases from multiple disciplines. Articles were retrieved from academic search engines and databases such as Google Scholar, EBSCOhost, ProQuest, PubMed, and Web of Science. Federal government sites were also used, including sites for the US Department of Homeland Security (DHS), and the Federal Emergency Management Agency (FEMA). Finally, additional articles were found from conference presentations and papers that might not customarily be included in traditional academic search engines and databases.

Literature Review

This study is based on the following research question: What are the communication processes between emergency managers and water systems professionals about insufficient drinking water access?, and its sub-questions. As was previously noted in this study, there are gaps in the existing knowledge on this research question and its sub-questions, confirming that answering this research question "fits" within the context of existing literature to provide knowledge to help fill the existing knowledge gap (Fink, 2014).

As was previously discussed as a part of this study's theoretical framework, literature that does study the communication process as a system exists, but the review found that this literature did not include research that focused on the study's research question. Due to the lack of an existing body of knowledge based on this study's research question, there was also a lack of relevant content to include in the literature review. Existing literature that was included in this literature review can be grouped into the following two categories, which are discussed in detail in this chapter: communication

processes between emergency managers and water systems professionals, and whole community as a communication approach.

Communication Processes between Emergency Managers and Water Systems Professionals

A review of existing gray literature (content and research from outside of academia, including academic technical reports, government documents, and white papers) from two federal agencies, the Environmental Protection Agency (EPA) (two pieces) and Federal Emergency Management Agency (FEMA) (two additional pieces), demonstrates that at a minimal level, there is existing documentation confirming that this study topic, broadly construed, is under discussion in federal government practice.

The EPA has published two guides that contain information on communication between emergency managers and water systems professionals specifically in an effort to mitigate issues associated with drinking water access. These documents demonstrate how communication processes have been discussed in practice and reflect a need to consider these issues from a systems theory perspective to understand the environment, organization, and humans involved in these documents and processes. The goal of synthesizing the gray literature through the lens of SCT was to further assess the role of constructs like specifically perceived barriers, self-efficacy, cognition of situation, and social support on the implementation of the suggestions put forward in such documents, particularly if those suggestions are put forward by one group or organization with the goal of multiple stakeholders using them. In addition, what can this larger literature from practice tell us about what communication or communication plans already exist between emergency managers and other professionals? Such questions are essential to a more

complete framing of the research questions in this work, which ask - with varying degrees of specificity - questions about the communication processes between emergency managers and water systems professionals and what influences them.

The first EPA guide, published in 2013, focused on state-level EPA offices and how they can more effectively "mitigate, prepare, respond, and recover from water-related emergencies" (EPA, 2013a, p.1). This guide was limited, focusing less on real-world recommendations, and more on how to find funding sources to assist in managing drinking water issues. While the EPA guide did mention the word "communication" and noted the importance of communication itself, the guide did not provide any recommendations on how to improve communication processes between water systems professionals and any other stakeholder groups, including emergency managers. A second EPA document was also published in 2013, and it focused on providing state water utilities with a checklist of what actions should be undertaken before, during and after water hazards and disasters occur (EPA, 2013b). However, the checklist did not mention the word "communication" outside of a person's job description (communication officer, for example), and details about the communication process were not provided in the checklist.

The most recent primary EPA guide was published in 2018 with the goal of more effectively understanding how water utilities and emergency management agencies work together to more effectively respond to emergencies (EPA, 2018, p. 2). This guide provides real-world, practitioner-based examples of how the two aforementioned groups of professionals – emergency managers and water systems professionals – can communicate with each other to respond more effectively to drinking water access issues.

This EPA guide includes recommendations to improve communication between emergency managers and water systems professionals during disaster response activities, such as providing regular tours of each other's facilities; providing shared workspaces in both water utility plants and emergency operations centers; conducting joint training exercises; and sharing administrative and emergency communication processes (EPA, 2018, p. 1). Inclusions like these reveal some hint at the problems that exist and are acknowledged in the communications processes between these groups, driving the research questions in this work, both overall (what are the communication process in practice that might prompt the need for such recommendations?) but also in more specific ways (for example, what perceived barriers exist in these communications?). This EPA guide also includes recommendations for joint mitigation and preparedness activities to promote communication processes.

Beyond the EPA's efforts, the Federal Emergency Management Agency (FEMA) provides a course titled Coordination between Water Utilities and Emergency Management Agencies. This course's goal is to foster working relationships between emergency managers and water systems professionals (FEMA, 2021). This FEMA-sponsored course also referenced the EPA's website. The course's primary focus is on communication relating to preparedness efforts for water systems and other water utilities facilities, both for drinking water and for wastewater. In addition, the course provides the following topics to consider: identifying the key actors and stakeholders in both fields (the proverbial exchange of business cards); why communication between the two fields is important; and the benefits of building relationships (FEMA, 2021). Such courses acknowledge the need to increasingly develop more effective communications between

the two groups, which also prompted questions in this research such as those exploring the perceived barriers that still exist in that communication, as well as questions about self-efficacy from the perspective of involved stakeholders, the situations, and potential social supports within each community. Exploring such nuances from the perspectives of both groups will enable a better understanding of what communication processes exist, the problems that exist within those processes, and what views of those processes exist – all essential components for understanding whether courses like these will actually help produce more effective communication.

There is also gray literature on the importance of drinking water access as an emerging emergency management issue through grantee program information for FEMA's new Building Resilient Infrastructure and Communities (BRIC) program. BRIC provides support for states, tries, and communities to obtain grants to fund infrastructure projects to reduce disaster risk (FEMA, 2022a). Funding for FEMA's BRIC program totals $500 million, with two of the funded programs grounded in the notion that drinking water access is a threat that must be urgently addressed. The first BRIC program is located in North Carolina, and includes funding to improve critical lifeline utilities, such as drinking water, part one of FEMA's Community Lifelines, specifically the lifeline for food, water, and shelter. The second BRIC program is located in South Carolina, with the mission of improving water supply infrastructure so that it is more resilient against disasters like hurricanes. Again, as is the case with previous gray literature included in this literature review, this source does mention communication and its importance, but does not provide information about communication processes between stakeholder groups.

In summary, regarding existing literature from EPA and FEMA, there is documentation to suggest that the topic of communication between emergency managers and water systems professionals about issues associated with drinking water access is under discussion in federal government practice. However, this topic was discussed as a process that was important, without providing more detailed information about how to implement a system of communication between the two groups of professionals. This research, though, goes beyond this work, asking questions of stakeholders about what communication processes exist, as well as what barriers play a role in disrupting potential communication. Gaining a better understanding of not only what communication processes exist, but also potential problems with communication, allows for a far more nuanced understanding of what works, why it works, what does not work, and why it does not work within communication between emergency managers and water systems professionals. This research can then, it is hoped, contribute to both the academic and practitioner literature with recommendations to better improve these communication issues, going beyond this existing limited gray literature.

Beyond the EPA and FEMA, additional gray literature about the issue of insufficient drinking water access has been produced outside of the government sector by the Rockefeller Foundation and its 100 Resilient Cities (100 RC) initiative. 100 RC is a global network of member-based cities that work together to make cities safer and more equitable. During its first few years of operations, the 100 Resilient Cities program has supported participating city governments in the preparation of city-wide resilience strategies and the development of tools to build the capacity of their drinking water

systems to improve resilience, while also allowing cities to *measure* the resilience of their drinking water systems (Rockefeller Foundation, 2019a, 2019b).

One of the identified problems further confounding drinking water access and resilience involves communication issues that make it more difficult to communicate across multiple stakeholders, an important issue that would benefit from research from a systems theory and SCT approach. This set of literature from the 100 RC program documents the importance of increasing resilience for drinking water systems by taking more comprehensive steps to do so (Rockefeller Foundation, 2019a).

Gray literature from 100 RC further documents the importance of communication among stakeholders, but again does not explicitly mention the role of the Department of Homeland Security, Federal Emergency Management Agency, or emergency managers as stakeholders who should be included in this mitigation process. These documents provide evidence that communication between emergency managers is especially important, at least for the maintenance of drinking water infrastructure and systems. However, it fails to clarify the critical importance of communication between emergency managers and others, such as water systems professionals and the diverse stakeholders in communities. This gap is a demonstration of not only the existing gaps in the literature, but also the critical importance of considering communication – or lack thereof – from a systems perspective. This research, with its questions regarding the specifics of communication processes between emergency managers and water systems professionals, will be able to help fill these gaps and address some critical questions, contributing to a better understanding of not only the fact that some communication issues exist, but *why* and *how* they work, potentially leading to a better understanding of how to solve them.

Combining the FEMA's BRIC program and the 100 RC program literature with the larger gray literature, it is clear that the issue of drinking water access is an emerging issue to address in the practice of emergency management and at a municipal-city level to make cities more resilient. However, even though both of the BRIC and 100 RC programs provided financial support for drinking water access issues, neither of the programs' gray literature documented how, and even if, the programs considered providing detailed information about the processes of communication between emergency managers and water systems professionals.

Whole Community as a Communication Approach

Even though FEMA's whole of community approach is a relatively new concept in emergency management, its approach resonates within the field of practice because it acknowledges the vital role each and every individual within a community can play in keeping people safe from disasters. From a communication perspective, whole of community is an example of what emergency managers are, and can be, doing to increase communication with other government agencies and stakeholder groups to conduct efforts to mitigate disasters. The whole of community approach to emergency management provides a relatively new concept that focuses on, in this study, emergency managers and water systems professionals and how they communicate to keep communities safe from issues such as insufficient drinking water access.

As was discussed in the Problem section of Chapter 1, the issue of insufficient access to drinking water is becoming more of a problem that should be addressed not only by water systems professionals, but also by emergency managers. Emergency managers and water systems professionals are just two of the key stakeholder groups for

this issue, as well as in FEMA's whole of community approach to disaster communication and mitigation. From a systems-based perspective, the issue of insufficient drinking water access is complex and includes even more stakeholder groups than just emergency managers and water systems professionals. Because of this fact, whole of community provides a lens through which to learn more about "the problem" and its stakeholders.

Whole of community is based on the philosophy that requires collective input from government and community leaders to organize and strengthen their resources to protect communities before, during, and after disasters (FEMA, 2011). Because of the increase in the number, severity, and scope of disasters, existing resources are even more limited. Emergency managers must "do more with less," while also working with others outside of the emergency management field to successfully perform their jobs.

Thus, it is essential that emergency managers communicate and form collaborative partnerships outside of their field of practice to more efficiently and effectively function and operate. Furthermore, emergency management practice is based on the establishment and development of relationships with other stakeholders to "exchange those business cards" to form those relationships. And these relationships are established through communication within the field and with other stakeholder groups. The importance of open communication within the field of emergency management is supported by Graham (2014), who noted in his research that communication is essential, especially in a democracy; and by Clarke (2015), who also noted that communication is especially important, given the alarming increase of severity and scope of disasters.

While the whole of community approach, as was previously noted, does provide information on how emergency management practice should communicate with other stakeholder practitioner groups, the gray literature on whole of community included in this study did not mention the importance of communication specifically with water systems professionals on mitigation of the issue of insufficient drinking water access.

Gaps in Existing Knowledge

Beyond this exploration of the gray literature, a review of the literature confirms that there is existing research that documents the importance of communication between emergency managers and professionals from other sectors (law enforcement, fire, etc.), but this literature also documents that there have been comparatively few studies that focus on communication processes between emergency managers and water systems professionals, especially relating to concerns regarding mitigation of insufficient drinking water access as an issue to address. For example, according to Waugh and Streib (2006), emergency managers must communicate with multiple organizations, government levels, and sectors to effectively "get the job done" to manage issues, hazards, and risks. The authors note the importance of communication efforts between emergency managers and other stakeholder groups that have roles to play in dealing with disasters, but there is no mention of communication with water systems professionals and the utilities for which they work. This confirms the gap in existing literature when it comes to communication processes between emergency managers and water systems professionals.

Other research also touts the importance of communication between emergency managers and other partners, noting how emergency management is "historically collaborative" in its practice (Kapucu, 2008) and how collaborative relationships with

other emergency managers are used to achieve common goals while using combined resources to tackle the "wicked" problem that is disaster management (Agranoff & McGuire, 2003; Kamensky et al., 2004; Kapucu, 2012). However, there is no explicit mention of communication efforts with water systems professionals. Finally, from a preparedness perspective, literature exists that discusses the importance of drinking water access as a concern to be addressed, noting that water supply of at least one gallon per person is required to be properly prepared for disasters, but Sutton and Tierney's study (2006) focuses on preparedness, not mitigation.

This literature review also documents research which focuses on water and other utility types (electricity, gas, etc.) and their importance to people and their communities before, during, and after disasters, noting that the capacity water, energy, and communications utilities are vital to the social welfare of both communities and the countries in which they live (Gheorghe et al., 2007). However, a preponderance of the literature underscores the technical aspects of these utilities, rather than focusing on how utilities (including their water systems professionals) communicate. There is a considerable amount of literature that focuses on insufficient drinking water access (Alcamo et al., 2007; Gosling & Arnell, 2013), especially from within the fields of public and global health (Patel et al., 2020; Patel & Schmidt, 2017; United Nations, 2015a), but not within the space of emergency management.

These gaps in the academic literature, as well as gaps in gray literature, point to an important failure to contextualize emergency management and non-emergency management practice, both in lived reality and in our understanding of how they should best operate. Future academic researchers must move beyond a superficial investigation

of communications processes to determine how emergency managers assist water systems professionals in mitigating this issue of insufficient drinking water access. The research conducted in this study can be used to help fill these gaps in knowledge to better inform the practice of emergency management by asking: What are the communication processes between emergency managers and water systems professionals regarding insufficient drinking water access? And what role do perceived barriers, self-efficacy, work situations, and social support play in communication processes between emergency managers and water systems professionals?

Summary

This chapter provided an overview of the importance of a study's theoretical framework, which provides the study with a well-defined basis for argument for the research and its results and outcomes, and structure for the study. The chapter provided an in-depth discussion on how the theoretical framework was chosen, and how this study provides an opportunity to incorporate parts of existing frameworks, such as systems theory and the communication process as a system, into a final theoretical framework to use. Social Cognitive Theory (SCT), the theory used in this study, was discussed in detail that included its definition and why it was the appropriate theoretical framework for this study.

The chapter provided an overview of how the literature review was conducted, and a discussion of the results of the review, which included the following areas: communication processes between emergency managers and water systems professionals; and whole of community as a communication approach. The results of the literature review, which included both peer-reviewed journal articles and gray literature, found that

there have been comparatively few studies that focus on communication efforts between emergency managers and water systems professionals, and especially focusing on concerns regarding mitigation of insufficient drinking water access as an issue to address.

Research gaps include a depth of studies that focus on how – if at all – emergency managers and water systems professionals communicate to address disasters associated with insufficient access to drinking water. In addition, this type of study is needed in the field of emergency management because its results can assist in the process of developing recommendations to assist the field's practitioners in the process of communication efforts with water systems professionals to manage disasters associated with insufficient drinking water access. These gaps in existing knowledge support the need for research that focuses on this issue, such as this study.

The next chapter, Chapter 3, provides an overview of the methodology used in this study. This chapter describes the methods used to answer this study's research question: What are the communication processes between emergency managers and water systems professionals about insufficient drinking water access?, and its sub-questions based on the knowledge gaps in the literature that were found in this chapter.

CHAPTER 3: METHODOLOGY

This chapter discusses the study's chosen research method along with justification for each methodological choice. Since the purpose of this study is to understand communication processes between emergency managers and water systems professionals regarding insufficient drinking water access issues, the qualitative research method is the more appropriate choice.

Qualitative Design

This study uses the qualitative research method. Qualitative research focuses on the process of collecting non-numerical, words-based data sources – such as observations, interviews, documents, and audiovisual materials (Creswell & Creswell, 2018) – and structuring the words into codes, patterns, and themes to produce meaningful information and outcomes. Qualitative research helps to answer the "how" and "why" of a research question, as opposed to quantitative research that focuses on a statistical analysis of the "who," "what," and "how much."

In addition, the study focuses on the analysis of groups of people within their work environment (Leedy & Ormrod, 2010), which is characteristic of a qualitative study. Qualitative methods focus on people and their experiences, while quantitative methods focus on numbers and statistics (McCusker & Gunaydin, 2015). Since it is difficult to understand communication-based relationships between emergency managers and water systems professionals by using statistics and mathematical equations, this study's research question can only be analyzed using a qualitative approach.

The qualitative method is effective for this study because what is being studied is associated with human experiences of groups of participants that cannot be expressed

numerically or quantitatively (Hammarberg et al., 2016), and thus qualitative research provides a better fit for what is being researched in this study. Like the study itself, qualitative research studies topics to understand how people impact phenomena (Denzin & Lincoln, 2011). In addition, like this study, qualitative research focuses on data sources that are not numeric and that cannot be counted. Furthermore, while quantitative data provides researchers with what happened, qualitative data provides information on why something happened, providing researchers with a more in-depth understanding of disaster-related problems. Thus, the qualitative research method is the best fit for this study.

Unlike quantitative research, qualitative research provides a more holistic understanding of a problem, issue, or situation. Qualitative research focuses on the human experience (Cilesiz, 2011), with the goal of gaining a better understanding of the human experiences, in this case, of emergency managers and water systems professionals. This study is best suited for the qualitative research method because it focuses on personal and cultural perspectives that can impact the human experience, both at an individual and group level, to more effectively people in real-world-based settings (Yin, 2015). The qualitative design method provides researchers with the ability to learn more about what is being studied by communicating with people who have the "human experience" to provide a more nuanced view of what is being studied.

In addition, qualitative research methodology is used in this study because this method has the same research-based goals. The goals of qualitative methods are to explore, describe, and interpret phenomena. For this study, the respective goals are as follows:

- Explore: identify themes and patterns to provide an initial understanding of communication between emergency managers and water systems professionals;
- Describe: provide detailed, specific information to understand communication efforts between both groups about drinking water access issues; and
- Interpret: understand the effectiveness of existing communication between emergency managers and water systems professionals.

These aforementioned qualitative study goals will be undertaken by the use of the case study approach, which is discussed in more detail in this chapter.

Exploratory Case Study

Because this study investigates distinct phenomena – specifically communication between emergency managers and water systems professionals – within a specific research environment (Mill et al., 2010) of mitigating disasters associated with insufficient drinking water access, this is an exploratory case study. One reason not previously discussed as to why this is both a qualitative and an exploratory study is that the research question focuses on more than just inferential statistics (Kimmelman et al., 2014). Also, as was noted in the literature review in Chapter 2, there is a gap in existing knowledge and research conducted on this study's topic, which further supports the exploratory nature of this study.

Exploratory study is useful when the context of the problem or issue – like the research question for this study: What are the communication processes between emergency managers and water systems professionals about insufficient drinking water access? and its sub-questions – is complex, not well-defined, and quantifiable measures don't fit the problem well (Creswell & Poth, 2018).

There are other reasons why this study is exploratory, as opposed to being confirmatory. This study aims to connect ideas to determine the “how” and the “why” of the research questions, or why there is a lack of communication between emergency managers and water systems professionals about insufficient drinking water access. The researcher already knows the "what," or that the problem of a lack of communication is occurring, and wants to focus on obtaining the most insight on a topic (Stebbins, 2001). And that why this is an exploratory study, to interview emergency managers and water systems professionals to help identify “why” the communication breakdown is occurring.

The researcher knows that there is a problem, but there is not a thorough enough understanding of why the problem is occurring. Metaphorically speaking, the researcher knows that there are pieces missing in the puzzle, does not know what the missing pieces are, and must conduct an exploratory story and interview groups of practitioners to help identify them in order to put all of the puzzle pieces together to complete the picture.

This qualitative, exploratory study is also a case study. According to Yin (2009), a case study focuses on phenomena as they occur in real-world-based settings to gain more context about the topic. Since the research question focuses on the present and not the past or an historical event, the case study approach is an effective one for this study (Yin, 2009). In addition, the data analysis phase of the multiple-case study provides a comparison of similarities, differences, and patterns among the cases to make the outcomes of the research more generalizable, while also allowing for more cross-organizational comparison (Goodrick, 2014; Kaarbo & Beasley, 1999).

The multiple-case study focuses on the comparison between two or more groups of study participants, which makes this approach an ideal fit. In addition, case studies are

useful in getting a complete understanding of a situation, such as the communication processes between emergency managers and water systems professionals about insufficient drinking water access.

The case study is also effective in the analysis of events that involve complex relationships between people (emergency managers and water systems professionals), their settings (emergency management agencies and water utilities) and events, such as instances in which there is insufficient water access (Holosko, 2006; Stake, 1995). Thus, the case study approach fits the purpose of the study's research question.

According to Crowe et al. (2011) and Stake (1995), the steps in the case study approach are as follows: define the case; select the case; collect the data; and analyze, interpret, and report the results from the case. This approach was selected for this study for two reasons. First, the steps in Crowe et al.'s approach complement, and are similar to, the case study approach as outlined by Creswell and Poth (2018), which includes references to the case study approach also outlined by Yin (2009). Second, Crowe's approach to case study methodology is effective to use because of its simplicity and ease of understanding. A more detailed description of each of the four steps in this case study approach is discussed below.

Defining the case is the first of four steps in the case study approach (Crowe et al., 2011; Stake, 1995). It is important to define what the "case" is, specifically to set its boundaries (Yin, 2018) for this study. Because a case relies on its structure of a bounded system (Stake, 2003; Yin, 2014), the boundaries of the case must be defined (Stake, 2013). If the case is not bounded, then there is not a case (Merriam, 1998). Establishing the boundaries of how a case is defined, regardless of whether it is a single- or multiple-

case study, is necessary to produce a proverbial picture of what the case is for a particular study. This provides others with a situational context and understanding of the case's definition (Miles & Huberman, 1994; Stake, 2008).

The boundary for the case can be an individual, group, organization, or community (Merriam, 1998). For this study, the case is bounded and defined by group, specifically two separate groups of people: emergency managers and water systems professionals. Because this study has two, uniquely bounded groups, this is a multiple-case study.

According to Yin (2016), the qualitative case study approach has six different types of data that can include documentation, archival records, interviews, direct observations, participant observation, and physical artifacts. This study uses identical, in-depth, semi-structured interview surveys with the respective two case group study participants (emergency managers and water systems professionals). Interviews are directly targeted to the study's research question to provide insights into the "how" and "why," of explanations provided by the study's participants (Yin, 2016). Conducting these interviews with two different groups, along with a document review, provides two distinct, but overlapping, data sources to triangulate the study's findings and increase the study's validity and credibility.

Population Sample

Case selection, specifically for the population sample in this study, is the second of four steps in the case study approach (Crowe et al., 2011; Stake, 1995). Case selection is used to find cases that properly represent the study population (Seawright & Gerring, 2008). Effective case selection helps the researcher to more effectively identify the

study's target population to better answer the research question (Cooper & Schindler 2008).

Furthermore, this study includes two groups of cases, specifically emergency managers and water systems professionals, to produce a multiple-case-based study. The multiple-case is used in this study to more effectively answer the research question and its sub questions, which focus on two different groups of people: emergency managers and water systems professionals. An additional benefit of using the multiple-case in this study is that it can be used to compare and contrast results of the study's analysis to provide more compelling evidence and robustness for the study's results and findings (Yin, 2017).

Because this is a qualitative, exploratory multiple-case study, much care and attention must be paid to the careful selection of each case (Crowe et al., 2011). For example, to gain a better understanding of communication between emergency managers and water systems professionals, study participants from both groups were interviewed to get a more thorough understanding of their collective work experiences in dealing with issues associated with insufficient drinking water access. Study participants met all of the following criteria to be included:

- Adult (> 18 years old) that is either an (1) emergency manager or (2) water systems professional that works for an organizational type that is either an (1) emergency management agency or (2) water utility;
- Has worked at least three years as either an (1) emergency manager or (2) water systems professional, and is in a management or leadership position as an (1) emergency manager or (2) water systems professional;

- Is an (1) emergency manager or (2) water systems professional that has prior experience working with (1) water systems professionals or (2) emergency managers; and
- The (1) emergency management agency or (2) water utility is predominantly located in urban, metropolitan areas that are east of the Mississippi River.

Exclusionary or disqualifying criterion for this study is that study participants must be aged 18 or older.

The researcher used a convenience sampling approach to recruit study participants. Convenience sampling is a method that recruits study participants that are "convenient" to the researcher, often by geographic location or professional affiliation (Patton, 2002). Study participants were recruited through their professional membership-based affiliation with either the International Association of Emergency Managers (IAEM) for emergency managers, or the American Water and Wastewater Association (AWWA) for water systems professionals. Study participants were chosen for the study if they met all of the aforementioned study criteria and were also a current member of either IAEM for emergency managers, or AWWA for water systems professionals. The researcher was given a list of potential study participant names and contact information. Participants were then contacted and consecutively selected in order of availability from the list until the total amount of study participants for each of the respective two groups was reached (Martínez-Mesa et al., 2016), which was five).

The researcher interviewed five study participants from each of the two respective practitioner-groups: emergency managers and water systems professionals. While the sample size of two groups (emergency managers and water systems professionals) for

this study might seem small, the sample size is appropriate for a qualitative, exploratory, multiple-case study approach. Furthermore, a large sample size and its generalizability are not the objective of qualitative studies.

University Protocol

This study was approved by the University's Institutional Review Board (IRB) prior to conducting this study Refer to Appendix B for a copy of the IRB approval letter. IRB approved all methods and procedures prior to conducting the research. Because this study does not involve any vulnerable populations or ask interviewed study participants any questions that are either private or sensitive in nature, it was expected that the IRB process would be expedited. The interview survey was piloted and tested prior to being disseminated to make sure that its questions were easy to understand to elicit substantial responses (Doody & Noonan, 2013).

Each interview was conducted separately to decrease any outside influences on the study participants' responses to the interview survey and to increase the response rate. Once each study participant consented, each interview began and was recorded, transcribed, and analyzed. Interviews were conducted virtually via Zoom to maintain a complete record of the interview's content and provide a secure, private location for interviews. Microsoft Word software© was used to transcribe the study's interviews and assist in data collection and analysis processes. The interviews also included detailed notes to make sure that the datasets were captured. Each study participant was assigned a unique alpha-numeric identifier to protect their privacy and confidentiality.

With the exception of questions that focus on the demographics of the study participants, this study used semi-structured, open-ended interview questions that were

based on the research question and were conducted with each study participant. The interview survey focused on the spoken words of study participants, focusing on their individual experiences as told via their life stories. As was previously discussed in detail, the following constructs are part of the theoretical framework of Social Cognitive Theory: perceived barriers, self-efficacy, cognition of situation, and social support (Dewar et al., 2012; Romeo et al., 2021). These constructs were used to produce this study's research question: What are the communication processes between emergency managers and water systems professionals about insufficient drinking water access?, and its sub-questions. In turn, the research question and its sub-questions were used to produce the interview survey, which is also based on the aforementioned four constructs within Social Cognitive Theory. The complete interview protocol is available in Appendix E.

The interview survey also included questions on basic descriptive statistics – such as age, sex, ethnicity, geography (by zip code), and socio-economic status – to aid in determining if there are group characteristics that can be gleaned from the data. The interview survey included the following statistics (demographic questions): gender, age, ethnicity, college/university education level, college degree areas (engineering, hard sciences, social sciences, humanities), specific industry-based certifications, number of years in the water professional industry, geographical location, and social media usage at (1) home and (2) work (Twitter, Facebook, Instagram, LinkedIn). Detailed notes were taken during the interviews to add to the data analysis process, which is discussed in more detail later in this chapter.

Prior pilot testing of the interview survey was conducted with two respective emergency managers and water systems professionals that were not study participants. The pilot study provided information used to finalize the content and order of the interview survey's questions and average interview length. This pilot testing found that the time range for the interviews was 45 to 60 minutes, so each interview appointment was scheduled for 60 minutes with a 30-minute extension of the interview time if needed. At the end of the interview, the researcher answered any questions, and provided contact information for future updates on the study.

Regarding ethical considerations for the study, all audio files, surveys, notes, and other interview materials were stored in digital format on a secure, encrypted-computer and an encrypted external hard drive. There were no hard-copy materials to secure for this study. As was previously noted, the research proposal was approved by the university's Institutional Review Board (IRB). All study participants signed an informed consent form before being interviewed for this study.

Data Collection

Data collection is the third of four steps in the case study approach (Crowe et al., 2011; Stake, 1995). Before the data collection process starts, it is important to consider the research question for which the data is collected, the type of data to collect, and the protocols and methods that are used to collect, store, and process the study's data. A more detailed description of how the study processes, or analyzes, its data is included in the following section on Data Analysis.

This study collected two types of data: study participant interviews and a document review. The document analysis review was used to gather background

information on the communication processes between emergency managers and water systems professionals about insufficient drinking water access. The two previous sections of this chapter, Population Sample, and University Protocol, provide details on the data collection that was conducted for study participant interview. For data collection purposes, the document review was limited to public-facing documents that are available either online or in federal library repositories. The document review consisted of the following steps: search for existing documents, assess existing documents, compile the documents, conduct a content analysis of the documents, and summarize the documents' information (Bretschneider, 2017; CDC, 2018).

Data Analysis

Once the data collection instrument was chosen, it was important to then determine how data from the collection instrument should be analyzed. Data analysis, and interpretation and reporting the results from the cases, is the fourth and final step of the four steps in the case study approach (Crowe et al., 2001; Stake, 1995). Data analysis is a crucial part of a case study because its processes provide a way to look for and find patterns – if any – within the collected data to provide meaning, outcomes, and next steps for the study's results. Gibson and Brown (2009) provide five ways to analyze collected data: content analysis, narrative analysis, discourse analysis, thematic analysis, and grounded theory. For the study participants interviews, this study used thematic analysis to group datasets according to their similarities (themes) to provide context for the data content. A major benefit of using thematic analysis in this study is that it pairs well with the exploratory, or "how" and "why," nature of the research question: What are the communication processes between emergency managers and water systems professionals

about insufficient drinking water access?, and sub-questions. For the document review, this study used content analysis to evaluate content-based patterns within the documents. These content-based patterns were based on specific words or phrases that were mentioned in the documents. These patterns were grouped into codes, which were then summarized into categories for reporting purposes.

After the two data sources are analyzed, the results are then reported to understand what the outcomes are for the study. This research used themes, or thematic analysis, for the data analysis portion of this study. Fortunately, it is these themes and direct, in vivo quotes from study participants that often are a key component of reporting the outcomes of the study. Data results are organized to provide a defined set of the themes revealed from the analysis, and how these themes refer back to the study's literature and theoretical framework (Rubin & Rubin, 1995).

A reminder that there are two data sources collected for this study: interviews with study participants and document review. Making sense and providing interpretation of datasets collected from the qualitative analysis is not that straightforward (Crowe et al., 2011), which is why it is important to select an effective data analysis method. This study used a combination of Creswell's and Stake's respective case study analysis approaches to analyze its qualitative data. Stake's approach combines multiple phases of data analysis to elicit patterns and generalizations (Creswell, 2013; Stake, 2005). Creswell's approach is similar to Stake's approach, which is why both approaches are incorporated into the data analysis approach that is used in this study. The specific steps used in this study's data analysis approach combination are as follows: organize the data; code the data; search for themes, or patterns, within the data; seek linkages between

themes, or patterns, within the data and tentative interpretations of results and outcomes; and organize final results and outcomes from the data analysis, and submit the study's final report. (Creswell, 2013; Stake, 1995, 2005).

Organization of the Data

This section of the chapter provides an overview of how the datasets that were collected for this study, interviews, and document review, were organized to prepare for subsequent steps in the data analysis process. In this step 1 of 5 in this study's data analysis approach (Creswell, 2013; Stake ,1995, 2005), the researcher must choose which type of qualitative data analysis technique to use from the following list: content, narrative, discourse, framework, and grounded theory. Content analysis, which categorizes datasets first by codes and second by themes, was used for this study. Coding of qualitative datasets makes it easier to interpret the results from the study by assigning codes to words and phrases from each study participant's interview and from each document included in document review to more effectively summarize the overall results from all of the study's participants (Krippendorff, 2018). In a way, coding "quantifies" qualitative data so that it is easier to interpret.

Coding Protocols and Methods

The development of coding protocols and methods is step 2 of 5 in this study's data analysis approach (Creswell, 2013; Stake, 1995, 2005). Coding provides a systematic way to code data to give it a foundational framework (Gibbs, 2007). In qualitative research, coding is definingthe data that you are analyzing (Gibbs, 2007).

The study participant interview script included specific questions that derived from the study's Social Cognitive Theory (SCT) framework, with questions that focused

on the following SCT constructs: perceived barriers, self-efficacy, cognition of situation, and social support (Dewar et al., 2012; Romeo et al., 2021). Because the survey included these SCT constructs, the results of the coding process included categories that are directly associated with SCT.

Before qualitative data coding can start, the researcher must decide what type of coding approach to use, either inductive or deductive coding. Deductive coding starts with a previously established and defined list of codes and then assigns these codes to the data. Inductive coding, also known as open coding, starts with no previously defined list of codes, allowing the codes to emerge as a part of the data analysis and coding process. Deductive coding was primarily used, with a defined list of codes including the four SCT constructs (perceived barriers, self-efficacy, cognition of situation, and social support) included in this study. This study also used inductive, or open, coding to allow the researcher the ability to be open to potential themes that come from the data, while also providing the flexibility to properly conduct qualitative, exploratory multiple-case study-based research. Thus, this study used hybrid coding, which is a combination of both deductive and inductive coding.

This study used a combination of descriptive, structural, and in vivo coding in three rounds of coding the data. A reminder that once the codes are created, the researcher must then decide on which coding frame to use, either flat or hierarchical. A coding frame provides a structure for the codes in order to transform the existing codes into themes for further data analysis. A flat coding frame organizes codes by assigning equal "weight" and level to each respective code. By its name, a hierarchical frame

organizes codes ranked by how they are associated with each other. This study used flat coding.

During the initial, or first, round of coding, descriptive coding was used to summarize responses from the study's semi-structured interviews by using words that encapsulate the general idea of the data. These "code-words" describe the data in a highly condensed manner, allowing the researcher to quickly refer to the content. The second round of coding used structural coding, using the research question, its sub-questions, and the study participant interview questions to guide in the development of codes. Specifically, study participants' responses to interview questions were coded deductively by the four Social Cognitive Theory (SCT) constructs of cognition of situation, perceived barriers, self-efficacy, and social support. The results of these two rounds of coding were supported by in vivo coding in the third and final coding round, which makes use of the participants' own direct words and phrases as codes, allowing for these codes to stay as close to the study participants' original phrases and words as possible. These coding steps and their respective techniques are used to categorize and cluster the data to find emergent patterns to generate themes that are used to produce assertions and theoretical frameworks (Saldana, 2021).

Themes to Data Analysis Results

The production, or generation, of themes is step 3 of 5 in this study's data analysis approach (Creswell, 2013; Stake 1995, 2005). Unlike a code, a theme is a phrase that identifies what a unit of data, or a code, that comes from the data analysis process (Saldana, 2021). The researcher reviews the dataset's codes, identifies patterns in the codes, and then clusters these codes together by their patterns to generate these themes.

In step 4 of 5 in this study's data analysis approach (Creswell, 2013; Stake 1995, 2005), each respective theme is named or labeled, defined, and finalized. It is important to review themes to make sure that they accurately represent the datasets and are useful in the dataset's representation. It is also important to make sure that the created themes align with the research question – in this case: What are the communication processes between emergency managers and water systems professionals about insufficient drinking water access? and its sub-questions.

Organize and Report Results from the Data Analysis

This chapter provides an overview of each of the first four steps in the data analysis approach used in this study. These first four steps, including the 5th and final step – organize the final results and outcomes from the data analysis, and submit the study's final report – are discussed further in Chapter 4.

Assumptions

There are assumptions for this study regarding participation. First, the study assumes that there is room for improvement regarding the communication processes between emergency managers and water systems professionals about the issue of insufficient drinking water access. This study also assumes that emergency managers should play some type of role in mitigating this issue. Finally, this study assumes that potential study participants will consent to be interviewed, and that once consent is received, they will be truthful in their responses to the study's interview survey.

Trustworthiness

It is crucial that the study describes the issue being researched from the perspective of relevant parties. Those who experience this communication issue must be

the people that are asked questions regarding that issue. In this study, the relevant parties are practitioners, specifically those from the respective practices of emergency management and water utilities. These two groups of practitioners are the study's participants.

Second, it is important to establish and document that the issue being researched in the study actually exists. In social sciences, the researcher must establish that the issue exists to ensure that the research question addresses a real issue, and not a perceived one (van de Ven, 2016). This issue is addressed in the study in Chapter 2's literature review where it is documented that the study's research question does exist, and that more research must be conducted to better understand the issue that is addressed by the research question.

A third issue is whether the study's results and outcomes are applicable and generalizable outside of the research environment. While small, qualitative research studies like this one are not generalizable, they help to explain phenomena to understand and describe human experiences more effectively (Myers, 2000).

Finally, there are some advantages to the use of the qualitative, exploratory, multiple-case study approach regarding grounding and trustworthiness of the study's findings. First, according to Eisenhardt and Graebner (2007), because this study used multiple cases to gather data from the study interviews, the information produced from that data produces a more convincing theory to answer the research question and its sub-questions. Furthermore, as was previously discussed, this multiple case approach conducts interviews with two different groups of study participants, and a document review to increase the study's validity and credibility. In addition, compared with an

individual case study, a multiple-case study can clarify whether the results of the research are valuable, while also opening up the opportunity to discover even more about any theory that can be deduced from the research's more grounded findings (Gustafsson, 2017).

Method Limitations

There are some limitations to this proposed study method. One major limitation is the geographically specific and small sample size, which means that the study's results are not generalizable. In addition, if the study finds strong associations, these associations can form the basis and support of a more extensive study in the future. Furthermore, researchers often want a large number of cases to improve the generalizability of a study's findings, and generalizability. Finally, smaller studies are quicker to conduct, providing the dual benefit of answering a research question in a shorter time period while also spending fewer resources to conduct the study (Hackshaw, 2008). Because of the study's time constraints and non-existent resource budget, the perceived limitation of a small sample size is not applicable.

Because this is a qualitative study, there can be some limitations associated with the validity and reliability of the study's results. These concerns are addressed in the study by conducting multiple-case interviews with two different groups of study participants, specifically emergency managers and water systems professionals. In addition, the qualitative coding that is conducted in this study provides a systemic organization and structure for its data, thus increasing the validity of the analysis.

Another limitation is that this study relies on self-reported data, which is based on the responses of the study participants. These responses can be biased, either under- or

over-estimating research study results and outcomes. However, even though self-reported data and results can be biased, they can also result in a credible study by ensuring that the data is properly collected and interpreted, so that the findings and conclusions accurately reflect and represent the world that was studied (Yin, 2016). In addition, using self-reported data saves time and study resources, which is important because of the study's time constraints and non-existent budget.

Another limitation is the researcher, specifically their time limits and experience level. A final limitation is the potential difficulty in the recruitment and retention of study participants. Each study participant received an Amazon gift card to assist in the recruitment and retention process. Since study participant recruitment and retention can be difficult, other populations of emergency managers and water systems professionals (managers, planners, coordinators, etc.) can also be considered as populations to focus upon in future versions of this study.

Expected Outcomes

It is expected that for emergency managers and water systems professionals, existing communication efforts with each other about drinking water access issues are not as effective as they should be, or might not exist at all. Furthermore, it is possible that both groups do communicate with each other, but are too busy with their respective duties to deal with the issue of insufficient drinking water access since it is not considered to be a hazard, only a pre-cursor of a hazard. The communication connections might "be there," but the quality of that communication might not be the best because both emergency managers and water systems professionals are overworked and overwhelmed.

These expected outcomes are also more likely to be associated with the size and scope of the emergency management agency or water utility. For example, larger, urban metropolitan agencies and utilities are likely to have more resources and staff, to mitigate insufficient drinking water access. It is also expected that outcomes will differ by demographics (gender, age, ethnicity, etc.); and by profession, either as an emergency manager or as a water systems professional. Are women, for example, that are either emergency managers or water systems professionals more likely to be aware of the issue of insufficient drinking water access?

The results of this study provide more documentation on communication efforts between emergency managers and water systems professionals about insufficient drinking water access issues to better understand and manage any communication barriers between the two practitioner-groups. The results of this study also aid in the process of the development of recommendations to deal with these communication issues to answer specific questions, including the following: why should emergency managers be concerned about water issues and why is there a need for emergency managers to work with water professionals? It is expected that the results of this study can provide recommendations on how communication between the two practitioner groups can be improved in the future.

Summary

This chapter provided an overview of the research methods used in this study. The chapter provided justification for the study's use of a qualitative research method, and for it being an exploratory multiple-case study. A description of the study's case selection, specifically for the population sample in the study, was provided, along with an overview

of the criteria used to select items to include in the study's document review to triangulate the results.

An overview of the study's university protocols was discussed, with special attention paid to ethical considerations for the study. The chapter included a description of how data collection was conducted in the study, and a thorough overview of the steps that were taken in the study's data analysis. The study's data analysis included how the data is organized, coding protocols and methods, how the results are reported, and assumptions that were made in the data analysis process.

Chapter 3 ended with sections on the trustworthiness of the study's findings, its limitations from a research design perspective, and expected outcomes. Chapter 4 provides an overview of results of the data analysis processes that were discussed in detail in this chapter.

CHAPTER 4: RESULTS

The aim of this study was to explore the communication processes between emergency managers and water systems professionals to better understand and learn how the two groups collaborate and coordinate their organizational efforts regarding insufficient drinking water access. The aim is used to specifically to answer the following research question: what are the communication processes between emergency managers and water systems professionals about insufficient drinking water access?, and its sub-questions. The purpose of the analysis is to answer the research question and its sub questions.

This chapter presents the results of the analysis outlined in Chapter 3. The chapter is organized by first presenting the relevant aspects of participants' demographics, followed by an analysis of results from the study participant interviews and document review, a description of the themes synthesized from interviews and the document analysis, and a summary of findings. A reminder that this study employs Creswell's (2013) and Stake's (1995, 2005) respective approaches: organize the data; code the data; search for themes, or patterns, within the data; seek linkages between themes, or patterns, within the data and tentative interpretations of results and outcomes; and organize final results and outcomes from the data analysis, and submit the study's final report.

This study's research question and its sub-questions are based on Social Cognitive Theory (SCT), and specifically focus on how four constructs of SCT – perceived barriers, self-efficacy, cognition of situation, social support (Bandura, 1989) – are used as measures of the communication processes between emergency managers and water systems professionals. These four constructs are used to provide a linkage between this

study's theory, its aforementioned research question and sub-questions, and the questions that were asked during study participant interviews. Specifically, questions from the study participant interviews and the research question and its sub-questions are directly linked to the four SCT constructs included in this study, as outlined in Appendix A.

This study used a combination of both deductive and inductive coding to produce a hybrid coding approach. The study's theoretical framework was deductively used to create a previously established list of categories of codes based on the four SCT constructs of perceived barriers, self-efficacy, cognition of situation, social support to assign excerpts of the data with these codes. For inductive, or open, coding, the study starts with the data and then allows the codes and themes to emerge.

For the study participant interviews, the organization of categories of themes by the study's theoretical framework constructs was an intentional decision. As a result of this intention, data analysis using the deductive coding method found the following categories of themes from the data: perceived barriers, self-efficacy, cognition of situation, and social support. Through inductive coding, another code emerged from the study participant interviews: communication. The code book that was created as a part of the hybrid coding process is available in Appendix F.

For the document review, deductive coding was used to search for the four SCT constructs – perceived barriers, self-efficacy, cognition of situation, social support – and for "communication." While the words and phrases that could be coded back to the four SCT constructs were not found in any of the documents included in the study's document review, inductive coding found multiple words and phrases that could be coded under the theme of "communication."

In addition, the results of the hybrid coding for the study participant interviews and document review found several overlapping themes that emerged. These overlapping themes are defined and described as a part of this chapter.

Results

The following sections provide an overview of the study participant demographics, information about the documents included in this study's document review, and a descriptive overview of each of themes from this study.

Participant Demographics

In an effort to protect participants' identities, each study participant was assigned a unique alpha-numeric identifier: EM01-EM05 for emergency managers, and WS01-WS05 for water systems professionals.

Table 1

Participant Demographics

SP #	Profession	Years' experience	Job title
EM01	Emergency manager	9	Deputy Director
EM02	Emergency manager	8	Regional Coalition Manager
EM03	Emergency manager	15	Emergency Manager
EM04	Emergency manager	14	Deputy Emergency Management Coordinator
EM05	Emergency manager	15	Vice President, Public Safety and Emergency Preparedness
WS01	Water systems professional	3	Environmental Programs Specialist
WS02	Water systems professional	20	Human Resources Director

WS03	Water systems professional	37	Trainer
WS04	Water systems professional	35	Member Relations and Leadership Development
WS05	Water systems professional	17	Management Analyst

As shown in Table 1, all participants have prior experience in their respective field, with an average number of 12 years for emergency managers, 22 years for water systems professionals, and 17 years overall. As can also be seen in the table, some of the water systems professionals have titles that might question if they are qualified to be included in this study. For example, WS03 and WS04 have the job titles of Trainer and Member Relations and Leadership Development, for example. To resolve this question, it is important to also note number of years that each of these study participants have worked as a water systems professional, which is over 30 years for each study participant. Water systems professionals often stay in their profession for their entire career and have multiple job types as a result, which explains and resolves this issue about their qualifications.

Table 2 provides a reference list of the documents included in the document review. Unfortunately, the analysis did not find any documents from FEMA that were pertinent to the issue of drinking water access. For example, while FEMA's Community Lifelines reference provided basic high-level content that defined water as a community lifeline (as was discussed in Chapter 1's introduction), there was not enough content in the Community Lifelines document to use in this study's document analysis. FEMA's Case Study Library (2022b) included case study reports that focused on drought, but there were no case study reports that focused on insufficient drinking water access.

FEMA's Comprehensive Preparedness Guide 101: Developing and Maintaining Emergency Operations Plans (2010) included references to water, but primarily in the form of floods, maintenance of emergency water supplies during water outages, and other types of disasters. The document did include content that noted the importance of running water and sanitation issues associated with water, but this content was too limited to provide enough content for a document analysis.

The results of the document review found only three documents that provided an acceptable amount of content to use in the document analysis process, and thus were pertinent to this study. All three documents were produced by the Environmental Protection Agency (EPA):

Table 2

References for Document Review

Agency	Citation	Reference
Included in This Study		
Environmental Protection Agency (EPA)	(EPA, 2011)	Environmental Protection Agency (EPA). (2011). Planning for an Emergency Drinking Water Supply. Retrieved through www.epa.gov.
Environmental Protection Agency (EPA)	(EPA, 2013a)	Environmental Protection Agency (EPA). (2013). Bridging the Gap: Coordination between State Primary Agencies and State Emergency Management Agencies. Retrieved through www.epa.gov.
Environmental Protection Agency (EPA)	(EPA, 2018)	Environmental Protection Agency (EPA). (2018). Connecting Water Utilities and Emergency Management Agencies. Retrieved through https://nepis.epa.gov.
Not included in This Study due to Insufficient Data		
Federal Emergency Management Agency (FEMA)	(FEMA, 2010)	Federal Emergency Management Agency (FEMA). (2010). Comprehensive Preparedness Guide 101: Developing and Maintaining

		Emergency Operations Plans. Retrieved from www.fema.gov.
Federal Emergency Management Agency (FEMA)	(FEMA, 2020)	Federal Emergency Management Agency (FEMA). (2020). Community Lifelines. Retrieved from www.fema.gov.
Federal Emergency Management Agency (FEMA)	(FEMA, 2022b)	Federal Emergency Management Agency (FEMA). (2022). FEMA Case Study Library. Retrieved from www.fema.gov.

Refer to the following tables. Table 3 presents the frequency of codes which emerged from the interviews. Table 4 presents the frequency of codes extracted from the document analysis.

Table 3

Code Frequency Occurrence for Participant Interviews

	CODES												TOTAL
EM/WS#	Disaster Definition, escalation of events	Disaster as disruption to normal activities and services	Drinking water access not perceived as a disaster/ or part of EM	Drinking water access acknowledged as a disaster	Lack of communication and working in silos as a barrier	Lack of proper hand-over as a barrier	Expressed need for effective communication and coordination between stakeholders by EMS/WSs	Belief in ability to communicate and work with other discipline	Lack of and need for public awareness and engagement	Willing to learn, communicate and coordinate between departments	Utilizing existing excercises, meetings and workshops linking EM and ws	Excercises and meetings needed between EM and WS	
EM01	1			5	2	1	8	2	1			4	24
EM02	2	1	4	3	2		7			2			21
EM03	1			1	2		6	1	1	1	2	2	17
EM04	2	1	6		4				1	2	2	2	20
EM05				1	2		2	1	1	1		2	10
WS01			1			1	3	1	1	3	1	2	13
WS02				2	1		3	2	5	1	3		17
WS03			1		2	1		1	2		1		8
WS04		1			2		5	1		3			12
WS05				2	1	1	2	2			5		13
TOTAL	6	3	12	14	18	4	36	11	12	13	14	12	155

Table 4

Code Occurrence for Document Review

	CODES										TOTAL
DOC	Emphasis on the importance of preparing for alternative drinking water sources	Strong emphasis on collaboration and the involvement of multiple stakeholders in preparedness, response and recovery	Assigning clear, roles and responsib ilities	State agencies as first layer of support, coordinators and in adirect relation with federal agencies	Federal agencies as the coordinators and last level of government to be involved in disasters	Emphasizing the importance and including guiding strategies in developing and maintaining comprehensive emergency plans (including emergency drinking plans)	Role and involvement of WARN	Conext specific risk and vulnerbility assessment	Water professionals working with EMs and EM plans	Persistence of public health concerns and working with public health agencies	
(EPA, 2011)	6	10	19	4	6	6	2	7	6	3	69
(EPA, 2013)	3	5	17	12	2	2	5	2	12	5	65
(EPA, 2018a)	1	2	1	2	0	1	0	0	9	0	16
TOTAL	10	17	37	18	8	9	7	9	27	8	150

The following section of this chapter provides an overview of the categories of themes from the study participant interviews and the document review.

Themes Under the Category of Perceived Barriers

A perceived barrier is a personal factor, specifically a mental block that can occur that disrupts the cognition process, and prevents people like emergency managers and water systems professionals from communicating with each other. These barriers create challenges and obstacles that impede effective communication (Lovari & Bowen, 2019). Study participants were asked to discuss any perceived barriers – if any – that made communication between the two groups of professionals – emergency managers and water systems professionals – about insufficient drinking water access more difficult.

For the category of perceived barriers, Table 5 shows the applicable linkages between the study's research question and sub questions with the questions included in the study participant interview protocol.

Table 5

Interview Protocol to Research/Sub-Question(s): Perceived Barriers

Interview Protocol Question(s)	Research/Sub Question(s)
What challenges have you personally experienced between emergency managers and water systems professionals, before, during, or after any types of disasters have occurred? Now, specifically think about insufficient drinking water access as an issue. What challenges might there be with communication between emergency managers and water systems professionals? Tell me about examples of when communication between emergency managers and water systems professionals worked. Why do you think that these communication challenges between emergency managers and water systems professionals exist?	What role do perceived barriers play in communication processes between emergency managers and water systems professionals?

Study findings indicated that four of the five study participants from the emergency management (EM) group view lack of awareness, or knowledge about, insufficient drinking water access as a barrier to communication with water systems professionals. They noted that this lack of awareness or knowledge is the result of a combination of siloed organizations and a lack of this issue being understood as something that should be addressed. In this study's context, a silo is defined as a department that is isolated from others.

Water systems professionals perceived a range of organizational barriers, including the impact of COVID-19 on their work and on the work of emergency

managers, issues with timelines, the types of communication channels used, high employee turnover, and need to keep contact information up to date (both internally and across professions). Table 6 provides part of the interview content from the two groups in this multiple-case study.

Table 6

Perceived Barriers

Study Participant Interview Question Content	Code	Key Theme Content
Perceived barriers for disasters	PRC_BAR_dis	Lack of communication between emergency managers and water system professionals (EM01) Timelines in communication and the accessibility to the right individuals in the communication process (WS02)
Perceived barriers for insufficient drinking water access	PRC_BAR_wtr	Barrier is both sides not listening to each other (EM05) Barrier to communication when water utility is not in the same governmental organization as the emergency management services (WS03)
Why perceived barriers exist	PRC_BAR_why	Not considering decreased access to drinking water as an emergency (EM01) Lack of resources and time on both sides (WS03)
Overcoming perceived barriers for disasters	PRC_BAR_ovr	Being willing to look at emergency management differently (EM02)

		Education and provision of necessary resources to address the issues of decreased water access (WS03)

From the previous table, data from the study participant interview questions that focused on perceived barriers was grouped into the following themes:

- perceived barriers for disasters (PRC_BAR_dis),
- perceived barriers for insufficient drinking water access (PRC_BAR_wtr),
- why perceived barriers exist (PRC_BAR_why), and
- overcoming perceived barriers for disasters (PRC_BAR_ovr).

The table provides a quote from each group, emergency managers and water systems professionals, that summarizes the respective codes that comprise the overall category of perceived barriers. More detailed quotes from study participants in each of the two groups of professionals is as follows, organized by themes.

Theme: Perceived Barriers for Disasters and for Insufficient Drinking Water Access

The study participant groups noted that multiple organizational barriers exist regarding communication between the two groups on the subject of insufficient drinking water access. Refer to the following statements from some of the study participants:

> The barriers come from silos. Emergency management is better, but it tends to be siloed. Stop an emergency manager on the street, and I don't think you're going to see water shortage is an emergency or they're not going to see how it's going to impact their job. (EM02, 2022, p. 3)

> If there is an issue, who needs to be contacted and by when? If there's not a system in place that regularly updates your points of contact and a new person or hires comes into play and there's a delay in information being shared, this can impact how you're communicating. (WS02, 2022, p. 3)

Indeed, this issue of silos was also included as a barrier in the document review, further supporting the idea that not only do these silos exist, but they also create literal and figurative barriers to communication between different groups of professionals:

> Agencies have many of the same goals – protecting public health, ensuring the restoration of essential services, and reducing the risks faced by citizens in times of crisis. Yet, in many jurisdictions, these agencies have worked in isolation rather than in collaboration. These two agencies need to strengthen their collaborative efforts to support the needs of the public that they both serve. (EPA, 2013a, p. 1)

Finally, one emergency manager noted that a major barrier is communication, specifically a lack thereof, in the following quote:

> Probably one of the biggest barriers that we face from experience with multiple jurisdictions that I've been in is an unfolding disaster like this type. We are not notified of the event. We have to call upon the water systems or the employees to find out what's going on. The prior communication, before an incident takes place, doesn't happen, even in an emerging situation. (EM03, 2022, p. 3)

Theme: Why Perceived Barriers Exist

Overall, water systems professionals attribute perceived barriers to the differences in organizations and focuses of the respective two professions. They see emergency

managers as being responsible for multiple types of disasters, with no clearly identified person within the department for communication or planning around water issues. For example, emergency managers and water systems professionals are often located in different departments, making it difficult to communicate and plan.

One water systems professional also mentioned frequent turnover in positions, leading to a gap in lines of communication as well as organizational knowledge. Fortunately, another water systems professional notes that their department has recognized the need for cross-communication, and has implemented training and technology between both departments to share information. However, this positive outcome was for only one of the five water systems professionals.

Both emergency managers and water systems professionals provided the following multiple reasons why barriers exist, some of which were discussed in their earlier responses. These include organizational silos, different focus areas, multiple jurisdictions, lack of shared planning, lack of shared disciplinary knowledge (e.g., emergency managers not understanding the operational processes and challenges of water systems management), and turnover and open positions within departments all lead to limited opportunities to communicate, collaborate, plan, and coordinate to address the issue of insufficient drinking water access. Individual study participants from both areas reiterated the challenge of recognizing and responding to this drinking water access issue, especially when resources and personnel are stretched thin and focused on immediate needs. Refer to the following statement from one of the study participants who stated, “I think a lot of it is that emergency managers are not seeing the bigger picture just because it's not in the forefront for them” (EM02, 2022, p. 5). Study participant EM03 (2022)

agreed with EM02, stating that, “we don't really understand how each other works” (p. 4).

Theme: Overcoming Perceived Barriers for Disasters

While the results of these interviews provide much detail about the perceived barriers that emergency managers and water systems professionals experience in their communication processes about the issue of insufficient drinking water access, these same interviews do provide insight into how these barriers can be overcome. Potential ways to overcome these perceived barriers flows from how study participants characterize their respective challenges.

All five emergency managers emphasized the need for building relationships across professions to mitigate silos through mutual planning and training sessions, opening conversations so that each can understand the structures and challenges the other discipline works within, and to identify areas of mutual concern and potential communication. Water systems professionals suggested shared meetings, planning sessions, training exercises, and shared technology systems as ways to improve the communication processes.

Most study participants expressed optimism that barriers can be overcome without difficulty, even within the constraints of their organizations, roles, and responsibilities, simply by being proactive and beginning the communication process. As one emergency manager noted that “there are the three Cs in emergency management: you collaborate, you coordinate, and you communicate. One of the ways that we could address challenges is through expanding a network letting individuals know that this is an issue” (EM04, 2022, p. 3). A water systems professional added, “desktop exercises are helpful. Most

utilities have spent some time coordinating with their emergency management personnel. Working through exercises together improves communication and the ability to work together" (WS04, 2022, p. 4).

Finally, the document review included information about what types of barriers exist as was documented in previous themes, but also provided insight into overcoming these barriers. The document review noted that "water utilities can develop risk communication plans with EMAs. Work together to write water use notices ahead of time" (EPA, 2018, p. 3). And another quote, as follows:

> A major factor inhibiting an effective, streamlined response after a catastrophic disaster is the sheer number of entities that are involved: political (local, regional, national and international), technical, operational, administrative, NGOs, random volunteers, etc. Coordination and communication between major players is essential. It helps to limit conflicts of jurisdiction, overlapping responses, and underutilized resources that could delay effective responses. (EPA, 2011, p. 22)

The City of Portland, Oregon is an example from the document review of how a municipality has worked to overcome communication barriers between its emergency managers and water systems professionals: The Portland Bureau of Emergency Management (PBEM) and the Portland Water Bureau (Portland Water) have a strong partnership. "They [PBEM and Portland Water] plan and participate in joint training exercises, including earthquake exercises and dam safety drills, and are co-located in adjacent offices. They work together daily and during emergencies" (EPA, 2018, p. 1).

The City of Portland is one example of how emergency managers and water systems professionals have established communication processes that foster

communication between the two professional groups that can help to not just mitigate disasters in general, but to also mitigate issue regarding insufficient drinking water access. Portland is an example of how to not only recognize that the barriers exist, but to also overcome them. While the analysis found that multiple types of barriers exist to the communication processes between emergency managers and water systems professionals about the issue of insufficient drinking water access, the analysis also revealed that there are ways that these barriers can be overcome.

In summary, the category perceived barriers provided answers to the following research sub question in this study: What role do perceived barriers play in communication processes between emergency managers and water systems professionals? Results from the analysis found that there were multiple perceived barriers that impacted the communication processes between these two groups: lack of awareness, or knowledge about, insufficient drinking water access as a barrier to communication at the individual level; which resulted from a lack of awareness about this issue at the organizational level for emergency managers; the impact of COVID-19 on existing workload for both professionals; high employee turnover; and ineffective existing communication channels. While these perceived barriers did impact communication processes between both groups, study participants were optimistic that these barriers could be overcome through mutual planning and training sessions to open up communication channels to be more proactive to overcome them.

Themes Under the Category of Self-efficacy

Self-efficacy is a personal factor, and is defined as a person's belief that they can perform a task well. For this study, the specific task is communication between

emergency managers and water systems professionals about issues associated with drinking water access, focused on an ultimate goal of improving respective communication efforts to mitigate insufficient drinking water access issues before they transform into a hazard that can cause a disaster. To accomplish this task, emergency managers and water systems professionals must believe that as individuals they can effectively communicate with their peers in a separate industry in order to conduct their efforts; they must be motivated to continue an open dialogue with their peer; and they must develop and continue a routine.

For the category of self-efficacy, refer to the following tables. Table 7: Interview Protocol to Research/Sub Questions(s): Self-efficacy shows the applicable linkages between the study's research question and sub questions with the questions included in the study participant interview protocol. Table 8 provides part of the interview content from the two groups in this multiple-case study that focuses on self-efficacy.

Table 7

Interview Protocol to Research/Sub-Question(s): Self-efficacy

Interview Protocol Question(s)	Research/Sub Question(s)
What are some examples of how much support emergency managers and water systems professionals typically get from their employers (emergency management agencies and water utilities) to communicate and collaborate with each other -- especially regarding issues associated with insufficient drinking water access?	What role does self-efficacy play in communication processes between emergency managers and water systems professionals?

Thinking about your own situation as an individual within [(1) emergency management | (2) water systems], have you been able to communicate with your colleagues in [(1) water systems | (2) emergency management] regarding insufficient drinking water access issues? If yes, tell me more?	

Table 8

Self-efficacy

Study Participant Interview Question Content	Code	Key Theme Content
Support from employers of (1) emergency managers (2) water systems professionals) to communicate and collaborate with (1) water systems professionals (2) emergency managers	SLF_EFC_pro	Need for willingness from both parties to communicate (EM05) National Incident Management System (NIMS) courses essential in guiding communication (WS05)
Ability of the individual (1) emergency manager (2) water systems professional) to communicate and collaborate with (1) water systems professionals (2) emergency managers	SLF_EFC_ind	Focusing on health care and not having conversation about water with water systems professionals (EM02) Capability to communicate aided by access to technology and ability to use multiple forms to communicate (WS02)

From the previous table, data from the study participant interview questions that focused on self-efficacy was grouped into the following codes that are divided into respective themes:

- support from employers (SLF_EFC_pro), and
- ability to communicate and collaborate with the other group (SLF_EFC_ind).

The table provides a quote from each group, emergency managers and water systems professionals, that summarizes the respective codes that comprise the overall theme of self-efficacy. More detailed quotes from study participants in each of the two groups of professionals is as follows, organized by themes:

Theme: Support from Employers

Regarding organizational, employer-based support, four of the five emergency managers mentioned actions that their agencies are already doing, or could easily "take to," in order to improve joint planning and communication around the issue of insufficient drinking water access. One participant noted that the initiative should come from the water agencies. The other four viewed their organization's role as fostering communication with water systems professionals around immediate disaster planning, and that it would be straightforward to formalize joint activities that build on their shared experiences managing sudden water disruptions. They view the partnerships and communication as "ad hoc," but that they could be formalized and focus shifted to include insufficient drinking water access issues as a type of event to mitigate. One emergency manager suggested including their municipality's Chief Resilience Officer in the communication process, as the following quote mentions:

> I would say at the departmental level, bring in some of these issues to the Chief Resilience Officer. Also, have regular meetings with emergency managers and coordination calls. We work very closely with police, fire, public works, and the

> Department of Neighborhoods. This would be a perfect way to highlight this issue because again, I don't think that this is something that people are sort of aware of. And this is an issue to address. (EM04, 2022, p. 7)

For water systems professionals, they see the role of their agencies and those at higher levels for setting this issue as a priority, advocating for focused exercises, drills or simulations, and taking the lead to reach out to emergency managers, as evidenced in the following response from a study participant: “Being the host of those events and speaking to “the why” behind why those events are necessary, and then sharing that insight publicly so that the communities recognize that the partnerships exist” (WS02, 2022, p. 5).

Two water systems professionals specifically mention the need for more regulatory pathways for cross-agency communication. Three emphasize the importance of working with members of the community for input, and the importance of joint communication through public relations and information events.

Theme: Ability to Communicate and Collaborate with the Other Group

For this theme, one emergency manager commented that actual conversations were not happening due to a need to focus on managing COVID-19. Water systems professionals described a few challenges, such as a lack of access to resources and tools, and the need to set up structures and technologies for communication. Two water systems professionals noted that a high turnover in positions and out-of-date contact information as practical challenges that they face. Refer to the following statement from one of the study participants:

> My focus for the last several years has been COVID. I don't have the ability to have those conversations, not from lack of wanting to, but right now, a lot of emergency managers, it's just not on my radar at the moment. (EM02, 2022, p. 6)

Emergency managers also mentioned that there was a general lack of resources available to develop partnerships, and there was a general lack of staff, time, and a multitude of competing priorities, making it more difficult to be proactive in mitigating issues, risks, and disasters, especially when combined with daily activities.

For the category of self-efficacy, the study findings indicate that emergency managers perceive the respective professions as having efficacy defined as "ability to" communicate and "having opportunities" for communication. Water systems professionals shared a similar perspective. They acknowledge the importance of being both capable and willing to communicate on both sides, providing opportunities such as tabletop exercises or National Incident Management System (NIMS) training where both groups can develop a shared understanding of processes and technology. Refer to the following statement from some of the study participants: "We do a very good job at being proactive. But we're only proactive once we've had something to react to (EM02, 2022, p. 5). And another statement from a study participant:

> I've seen utilities that were not even associated with the emergency management structure. [But] most utilities have spent some time coordinating with their emergency management personnel, working through exercises together to improve communication and the ability to work together. (WS04, 2022, p. 4)

All participants viewed themselves as having individual efficacy for communication, with several emphasizing a depth of experience both in their field and in working across agencies.

Regarding self-efficacy, the results show that the study participants believe that they have the ability and opportunity to communicate at an individual level, but that both groups of professionals have time and capacity restraints that make it less likely that communication occurs between the two groups on a regular basis.

This study's analysis found that, from a self-efficacy-based perspective, both emergency managers and water systems professionals are willing to communicate with each other at both the individual and employer-based organizational levels. However, both groups of professionals acknowledge that there are time constraints in their respective jobs – and at the organizational level – that make it difficult to deal with issues that require a more proactive approach, such as the issue of insufficient drinking water access.

In summary, this category of self-efficacy provided answers to the following research sub question in this study: What role does self-efficacy play in communication processes between emergency managers and water systems professionals? This study found that self-efficacy does play a role in communication processes between the two groups. For example, regarding the ability to communicate and collaborate with the other group, both emergency managers and water systems professionals noted that they had the respective individual ability to communicate, but that that communication must be more proactive. Both emergency managers and waters systems professionals mentioned that

there must be more regulatory pathways in place for their organizations to foster this cross-agency communication, since existing resources were limited for both groups.

Themes Under the Category of Cognition of Situation

Cognition specifically describes the understanding that risk is occurring, which starts the emergency response process (Comfort, 2007a, 2007b). As a measure of the effectiveness of communication efforts and processes, cognition is important for this study because effective cognition makes it necessary for emergency managers to function within the complex environment of dealing with emergencies and other types of issues associated with disasters (Axelrod & Cohen 2000; Comfort 1994, 1999; Kettl, 2006; Kiel, 1994). For both emergency managers and water systems professionals, cognition is an important part of understanding how intergovernmental agencies function and operate before, during, and after disasters and associated issues occur (Alberts & Papp, 2001; Salas & Klein, 2001).

For the category of cognition of situation, refer to the following tables. Table 9: Interview Protocol to Research/Sub Question(s): Cognition of Situation shows the applicable linkages between the study's research question and sub questions with the questions included in the study participant interview protocol. Table 10 provides part of the interview content from the two groups in this multiple-case study that focuses on cognition of situation.

Table 9

Interview Protocol to Research/Sub Question(s): Cognition of Situation

Interview Protocol Question(s)	Research/Sub Question(s)
What makes something rise to the level of a disaster in your mind? How likely are you and others in your field to describe insufficient access to drinking water as a type of issue that must be addressed? If no, why not? If yes, can you tell me more? What would you say should be done about insufficient access to drinking water ? How often have you encountered a situation in which residents in the community that you work in had insufficient access to drinking water? If yes, Tell me more. If no, given that it's a thing more and more communities may face, what would you say should be done? If a colleague of yours who is also an [(1) emergency manager | (2) water systems professional] was experiencing issues with insufficient drinking water access in the community that you work in, what advice would you give them for engaging with their fellow [(1) emergency managers | (2) water systems professionals] to deal with this issue? As an [(1) emergency manager | (2)water systems professional], how do you think that other people outside your field perceive that you should engage with [(1) water systems professionals | (2) emergency managers] in dealing with the issue of insufficient drinking water access?	What role does the work situation (e.g., work conducted at an emergency management agency or water utility) play in communication processes between emergency managers and water systems professionals?

Table 10

Cognition of Situation

Study Participant Interview Question Content	Codes	Key Theme Content
Definition of a disaster	COG_dis	Any contingency that provides disruption to day-to-day activities (EM04) A system that disrupts community services (WS04)
Definition of insufficient drinking water access	COG_wtr	Lack of awareness about insufficient access to drinking water as an issue (EM04) Lack of awareness about insufficient access to drinking water for the public as an issue (WS01)

From the previous table, data from the study participant interview questions that focused on cognition of situation was grouped into the following codes that are divided into respective themes:

- definition of a disaster (COG_dis), and
- definition of insufficient drinking water access (COG_wtr).

The table provides a quote from each group, emergency managers and water systems professionals, that summarizes the respective codes that comprise the overall theme of cognition of situation. More detailed quotes from study participants in each of the two groups of professionals are as follows, organized by themes:

Theme: Definition of a Disaster

Study findings indicated that emergency managers define disasters as disruptions to social order and normal systems operations. One emergency manager noted that a disaster event can be "expected." Another emergency manager noted definitional shift from natural disasters to include sociological causes such as terrorism. Not surprisingly, water systems professionals define disasters in the context of water systems, and the process of providing services to customers and communities.

Theme: Definition of Insufficient Drinking Water Access

Four of five emergency managers acknowledged that access to drinking water could be considered an event that can lead to a disaster, and was important to consider in theory. In practice, emergency managers' "water" focus remains on primary events such as contaminated or broken pipes, often due to natural disasters such as earthquakes, hurricanes, tornadoes or floods. One emergency manager noted that insufficient drinking water access is an issue that they had not considered before being asked about it.

All of the water systems professionals recognize access to drinking water as an issue, though one described droughts and flooding as specific events versus events developing over time. Two of them characterized work in their jurisdiction as focusing on creating "resilient" or "sustainable" water systems by creating redundancies in storage or deliverable paths to recycle and conserve water. Refer to the following quote from a study participant: "Lack of access to drinking water is not something that we are currently even advocating or even talking to our communities about it. Perhaps we should (EM04, 2022, p. 2). Alternatively, another study participant noted that lack of access to drinking water is already a priority for them, stating that, "We've taken great strides to

ensure that we still have access to water. Drinking water access is very high on our radar (WS05, 2022, p. 1).

Finally, one emergency manager noted that because of the "slow-moving" nature of the issue of insufficient drinking water access, the issue might not be as readily addressed as other issues. Refer to the following quote:

> If you put a frog in water and slowly continue to raise the temperature, it won't know that until it's too late. And I think a lot of that is the same. I think a lot of that mentality is there with slow-moving disasters. It's so slow, we don't we don't see it happening. (EM02, 2022, p. 2)

These results found that both emergency managers and water systems professionals have an understanding of their work environment, and how disasters are defined within that work environment-based situation. However, there is a lack of awareness about how the issue of insufficient drinking water access can be addressed in the field of emergency management.

In summary, this category of cognition of situation provided answers to the following research sub question in this study: What role does the work situation (e.g., work conducted at an emergency management agency or water utility) play in communication processes between emergency managers and water systems professionals? In general, emergency managers defined a disaster in general as a disruption to normal systems operations, and not surprisingly, water systems professionals defined a disaster in the context of disruptions to water systems. Specifically for the definition of drinking water access, emergency managers considered insufficient drinking water access as an event that can lead to a disaster, in theory, but not

a major focal point of their work. All water systems professionals recognized drinking water access as an issue. Thus, regarding cognition of the work situation for both groups, emergency managers were less likely to not only address the issue of insufficient drinking water access, but to also only think of the issue as something that could occur in theory.

Themes Under the Category of Social Support

As an environmental factor in this study, social support is defined as assistance individuals receive from others. This social support can be emotional, instructional, and informational. As a form of social support, information exchange between two people is also a form of communication that can increase awareness of a specific issue, such as insufficient drinking water access. Social support also has an emotional component in that supportive guidance and reinforcement from peers can act as catalysts to not only exchange information, but to also use that information to change behavior (Bandura, 2004; Dewar et al. 2012). For emergency managers and water systems professionals, it is important to understand what forms of social support exist to more effectively understand their communication processes.

For the category of social support, refer to the following tables. Table 11: Interview Protocol to Research/Sub Question(s): Social Support shows the applicable linkages between the study's research question and sub questions with the questions included in the study participant interview protocol. Table 12 provides an example of sample of the interview content from the two groups in this multiple-case study that focuses on social support.

Table 11

Interview Protocol to Research/Sub-Question(s): Social Support

Interview Protocol Question(s)	Research/Sub Question(s)
Joint activities include meetings, trainings, and conferences. For your profession, what joint activities occur between emergency managers and water systems professionals? How often have joint activities included efforts to prepare for potential issues associated with insufficient drinking water access? If so, what did those activities involve ? How often have joint activities included efforts to prepare for potential issues associated with insufficient drinking water access? If so, what did those activities involve ? How often do you have any joint activities, such as professional certifications or workshops, provided support for communication and collaboration efforts between the two groups? If so, can you tell me more about them? How can your organization be encouraged to increase communication and collaboration between emergency managers and water systems professionals? What other improvements would you like to see in communication and collaboration between emergency managers and water systems professionals?	What role does social support within the work environment play in communication processes between emergency managers and water systems professionals?

Table 12

Social Support

Study Participant Interview Question Content	Code	Key Theme Content
Description of joint activities in general	SOC_SPT_jds	Joint activities including trainings and exercises (EM04) More preparatory events and activities than routine professional workshops (WS04)
Description of joint activities focuses on insufficient drinking water access	SOC_SPT_jwt	No, because this falls outside the scope of our hazards (EM04)
Description of workshops and other activities provides to support joint communication	SOC_SPT_wks	Need for activities to provide a platform to understand the needs for both sides (EM03) Need for resources and funding to support more training and tabletop simulations (WS03)
How to encourage the profession of (1) emergency management (2) water systems to communicate with (1) water systems professionals (2) emergency managers	SOC_SPT_pro	Having regular meetings with emergency managers and coordination calls (EM04) Feasible regulatory push to foster communication (WS01)
Describe other improvements that can be made in joint communication efforts	SOC_SPT_otr	Having exercise or drills to improve communication (EM05) Having built in regulations that require annual reports and feedback (WS03)

From the previous table, data from the study participant interview questions that focused on social support were grouped into the following codes that are divided into respective themes:

- description of joint activities in general (SOC_SPT_jds),
- description of joint activities focused on insufficient drinking water access (SOC_SPT_jwt),
- description of joint activities to support joint communication (SOC_SPT_wks),
- how to encourage joint communication (SOC_SPT_pro), and
- improvements that can be made in joint communication (SOC_SPT_otr).

The table provides a quote from each group, emergency managers and water systems professionals, that summarizes the respective codes that comprise the overall theme of social support. More detailed quotes from study participants in each of the two groups of professionals are as follows, organized by themes:

Theme: Description of Joint Activities in General

Study findings indicate that three of five emergency managers confirm that joint activities do occur; two cannot. One qualifies that there may be activities, but they do not know about them. For the emergency managers, joint activities include pre- and post-disaster meetings across agencies, as well as workshops and tabletop exercises. Refer to the following statement from a study participant:

> I have not seen, nor have I personally attended a workshop in which you actually have both groups trying to address some of these issues. But it is more of how you bring those skills and both groups of folks to the same room and talk to each other? (EM04, 2022, p. 6)

Four water systems professionals also mention workshops or tabletop exercises, including some that are focused on emergency management planning, professional development, or immediate and imminent disasters. Two cannot describe specifics; two others mention the role of state- or national-level agencies where they might engage with their emergency management colleagues. One suggests that if any of these joint activities do occur, they will find out through their networks or professional associations. Another describes joint activities in terms of annual emergency management planning, or for response to imminent disasters such as fire or hazmat. One participant cautioned that access to activities can "fall by the wayside" due to staff turnover. Refer to the following statement from a study participant:

> Yes, there's been coordination when there's a pending hurricane, tornado, or weather event. The State Emergency Management System cranks up and there are water personnel who are part of that system and plugged in to help coordinate relief efforts after the event. There's not a lot of just kind of routine professional workshops that go on, but it's more preparatory events and activities that occur when an event does happen. (WS04, 2022, p. 5)

Theme: Description of Joint Activities Focused on Insufficient Drinking Water Access

The document review confirms that joint activities do occur that focus on issues with drinking water, with multiple types of "technical experts" in attendance: "Five workshops were convened with about sixty technical experts to review alternative means of providing drinking water in the event of destruction, impairment, or

contamination of the public water supply" (EPA, 2011, p. 11). However, this document did not include information about which professions are represented by the technical experts, and specifically if any of the technical experts are emergency managers.

For emergency managers, their experience in joint activities (planning, meetings, tabletop/desktop exercises) has focused on sudden disasters such as a fire, flood, or a water main break. One describes planning around drought. But the issue of insufficient drinking water access is not addressed in joint activities in emergency management for the following reason:

> This area falls outside the scope of our hazards. We have very specific hazards, again highlighted through our hazard mitigation plan. This would just be one other plan that gets added to our suite of products. And you need to create a forum so that you actually basically realize this is an issue that we need to address. (EM04, 2022, p. 7)

Another emergency manager's responses supported the previous quote's mention of the need to include the issue of insufficient drinking water access in plans and joint activities, emphasizing that the field of emergency management needs to understand that insufficient access to drinking water events qualify as disaster events that need planning and communication.

Three of five water systems professionals describe planning related to the classic definition of disaster as a sudden event, such as weather incidents or a water main break. The focus in these planning activities is providing emergency water supplies until the drinking water system can be restored, and is documented in the following quote from a study participant: "Several tabletop exercises that I've participated in revolved around

major disasters that were critical assets to the delivery of safe drinking water or just water to the distribution system" (WS03, 2022, p. 5).

Emergency managers see value in having meetings, exercises, or workshops that bring together professionals from both sides to both understand the work the other does, and then to establish relationships and processes for collaborative planning or response. One suggests that because water systems professionals understand their systems in detail, their agencies should take the lead. Two emergency managers wanted to know more about what organizational structures water systems professionals use and how they plan for disaster events. Three are curious, and would like to know more about how water systems managers think about and address disruptions to the supply chain. One frames the need around resiliency and social justice, focusing on what planning is needed to mitigate climate change and ensure that all citizens, especially those most impacted by water emergencies, have their needs addressed.

Theme: Description of Joint Activities to Support Joint Communication

The document review provided descriptions of joint activities to support communication between water systems professionals and emergency managers. The City of Portland, which was mentioned earlier in this analysis, is an example of effective joint communication between its emergency managers and water systems professionals since both organizations are located in the same physical space and conduct regularly-occurring joint activities (EPA, 2018, p. 1). And the State of Montana is also an example of effective joint communication:

In 2006, the state of Montana established the Water and Wastewater Critical Infrastructure Committee (WWCIC), which includes water and wastewater systems,

emergency responders, public health, water agencies, the primacy agency, and law enforcement agencies. This multidisciplinary group initiates necessary policies and acts as a water and wastewater contact to assist in response planning. This committee streamlines information and facilitates all hazards response planning and information sharing. This group supports a variety of collaborative efforts including quarterly training webinars, annual in-person meetings, and fostering the development and support of Montana Water/Wastewater Agency Response Network (WARN) (EPA, 2013a, p. 5).

In addition, Montana's Water/Wastewater Agency Response Network (WARN) provides an established protocol to maintain communication processes between emergency managers and water systems professionals regarding the issue of insufficient drinking water access, as evidenced by the following quote from the document review:

> State-based Water and Wastewater Agency Response Networks (WARNs) can be key partners in state water sector response planning. Many state primacy agencies and state emergency management agencies support WARNs by providing input into WARN plans and procedures and by helping integrate the "utilities helping utilities" concept into the state's response efforts. During large incidents, coordination among utility responders through WARNs, state and federal responders is important to ensure support is provided efficiently and effectively. (EPA, 2013a, p. 5)

The City of Portland and the State of Montana both provide documented examples of existing joint activities to establish ongoing communication between emergency managers and water systems professionals regarding insufficient drinking

water access. The next section provides recommendations on how to encourage ongoing joint communication.

Theme: How to Encourage and Improve Joint Communication

For recommendations to encourage and improve joint communication between the two groups, all water systems professionals and emergency managers echo each other's responses. They both emphasized the need for regular and increased opportunities for the two disciplines to come together for education, training, and planning (including the use of tabletop/desktop exercises). They noted that joint activities support mutual understanding, "break down silos," and build capacity for future joint response. Two reiterate the role that high-level emergency management agencies like NIMS or FEMA can play in funding and organizing such efforts. Refer to the following statement from one of the participants: "If I'm able to go to a workshop and receive education, tools, and any sort of resources, then I'm going to come back to my jurisdiction and start to have those conversations" (EM04, 2022, p. 7).

In addition, there should be more linkage between the two groups for this issue, since "it always helps to develop those relationships ahead of time before a crisis occurs to understand what my priorities are as a water professional and what their priorities are as an emergency management official" (WS04, 2022, p. 6). As two different groups, both emergency managers and water systems professionals recommend two important areas to focus on to improve communication processes: regular opportunities and protocols (including shared software) within and across agencies (as well as to other governmental levels); and a need to build mutual understanding of the problem as well as each other's jobs and priorities. Study participants recommended that these objectives could be

accomplished via regulating policy, participating in joint tabletop exercises and simulations, and building on existing relationships. One emergency manager noted that both professionals must have a better understanding of how each profession functions and operates, stating the importance of "better understanding of how things work. That better understanding is important, so when you say you've got a slow-moving disaster, you know what that means, and what complexities are involved in fixing that" (EM03, 2022, p. 7).

One water systems professional suggested that including community-based local sites, such as senior centers, would ensure both disciplines understand the issue of insufficient drinking water access from the perspective of those the disaster affects most. Another water systems professional focused on recommendations to improve regulations and policies that govern, and possibly mandate, communication between emergency managers and water systems professionals regarding insufficient drinking water access. Refer to the following quote:

> There should be something where there's forced, required communication between the two groups, such as a community right to know mandate like SARA Title 3 (Superfund Amendments and Reauthorization Act). It could be something as simple as an annual report that requires communication on this topic. (WS03, 2022, p. 6)

This recommendation of regulations, policies, and mandates to require communication between the two groups is also supported by the document review, which recommends requiring respective "equivalent" federal agencies – FEMA for emergency managers and EPA for water systems professionals – to communicate more effectively. "The regional

offices of EPA and FEMA should be incorporated so that functional relationships are established and a shared understanding of impact potential is communicated" (EPA, 2011, p. 19).

While these recommendations are more long-term and more difficult to implement, the document review also recommends the following short-term recommendations that are much easier to implement:

> Introduce yourself to your EMA (emergency management agency) director or emergency management coordinator prior to an emergency. Coordination with the state EMA to identify whether any federal funding is available to support response equipment purchases for water sector preparedness. (EPA, 2013a, p. 8)

> EMAs can give water utilities access to the Emergency Operations Center (EOC). Water utilities could staff a "water desk" in the EOC during emergencies. Or EMAs could provide access to a tool like WebEOC to water utilities. (EPA, 2018, p. 1)

This part of the study's analysis found much support for communication between emergency managers and water systems professionals regarding the issue of insufficient drinking water access, even providing suggestions on what policies, procedures, and events should occur on a routinely scheduled basis to start and continue regular communication between the two groups of professionals.

In summary, this category of social support provided answers to the following research sub question in this study: What role does social support within the work environment play in communication processes between emergency managers and water

systems professionals? Regarding general joint activities between emergency managers and water systems professionals, both groups were aware that this type of social support does occur and could provide various types of joint activities (planning, meetings, tabletop/desktop exercises), but had not actually participated in these type of events. In addition, for emergency managers, these joint activities did not include addressing the issue of insufficient drinking water access. While these results were unfortunate, study participants did provide recommendations on how to encourage joint communication to improve social support between the two groups, including the following recommendations: have regularly occurring joint education, training, and planning activities; and establish regular communication protocols between both types of organizations. For this second recommendation, one study participant mentioned that governmental policies must be in place to make this type of social support happen.

Themes Under the Category of Communication

Communication is defined as how people speak to understand each other. Communication focuses on how information (not just 'facts,' but policies, prospects, rumors, feelings, failures, and all other human experiences) is transferred in organizations (Kapucu et al., 2010).

For the category of communication, refer to the following tables. Table 13: Interview Protocol to Research/Sub Question(s): Communication shows the applicable linkages between the study's research question and sub questions with the questions included in the study participant interview protocol. Table 14 provides an example of sample of the interview content from the two groups in this multiple-case study that focuses on communication.

Table 13

Interview Protocol to Research/Sub Question(s): Communication

Interview Protocol Question(s)	Research/Sub Question(s)
Is there anything else that I should know regarding communication between emergency managers and water systems professionals? For example, what lessons might you share with emergency managers and water systems professionals concerning communication issues associated with insufficient drinking water access?	What are the communication processes between emergency managers and water systems professionals regarding insufficient drinking water access? For emergency managers: what are the communication processes with water systems professionals about insufficient drinking water access? For water systems professionals: what are the communication processes with emergency managers about insufficient drinking water access?

Table 14

Communication

Study Participant Interview Question Content	Code	Key Theme Content
Additional information regarding communication between emergency managers and water systems professionals, including shared lessons on risk assessment	COM_asm	Having comprehensive risk assessment (EM01) Understanding the needs and prioritizing them (WS04)
Additional information regarding communication between emergency managers and water systems professionals, including shared	COM_awr	Making the general public aware of their responsibility for water (EM01)

lessons on increasing awareness		Lack of awareness that insufficient drinking water access is an issue (EM04)
Additional information regarding communication between emergency managers and water systems professionals, including shared lessons on collaboration	COM_clb	Up for learning about this new issue and finding programs to support it (WS01) Sharing lessons through case studies with other utilities (WS03)
Additional information regarding communication between emergency managers and water systems professionals, including shared lessons on cons	COM_con	Political barriers (EM03) Decentralized governmental departments make it challenging to implement change (WS01)
Additional information regarding communication between emergency managers and water systems professionals, including shared lessons on pros	COM_pro	Opportunity to create resilience from the ground up (EM04)
Additional information regarding communication between emergency managers and water systems professionals, including shared lessons on specific recommendations	COM_rec	Facilitate a conversation on the holistic impact of water shortages (EM02) Better to put mitigation plans in place sooner (WS01)

From the previous table, data from the study participant interview questions that focused on communication were grouped into the following codes that are divided into respective themes: additional communication information on risk assessment (COM_asm), additional communication information on increasing awareness (COM_awr), additional communication information on collaboration (COM_clb), additional communication information on cons (COM_con), additional communication information on pros (COM_pro), and additional communication information on specific recommendations (COM_rec). The previous table provides a quote from each group, emergency managers

and water systems professionals, that summarizes the respective codes that comprise the overall theme of communication. More detailed quotes from study participants in each of the two groups of professionals is as follows, organized by themes.

Theme: Additional Communication Information on Risk Assessment

Gaining a better understanding of the kind of communication that exists between emergency managers and water systems professionals is critical to more effectively assess the risks that exist regarding insufficient drinking water access as a potential hazard that can lead to disasters such as drought. Both groups acknowledged the importance of risk assessment as a part of the communication process, noting that risk assessment helps both groups to determine what their priorities are. One water systems professional noted that from a risk assessment-based perspective, "there are certain things you know you need to take care of" (WS04, 2022, p. 7). An emergency manager agreed with this response, noting that risk assessment impacts emergency response processes by focusing less on preparedness and prevention versus a response and recovery. (EM01, 2022, p. 3) Unfortunately, this aforementioned comment demonstrates the reality that emergency managers and water systems professionals deal with on a daily basis. Both groups are understaffed and beyond capacity, so mitigating another hazard such as insufficient drinking access is difficult without mandates and financial support, which were recommendations that were included in the previous category: social support.

Theme: Additional Communication Information on Increasing Awareness

The document review noted the importance of communicating to raise awareness amongst different involved stakeholders and departments in terms of communicating the projected needs, gaps, current capacities, roles, responsibilities, regulations, and

opportunities for collaboration (EPA, 2013a, p. 13; EPA, 2018, p. 2). However, the documents included in the review did not provide concrete examples of how to increase awareness.

Regarding increasing awareness, study participants provided responses that focused on two different types of communication-based awareness regarding insufficient drinking water access: awareness within the two professions of emergency management and water systems, and the awareness of the public about this issue. Regarding awareness within the two professions, it is no surprise that water professionals expressed a heightened level of awareness about insufficient drinking water access. On the other slide, emergency managers were not as aware of this issue, as the following quote states, "I didn't have knowledge on this issue. I would love to learn more to share lessons learned, to share things actually taking place so you don't reinvent the wheel" (EM04, 2022, p. 6).

While emergency managers in this study were not that aware of the issue of insufficient drinking water access, they did stress that the public should and must be aware of this issue. This point was also supported by responses from water systems professionals.

This part of the study's results found that, from a communication-based perspective, emergency managers and the public that they serve are not that aware of the issue of insufficient drinking water access. Thus, it is important to increase this awareness for emergency managers by increasing communication with water systems professionals.

Theme: Additional Communication Information on Collaboration

As one of the three Cs of emergency management – communication, coordination, and control (FEMA, 2013) – emergency managers must conduct effective and efficient coordination of multiple stakeholder groups (including water systems professionals) in their communication efforts to stabilize mitigation, preparedness, response, and recovery efforts. Indeed, both emergency managers and water systems professionals should have better communication process to, in turn, improve collaboration processes, as one of the water professionals responded, “It's better to work together sooner rather than later. We just have to go over a couple of logistical hurdles, but that's not out of the norm” (WS01, 2022, p. 8).

One study participant from the water systems professionals group also provided the following suggestion on how to increase collaborative efforts between the two groups:

> There should be some case studies that could be shared with utilities that may be going through this. For example, what are…[emergency managers]… doing in regard to communication, coming up with solutions? Sharing of lessons learned is always a great thing, and it gives others a reason to explore this further or to take action to improve their situation. (WS03, 2022, p. 6)

Fortunately, most emergency managers and water systems professionals that participated in this study looked forward to increased communication and collaboration efforts between the two groups to mitigate the issue of insufficient drinking water access, even if they might not be aware of this issue prior to being interviewed for this study.

Theme: Additional Communication Information on Cons

Unfortunately, though, the results of this study did find some cons for increased communication efforts between emergency managers and water systems professionals. For example, as was discussed in the awareness theme, most emergency managers and the general public are unaware of the issue of insufficient drinking water access. As a result, there is an ignorance about the issue, as one emergency manager pointed out in the following quote, “So often in emergency management, we stress that we plan for the unexpected, but we also tend to have an ignorance sometimes of what that unexpected really is” (EM03, 2022, p. 7). And in this case, the “unexpected” is insufficient drinking water access, an issue that requires communication between multiple stakeholder groups. The same emergency manager stressed the importance of these communications, stating, “Let’s have those tough conversations. Having those tough conversations is important” (EM03, 2022, p. 7).

Both emergency managers and water systems professionals mentioned politics as a potential con, making it harder to even start the communication process, making it even more difficult to start those “tough conversations” between the two groups. Furthermore, political barriers are often intertwined with governmental barriers such as the bureaucratic organizational structure that can make it harder for public servants like emergency managers and water systems professionals to communicate. As one study participant noted, “Working with the government is always slow. That doesn't mean that we're don't care. Many of the larger actions that we need to conduct, ultimately, wind up in the board of commissioners, and that takes some time” (WS01, 2022, p. 8). While these multiple cons are disconcerting, the next section provides some pros of increasing communication processes between emergency managers and water systems professionals.

Theme: Additional Communication Information on Pros

As the results from the document review state regarding insufficient drinking water access issues, “communication between major players is essential. It helps to limit conflicts of jurisdiction, overlapping responses, and underutilized resources that could delay effective responses.” (EPA, 2011, p. 22). However, the previous section discussed multiple cons that hinder effective communication between emergency managers and water systems professionals.

One pro is to transform the obstacle of a lack of awareness about the issue into an opportunity for emergency managers and the public to increase their awareness. As one emergency manager discussed,

> This is a great way to engage the community, to host neighborhood block parties to get to know your neighbors and to also share resources. At least during a disaster after a block party, you know some of your neighbors. So again, that's creating that resilience from the ground up, which at the end of the day, those are the people that are going to come to your rescue. Neighbors truly helping neighbors. (EM04, 2022, p. 8)

And “neighbors helping neighbors” is an example of the whole community approach in action, increasing communication between emergency managers, water systems professionals, and the public that they both serve. Additional pros overlapped with specific recommendations on how to improve communication processes between the two groups, and are discussed in the next theme.

Theme: Additional Communication Information on Specific Recommendations

Both the document review and study participants supported the importance of mitigation efforts as recommendations to improve the communication processes between emergency managers and water systems professionals, with one water systems professional stating:

"It's better to work together sooner rather than later. It would be in our best interests to mitigate things" (WS01, 2022, p. 8). Statements from the document review provide information on communication recommendations, specifically ones that focus on mitigation, planning, and preparedness prior to events, such as issues with insufficient drinking water access. Recommendations from the document review include the creation of plans, coordination and communication between departments, identifying capabilities, and identifying projected needs (EPA, 2011, p. 14).

Finally, one emergency manager recommended having an "open door" policy with water systems professionals to start and continue the communication process:

> Emergency management districts should invite water district professionals to come to their meetings for local emergency planning. Local emergency managers need to make sure that the water district people are involved with planning and when they open up the Emergency Operations Center for briefings, be it weather or anything like that. People really need to be a part of those meetings. (EM05, 2022, p. 5)

Indeed, people – emergency managers and water systems professionals – need to be a part of "those" meetings, and need to meet on a regular basis to communicate about how to mitigate the issue of insufficient drinking water access. As the study participants

and the document review both show, communication is key to dealing with this issue, transforming some cons into pros.

In summary, this category of communication provided answers to the following research sub questions in this study: what are the communication processes between emergency managers and water systems professionals regarding insufficient drinking water access?; for emergency managers, what are the communication processes with water systems professionals about insufficient drinking water access?; and for water systems professionals, what are the communication processes with emergency managers about insufficient drinking water access? Regarding the communication processes between the two groups, both groups acknowledged the importance of risk assessment as a part of the communication process, noting that risk assessment helps both groups to determine what their respective priorities are. They both noted that communication between the two groups is important to increase awareness about the issue of insufficient drinking water access, not just for both of their respective professions, but also for the public that they serve. However, both groups noted that these communication processes will not occur unless they are based upon established, financially funded policies and procedures that require that communication occurs. Without mandates and financial support to fund them, it is less likely that communication between emergency managers and water systems professionals regarding the issue of insufficient drinking water access will occur.

Overlapping Themes

The study's results included themes that overlapped with at least two of the previous five categories of themes included in this study, which made some parts of the

study's results appear to be repetitive. As a part of the data analysis, these seemingly repetitive, overlapping themes were teased out of the previous five categories of the analysis' results to discuss in more detail. These overlapping themes were as follows:

- Lack of awareness and knowledge about the issue of insufficient drinking water access
- Silos as a communication barrier
- Lack of capacity, time, and resources as communication barriers
- Importance of education, training, and planning to coordinate activities

The following is a discussion of the study's results for each overlapping theme.

Lack of Awareness and Knowledge about the Issue of Insufficient Drinking Water Access

This theme overlapped across the results of the following categories of themes included in the study's results: perceived barriers, social support, and communication. The study's results found that while water systems professionals knew about and had awareness of the issue of insufficient drinking water access, the emergency managers did not. This lack of awareness and knowledge was both at the individual emergency manager level and the organizational (emergency management agency) level. Unfortunately, the study's results found that this lack of awareness and knowledge about the issue also exists for the general public for both emergency managers and water systems professionals, creating a symmetry of information about the issue of insufficient drinking water access, leading to more ignorance about this issue from both groups as well as they general public that they serve.

However, even though emergency managers in the study acknowledged this lack of awareness, they also noted that this issue should be addressed and were open to increased communication between the two groups to learn more to mitigate the issue. The document review also mentioned the importance of communication between various stakeholder groups to mitigate the issue of insufficient drinking water access, which could transform this lack of awareness and knowledge into an opportunity to start communication between the two groups to educate and inform each other and the public.

Silos as a Communication Barrier

This theme overlapped across the results of the following categories of themes included in the study's results: perceived barriers and communication. The previous overlapping theme that focused on a lack of awareness and knowledge about the issue dovetails right into silos as an overlapping theme since the study's results found that silos -- or departments that are isolated from others -- were a communication barrier. The study's results documented that these literal and figurative barriers do exist, and that it was necessary -- as one study participant mentioned -- to "break down silos" to increase communication between emergency managers and water systems professionals regarding the issue of insufficient drinking water access. The results also found that shared technology and coordinate of activities were two ways to break down silos, and each of these recommendations were also overlapping themes to be later discussed.

Lack of Capacity, Time, and Resources as Communication Barriers

This theme overlapped across the results of the following categories of themes included in the study's results: perceived barriers, self-efficacy, and communication. As was noted from the results of the document review, drinking water systems must have

enough capacity and resources to be resilient against issues such as insufficient drinking water access. The study's results also found that capacity and resources can be viewed through multiple lenses, such as the capacity of infrastructure and the capacity of professionals like emergency managers and water systems professional to maintain that infrastructure. In addition, communication between the two groups requires time, and that time was limited. The study's results found that both groups had limited capacity, time, and resources to manage their respective workloads, which was especially true for emergency managers who were already dealing with multiple types of hazards.

Because mitigating "water issues" was a part of their job description, water systems professionals interviewed in the study noted that the mitigation of insufficient drinking water access was a part of their job duties and responsibilities. However, this was not the case for emergency managers, who noted in a previous overlapping theme that they lacked awareness and knowledge of the issue of insufficient drinking access. And this lack of awareness and knowledge could be the result of this lack of additional capacity, time, and resources to help incorporate yet another potential hazard to manage as a part of their overburdened workload. Unfortunately, capacity-, time- and resource-based restraints make it less likely that communication regarding the issue of insufficient drinking water access occurs between the two groups on a regular basis.

Importance of Education, Training, and Planning to Coordinate Activities

This theme overlapped across the results of the following categories of themes included in the study's results: perceived barriers, social support, and communication. While the previous overlapping themes focused on why there was not effective communication between emergency managers and water systems professionals, this

theme provides recommendations on how to start and maintain regular communication channels regarding the issue of insufficient drinking water access.

Both emergency managers and water systems professionals recommended that in order to effectively communicate regarding the issue of insufficient drinking water access, that they needed regular meetings with each other. Both groups recommended continuous training and education activities such as tabletop exercises. They also recommended hosting joint planning meetings to coordinate their respective activities and to produce risk communication, hazards assessment, and other plans with input from both groups.

Summary

Two groups of study participants (emergency managers and water systems professionals) participated in this exploratory multiple-case study to answer the following research question: What are the communication processes between emergency managers and water systems professionals about insufficient drinking water access?, and its sub-questions. This study has the following aim: to explore the communication processes between emergency managers and water systems professionals to better understand and learn if and how the two groups collaborate and coordinate their organizational efforts regarding insufficient drinking water access. An analysis of the results of this study found five categories of themes – perceived barriers, self-efficacy, cognition of situation, social support, and communication – and multiple overlapping themes. The themes provided insight into communication processes between emergency managers and water systems professionals that will be used to more effectively deal with these communication issues in the future to more effectively mitigate the issue of insufficient drinking water access.

Interpretation of the study's results provided in this chapter is included in the next chapter, Chapter 5.

CHAPTER 5: DISCUSSION

The aim of this exploratory, multiple case study was to investigate the communication processes between emergency managers and water systems professionals to better understand how the two groups collaborate and coordinate their organizational efforts regarding insufficient access to drinking water. This aim shaped the study's following research question: What are the communication processes between emergency managers and water systems professionals about insufficient drinking water access?, and its sub questions.

Overview of Chapters

Chapter 1 introduced the problem of insufficient drinking water access and how this issue warrants a study on the communication processes between emergency managers and water systems professionals to better understand and learn if – and how – the two groups communicate about their respective organizational efforts to mitigate insufficient drinking water access issues. Because of the increase in the number, severity, and scope of disasters, existing resources are even more limited for both groups of professionals, who each have a role in the mitigation of drinking water access issues. The study is conducted to answer the following research question: What are the communication processes between emergency managers and water systems professionals about insufficient drinking water access?, and its sub-questions.

Chapter 1 also provided a discussion of multiple factors associated with this issue of insufficient drinking water access, including physical water shortages, water infrastructure failures, and the commodification of water. Regardless of what caused the

issue of a lack of drinking water access, Chapter 1 emphasized that it is important to realize that insufficient drinking water access is a hazard that can lead to disasters similar to drought if not properly addressed, and in a timely manner. Thus, it is also important that emergency managers and water systems professionals have clear communication and have developed standardized, streamlined communication processes to mitigate the issue of insufficient drinking water access.

Chapter 2 provided a review of existing literature to identify the most relevant articles on communication processes between water systems and emergency professionals, insufficient drinking water access, and the development of the theoretical framework that was used for this study. The literature review consisted of existing peer-reviewed journal articles and a review of existing gray literature that included publicly available documents from two federal agencies: the EPA and Federal Emergency Management Agency (FEMA). A review of the literature confirmed that there is existing research that documents and distinguishes the importance of communication between emergency managers and professionals from other sectors, but this literature also documents that there have been comparatively few studies that focus on collaboration and coordination of efforts between emergency managers and water systems professionals, that focus specifically on concerns regarding mitigation of insufficient drinking water access as an issue to address. This exploratory study was conducted to help fill the empirical gap on this emerging issue within emergency management to be used to better inform the practice.

Chapter 3 provided the methods used to answer the study's research question and sub- questions, based on the gap in the literature. The study's research method, design,

and approach were described, along with an overview of methodological procedures. The chapter provided details on the study's population sample, the document review, and how the data was collected and analyzed. Chapter 4 provided the results of the study that were outlined in Chapter 3. The results included the demographics of the study's participants, a content analysis of the study participants' interviews and the document review, and an overview of the themes that from the study's analysis. Chapter 5 provided a summary of the study's findings, recommendations, and suggestions for further research, and Chapter 6 provides a conclusion for the study.

Summary of Findings

As was previously noted, this study's results found five categories of themes (perceived barriers, self-efficacy, cognition of situation, social support, and communication) and four overlapping themes (lack of awareness and knowledge about the issue of insufficient drinking water access; silos as a communication barrier; lack of capacity, time, and resources as communication barriers; and the importance of education, training, and planning to coordinate activities). This chapter provides an overview of the study's findings for each of theme, starting with the category-theme of perceived barriers.

For perceived barriers, this study found that multiple barriers exist in the communication processes between emergency managers and water systems professionals. Study participant responses indicated that "lack of awareness" was an overarching barrier to communication, which resulted due to created "silos" and a lack of interaction between disciplines. For example, both emergency managers and water systems professionals expressed the lack of awareness needed to acknowledge the problem, lack of knowledge

of counter- discipline's plans, lack of a clear tracing system for the most updated staffing positions (caused by high turn-over), lack of easily accessible staff contact information, and lack of knowledge regarding appropriate communication channels, organizational roles, etc. However, although professionals believe barriers exist, both groups have a strong desire to overcome the communication barriers by simply being proactive and initiating a two-way communication process. Study participants also showed a great sense of optimism and belief that the existing barriers could be overcome.

In addition to the belief that existing barriers to communication between emergency managers and water systems professionals could be overcome, study participants' responses reveal a strong overall belief in the importance of a communication stream between both disciplines. Although barriers like capacity and awareness exist (which was discussed in the previous theme), emergency managers and water systems professionals believe in the need for communication streams and in their professional ability to efficiently and professionally communicate throughout both disciplines for better coordination and on-the-ground efforts.

For perceived barriers, the study found both emergency managers and water systems professionals were aware of the structural and organizational silos that existed, making it difficult for the two groups to communicate about the issue of insufficient drinking water access. Fortunately, both emergency managers and water systems professionals expressed a strong desire to overcome these silos and communication barriers and become more proactive on how they communicate with each other through regularly occurring meetings that focus on education, training, and joint planning. Study

participants reported a great sense of optimism and belief that existing communication barriers could be overcome.

For self-efficacy, both groups of professionals reported having a personal and professional ability to communicate with each other, and also having opportunities to do so. However, both groups also reported that communication was not proactive or frequent. Emergency managers and water systems professionals showed a strong overall belief in the importance of a communication stream between both disciplines to efficiently and professionally coordinate "boots-on-the-ground efforts" between both professions.

For the category of situation, both emergency managers and water systems professionals provided similar descriptions on how they define a disaster. Unsurprisingly, water systems professionals were more likely to include the issue of insufficient drinking water access as a disaster type, even though this issue is not categorized as a type of disaster in the practice of emergency management.

Fortunately, both emergency managers and water systems professionals expressed similarities in terms of initial thoughts around what a "disaster" is. Both emergency managers' and water systems professionals' initial definitions of a disaster seems to be a "suddenly-occurring" event, and by definition does not include issues associated with insufficient drinking water access. This revealed much about what kind of disasters professionals in both disciplines prioritize as a result of how a disaster event is defined. For example, that emergency managers saw water disasters differently, and did not really consider insufficient drinking water access as an issue to address.

For social support, study participants showed a disparity of knowledge about whether joint activities between emergency managers have occurred or not. Some participants indicated that there were joint activities that occurred between the two groups at a national and international level, but they were not aware of them at a local or state level. Such disparity in responses hints towards the need for increased opportunities for the two disciplines to come together for education, training, and planning.

When asked about joint activities that occur between emergency managers and water systems professionals, responses showed great variance in knowledge between individuals about whether such activities exist or not. Some study participants indicated that they existed at a national and international level, but they were not aware of them at a local or state level. When asked to give examples of such activities, the individuals who did so mentioned activities that were central to their role, without much overlap with the other discipline. Emergency managers mentioned experiences that focused on sudden disasters, and water systems professionals mentioned activities that focused on providing emergency water supplies until the drinking water system can be restored. Overall, study participants illustrated a need for increased opportunities for the two disciplines to come together for education, training, and planning.

Regarding communication, the study's results indicated that risk assessment of the issue of insufficient drinking water access is an important part of the communication process between emergency managers and water systems professionals so that they both can work together and collaborate to gain a more accurate assessment of risk from this issue. This risk assessment is especially important because there is a lack of awareness of the issue of insufficient drinking water access, both within emergency management and

for the general public. And even though there are cons that are in the way of this communication process taking place, the pros of implementing and continuing the process is beneficial in the long term. The study's results also provided recommendations on how to increase communication between emergency managers and water systems professionals regarding insufficient drinking water access issues.

For communication, both emergency managers and water systems professionals reported that there is a need for more communication between the two groups, and with the general public that both professional groups serve, to make all three groups more aware of the issue of insufficient drinking water access. Emergency managers and water systems professionals both agreed that they – and the populations they serve – have a lack of awareness of this issue. Both groups agreed that more communication should occur, and provided a varied list of suggestions on how to increase communication including the creation of a shared knowledge repository, conducting joint risk assessment activities, and the creation of hazard mitigation and resilience plans that include the issue of insufficient drinking water access.

For the overlapping theme of a lack of awareness and knowledge about the issue of insufficient drinking water access, the study found that emergency managers lacked awareness and knowledge of the issue, especially when compared to water systems professionals. This lack of awareness and knowledge was at both the individual and organizational levels. However, the study's results also found that increased communication between the two groups of professionals about the issue of insufficient access could be a way to decrease the awareness and knowledge gap that the emergency managers had.

For the overlapping theme of silos as a communication barrier, the study found that both emergency managers and water systems professionals mentioned that there were multiple literal and figurative barriers that created these silos. Fortunately, both groups also reported that there were ways to "break down silos" to increase communication between regarding the issue of insufficient drinking water access.

For the overlapping theme of a lack of capacity, time, and resources as communication barriers the study found that a lack of these three aforementioned factors could negatively impact communication between the two groups. This was especially true for emergency managers, since the mitigation of insufficient drinking water access was not a hazard that they were required to address in their jobs.

For the overlapping theme of the importance of education, training, and planning to coordinate activities, the three aforementioned factors were all recommendations that both emergency managers and water systems provided to increase communication between the two groups. Both groups emphasized that continuous coordination of joint activities would increase communication, and also improve in the coordination of activities.

Implications of Study Findings

The following provides an overview of the study's results and their implications. For perceived barriers, the study's results found that perceived barriers do exist, and that these multiple types of perceived barriers negatively impact the communication processes between emergency managers and water systems professionals. These findings are important to emergency management practice since these barriers must be dealt with, or even removed, to increase and improve communication between emergency managers

and water systems professionals. In addition, this study findings also suggest that policies should be in place that can be used to, as one study participant said, "break down silos" and other types of barriers.

For self-efficacy, the study's results found that both groups said that they have, as individuals, the ability to communicate with individuals from the other group, but suggested that there should be more required, proactive, and consistent communication between the two groups in order to be effective in dealing with the issue of insufficient drinking water access. These findings suggest that it is not enough for emergency managers and water systems professionals to want to communicate; policies and regulations to mandate communication must first be in place. This implication of findings on self-efficacy suggests that future studies should focus on learning more about existing government policies and regulations that exist to learn more about how they impact communication between the two groups regarding the issue of insufficient drinking water access.

For cognition of situation, the study's results found that emergency managers and water systems defined a disaster differently, with water systems professionals defining all disasters as “water related.” Emergency managers did not define insufficient drinking water as a type of disaster. This finding is important to emergency management practice because it documents that since insufficient drinking water is not defined as a disaster, there is no reason for emergency managers to mitigate this issue as a hazard to address. Furthermore, this finding suggests that, again, it is important to better understand how existing government policies and regulations impact this issue. For example, what

policies and regulations must be put into place to include insufficient drinking water access as a hazard for the practice of emergency management?

For social support, the study's results found that for joint activities as a form of social support, both groups knew that joint activities occurred, but had not attended any of them. In addition, none of the joint activities focused on the topic of insufficient drinking water access. This study finding was unfortunate, suggesting that more research should be conducted to understand why neither group attended these joint activities, even though they were fully aware of them. More information about this recommendation for future research is discussed in more detail in Chapter 6: Conclusion.

For communication, the study's results found that both groups reported that there should be more assessment of the risk of insufficient drinking water access to mitigate the issue, but that this risk assessment task is difficult for emergency managers to conduct because of a lack of mandates and funding, and because of political barriers that could make working with another group like water systems professionals more difficult. Again, these study findings suggest that is important to better understand how existing government policies and regulations impact this issue.

For a lack of awareness and knowledge about the issue of insufficient drinking water access, the study's results found that emergency managers lacked awareness and knowledge of the issue, especially when compared to water systems professionals. This lack of awareness and knowledge was at both the individual and organizational levels for emergency managers. This finding, which was expected, is probably because water systems professionals deal with various types of "water issues" as a part of their jobs on a daily basis. This finding also suggests that emergency managers should receive more

training on the issue of insufficient drinking water access to become more knowledgeable about the topic.

For silos as a communication barrier, the study's results found that multiple types of silos, both literal and figurative ones, do exist; and do create communication barriers between emergency managers and water systems professionals. The study found that these silos result from government infrastructure at federal, state, and local levels. This finding suggests that, again, it is important to better understand how existing government policies and regulations impact this issue of insufficient drinking water access, and communication between emergency managers and water systems professionals about the issue.

For a lack of capacity, time, and resources as communication barriers, the study's results found that both groups were overburdened in their respective jobs, noting that they did not have enough staff, organizational support, time, and other resources do their jobs. This lack of capacity, time, and resources made it even harder for emergency managers deal with the issue of insufficient drinking water access, especially since the issue is not defined as a hazard to address. While this finding, again, was not surprising, it does have several implications. First, emergency managers would be less likely to communicate with emergency managers about the issue of insufficient drinking water access if the issue is not a hazard that is in their job descriptions. In addition, from a policy and public administration-based perspective, it could take much time for the issue to be legally defined as a hazard.

For the importance of education, training, and planning to coordinate activities, the study's results found that joint education, training, and planning activities were all

ways to increase communication between the two groups regarding insufficient drinking water access issues. These activities require that communication occurs between emergency managers and water systems professionals to improve coordination of their work efforts. This part of the study's findings suggests that further research be conducted on existing education, training, and planning activities, including any instances in which these activities were formally evaluated by attendees to learn how to improve the activities. This finding is important to emergency management practice since it suggests that they can have the opportunity to learn more about the issue of insufficient drinking water access, even though the issue has yet to be defined as a hazard.

This study found that while both emergency managers and water systems professionals who participated in this study noted that even though there *should* be established communication processes between the two groups regarding the issue of insufficient drinking water access, in reality, these communication processes did not exist or were more informal in nature. These results from the study were expected since the issue of insufficient drinking water access is relatively new, and is not even defined as a hazard or type of disaster, as was discussed in detail in Chapter 1. In addition, Chapter 2's literature review – which included both peer-reviewed journal articles and gray literature – found a lack of studies that focus on the topic of communication processes between emergency managers and water systems professionals regarding the issue of insufficient drinking water access. This study's findings do support more research in this area of emergency management research.

For this study, the results did not include any outliers for the two different groups: emergency managers and water systems professionals. This could be because the size of

each group was small, at five study participants per group. Another interesting part of the study's results was that the water systems professionals group had an average number of years of experience that was ten more years than the average for emergency managers, a demographics-based statistic that could have influenced the study's results. For example, if the study had included study participants from both groups that have respective average numbers of years of experience that had a closer range, the results of the study might have been different.

In summary, the findings of this study show that there is a lack of communication processes between emergency managers and water systems professionals, but that the study participants were amenable to finding ways to increase communication across their respective fields of practice.

This study contributes to emergency management research by bringing attention to the importance of communication processes and how they impact the issue of insufficient drinking water access, and the multitude of water systems professionals, emergency managers, and other groups of stakeholder-professionals whose task it is, and will be, to mitigate this issue before it transforms into a disaster similar to a drought. However, this study did have its limitations, which will be covered in detail in the Study Limitation section of Chapter 6: Discussion. Even with these limitations, from an academic perspective, this research provides a foundational starting point for future studies on this issue that can be used to better inform the practice of emergency management.

CHAPTER 6: CONCLUSION

This exploratory multiple-case study used a thorough review of literature and qualitative research methods to answer the following research question: what are the communication processes between emergency managers and water systems professionals about insufficient drinking water access?, and its multiple sub questions, which are listed in Table 1. The aim of this study was to explore the communication processes between emergency managers and water systems professionals to better understand and learn if and how the two groups communicate about their respective organizational efforts regarding insufficient drinking water access to distinguish the role of each practitioner group in dealing with the issue of insufficient access to drinking water. The study's results found that there was some communication between the two groups about this issue, but not much. Water systems professionals were more likely to communicate with emergency managers than vice versa, probably because the issue of insufficient drinking water access is a part of their jobs. In addition, multiple communication barriers exist that require policies, regulations, funding, and other resources to ensure that communication occurs.

Study Limitations

There were some limitations for this study. One limitation was the complexity of the research itself, which focused on communication processes between emergency managers and water systems professionals. The study focused on the roles of people, specifically the study participants, in the mitigation of the issue of insufficient drinking water access. And studying people can be complicated. For example, refer to the

demographics of the study participants included in this study. Even though the study had a small sample size, the demographics of the two groups of cases were diverse, including four ethnic groups and 30% women, which is relatively high for two professions that are predominantly male.

However, emergency managers and water systems professionals have different career trajectories, with water systems professionals often staying in their profession much longer than emergency managers. The results of this study found, for example, that, on average, water systems professionals had ten more years of work experience than emergency managers. As a result of more years of work experience, water systems professionals have multiple types of positions, including as educators and human resources representatives, for example, as a part of their career trajectory. These differences in people, specifically for the career trajectories for the two groups of professionals as an example, was a limitation for the study.

These differences in people, and the complexity of studying them, also leads to another study limitation: replication of the study's results. If the study were replicated in the future and found similar results, this replication would increase the original study's validity and ability to be generalizable. However, because each study participant is a "complex person," it could be difficult to replicate the study's results with other populations.

Another limitation was the study's small sample size of study participants, making it difficult to generalize the study's results. These concerns were addressed in the study by conducting multiple-case interviews with two different groups of study participants: emergency managers and water systems professionals. In addition, the

qualitative coding that was conducted in this study provides a systemic organization and structure for its data, thus increasing the validity of the analysis. Finally, because this was a qualitative study, generalization of a study's results was not one of the study's priorities.

The study's sample size included people dispersed across a large geographic area, which was also a limitation of the study. The results of the study would have been more compelling if study participants were clustered in a smaller area, such as one municipality, county, or state.

There was also a small number of documents that were included in the document review for this study, with only three of the six documents that were found having enough content to be used in data analysis. However, this limitation does provide a reason to conduct studies like this one in order to help fill in gaps in existing knowledge about the research topic.

Recommendations for Further Research

As was discussed in detail in Chapter 2, the literature review in this study identified gaps in research on the topic of communication between emergency managers and water systems professionals, suggesting that there are multiple recommendations for further research on topics that can better improve emergency management research and practice. One recommendation is to conduct a study that focuses on additional job positions within each profession, and how these specific positions can impact the overall communication processes between each profession regarding insufficient drinking access. For example, the group of water systems professionals for this study included an Environmental Programs Specialist (WS01) who conducts public education and outreach

activities with the public to inform them about their drinking water. Larger water utilities often have community liaisons to coordinate efforts between the utility, other stakeholder groups such as emergency management agencies, and the general public to increase awareness. Further studies should focus on interviewing these types of job positions within both groups to get a more granular understanding of people's roles in each profession, and how their respective roles impact communication between the two groups.

Another recommendation for future research is to conduct a study that only contains professionals from both groups that are all located in one specific region or location, such as Portland, Oregon or in the State of Montana, which were both specific regions that were included in the study's results. Again, this study approach provides a more granular understanding of the study's research question and its sub questions, based on geography, to better understand if the findings of this study are similar to future studies on the same topic.

Another recommendation to consider is to conduct a study similar to this one, but with a different theoretical framework. For example, instead of using SCT theory that focuses on communication and behavior, use another theoretical framework that focuses on communication and another factor, such as negotiation. Since the results of this study found multiple barriers to communication between emergency managers and water systems professionals regarding insufficient drinking water access, negotiation theory could suggest some different ways to overcome these barriers between the two groups.

Because this study included multiple sub questions, future studies should focus on each, respective sub question, taking a proverbial deeper dive into one sub question at a

time to get more in-depth results to improve emergency management research and practice. For example, consider the following sub question from this study that focused on the category of social support: What role does social support within the work environment play in communication processes between emergency managers and water systems professionals? The study's results found that while both emergency managers and water systems professionals knew about joint activities, none of the study participants had attended these events. Further research should focus on this issue. For example, what were the reasons why the two groups did not attend joint activities? And what additional incentives or mandates must be in place to get them to attend? The results of these types of study that are respectively paired with the study's sub questions can be used to conduct multiple studies to gain a better understand of the factors that impact communication between the two groups.

The results of this study suggest that more research be conducted to learn more about existing and potential opportunities for emergency managers and water systems professionals to have both structured and unstructured communication to improve their collaborative efforts. For example, the study's results found that education (including training), planning activities, and financial resources were all important factors to support increased communication. Future studies should focus, respectively, on these aforementioned areas to understand how each impacts the communication process between the two groups to foster communication. Learning more about how each of these impact communication can provide even more evidence-based recommendations on how to establish and maintain communication between the two practitioner groups regarding the issue of insufficient drinking water access.

Further research should be conducted that focuses on learning more from designated urban areas that have more established drinking water infrastructure and financial budgets to determine how these larger, more-established urban areas handle the issue of communication between emergency managers and water systems professionals regarding issues with drinking water access. For example, future studies should conduct more in-depth studies on a specific city or municipality that is actively involved in communication between emergency managers and water systems professionals. For example, the City of Portland, Oregon's Portland Bureau of Emergency Management (PBEM) and the Portland Water Bureau (Portland Water), which were mentioned in this study's document review, is an excellent example of how emergency managers and water systems professionals have established communication processes that can be evaluated to gather best practices that can be applicable to other municipalities.

Finally, another area that requires more research is on governmental policies at all levels (federal, state, county, and municipal/local) that impact standard operating procedures for emergency managers and water systems professionals regarding drinking water access issues. However, some of these documents might be difficult to access since these documents are often only accessible through federal Freedom of Information Act (FOIA) (Feinberg, 2004; Pozen, 2017; U.S. Department of Justice, 2022;), or local- and state-level, document requests. The process of requesting access to documents through FOIA and other means can be prohibitively time-consuming. Fortunately, there is another resource that can provide information on governmental policies that is publicly available: newspaper articles. Newspapers provide a secondary data resource that contains in-depth information and reporting. From a policy perspective, even though newspaper articles are

secondary research, they are also easily available and accessible, and are not subject to FOIA restrictions.

Summary

This study contributes to the body of knowledge that is available on this topic. Furthermore, the results of this study provide recommendations for further studies that can provide more substantive knowledge on research that focuses on the communication processes between emergency managers and water systems professionals regarding insufficient drinking water access. Critical to better addressing future drinking water access crises is a solid foundation of streamlined communication processes to help emergency managers and water systems professionals to more efficiently and effectively manage this issue. Since this issue of insufficient drinking water access has multiple causes, there must be multiple seats at the proverbial table to discuss collaborative ways to handle it in an efficient and effective manner. This study has shown that creating and maintaining communication processes between emergency managers and water systems professionals is a multi-faceted phenomenon. Substantive, long-term improvements will take much time and effort.

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APPENDIX A

SCT* Connections to Research Question, Sub-Questions, and Interview Protocol

Construct	Definition	Research/Sub Question(s)	Interview Protocol Question(s)
SCT	SCT definition: learning occurs in a social context with personal, environmental, and behavioral interactions (Bandura, 1986)	What are the communication processes between emergency managers and water systems professionals regarding insufficient drinking water access?	Is there anything else that I should know regarding communication between emergency managers and water systems professionals? For example, what lessons might you share with emergency managers and water systems professionals concerning communication issues associated with insufficient drinking water access?
		For emergency managers: what are the communication processes with water systems professionals about insufficient drinking water access?	Is there anything else that I should know regarding communication between emergency managers and water systems professionals? For example, what lessons might you share with emergency managers and water systems professionals concerning communication issues associated with insufficient drinking water access?
		For water systems professionals: what are the communication processes with emergency managers about insufficient drinking water access?	Is there anything else that I should know regarding communication between emergency managers and water systems professionals? For example, what lessons might you share with emergency managers and water systems professionals concerning communication issues associated with insufficient drinking water access?
Perceived barriers	A mental block can occur that disrupts the	What role do perceived barriers play in communication	What challenges have you personally experienced between emergency managers and water systems professionals, before,

	cognition process, and prevents people from communicating with each other.	processes between emergency managers and water systems professionals?	during, or after any types of disasters have occurred? Now, specifically think about insufficient drinking water access as an issue. What challenges might there be with communication between emergency managers and water systems professionals? Tell me about examples of when communication between emergency managers and water systems professionals worked. Why do you think that these communication challenges between emergency managers and water systems professionals exist?

Self-efficacy	A person's belief that they can perform a task well.	What role does self-efficacy play in communication processes between emergency managers and water systems professionals?	What are some examples of how much support emergency managers and water systems professionals typically get from their employers (emergency management agencies and water utilities) to communicate and collaborate with each other -- especially regarding issues associated with insufficient drinking water access? Thinking about your own situation as an individual within [(1) emergency management | (2) water systems], have you been able to communicate with your colleagues in [(1) water systems | (2) emergency management] regarding insufficient drinking water access issues? If yes, tell me more.
Cognition of situation	Within the organizational workplace, the initial insight of emerging risk that initiates action.	What role does the work situation (e.g., work conducted at an emergency management agency or water utility) play in communication processes between emergency managers	What makes something rise to the level of a disaster in your mind? How likely are you and others in your field to describe insufficient access to drinking water as a type of issue that must be addressed? If no, why not? If yes, can you tell me more?

		and water systems professionals?	What would you say should be done about insufficient access to drinking water ? How often have you encountered a situation in which residents in the community that you work in had insufficient access to drinking water? If yes, Tell me more. If no, given that it's a thing more and more communities may face, what would you say should be done? If a colleague of yours who is also an [(1) emergency manager | (2) water systems professional] was experiencing issues with insufficient drinking water access in the community that you work in, what advice would you give them for engaging with their fellow [(1) emergency managers | (2) water systems professionals] to deal with this issue? As an [(1) emergency manager | (2)water systems professional], how do you think that other people outside your field perceive that you should engage with [(1) water systems professionals | (2) emergency managers] in dealing with the issue of insufficient drinking water access?

Social support	Assistance individuals receive from others.	What role does social support within the work environment play in communication processes between emergency managers and water systems professionals?	Joint activities include meetings, trainings, and conferences. For your profession, what joint activities occur between emergency managers and water systems professionals? How often have joint activities included efforts to prepare for potential issues associated with insufficient drinking water access? If so, what did those activities involve ? How often have joint activities included efforts to prepare for potential issues associated with insufficient drinking water access? If so, what did those activities involve ? How often do you have any joint activities, such as professional certifications or workshops, provided support for communication and collaboration efforts between the two groups? If so, can you tell me more about them? How can your organization be encouraged to increase communication and collaboration between emergency managers and water systems professionals? What other improvements would you like to see in communication and collaboration between emergency managers and water systems professionals?

*SCT is Social Cognitive Theory

APPENDIX B

IRB Approval Letter

Institutional Review Board for the Protection of Human Subjects in Research
249 Angle Hall
700 Pelham Road North
Jacksonville, AL 36265-1602

August 30, 2022

Paula Buchanan
Jacksonville State University
Jacksonville, AL 36265

Dear Paula:

Your protocol for the project titled "Can you hear me now? A study of communication between emergency managers and water systems professionals regarding insufficient access to drinking water" protocol number 08302022 has been granted exemption by the JSU Institutional Review Board for the Protection of Human Subjects in Research (IRB).

If your research deviates from that listed in the protocol, please notify me immediately. One year from the date of this approval letter, please send me a progress report of your research project.

Best wishes for a successful research project.

Sincerely,

Jennifer Mead
Senior Human Protections Administrator, Institutional Review Board

Phone: 256-782-8144 • Fax: 256-782-8146 • www.jsu.edu • An Equal Opportunity | Affirmative Action Employer

APPENDIX C

Recruitment Script

Dear [person's name],

I am Paula Buchanan, and I am a doctoral student in the Department Emergency Management and Public Administration at Jacksonville State University.

I am conducting a research study examining communication between emergency managers and water systems professionals. This research is important to learn more about how to improve efforts between both groups to more effectively understand and respond to the issue of insufficient drinking water access.

You are invited to participate in the study. If you agree, you are invited to participate in an interview in which you can answer a series of demographic question, and open-ended questions. The interview is anticipated to take no more than 60 minutes to complete and is conducted online via Zoom. The interview is also recorded via Zoom.

Participation in this study is voluntary. Your identity as a participant will remain anonymous and confidential during and after the study. Each study participant is assigned a unique alpha-numeric identifier to protect their privacy and confidentiality. All audio files, surveys, notes, and other interview materials are stored in digital format on a secure, encrypted computer and an encrypted external hard drive.

If you choose to participate, you will have the opportunity to review your entire interview survey, and you will get a copy of the study's findings. The study's findings include quotes from your interview survey.

If you have questions or would like to participate, please contact me at pbuchanan@stu.jsu.edu.

Thank you for your participation,

Paula Buchanan
Doctoral Student
Jacksonville State University
Phone: 202.549.3070
Email: pbuchanan@stu.jsu.edu

APPENDIX D

Informed Consent Form Communication between Emergency Managers and Water Systems Professionals

Please consider the information in this form carefully before deciding to participate in this research.

Purpose of the research
To understand more about communication efforts between emergency managers and water systems professionals regarding insufficient drinking water access for people and the communities in which they live.

Research activity
If you take part in this research activity, you will be asked to participate in one interview for about one hour and answer some questions about your understanding and experience as it relates to increases in insufficient drinking water access.

Recording of interview
With your permission, the interview will be recorded for transcription and data analysis purposes.

Duration
The interview is for approximately one hour.

Participant selection
You are being invited to take part in this research because of your work experience, either as an emergency manager or as a water systems professional.

Voluntary participation
Your participation in this research is entirely voluntary. It is your choice whether to participate or not. If you decide to take part in this study, you will be asked to sign a consent form. After you sign the consent form, you are still free to withdraw at any time, and without giving a reason, by sending an email to pbuchanan@stu.jsu.edu to request to withdraw. Withdrawing from this study will not affect the relationship you have, if any, with the researcher. If you withdraw from the study, your data will be destroyed.

Risks
There are no anticipated risks associated with participation in this interview.

Benefits
You will receive a $10 Amazon gift card as a participant in this study. In addition, participation in this study may provide you with a better understanding of the how the communication process impacts the work that you do in your field of practice.

Confidentiality
Your responses to interview questions are kept confidential, and your actual identity is not revealed. You will be assigned a random numerical identifier so that no one will know your identity. The key code that associated your name with the numerical identified is keep in a locked file cabinet in a locked office.

The interview's recording will be destroyed seven years after the research is complete. The interview transcript – which does not include your identity, only a randomly assigned numerical identifier – will be used as the basis for articles or presentations in the future. Your name or any information that identifies you will never be used in any publication, conversation, or presentation. The interview transcript will be kept for seven years and then also destroyed.

Sharing the results
Nothing will be shared with anybody outside the research team, and nothing will be attributed to you by name. The knowledge that we get from this research will be shared with you and your community before it is made widely available to the public. Each participant will receive a summary of the results. We will then publish the results so that other interested people may learn from the research.

Right to refuse or withdraw
Your participation in this study is completely voluntary, and you may skip any question during the interview. You may refuse to participate or withdraw from the study without penalty at any time by informing the researcher that you no longer wish to participate.

Who to contact
If you have any questions, you may ask them now or at a later date. If you have questions or concerns about this research, contact:

Paula Buchanan
Phone: 202.549.3070
Email: pbuchanan@stu.jsu.edu

You may also contact the faculty supervisor for this research:

Dr. Alessandra Jerolleman
Phone: 256.782.5925
Email: ajerolleman@jsu.edu

For more about your rights in this research, questions, concerns, or suggestions that are not being addressed by the researcher, or research-related harm, contact:

Office of Sponsored Programs
Jacksonville State University
249 Angle Hall
700 Pelham Road North
Jacksonville, AL 36265

Phone: 256-782-5540
Email: irb@jsu.edu

Agreement

I have read the above information, and have received answers to any questions I asked. I consent to take part in the study.

_____ Date: _____
Participant Signature

_____

Participant Name, printed

_____ Date: _____
Principal Researcher Signature

Paula Buchanan_____
Principal Researcher Name, printed

APPENDIX E

Interview Protocol

[PREAMBLE: Overview of the Study

In this study, I am trying to understand how emergency managers and water systems professionals communicate, in identifying and addressing insufficient drinking water access as an issue to be addressed. Gaining a better understanding of the specific interactions between emergency managers and water systems professionals is an important part of improving efforts between both groups to more effectively understand and respond to the issue of insufficient drinking water access.]

[PREAMBLE: Interview Questions

There are two groups of questions, demographic questions and questions that ask you more about communication between emergency managers and water systems professionals.]

Semi-Structured Interview questions

[PREAMBLE:

The next questions focus on your thoughts about the work that you do, and the conditions in which you perform your job. As a reminder, the situation for this study is insufficient drinking water access]

Cognition of situation
What makes something rise to the level of a disaster in your mind?

Cognition of situation
How likely are you and others in your field to describe insufficient access to drinking water as a type of issue that must be addressed?

If no, why not?

If yes, can you tell me more?

Cognition of situation
What would you say should be done about insufficient access to drinking water ?

Cognition of situation
How often have you encountered a situation in which residents in the community that you work in had insufficient access to drinking water?

If yes, Tell me more.

If no, given that it's a thing more and more communities may face, what would you say should be done?

Cognition of situation
If a colleague of yours who is also an [(1) emergency manager | (2) water systems professional] was experiencing issues with insufficient drinking water access in the community that you work in, what advice would you give them for engaging with their fellow [(1) emergency managers | (2) water systems professionals] to deal with this issue?

Cognition of situation
As an [(1) emergency manager | (2) water systems professional], how do you think that other people outside your field perceive that you should engage with [(1) water systems professionals | (2) emergency managers] in dealing with the issue of insufficient drinking water access?

[PREAMBLE:

The next questions focus on communication between emergency managers and water systems professionals, specifically regarding any challenges that may or may not exist between the two groups that could make it more difficult for them to work together.]

Perceived barriers
What challenges have you personally experienced any communication challenges between emergency managers and water systems professionals, before, during, or after any types of disasters have occurred?

Perceived barriers
Now, specifically think about insufficient drinking water access as an issue. What challenges might there be with communication between emergency managers and water systems professionals?

Perceived barriers
Tell me about examples of when communication between emergency managers and water systems professionals worked.

Perceived barriers
Why do you think that these communication challenges between emergency managers and water systems professionals exist?

[PREAMBLE

The next questions focus on the concepts of self-efficacy and social support. Self-efficacy is defined as a person's belief in their capacity to start behaviors necessary to produce an end-goal, with the end-goal in this case being an increase in communication between emergency managers and water systems professionals to lessen the impact of issues associated with insufficient access to drinking water.

Questions about social support focus on the relationship you have with others in your profession, and with professionals from [(1) emergency management | (2) water systems].

Self-efficacy
What are some examples of how much support do emergency managers and water systems professionals typically get from their employers (emergency management agencies and water utilities) to communicate with each other -- especially regarding issues associated with insufficient drinking water access?

Self-efficacy
Thinking about your own situation as an individual within [(1) emergency management | (2) water systems], have you been able to communicate with your colleagues in [(1) water systems | (2) emergency management] regarding insufficient drinking water access issues?

If yes, tell me more.

Social support
Joint activities include meetings, trainings, and conferences. For your profession, what joint activities occur between emergency managers and water systems professionals?

Social support
How often have joint activities included efforts to prepare for potential issues associated with insufficient drinking water access? If so, what did those activities involve ?

Social support
How often do you have any joint activities, such as professional certifications or workshops, to provide support for communication efforts between the two groups? If so, can you tell me more about them?

Social support
How can your organization be encouraged to increase communication between emergency managers and water systems professionals?

Social support
What other improvements would you like to see in communication between emergency managers and water systems professionals?

General question: end of semi-structured Interview questions

Is there anything else that I should know regarding communication between emergency managers and water systems professionals? For example, what lessons might you share with emergency managers and water systems professionals concerning communication issues associated with insufficient drinking water access?

Structured Interview Questions – Demographics | What is your…

Age range

- 18-24 years old
- 25-34 years old
- 35-44 years old
- 45-54 years old
- 55-64 years old
- 65-74 years old
- 75 years or older

Do you identify as [gender]

- Male
- Female
- Other

Do you identify as [Race/ethnicity] (select all that apply)

- Asian or Pacific Islander
- Black or African American
- Hispanic or Latino of any race
- White or Caucasian
- Native American
- BiPOC

Total household income last year?

- less than $25,000
- $25,000 – 49,999
- $50,000 – 74,999
- $75,000 – 99,999
- More than $100,000
- Prefer not to answer

Highest education level (have completed the degree)

- GED
- High school diploma
- Associates degree
- Bachelor's degree
- Master's degree
- JD

- PhD or equivalent degree
- MD

For your highest education level, in what area of study is your degree (engineering, hard sciences, social sciences, humanities)?

Are there any specific certifications do you have (CPA, CEM, etc.)?

Are you an emergency manager or a water systems professional?

What is your job title?

How many years have you been in your current job?

How many years have you been in your current profession?
(either emergency management or water systems)

For your current profession (either emergency management or water system), what other positions have you served in, and for how many years in each?

Which state do you live in?

How long have you lived in [insert state name]?

[That's the end of the survey. Thank you for taking time today to participate in this study.]

APPENDIX F

Code Book

Theme	Codes	SubCodes
Perceived barriers	PRC_BAR	PRC_BAR_dis (disaster) PRC_BAR_wtr (water access) PRC_BAR_why (why exist) PRC_BAR_ovr (how to overcome)
Self-efficacy	SLF_EFC	SLF_EFC_pro (within profession) SLF_EFC_ind (individual)
Cognition of situation	COG_SIT	COG_dis (disaster) COG_wtr (water access)
Social support	SOC_SPT	SOC_SPT_jds (joint activities, describe) SOC_SPT_jwt (joint activities, water access) SOC_SPT_wks (what works) SOC_SPT_pro (profession) SOC_SPT_otr (other improvements)
Communication	COM	COM_ase (assessment) COM_awr (awareness) COM_clb (collaboration) COM_con (cons) COM_pro (pros) COM_rec (recommendation)

APPENDIX G

Study Participant Interviews

EM01

PRB
In this study, I am trying to understand how emergency managers and water systems professionals communicate, in identifying and addressing insufficient drinking water access as an issue to be addressed. Gaining a better understanding of the specific interactions between emergency managers and water systems professionals is an important part of improving the coordination efforts between both groups to more effectively understand and respond to the issue of insufficient drinking water access.

There are two groups of questions, demographic questions and questions that ask you more about communication and collaboration between emergency managers and water systems professionals.

The next questions focus on your thoughts about the work that you do, and the conditions in which you perform your job. As a reminder, the situation for this study is insufficient drinking water access

PRB
What makes something rise to the level of a disaster in your mind?

EM01
I look at it as any event that's beyond the control of the initial first responders responding to that event.

PRB
How likely are you and others in your field to describe insufficient access to drinking water as a type of issue that must be addressed?

If no, why not?

If yes, can you tell me more?

EM01
Yes, but there's caveats to that.

PRB
What would you say should be done about insufficient access to drinking water ?

EM01

I mean, it could be a secondary event that causes the drinking water disaster, or it could be a primary event that causes the drinking water issue, such as broken pipes. Contaminated pipes, contaminated water could lead to that, or an earthquake that breaks pipes that could lead to the drinking water issue.

PRB
How often have you encountered a situation in which residents in the community that you work in had insufficient access to drinking water?

If yes, Tell me more.

If no, given that it's a thing more and more communities may face, what would you say should be done?

EM01
We have dealt with drought, but that's different.

PRB
If a colleague of yours who is also an emergency manager was experiencing issues with insufficient drinking water access in the community that you work in, what advice would you water systems professionals to deal with this issue?

EM01
I would say reach out to the water utilities. Communicate with them.

PRB
As an emergency manager, how do you think that other people outside your field perceive that you should engage with water systems professionals in dealing with the issue of insufficient drinking water access?

EM01
I think both groups should work together more, but that's easier said than done.

PRB
The next questions focus on communication and collaboration between emergency managers and water systems professionals, specifically regarding any challenges that may or may not exist between the two groups that could make it more difficult for them to work together.

What challenges have you personally experienced any communication challenges between emergency managers and water systems professionals, before, during, or after any types of disasters have occurred?

EM01
Lack of communication. What's the word I'm looking for, retention?

PRB

Can you go more into what you mean by communication and retention?

EM01
And the word I'm looking for is not coming today, but, you know, more of a transition, when someone takes another job or loses that job. There's a word I'm looking for there that's not going to mind, but basically it's when you're there today, and then two months from now, there may be someone else new. I have no relationship with the "new you" and I'm starting from scratch. Lack of communication occurs because everyone gets in their own silos and they don't feel that they need to talk with us. Water systems that are part of a jurisdiction deal with the jurisdiction more than I would deal with that water operator. Depending on the size of the water operation, they may or may not know what they're supposed to do or who they're supposed to communicate with. And then a lack of sharing of plans means that other jurisdictions are now going to have to step in to be able to assist and may not have had that on their radar. That's a risk.

PRB
Now, specifically think about insufficient drinking water access as an issue. What challenges might there be with communication between emergency managers and water systems professionals?

EM01
I think it's a consequence. It's their water supply is unavailable, what is their workaround plan? Do they provide water while their workers are trying to complete any type of repairs? Are they also going to provide water to their community in which they're supposed to serve? Do they have a commodities plan to be able to purchase and provide that particular water to their community that they serve?

PRB
Tell me about examples of when communication between emergency managers and water systems professionals worked.

EM01
Yes, over time. For example, inclusion in meetings, inclusion in planning activities. Inclusion in reaching out to understand who the players are. And it also takes some operational oversight to understand what the risks are to their systems.

PRB
Why do you think that these communication challenges between emergency managers and water systems professionals exist?

EM01
Again, it's a little bit of a silo. I think, you know, it's that they may not be looked at as a primary utility. It may be their size. They may never have dealt with emergency management before, or they may not really have a business continuity plan in place, or have gone through the process to understand what their roles and responsibilities are.

PRB

The next questions focus on the concepts of self-efficacy and social support. Self-efficacy is defined as a person's belief in their capacity to start behaviors necessary to produce an end-goal, with the end-goal in this case being an increase in communication and collaboration between emergency managers and water systems professionals to lessen the impact of issues associated with insufficient access to drinking water.

Questions about social support focus on the relationship you have with others in your profession, and with professionals from water systems.

PRB
What are some examples of how much support do emergency managers and water systems professionals typically get from their employers (emergency management agencies and water utilities) to communicate and collaborate with each other -- especially regarding issues associated with insufficient drinking water access?

EM01
Yes, I think they have the ability to do have support. Do I think that happens? No, I think it's only most of them do so as needed, and "as needed" is usually during an event as it is occurring. It's very few that are planning. But there's probably more they're not meeting than there than they should be.

PRB
Thinking about your own situation as an individual within emergency management, have you been able to communicate with your colleagues in water systems regarding insufficient drinking water access issues?

If yes, tell me more.

EM01
I have the ability. Do I think we do that enough? No. Are there water agencies that I have in our area that I've yet to talk to? Yes. Have we tried to set up a system where they go to work through different types of processes that they deal with when responding to a water emergency?

I think it will be chaos at the onset of something. Do we have plans to be able to do this ad hoc? Yes. Have we had to do this in an ad hoc situation? Yes.

PRB
Joint activities include meetings, trainings, and conferences. For your profession, what joint activities occur between emergency managers and water systems professionals?

EM01
Occasionally. I think things happen occasionally when we're invited, but not often enough.

There have been meetings at the water agencies have had where we actually have been invited to. We've reached out to the major water provider in the area to talk about what their role

actually is. And then post-disaster when we've reached out to some agencies. Those are probably the best opportunities.

PRB
How often have joint activities included efforts to prepare for potential issues associated with insufficient drinking water access? If so, what did those activities involve ?

EM01
No, I think they're mostly drought, not actual drinking water access. However, the consequences of the drought do affect your drinking water.

Also, when you're in a drought situation and you have a major wildfire, you know, any body of water is available for them to use to better help put out that fire by them. Taking the water from reservoirs reduces the amount of drinking water that reservoir would actually have, increasing your drought situation.

PRB
How often do you have any joint activities, such as professional certifications or workshops, provided support for communication and collaboration efforts between the two groups? If so, can you tell me more about them?

EM01
No, not often. But I think knowing what the risk assessments are for their agencies would be helpful if they are responsible or feel that they're responsible, providing water if their systems are down within a community. Do they have a plan to purchase and do that? Do they have a plan for distribution of that? Do they have the equipment either to provide water or be able to do that? Do they know who they are dealing with for water if that system is going to be down for multiple days and what the impacts of that system being down for multiple days? So I start there.

PRB
How can your organization be encouraged to increase communication and collaboration between emergency managers and water systems professionals?

EM01
We have an ad hoc relationship with probably the largest water system here who will be depended upon to reach out to the smaller ones to make contact, or we would go through our jurisdictions to find out who actually has water services in their community, and our public works and our public health department both have parts of their services that address and deal with water.

During our drought, we did have wells that were running dry. So we've dealt some water issues here and within the state. Once, another water agency had to come in and take over because their pipes are contaminated. Water coming out of there was brown. We ended up having to set up a distribution center in four different locations to better provide water to the community, and it became a large media event.

PRB
What other improvements would you like to see in communication and collaboration between emergency managers and water systems professionals?

EM01
I think once the communication and the integration are done, I think that's a that's an initial start. I think that will go a pretty long way on restarting the conversation. The challenge is going to be for the number of water agencies that are out there being able to communicate. Here, we have one agency that sells water to smaller jurisdictions and they become a consortium. But for those agencies that are not part of that consortium, who do they communicate with? How do we communicate with them? And do we know who they are?

PRB
Is there anything else that I should know regarding communication between emergency managers and water systems professionals? For example, what lessons might you share with emergency managers and water systems professionals concerning communication issues associated with insufficient drinking water access?

EM01
I think they need to be tied into a notification tree so when something happens, that information rolls up to the city or to the county. I think there's communication that needs to happen in regard to them being able to support one another if something actually happens. And I think there needs to be that same kind of communication tree during an event that has communication that goes both ways. They need to be on the emergency management software systems to be to communicate or have some means to communicate with the emergency operation centers.

PRB
That’s the end of the survey. Thank you for taking time today to participate in this study.

EM02

PRB
In this study, I am trying to understand how emergency managers and water systems professionals communicate, in identifying and addressing insufficient drinking water access as an issue to be addressed. Gaining a better understanding of the specific interactions between emergency managers and water systems professionals is an important part of improving the coordination efforts between both groups to more effectively understand and respond to the issue of insufficient drinking water access.

There are two groups of questions, demographic questions and questions that ask you more about communication and collaboration between emergency managers and water systems professionals.

The next questions focus on your thoughts about the work that you do, and the conditions in which you perform your job. As a reminder, the situation for this study is insufficient drinking water access

PRB
What makes something rise to the level of a disaster in your mind?

EM02
The simplest definition would be a change in normal activity or routine. Let me rephrase that. A disruptive change in normal activities.

PRB
How likely are you and others in your field to describe insufficient access to drinking water as a type of issue that must be addressed?

If no, why not?

If yes, can you tell me more?

EM02
No, in general. And the reason why I'm going to say no is because a lot of emergency managers tend to think of emergencies as those that are fast moving. Such as a hurricane or tornado, an earthquake.

I understand that emergencies are changing the definition of emergency management, and since I've been in the field has continued to expand. And not only is it talking about what you used to typically think of as emergency management areas, which were natural disasters. It's now including human causes, actually. Human caused events such as militias, terrorist acts. And then, of course, you have to now talk about human caused digital attacks to cyber security issues. So from hurricanes and tornadoes to now talking about hacking. That definition just continues to expand, and I think a lot of emergency managers still tend to hold on to the old. We don't stop to think of the new world, that we're there, and they're looking for something tangible.

So a lot of emergency managers will say yes, terrorism, because of 911, it's tangible. It's a tangible thing, and we could see it. But in a way you can kind of think of this as something that's intangible. What's the correct analogy?

If you put a frog in water and slowly continue to raise the temperature, it won't know that until it's too late. And I think a lot of that is the same. I think a lot of that mentality is there with this. It's so slow we don't we don't see it happening.

Look at old photos of Niagara Falls and look at the current photo Niagara Falls. And you can see in like 150 years how far the falls have moved. But if you're just sitting there watching it every day, you're not going to see it. And I think that is what a lot of emergency managers will think of this world. And the bad thing is, is I don't think a lot of them understand that. Water can be an emergency management issue. Deforestation can be an emergency management issue.

PRB
What would you say should be done about insufficient access to drinking water ?

EM02
We need to talk about this issue more, issues that might not be as tangible now.

PRB
How often have you encountered a situation in which residents in the community that you work in had insufficient access to drinking water?

If yes, Tell me more.

If no, given that it’s a thing more and more communities may face, what would you say should be done?

EM02
Again, I think we should talk about it more, to start a discussion about it.

PRB
If a colleague of yours who is also an emergency manager was experiencing issues with insufficient drinking water access in the community that you work in, what advice would you water systems professionals to deal with this issue?

EM02
I would suggest reaching out to more experienced emergency managers for advice.

PRB
As an emergency manager, how do you think that other people outside your field perceive that you should engage with water systems professionals in dealing with the issue of insufficient drinking water access?

EM02

I don’t think that the public realizes this is an issue. That’s a problem.

PRB
The next questions focus on communication and collaboration between emergency managers and water systems professionals, specifically regarding any challenges that may or may not exist between the two groups that could make it more difficult for them to work together.

PRB
What challenges have you personally experienced any communication challenges between emergency managers and water systems professionals, before, during, or after any types of disasters have occurred?

EM02
I think the barriers come from silos. I think emergency management is better, but I think it it's tended to be siloed. Stop an emergency manager on the street, and I don't think you're going to see a water shortage is an emergency or they're not going to see how it's going to impact their job. So I think part of that is that disconnect that's there. It's because people aren't seeing. They're not seeing how water shortage and water in general impact what they're doing now.

Obviously, I'm speaking in general terms as you get into particular communities. I think in general, emergency managers are not seeing that. I think emergency managers are just now beginning to see the other parts of the definition that go into their jobs, which is cybersecurity, health care, because I think for a long time, everyone began going back to what I said earlier about silos, your focus on your facility.

I think a lot of it is just making those connections with different groups and different organizations, and I think that's something that is lacking. In conversations with friends or other emergency managers as a field, as a profession, I don't think we communicate well. I don't think we communicate well with each other. I don't think we communicate well with the public. And I think if we can start communicating, we can actually start seeing more dots that need to be connected.

PRB
Now, specifically think about insufficient drinking water access as an issue. What challenges might there be with communication between emergency managers and water systems professionals?

EM02
Again, I think that barrier is the fact that emergency managers don't think of it as an emergency management issue, because, again, it's something that doesn't affect my EOP, my emergency operations plan.

If you look through many emergency operations plans around the country, there's going to be chapters in those plans that discuss terrorism, that discuss earthquakes, that discuss tornadoes, things like that. But there's not anything in there about lack of water. And the reason I'm phrasing

it that way is because there may be a chapter in the plan about flooding, but about lack of water, that's not going to be there.

But when I think of water, I don't think of it necessarily as drinking water. I think of this water that's flowing through our water systems. So when you're driving down the street, walking on the sidewalk, there's water back and forth. What it boils down to from an emergency management standpoint is that lack of water. What are the impacts? And one thing that I would think would be interesting is to take a look at. I believe it was Cape Town, South Africa?

There was a lot of focus on, lack of drinking water, lack of water to brush your teeth, take a shower, to get a bottle of water. But no one looked at the other side of that, which is what is what are the impacts to the fire department? What are the impacts to industry there as well? What is the impact on energy?

PRB
Tell me about examples of when communication between emergency managers and water systems professionals worked.

EM02
Having conversations between the two groups. Emergency managers always focus on emergency managers. That's why we're here. Think of infrastructure as what they see; it's the roads, the bridges. It's also the banks, the hospitals, you know, but infrastructure is more than just that.

I can touch a hospital. But unless I go into ground, I can't touch a pipe, so it's out of sight, out of mind, I think a lot of times. And I think making emergency managers understand that water systems are a critical infrastructure, you know, because again, we mentioned Cape Town South Africa. There's also Wichita Falls, Texas, which several years ago had droughts continue to happen in that part of the state. They were looking at ways to capture water. They captured that waste. Now the reason I'm mentioning that, as well as you know, Cape Town, is because I would love to have been part of those conversations. I think it's being willing to look at emergency management differently.

PRB

Why do you think that these communication challenges between emergency managers and water systems professionals exist?

EM02
Because, again, it's not something that, emergency managers think about as an emergency management issue. And I'm going to flip that and say, I don't think it's something bad about water and folks that work in the water industry. I think of it as an emergency management issue. They may think of it as an emergency. But they're not connecting it to emergency management. So I think that's where it comes from.

Again, I think a lot of it is emergency managers are not seeing the bigger picture on these disaster events just because it's not it's not in the forefront for them. It's not a tangible thing like a

tornado or a terrorist attack. And I hate to say this, the sexiness of it, you know? The sexiness of a tornado and the recovery of that, you're actually seeing things happening when you see a terrorist event happen. It's a tragedy. But you see the sexiness of it being like a lot of coming together of people, a lot of rebuilding taking place. You actually get to see things happen. It's sexy and I think again it ties into what I said about it being tangible. I can see it.

I can't touch it with this event. It's hard to grasp it because it hasn't happened. And by that, I mean, you know, tornado touches down, boom, it happened. But I can put my hands around that something that's taking place over, you know, a 10, 15, 20-year span. It's just hard to wrap your head around that.

PRB
The next questions focus on the concepts of self-efficacy and social support. Self-efficacy is defined as a person's belief in their capacity to start behaviors necessary to produce an end-goal, with the end-goal in this case being an increase in communication and collaboration between emergency managers and water systems professionals to lessen the impact of issues associated with insufficient access to drinking water.

Questions about social support focus on the relationship you have with others in your profession, and with professionals from water systems.

PRB
What are some examples of how much support do emergency managers and water systems professionals typically get from their employers (emergency management agencies and water utilities) to communicate and collaborate with each other -- especially regarding issues associated with insufficient drinking water access?

EM02
There's not much support. Recognition needs to happen. And again, I think it goes back to that we're just not seeing it. 30 years ago, if you had asked an emergency manager about terrorism, you probably would have gotten, you know, a deer in the headlights look or just a blank stare from them. But now that is part of emergency management. It's the possibility of that same thing with hacking. You know, if your systems have been hacked 20 years ago, ask an emergency manager and I think he would have gotten the same blank stare.

Emergency management is very good at being proactive. But they're only proactive after they've had to react to something. Once something happened and we reacted to it, we were able to start proactively looking at how do we mitigate, prepare and respond to recover from a disaster. We do a very good job at being proactive. But we're only proactive once we've had something to react to.

PRB
Thinking about your own situation as an individual within emergency management, have you been able to communicate with your colleagues in water systems regarding insufficient drinking water access issues?

If yes, tell me more.

EM02
As an individual, I'm happy to have that conversation with water folks, water professionals. I think again, I think I'm pretty good myself to kind of see some dots that need to be connected. So personally, not a problem.

In my current role, I do not have those conversations with water professionals for a variety of reasons, one being health care. My focus for the last several years has been COVID. I don't have the ability to have those conversations, not from lack of wanting to, but for right now, for a lot of emergency managers, it's just not on my radar at the moment.

PRB
Joint activities include meetings, trainings, and conferences. For your profession, what joint activities occur between emergency managers and water systems professionals?

EM02
I can't think of any. But just because I can't think of any doesn't mean that they don't exist. I know that. So having said that, I can see where yes, exercises need to include water professionals. Some of the zoning changes, for example, that are taking place, and neighborhood development as well; is the water system capable of handling all these new residential buildings that are going up? So it is in that kind of community development work that water professionals working in conjunction with each other. And I think it does lead to meaningful conversations during those exercises to take place in an emergency management arena.

PRB
How often have joint activities included efforts to prepare for potential issues associated with insufficient drinking water access? If so, what did those activities involve ?

EM02
I think so. Like I said, I'm sure there are. I'm not aware of them off the top of my head.

PRB
How often do you have any joint activities, such as professional certifications or workshops, provided support for communication and collaboration efforts between the two groups? If so, can you tell me more about them?

EM02
No, no joint activities.

I think about all the time when a disaster happens, and one of the very first things that shows up is a truck carrying pallets of water. So obviously, right, there is something that needs to happen. So a conversation needs to take place with local water professionals on why that's needed, obviously. Obviously, it can be needed for the fact that whatever that disaster event was, it was so powerful it actually damaged water systems. And so we don't have any drinking water that's

readily available until repairs are done because you want to make sure that there's no contamination.

PRB
How can your organization be encouraged to increase communication and collaboration between emergency managers and water systems professionals?

EM02
We've had we had several health care facilities that were impacted from tropical depression Ida last summer, as well as runoff from winter or spring rains and flooding. Obviously, that means that we need to be having conversations with water professionals. What can facilities do to protect the integrity of their drinking water so that when they are impacted? And that whether it be flooding, whether it be whatever, that they can be assured that their water is drinkable for them, for their staff, and for the patients.

PRB
What other improvements would you like to see in communication and collaboration between emergency managers and water systems professionals?

EM02
Well, I'd like to see it start, that those conversations are taking place on a wide scale. I want I want to be optimistic, and I want to believe that emergency management professionals were involved in some conversations. Likewise, look at Miami. Miami is redoing its water drainage because of sea level rise. And again, I'm going to be optimistic, and I'm hoping emergency management professionals are involved in those conversations. Because that's just my nature to be optimistic.

So I'm hoping that helping in places like that, those conversations are happening. But I don't think those conversations are taking place in general. I don't even think those conversations have ever even entered anyone's thought, both on the emergency management side, and I'm going to go out on a limb and say in the water professional side as well.

PRB
Is there anything else that I should know regarding communication between emergency managers and water systems professionals? For example, what lessons might you share with emergency managers and water systems professionals concerning communication issues associated with insufficient drinking water access?

EM02
Well, I would like to be able to just again facilitate the conversation. I don't really think the conversations are taking place. And I think people need to think about this again. Like you had mentioned yourself earlier that there's wastewater and there's drinking water, but to some of that, some of the prevention is not just water, it's water systems.

If we just could approach it more and I'm not a professional on this, but if we can address it from a water standpoint, I think that might engage a market. Well, you know, if there's a water shortage, what are you going to do for a fire?

And I think is the way to get inroads and then start having that conversation with water professionals and emergency managers, because I think that's a conversation that emergency managers would be interested in if you just said that water impacts the ability to put out fires.

PRB
That’s the end of the survey. Thank you for taking time today to participate in this study.

EM03

PRB
In this study, I am trying to understand how emergency managers and water systems professionals communicate, in identifying and addressing insufficient drinking water access as an issue to be addressed. Gaining a better understanding of the specific interactions between emergency managers and water systems professionals is an important part of improving the coordination efforts between both groups to more effectively understand and respond to the issue of insufficient drinking water access.

There are two groups of questions, demographic questions and questions that ask you more about communication and collaboration between emergency managers and water systems professionals.

The next questions focus on your thoughts about the work that you do, and the conditions in which you perform your job. As a reminder, the situation for this study is insufficient drinking water access

PRB
What makes something rise to the level of a disaster in your mind?

EM03
So a disaster for us is anything that has societal impacts, typically negative, but anything that needs A response and recovery role for the people we serve. That can be businesses, it can be residents, it can be whoever, it can even be government.

PRB
How likely are you and others in your field to describe insufficient access to drinking water as a type of issue that must be addressed?

If no, why not?

If yes, can you tell me more?

EM03
Oh yes. That's one of the critical core needs as a human. And decreased access in general is always an issue that we try to focus on because deficiencies in access create gaps both in the response and the recovery of the community.

PRB
What would you say should be done about insufficient access to drinking water ?

EM03
Something like this has the potential to totally stop operations, and it impacts not just the citizens, but also places like hospitals and the needs that exist there. Data centers use water supplies, some use recycled water, but some use municipal water supply for cooling.

PRB
How often have you encountered a situation in which residents in the community that you work in had insufficient access to drinking water?

If yes, Tell me more.

If no, given that it's a thing more and more communities may face, what would you say should be done?

EM03
Yes, we see this in my jurisdiction. So we're talking about a cascading type of disaster that has major societal impacts, and not just to low-income communities that typically see most impacts from a lack of water access. We're talking issues across the board.

PRB
If a colleague of yours who is also an emergency manager was experiencing issues with insufficient drinking water access in the community that you work in, what advice would you water systems professionals to deal with this issue?

EM03
I would definitely tell this person to contact someone who is in charge of operations, and definitely co-workers or peers who might have more experience.

PRB
As an emergency manager, how do you think that other people outside your field perceive that you should engage with water systems professionals in dealing with the issue of insufficient drinking water access?

EM03
I don't think it's perceived as a big issue, something that can stop operations across a city. That is unfortunate.

PRB
The next questions focus on communication and collaboration between emergency managers and water systems professionals, specifically regarding any challenges that may or may not exist between the two groups that could make it more difficult for them to work together.

PRB
What challenges have you personally experienced any communication challenges between emergency managers and water systems professionals, before, during, or after any types of disasters have occurred?

EM03
Obviously, one of the biggest ones is communication. Typically, probably one of the biggest barriers that we face from experience with multiple jurisdictions that I've been in is an unfolding disaster like this type. We are not notified of the event. We have to call upon the water systems

or the employees to find out what's going on, and that can be a water main break, or even a power outage like we had several years ago in Atlanta that caused a disruption to water supply.

The prior communication, before an incident takes place, doesn't happen, even in an emerging situation. We're not notified of that to start the response and recovery processes. So that's probably one of the biggest challenges that I've faced.

I think a challenge that all emergency managers face is that communication really isn't there. I think part of it is a lack of understanding of what emergency management can provide, whether it's communicating to the to the residents, the business owners, but also starting to get our critical infrastructure processes and getting, let's say, hospitals, non-potable water supplies so they can continue to operate, or bottled water for our schools, which we've done in the past. Things like that, because it's a lot easier to get those ahead of time than it is when nobody has water for several hours and you're trying to catch up.

PRB
Now, specifically think about insufficient drinking water access as an issue. What challenges might there be with communication between emergency managers and water systems professionals?

EM03
One of the biggest barriers is going to be people trying to convince others that the disaster exists. We see that all the time with drought. We see that with sea level issues, constantly. We've seen that with COVID. These disasters take a lot of extra communication, and a lot of convincing. And I think a lot of it is because people don't really understand that it impacts them until it physically impacts them. And by then, it's too late to prepare. It's too late to respond to it.

PRB
Tell me about examples of when communication between emergency managers and water systems professionals worked.

EM03
One thing that is nice with the city of Atlanta and their water system is that they have emergency managers on staff. And so those emergency managers are direct liaisons before and after there's a situation. Once a week, we actually do touch base to talk about who the duty officer is, and other things. So if there is something that emerges, we know exactly who to contact, and they do the same for us.

It goes back to that communication piece, and I think it's important to have that working relationship with each other.

With that common communications in place, we also have meetings with them and do interface with them, whether it be situation planning or just even general planning for response type of a system. So the possibility is there to work between each other. It just has to be explored. It has to be opened up.

PRB
Why do you think that these communication challenges between emergency managers and water systems professionals exist?

EM03
I think it's just a lack of understanding of what both entities can provide. The water utilities don't really understand the need to communicate, let's say, to hospitals, to their public safety entities, to emergency management about what may be going on. At the same time, I don't think emergency management does a really good job of even reaching out to watershed systems to offer those services.

And one thing that I've noticed, too, is we don't really understand how each other works. I've learned a lot about water systems over the years through my work in emergency management, though. There is a lack of understanding of how the system operates. It's just one of those things. We just assume it's always going to work in watershed and water systems. There's a lot of intersect there that I don't think is explored.

PRB
The next questions focus on the concepts of self-efficacy and social support. Self-efficacy is defined as a person's belief in their capacity to start behaviors necessary to produce an end-goal, with the end-goal in this case being an increase in communication and collaboration between emergency managers and water systems professionals to lessen the impact of issues associated with insufficient access to drinking water.

Questions about social support focus on the relationship you have with others in your profession, and with professionals from water systems.

PRB
What are some examples of how much support do emergency managers and water systems professionals typically get from their employers (emergency management agencies and water utilities) to communicate and collaborate with each other -- especially regarding issues associated with insufficient drinking water access?

EM03
Yes, there is support. However, I will say I don't think it's explored as often as it should be. With a lot of things in emergency management, the capability always exists. The problem a lot of times is from experience, just a staffing related issue. We don't have as many resources as we would like to have to explore our deeper partnerships. We'd like to work on plans more. We don't have the staffing depth to do that.

So we're really hyper focused on what we can accomplish. And unfortunately, a lot of the time, extra stuff that we would like to do just kind of gets put by the wayside, including working on communication between each of us and water systems. Even creating some sort of public campaign, for example, is a part of things that do fall by the wayside. And I don't think it's intentional. I just think it's reality.

PRB
Thinking about your own situation as an individual within emergency management, have you been able to communicate with your colleagues in water systems regarding insufficient drinking water access issues?

If yes, tell me more.

EM03
Definitely. And that is one nice thing because I do have a focus on critical infrastructure in my current job. I do frequently have those conversations with watershed employees and even across other sectors, such as energy sector employees that supply energy to our water facilities and things like that, making sure all of those connections are made ahead of time.

PRB
Joint activities include meetings, trainings, and conferences. For your profession, what joint activities occur between emergency managers and water systems professionals?

EM03
As a profession, I think those exist, but I don't think it's a whole lot. I know about the AWWA (American Water Works Association).

I know there's some partnerships there within the AWWA. I know there's some discussion there. I don't know to what depth what happens in AWWA, and I don't think anything trickles down all the way to the practitioner level. I think it stays kind of really high level, and I don't think that benefits us as a whole.

I know that at my current job, we have had workshops and we've even had a tabletop exercise with our watershed partners because we do have two water systems in the jurisdiction, City of Atlanta and Fulton County. We have had some of those discussions, but it has been related directly to, you know, a main water main break that affects the community, or hospital related sector to determine how does the hospital continue to function, and how do we provide those critical functions.

PRB
How often have joint activities included efforts to prepare for potential issues associated with insufficient drinking water access? If so, what did those activities involve ?

EM03
They do, but it's mostly because of a rapidly occurring event. So a water main break that does cut off drinking water access, or water for a cooling system, stuff like that. We have actually run through these kind of workshops and had the tabletop exercises to really get into details of how we start that response process, what kind of repairs are going to be needed, how long those repairs are going to take, and what kind of resources we provide to the community in the interim.

Some of the things that have come out of those tabletop exercises is that we actually have water filter trailers that can pull and filter untreated water from any water source, a pond, a lake, and

it's actually a full filter system that can provide water to the community. I don't know the capacity on those. It's not super high capacity, but it gives us the ability to, you know, give somebody a gallon of water within a minute. It's not super-fast, but it does give us that capability.

We've also learned from these exercises that there are contracts set up with our hospitals that create a process to where if there's a disruption, they automatically start those contracts and get water into the water filter trailers. We also have contracts with our school districts now for bottled water. And actually, during the last water incident that we had, we actually had Wal-Mart come in and donate water. So these exercises provided resources for something long term. I'm not sure how long we'd be able to sustain that.

PRB
How often do you have any joint activities, such as professional certifications or workshops, provided support for communication and collaboration efforts between the two groups? If so, can you tell me more about them?

EM03
I think a lot of it is understanding what the needs are for both sides. Additionally, the one nice thing about, let's say, workshops, for instance, is it starts that process of meeting and exchanging information on what we each can provide. The workshops bring people together, and it forces that collaboration. I think that is important.

In the emergency management field, events like a workshop are technically considered an exercise, according to the Homeland Security Exercise Evaluation Program. This consideration from the Department of Homeland Security forces that collaboration to happen, and a lot of times that's the only way we can make it happen.

PRB
How can your organization be encouraged to increase communication and collaboration between emergency managers and water systems professionals?

EM03
For us, it's that continued partnership at this point. Fortunately, we do have a really good existing relationship with water utilities from various events that have occurred over time. And so that partnership has really built up over the years. It's just maintaining that partnership, working with those emergency managers there that work with watershed, and continuing to keep having these discussions.

PRB
What other improvements would you like to see in communication and collaboration between emergency managers and water systems professionals?

EM03
Better understanding of how things work. For water, we don't make tactical level decisions on the emergency management side. A watershed is always going to own those tactical decisions.

But we're there to get them the resources, helping them spread information resources out. We're there for that coordination piece of it. And with any disaster, understanding the complexities of the disaster helps us respond appropriately and get the resources we need to start the recovery process as well, because that starts immediately after the response.

That better understanding is important, so when you say you've got a disaster, you know what that means, and what complexities are involved in fixing that. But as a whole, I don't think a lot of this information is well known.

PRB
Is there anything else that I should know regarding communication between emergency managers and water systems professionals? For example, what lessons might you share with emergency managers and water systems professionals concerning communication issues associated with insufficient drinking water access?

EM03
I think the biggest thing is, let's talk. Let's have those tough conversations. I don't fully understand what the barriers are all the time, and some of it may be political. I know that politics exists a lot and in the profession on both sides, both the watershed side and emergency management side. But having those touch conversations is important. So often in emergency management, we stress that we plan for the unexpected, but we also tend to have an ignorance sometimes of what that unexpected really is.

PRB
That’s the end of the survey. Thank you for taking time today to participate in this study.

EM04

PRB
In this study, I am trying to understand how emergency managers and water systems professionals communicate, in identifying and addressing insufficient drinking water access as an issue to be addressed. Gaining a better understanding of the specific interactions between emergency managers and water systems professionals is an important part of improving the coordination efforts between both groups to more effectively understand and respond to the issue of insufficient drinking water access.

There are two groups of questions, demographic questions and questions that ask you more about communication and collaboration between emergency managers and water systems professionals.

The next questions focus on your thoughts about the work that you do, and the conditions in which you perform your job. As a reminder, the situation for this study is insufficient drinking water access

PRB
What makes something rise to the level of a disaster in your mind?

EM04
So a disaster is basically any contingency that provides a disruption to your day-to-day activities.

PRB
How likely are you and others in your field to describe insufficient access to drinking water as a type of issue that must be addressed?

If no, why not?

If yes, can you tell me more?

EM04
It’s more with drought. And this thing with drought. So when I was in Richmond, California, we were dealing with that. And that's actually one of the reasons why a new little spark starts with this huge wildfire is because, again, the ground has been so void of water.

PRB
What would you say should be done about insufficient access to drinking water ?

EM04
So to be to be truthful, as an emergency manager, in my day-to-day activities I had no idea that this was taking place. I would say I don't necessarily think that this is an issue that a lot of emergency managers are aware of. I believe that again, there's a host of issues that come into our realm, or sort of the activities that we're currently engaged in. But unfortunately, I think that we're of involved with this issue day to day.

Basically, you have a risk profile when you're looking at your hazard mitigation plan and a lot of those items that you know, are basically top line. So I would argue for us here, our biggest threat is hurricanes. We've been doing a lot of disaster related hurricane preparedness workshops and basically again engaging the community, letting them know these are plans that you'll need to be working on.

PRB
How often have you encountered a situation in which residents in the community that you work in had insufficient access to drinking water?

If yes, Tell me more.

If no, given that it's a thing more and more communities may face, what would you say should be done?

EM04
Again, it's more likely to be an issue with drought.

PRB
If a colleague of yours who is also an emergency manager was experiencing issues with insufficient drinking water access in the community that you work in, what advice would you water systems professionals to deal with this issue?

EM04
Lack of access to drinking water or water scarcity is not something that we are currently even advocating or even talking to our communities about it. Perhaps we should.

PRB
As an emergency manager, how do you think that other people outside your field perceive that you should engage with water systems professionals in dealing with the issue of insufficient drinking water access?

EM04
They are more concerned with drought.

PRB
The next questions focus on communication and collaboration between emergency managers and water systems professionals, specifically regarding any challenges that may or may not exist between the two groups that could make it more difficult for them to work together.

PRB
What challenges have you personally experienced any communication challenges between emergency managers and water systems professionals, before, during, or after any types of disasters have occurred?

EM04

I would argue a barrier is probably the lack of knowledge from the community. This is this is something that's going to be affected in the very short term and also have long range consequences. So. I think that a big barrier is basically the lack of knowing about the issue.

I was just not aware that this was that this was an issue. And I have to say I don't remember having conversations with, I guess, water professionals about this even. I'm trying to think of my experiences in conversation with someone from public works. So we have a resiliency officer, part of the entire Rockefeller 100 Resilient Cities program throughout the nation, in which we're trying to build more facilities.

But this piece related to your question, I think, is something that we are not doing enough collaboration, and perhaps we should.

PRB
Now, specifically think about insufficient drinking water access as an issue. What challenges might there be with communication between emergency managers and water systems professionals?

EM04
Again, I think that with certain communities, we know the overall disparities in water related infrastructure in terms of both race and class is something that we have to deal with. We know that a perfect example when we when we order for water to be boiled, we know that when we basically send out that message to go into certain communities, the vast majority of time that message is going to communities of color. This is just sort of a reality. That's not happening in affluent communities. So, there are some issues. The communication is just not there.

PRB
Tell me about examples of when communication between emergency managers and water systems professionals worked.

EM04
I think that through education, and funding education in emergency management. For example, there are the three Cs in emergency management: you collaborate, you coordinate, and you communicate. I think that one of the ways that we could address some of the challenges that this issue is bringing up is through true collaboration. So again, expanding a network like basically letting individuals know that this is an issue and that these are these are some of the ways that we can actually do some sort of coordination in that coordination from the city side and talking to the different stakeholders to coordinate in terms of what are some of those resources that are needed in some of the funding that is needed because again, that that's also a big piece of the matter.

So again, I think if we follow the three Cs to collaborate, coordinate and communicate, we would be able to address a lot of these underlying issues. But there has to be a piece that addresses the funding question, too.

So it's so great for us to collaborate. And I think a lot of times we can certainly sort of bring the stakeholders to the table. But there's also, where's that money to address some of the issues coming up?

PRB
Why do you think that these communication challenges between emergency managers and water systems professionals exist?

EM04
So, my two answers thus far have sort of revolved around this same sort of issue. I don't think that this conversation is being had. And we have a Chief Resiliency Officer. We have a climate plan, and we have all these plans that are sort of trying to address making the city more resilient. And this entire piece that you're bringing in that you're actually trying to just move the needle and sort of expand the research and the knowledge base, that's just something that we're not we're not dealing with on an everyday basis, and is not something that is being addressed.

Again, this is the first time that this issue has been brought to my attention. I tend to read a lot of emergency manager magazines, and they sort of try to try to keep abreast on a set of covering news. But I did not necessarily think that this was an issue until now.

PRB
The next questions focus on the concepts of self-efficacy and social support. Self-efficacy is defined as a person's belief in their capacity to start behaviors necessary to produce an end-goal, with the end-goal in this case being an increase in communication and collaboration between emergency managers and water systems professionals to lessen the impact of issues associated with insufficient access to drinking water.

Questions about social support focus on the relationship you have with others in your profession, and with professionals from water systems.

PRB
What are some examples of how much support do emergency managers and water systems professionals typically get from their employers (emergency management agencies and water utilities) to communicate and collaborate with each other -- especially regarding issues associated with insufficient drinking water access?

EM04
I actually think that people in the field of emergency management, what we do on a day-to-day basis is truly at the forefront of enabling change and trying to make things better. So I wholeheartedly believe that people in this field of emergency management would want to address this issue, for the most part.

I think that is field brings in individuals that not only try to effect change, but also really care about their communities. No one gets into emergency management to make big money. That has nothing to do with what we do. I think that we are trying to provide value, at least from my perspective. What I try to do every day is just make my community better than yesterday, but

also just try to mitigate against some of some of the effects of climate change, to make our communities more resilient, especially because I live in this community. So, I have a stake in it.

I'm basically making this community better because you are my neighbor and I'm trying to help you, and that goes back to community emergency response teams and a lot of the different efforts that we do as a city. I think that we're all just trying to make the city better and more resilient.

PRB
Thinking about your own situation as an individual within emergency management, have you been able to communicate with your colleagues in water systems regarding insufficient drinking water access issues?

If yes, tell me more.

EM04
So I think I have this self-efficacy, and I think that's part of agency management. It's basically trying to increase that collaboration so that we can mitigate. Again, a lot a lot of different efforts, especially in regard to the sort of disasters, so yes, absolutely.

PRB
Joint activities include meetings, trainings, and conferences. For your profession, what joint activities occur between emergency managers and water systems professionals?

EM04
So this is this is a real question, because I would argue that within the International Association of Emergency Managers, I am sure that there is a space in which you basically have both of these types of professionals interacting. However, I have not seen, nor have I attended personally a workshop in which you actually have both groups trying to address some of these issues,

I think that the forums aren't there. Again, you have the international stage, you have the state level, and you have your association of emergency managers. I am sure that there's got to be water related associations that do the same thing, too. But it is more of how do you sort of bring those skills and both groups of folks to the same room and talk to each other?

PRB
How often have joint activities included efforts to prepare for potential issues associated with insufficient drinking water access? If so, what did those activities involve ?

EM04
From my experience regarding activities in regard to this issue, I have never done any anything related to it, but I this area falls outside the scope of our hazards. I mean, we have very specific hazards for the city, again highlighted through our hazard mitigation plan. From our risk analysis, we know that we have hurricanes, and that's why we have a plan. We have a flood plan. We have a plan to treat extreme heat. You know, we have a plan to treat wet weather. So again, this would just be one other plan that gets added to our suite of products.

Again, I think if you don’t have a clear understanding of an issue, you wouldn't know how to how to address it. And you need to create a forum so that you actually basically realize this is an issue that we need to address. And in that forum, can workshop the issue so that you would end up creating some sort of plan or at least some sort of, you know, standard operating procedure.

This is the way that it would work for the city, especially given that again, we do have different items that we are trying to address some of those shortages that we see.

PRB
How often do you have any joint activities, such as professional certifications or workshops, provided support for communication and collaboration efforts between the two groups? If so, can you tell me more about them?

EM04
So joint activities are basically participating in any sort of exercise or training and exercise so that you get both the educational piece and you also get to get to practice again. So, if you do create a plan to address this issue, then then go through a workshop to be able to validate and test the plan, Then run an exercise on the issue, and then you would have an action review. Doing this can actually address some of the deficiencies or at least highlight what you might not know.

PRB
How can your organization be encouraged to increase communication and collaboration between emergency managers and water systems professionals?

EM04
I don't have any specific ideas, but I would love, as a practitioner, if this was a workshop that was being featured often, whether it's your local conference, whether it's the International Association of Emergency Managers conference. I think that more people would come to the workshop, and basically realize that this issue needs more attention.

So, my answer to that is I would definitely love to learn more. Like, I would love to be able to see how from within my space, as an emergency manager, I can I help address some of those issues because again, I'm sure that at the end of the day, the vast majority individuals that are probably being affected are communities of color and others that are least able to. fare well during a disaster.

So, if I'm able to go to a workshop and receive education, tools, and any sort of resources, then I'm going come back to my jurisdiction and start to have those conversations.

A perfect example. We have a Chief Resiliency Officer, and then each department has its own Chief Resiliency Officer, and I am that person for our department.

Again, this this seems to be an issue that perhaps we need to start taking into account because the City has done a commendable job of trying to address climate change disparities to create this comprehensive resilience, and the issue that you're actually exploring definitely fits within that

area. So this totally again within this whole resilience piece that we're trying to do. It's basically trying to mitigate a lot of the stresses that we do have. And I would argue this this this massive disaster is definitely one of those.

So I would say at the at the departmental level, bring in some of these issues to the Chief Resiliency Officer during a monthly meeting that we have. Also, have regular meetings with emergency managers and coordination calls. We work very closely with police, fire, public works, and the Department of Neighborhoods.

This would be a perfect way to highlight this issue because again, I don't that this is something that people are sort of aware of. And this is an issue to address.

PRB
What other improvements would you like to see in communication and collaboration between emergency managers and water systems professionals?

EM04
Again, I think forums and workshops are good. I would argue it would be good to have someone like you go in there and basically explain this issue further, its risk and trends, and so on. You could actually bring in this topic and it would be very relevant. And I think that you would have really good feedback. So again, sort of utilizing some of the already existing networks that have been established is a great, safe way to sort of get this.

PRB
Is there anything else that I should know regarding communication between emergency managers and water systems professionals? For example, what lessons might you share with emergency managers and water systems professionals concerning communication issues associated with insufficient drinking water access?

EM04
So again, this is a space that I just didn't have a lot of visibility on. I would actually love to learn more. I think that this is a space that a lot of individuals in this field would want to not only learn more, but also see how they actually should have implemented, in effect, change.

And so, if there's lessons learned, that would be amazing. Maybe it's just me, but I didn’t have knowledge on this issue, specifically. Creating a forum to share lessons learned, to share some of the things that are actually taking place, that is so vital because you don't want to reinvent the wheel. Tap into those doors already created networks and the social support that you do have in your communities, and learn through conversations with your peers.

This is a great way to engage the community. I'll give you one perfect example. When I was an emergency manager in another city, a neighborhood hosted block party to get to know your neighbors and to also share resilience resources. At least during a disaster after this block part, you know some of your neighbors. So again, that's creating that resilience from the ground up, which at the end of the day, those are the people that are going to come to your rescue. Neighbors truly helping neighbors.

Also, having a knowledge repository for all of these lessons learned is helpful, and use and replicate those lessons learned and best practices.

PRB
That’s the end of the survey. Thank you for taking time today to participate in this study.

EM05

PRB
In this study, I am trying to understand how emergency managers and water systems professionals communicate, in identifying and addressing insufficient drinking water access as an issue to be addressed. Gaining a better understanding of the specific interactions between emergency managers and water systems professionals is an important part of improving the coordination efforts between both groups to more effectively understand and respond to the issue of insufficient drinking water access.

There are two groups of questions, demographic questions and questions that ask you more about communication and collaboration between emergency managers and water systems professionals.

The next questions focus on your thoughts about the work that you do, and the conditions in which you perform your job. As a reminder, the situation for this study is insufficient drinking water access

PRB
What makes something rise to the level of a disaster in your mind?

EM05
We define a disaster as an event that is expected that causes either physical damage back, that that causes that can cause physical damage and or loss of life and personal injury.

PRB
How likely are you and others in your field to describe insufficient access to drinking water as a type of issue that must be addressed?

If no, why not?

If yes, can you tell me more?

EM05
Yes, it needs to be addressed because if we don't deal with it now, it's going to be more costly if we try to deal with it later. So we need to come up with solutions now before it becomes an actual disaster.

PRB
What would you say should be done about insufficient access to drinking water ?

EM05
Again, this issue must be addressed now, sooner than later.

PRB

How often have you encountered a situation in which residents in the community that you work in had insufficient access to drinking water?

If yes, Tell me more.

If no, given that it's a thing more and more communities may face, what would you say should be done?

EM05
Planning for drought. Basically a drought or something of that nature, or climate change that has a negative impact upon the environment.

PRB
If a colleague of yours who is also an emergency manager was experiencing issues with insufficient drinking water access in the community that you work in, what advice would you water systems professionals to deal with this issue?

EM05
Again, deal with this issue sooner than later.

PRB
As an emergency manager, how do you think that other people outside your field perceive that you should engage with water systems professionals in dealing with the issue of insufficient drinking water access?

EM05
I don't think people view this as an issue, which is part of the problem.

PRB
The next questions focus on communication and collaboration between emergency managers and water systems professionals, specifically regarding any challenges that may or may not exist between the two groups that could make it more difficult for them to work together.

What challenges have you personally experienced any communication challenges between emergency managers and water systems professionals, before, during, or after any types of disasters have occurred?

EM05
I have not heard of any challenges.

PRB
Now, specifically think about insufficient drinking water access as an issue. What challenges might there be with communication between emergency managers and water systems professionals?

EM05

The challenges could be either side not listening to the other side, meaning that the water systems are executives; they can be asking for resources from emergency management, but emergency management may not perceive it as a disaster. And by vice versa. Basically, you know, emergency management, they can be doing a THIRA, a Threat and Hazard Identification Risk Assessment.

And so they can be doing their own risk analysis, vulnerability assessment, and they can see this coming on. Whereas, the water district may not have an interest and may not be looking. Forecasting what their problems may be.

PRB
Tell me about examples of when communication between emergency managers and water systems professionals worked.

EM05
By both parties coming to the table and working out a solution or at the start before the start of the process of coming up with solutions.

PRB
Why do you think that these communication challenges between emergency managers and water systems professionals exist?

EM05
Probably just as I stated, that they are on two separate pages as to when they see the urgency. The other may not, and so they're not able to come together to talk about it and resolve the issue of water.

PRB
The next questions focus on the concepts of self-efficacy and social support. Self-efficacy is defined as a person's belief in their capacity to start behaviors necessary to produce an end-goal, with the end-goal in this case being an increase in communication and collaboration between emergency managers and water systems professionals to lessen the impact of issues associated with insufficient access to drinking water.

Questions about social support focus on the relationship you have with others in your profession, and with professionals from water systems.

PRB
What are some examples of how much support do emergency managers and water systems professionals typically get from their employers (emergency management agencies and water utilities) to communicate and collaborate with each other -- especially regarding issues associated with insufficient drinking water access?

EM05
I just say that you always have the opportunity to communicate. It is just up to both parties to be willing to do so.

PRB
Thinking about your own situation as an individual within emergency management, have you been able to communicate with your colleagues in water systems regarding insufficient drinking water access issues?

If yes, tell me more.

EM05
Yes. I feel that is very powerful because I do believe in communicating with my partners and I will see them as a partner.

PRB
Joint activities include meetings, trainings, and conferences. For your profession, what joint activities occur between emergency managers and water systems professionals?

EM05
No, I have not been involved with any of those working with the water district personnel.

PRB
How often have joint activities included efforts to prepare for potential issues associated with insufficient drinking water access? If so, what did those activities involve ?

EM05
No, I have not heard about any. It is not something that I've heard about.

PRB
How often do you have any joint activities, such as professional certifications or workshops, provided support for communication and collaboration efforts between the two groups? If so, can you tell me more about them?

EM05
No, I have not heard of anything like that taking place.

PRB
How can your organization be encouraged to increase communication and collaboration between emergency managers and water systems professionals?

EM05
I would be encouraged if the water system professionals took the initiative to reach out to me, to let me know that this is an issue that needs to be addressed.

PRB
What other improvements would you like to see in communication and collaboration between emergency managers and water systems professionals?

EM05
Either side will have to take the first step in initiating communications and exercises. And I think, you know, I would think that if the water district would take the lead because they have the most to lose, you know; it's in their area. And so I would think that they would really need to take the first step because emergency managers are dealing with all types of planning. And so, you know, they're all-hazard risks, and they may not know about this hazard best basically a slow onset of water issues. So I personally think it's back to the water districts to initiate this.

PRB
Is there anything else that I should know regarding communication between emergency managers and water systems professionals? For example, what lessons might you share with emergency managers and water systems professionals concerning communication issues associated with insufficient drinking water access?

EM05
I would say that water district professionals should be inviting emergency managers to their annual conferences, if there is such an association or trade group for water systems people. It would be good to get more emergency managers coming to their meetings and giving presentations. And I think that emergency manager districts should invite them to come to their LETC (law enforcement training center) meetings for local emergency planning, and each county tends to have one monthly. And so, the local emergency managers need to make sure that the water district people are involved with planning and when they open up the Emergency Operations Center for briefings, be it weather or anything like that, the water district, people really need to be a part of those meetings.

PRB
That's the end of the survey. Thank you for taking time today to participate in this study.

PRB
In this study, I am trying to understand how emergency managers and water systems professionals communicate, in identifying and addressing insufficient drinking water access as an issue to be addressed. Gaining a better understanding of the specific interactions between emergency managers and water systems professionals is an important part of improving the coordination efforts between both groups to more effectively understand and respond to the issue of insufficient drinking water access.

There are two groups of questions, demographic questions and questions that ask you more about communication and collaboration between emergency managers and water systems professionals.

The next questions focus on your thoughts about the work that you do, and the conditions in which you perform your job. As a reminder, the situation for this study is insufficient drinking water access

PRB
What makes something rise to the level of a disaster in your mind?

WS01
I work at a public utility that is county wide. So I don't know if during training, we covered the definition of what a disaster was, but we had specific examples. So droughts and flooding were probably the big number two and. So I guess we kind of define disaster by then, probably by our working most relevant examples. I don't think we talk about disasters like generally like as a meta topic during our individual meetings. We were really focused, honed in on just the specific ones that we were handling at the time. So was droughts and flooding. And I'm really surprised that drinking water was not part of that. I don't think that we have been actively considering lack of access to drinking water in the future.

And actually, in our case, droughts are more cyclic in nature, I actually don't think that we think of it the issue that way, we just kind of anticipate it like year after year. I guess the frequency is more on just what makes it more apparent.

PRB
How likely are you and others in your field to describe insufficient access to drinking water as a type of issue that must be addressed?

If no, why not?

If yes, can you tell me more?

WS01
I think so, the fact that it's potable water, that people have lack of access to. So, as opposed to wastewater, yes. But yes, I do think it's important because we have people, you have residents in our county.

So. As a utility, we do have water customers and they are account holders. They pay their rates and they get provided a distribution of drinking water. Not everyone in the county is a customer and if so, what's going to happen? How will they access potable drinking water if they're not a customer? Nor can they afford the rates. We just recently increased our rates in 2020. I would say from a utility perspective, it was not like a drastic increase, but with aging infrastructure costs, this is going to be the long-standing trend. It's going to be less affordable.

I think it is a topic that we recognize, but perhaps we haven't had a structured or systematic way of approaching it from a utility end.

PRB
What would you say should be done about insufficient access to drinking water ?

WS01
Water infrastructure is a big one in our utility. So, any of the damages associated with that, I guess that would be a big, really huge concern, fiscally as an organization.

PRB
How often have you encountered a situation in which residents in the community that you work in had insufficient access to drinking water?

If yes, Tell me more.

If no, given that it’s a thing more and more communities may face, what would you say should be done?

WS01
This does happen. Residents encountering issues, well, it's connected with a lot of things: how our wastewater is, how our services are ultimately properly delivered in a quality fashion.

PRB
If a colleague of yours who is also a water systems professional was experiencing issues with insufficient drinking water access in the community that you work in, what advice would you give them for engaging with their fellow emergency managers to deal with this issue?

WS01
I would say contact them and start a conversation.

PRB
As a water systems professional, how do you think that other people outside your field perceive that you should engage with emergency managers in dealing with the issue of insufficient drinking water access?

WS01
I don’t think that customers even think about this.

PRB
The next questions focus on communication and collaboration between emergency managers and water systems professionals, specifically regarding any challenges that may or may not exist between the two groups that could make it more difficult for them to work together.

PRB
What challenges have you personally experienced any communication challenges between emergency managers and water systems professionals, before, during, or after any types of disasters have occurred?

WS01
I think COVID 19 has kind of exacerbated a lot of emergency responders in the county as an agency. They've been incredibly active, establishing and reestablishing public health guidelines for COVID. So, we know that they're there and they're working hard and they're, you know, busy. I tried to reach out to them for one of my environmental education programs, when we were doing this. We wanted to do some kind of like an interview, an educational interview and talk to them about emergency planning for commercial businesses and like flood mitigation or things that they could do. And I know that's not it's not related, I would say. I mean, it's not directly talking about drinking water access, but I never got a response from that email. Nor have I reached gotten a phone call back. So I feel like perhaps even though I know the actual line of proper, official communication, there was no actual emergency, I would say. That one opportunity I just gave them a lot of grace, and I just knew that it was not like an impending request, like it wasn't important. It wasn't a priority.

PRB
Now, specifically think about insufficient drinking water access as an issue. What challenges might there be with communication between emergency managers and water systems professionals?

WS01
I don't know of a person who is actually designated to talk about it like a person who is kind of like a czar of drinking water from the emergency planning perspective, it just seems like they all do. They kind of have like one central unit, but I from my standpoint, I don't see any like differentials, so I see it as impeding me of reaching out to the proper person in it. Perhaps because I work in a non-technical division, I just might not be aware of the right person, perhaps people in another division like environmental compliance or even our director may be already aware of such connections. But. We haven't. Yeah, we are at a loss of perhaps introspectively, that's probably something that we need to deal with as well, just interdepartmental within our own utility, making sure that all of the lines of communication are well established.

So I don't want to put all the blame on them because then perhaps when they mobilize, they perhaps do so, depending on the severity of the disaster. They probably have multiple types of disasters that they have to manage at a different set of time.

PRB
Tell me about examples of when communication between emergency managers and water systems professionals worked.

WS01
So the way it could be easily mitigated, I think, is even just starting. I don't think it would take too much work at all. I think visualizing it what that might entail would probably be some type of policy revisitation. I'm sure that there's some kind of precedent for this. Some type of guideline that we can overview and probably hasn't been updated in years, so we probably need to revisit that and make sure that it is up to date.

Make sure that the people that are…lines of connection and the names, division names, department names, all that information can be parceled out. I don't think that that should be difficult. I guess what I'm trying to say is we don't have to wait for the disaster to come to start planning. We can do all this stuff right now.

And apart from the actual logistical documentation and making sure that we have the policy backing and support, we have to have some type of meeting, I would say between county wide emergency planning response professionals, but perhaps state and federal as well, making sure that the links between local/municipal, state, and then federal, you have to have some kind of organization. I would suggest a consistent meeting between parties so that we develop that rapport and that extended relationship. And over time, people will move, retire things like that. But that still needs to be integrated in the actual policy. So I do think it's possible.

PRB
Why do you think that these communication challenges between emergency managers and water systems professionals exist?

WS01
I think from an internal level, it could possibly be capacity related. Water professionals have been experiencing a decline in the ability to refill positions after people have been retiring, and it's problematic, succession wise, being able to reliably pass on information and train your successors before you leave. Part is lost. And a lot of critical information gets is just harder to learn over time. I think as a utility, we kind of when it comes to droughts and flooding, we rely on a lot of guidance from state and federal agencies, but day to day we don't. Typically, it's not on the forefront of our day-to-day responsibilities. So it gets put on the backburner, unfortunately.

So I guess that is what my point is, I think it's capacity related. Second point. I think for me, where I'm currently working, we're working, we're like kind of a mid-sized to small county utility, and the organization is kind of structured based off of really, really ancient old rules and regulations and county ordinances. So the public gets to vote on that and the Board of Commissioners kind of do their best to, you know, structure the various divisions based off of that. So I think maybe it's not on the periphery of a lot of our elected officials, I would say. Or perhaps it is. But even if it were, it would take a long time for change to happen on a governmental level. I guess it's this is government is slow to act and respond, and perhaps it was

built that way originally, but I think that might have explained why, how our departments have been or have been organized and why it's so decentralized is probably like how it was originally developed.

PRB
The next questions focus on the concepts of self-efficacy and social support. Self-efficacy is defined as a person's belief in their capacity to start behaviors necessary to produce an end-goal, with the end-goal in this case being an increase in communication and collaboration between emergency managers and water systems professionals to lessen the impact of issues associated with insufficient access to drinking water.

Questions about social support focus on the relationship you have with others in your profession, and with professionals from emergency management.

PRB
What are some examples of how much support do emergency managers and water systems professionals typically get from their employers (emergency management agencies and water utilities) to communicate and collaborate with each other – especially regarding issues associated with insufficient drinking water access?

WS01
I feel like they're probably what they do is a lot less specialized than what we do.

It's easy for me to see as a water professional how relevant it is to what we do, but I'm not sure as emergency professionals can. Just thinking about what's on their plate is probably so many other things that they have to balance.

I wish I knew a little bit more about how they would operate. I don't know if it's one thing where they always have a core number of people, and then depending on the disaster they expand by pulling in people that are relevant to them for that particular disaster. Maybe the way that they approach disasters, might not meet, might not connect well with this issue. Because their teams like change depending on whatever they're dealing with.

PRB
Thinking about your own situation as an individual within water systems, have you been able to communicate with your colleagues in emergency management regarding insufficient drinking water access issues?

If yes, tell me more.

WS01
Yes, with even though I am not sure if they know it's their responsibility. I know that. I don't think that they would bat an eye if I were to connect them. I feel lucky because in my county utility, I don't have to go through the formal chain of command to reach out to someone if I have a question. Our current divisional managers plus the director, you know, like upper management folks: they've been incredibly accessible. And I think that that's been huge. So I would say, yes,

I think that I can probably reach out to them. Will I get the response? Will I get the response that I need or the help that I need? I'm not sure. I think I think they would respect it if I brought it to their attention. But to be honest, my current position is non-technical, I'm an educator. I am not sure how they would receive that information if it were to come solely from me. But I don't think they would care too much.

Like standard operating procedures. I don't see why we couldn't create one. Like every year, we re-evaluate standard operating procedures for our disasters. So I don't see why we can't have that same consistency with this issue.

PRB
Joint activities include meetings, trainings, and conferences. For your profession, what joint activities occur between emergency managers and water systems professionals?

WS01

PRB
How often have joint activities included efforts to prepare for potential issues associated with insufficient drinking water access? If so, what did those activities involve ?

WS01
I'm not even sure if we've ever had an emergency kind of training. I think the closest thing we've had is probably like a fire drill. We have these online professional training units about safety, like things like what to do when there's like an armed intruder, and on fires. But that has been mostly passive. Maybe it's because I'm in a lab and we're only one floor, and it's kind of obvious where you need to run if there's an emergency. But professional development wise, it's been kind of limited. I will say, though, I do go out to a tiny model village where they do public safety training for utilities. I don't think I have had much experience with any emergency professionals for joint activities in this case, to be honest

PRB
How often do you have any joint activities, such as professional certifications or workshops, provided support for communication and collaboration efforts between the two groups? If so, can you tell me more about them?

WS01
No. I don't think we've had anything formalized. Makes me feel sad.

PRB
How can your organization be encouraged to increase communication and collaboration between emergency managers and water systems professionals?

WS01
Everybody in a region has to abide by certain action items in that specific plan. And that's yes, as a utility, we have certain departments that have additional statewide, regional, and federal permitting that's going on. So that's not the only regulated body that we have to comply with. But

I think having that district and having it incorporated into that plan with a model example of some type of program that's had some level of success. That's really all we need is just have that little regulatory push.

And of course, it as a whole, it needs to be feasible for different levels of, and sizes of utility, though

PRB
What other improvements would you like to see in communication and collaboration between emergency managers and water systems professionals?

WS01
I think so. I mean, I'm kind of like the queen of programs and workshops based on what I do. I think it's a really small amount of effort to address. A really important issue that's probably going to become more and more relevant as time progresses.

We have service opportunities, we have volunteer roles, we have groups of people who are residents of our local community who know a little bit more about water topics. So we have formalized a formalized cohort of people that we interact with every year. We can just think in terms of possibilities, how we can integrate that into their training so that they are able to spread that information after they go through this said workshop to all of our outreach events.

So I guess I'm only thinking of how we would, how we can possibly achieve that through an education perspective. This is just what I do. I think that we it can probably scale based off of how much capacity, how many resources we add on. If our water district were to create and support some type of program or workshop, that could integrate that into our plan, then we would have like a regulative imperative in order to do something like this. Or maybe it's already there.

PRB
Is there anything else that I should know regarding communication between emergency managers and water systems professionals? For example, what lessons might you share with emergency managers and water systems professionals concerning communication issues associated with insufficient drinking water access?

WS01
I would say it's better to work with us sooner rather than later. It would be in our best interests to mitigate things like liability and fiscal responsibility. So I think, well, I'm ready and willing. I mean, in my capacity as my current position.

I would say if any of my colleagues were being interviewed right now, they would probably say something similar. As an educator, I'm always up for learning about a new issue and also developing programs to support it. I guess one thing I would say it depends on the department that you're working with; the response might be a little bit different.

And just so working with the government is always slow. That doesn't mean that we're not you don't care. Many of the larger actions that we need have to conduct, ultimately, wind up in the board of commissioners, and that takes some time. That's all I would add, I would say. I think it's possible just we just have to go over a couple of logistical hurdles, but that's not out of the norm.

PRB
That’s the end of the survey. Thank you for taking time today to participate in this study.

WS02

PRB
In this study, I am trying to understand how emergency managers and water systems professionals communicate, in identifying and addressing insufficient drinking water access as an issue to be addressed. Gaining a better understanding of the specific interactions between emergency managers and water systems professionals is an important part of improving the coordination efforts between both groups to more effectively understand and respond to the issue of insufficient drinking water access.

There are two groups of questions, demographic questions and questions that ask you more about communication and collaboration between emergency managers and water systems professionals.

The next questions focus on your thoughts about the work that you do, and the conditions in which you perform your job. As a reminder, the situation for this study is insufficient drinking water access

PRB
What makes something rise to the level of a disaster in your mind?

WS02
Any time there is limited access or detriment to the wider water system itself.

PRB
How likely are you and others in your field to describe insufficient access to drinking water as a type of issue that must be addressed?

If no, why not?

If yes, can you tell me more?

WS02
Absolutely, because when you don't have access to water, the ability to thrive and grow is limited as well.

PRB
What would you say should be done about insufficient access to drinking water ?

WS02
It must be dealt with because it leads to other issues. Definitely drought, degraded infrastructure. Growth, because obviously with growth, there is a reduction in accessibility to water.

PRB
How often have you encountered a situation in which residents in the community that you work in had insufficient access to drinking water?

If yes, Tell me more.

If no, given that it’s a thing more and more communities may face, what would you say should be done?

WS02
That happens sometimes with boil water advisories, for example, but it usually fixed quickly.

PRB
If a colleague of yours who is also a water systems professional was experiencing issues with insufficient drinking water access in the community that you work in, what advice would you give them for engaging with their fellow emergency managers to deal with this issue?

WS02
Definitely reach out to people like me for help.

PRB
As a water systems professional, how do you think that other people outside your field perceive that you should engage with emergency managers in dealing with the issue of insufficient drinking water access?

WS02
So making sure they understand what a drought is and what their role is in helping to reduce the impact of a drought, whether it's water conservation, whether it's not wasting water, whether it's fixing leaking pipes. Anything that may impact managing the water resources internally for a customer, I think, is a significant piece where you may have all this information being shared. People may not see it as relevant to them personally.

PRB
The next questions focus on communication and collaboration between emergency managers and water systems professionals, specifically regarding any challenges that may or may not exist between the two groups that could make it more difficult for them to work together.

PRB
What challenges have you personally experienced any communication challenges between emergency managers and water systems professionals, before, during, or after any types of disasters have occurred?

WS02
I think the timeliness of communication and the accessibility to the right individuals in the communication process. So there may be some communication that's in existence, but it may not be touching the right individuals.
So if there is an issue, who needs to be contacted and by when? If there's not a system in place that regularly updates your points of contact and a new person or hires comes into play and there's a delay in information being shared, this can impact how you're communicating. So if

you're using a robocall vs. an email vs. an alert, all those things can directly impact communication.

So I've typically been in a space where I've seen who the list of contacts are, and we annually updated information and I'm always amazed to see that sometimes that information has not been updated in a very long time and there are names on these lists that I don't even recognize as points of contact. This can hurt communication internally, so when you go external, that can even be worse. You run the risk of sharing incomplete or misinformation.

PRB
Now, specifically think about insufficient drinking water access as an issue. What challenges might there be with communication between emergency managers and water systems professionals?

WS02
I don't think there's barriers in communicating specifically as it relates to drought. Particularly between those two groups, I think getting the message down to the folks that are directly impacted is more of a challenge.

PRB
Tell me about examples of when communication between emergency managers and water systems professionals worked.

WS02
I think if there is a standard of protocol for how to do things and you're consistently following it, you're fine.

PRB
Why do you think that these communication challenges between emergency managers and water systems professionals exist?

WS02
Historically operating in silos and not connecting those dots of how your work directly impacts someone else or your delay of work is a challenge, or your impact of communicating or not effectively communicating.

PRB
The next questions focus on the concepts of self-efficacy and social support. Self-efficacy is defined as a person’s belief in their capacity to start behaviors necessary to produce an end-goal, with the end-goal in this case being an increase in communication and collaboration between emergency managers and water systems professionals to lessen the impact of issues associated with insufficient access to drinking water.

Questions about social support focus on the relationship you have with others in your profession, and with professionals from emergency management.

PRB
What are some examples of how much support do emergency managers and water systems professionals typically get from their employers (emergency management agencies and water utilities) to communicate and collaborate with each other – especially regarding issues associated with insufficient drinking water access?

WS02
With the access to technology the ability to use multiple forms to communicate, the capability is definitely there.

PRB
Thinking about your own situation as an individual within water systems, have you been able to communicate with your colleagues in emergency management regarding insufficient drinking water access issues?

If yes, tell me more.

WS02
Yes, I definitely have the ability. Once again, having the access to resources, the tools and being able to use them is readily available. It's just a matter of setting up that structure to do so.

PRB
Joint activities include meetings, trainings, and conferences. For your profession, what joint activities occur between emergency managers and water systems professionals?

WS02
Those are continually held through both professional associations and just through one off meetings between organizations.

So there's always activities through the American Water and Wastewater Professional Association. There's probably a plethora of others. Those are the ones I'm directly involved in. But typically, I'm always in tune with messaging that comes across in communications and notes of upcoming meetings and sessions that are tabletop discussions or forums discussing, specifically on how to partner for success or whatever typical issues are for the area that we live and work in, and how to work with the respective organizations that are being directly impacted by whatever the topic of discussion is for that particular session.

PRB
How often have joint activities included efforts to prepare for potential issues associated with insufficient drinking water access? If so, what did those activities involve ?

WS02
I can't think of one in particular that I've sat through, but I've just seen the notifications upcoming sessions on equity and accessibility.

PRB

How often do you have any joint activities, such as professional certifications or workshops, provided support for communication and collaboration efforts between the two groups? If so, can you tell me more about them?

WS02
I think, to have an opportunity to sit down and navigate with each other on a quarterly or biannual basis on what's working well, what's not working, and the historical situations to see what worked well and why didn't it. To make those meetings occur on a more frequent basis would help also to get best practices from folks who have been in the disaster relief type areas.

They can share what did and did not go well. And to share those best practices continually would help, but also to engage public feedback and insight. Because just because you have these two entities working together, the message is still not going to the direct group that it's impacting, so we get feedback on what they need to hear and understand, while also getting those two parties are working better together.

PRB
How can your organization be encouraged to increase communication and collaboration between emergency managers and water systems professionals?

WS02
I think being the host of those events and speaking to “the why” behind why those events are necessary, and then sharing that insight publicly through public access television so that the communities recognize that the partnerships exist. So that whether the message is coming from a water system or an emergency management system, people recognize the impact holistically and globally for both organizations.

PRB
What other improvements would you like to see in communication and collaboration between emergency managers and water systems professionals?

WS02
I would love to see different forms of communication and the sharing of that information collaboratively, whether it's in written form, whether it's social media, whether it's educational videos. And also to be able to see that information shared, not just within the organizations, but within the communities.

PRB
Is there anything else that I should know regarding communication between emergency managers and water systems professionals? For example, what lessons might you share with emergency managers and water systems professionals concerning communication issues associated with insufficient drinking water access?

WS02
No. No additional ones.

PRB
That’s the end of the survey. Thank you for taking time today to participate in this study.

WS03

PRB
In this study, I am trying to understand how emergency managers and water systems professionals communicate, in identifying and addressing insufficient drinking water access as an issue to be addressed. Gaining a better understanding of the specific interactions between emergency managers and water systems professionals is an important part of improving the coordination efforts between both groups to more effectively understand and respond to the issue of insufficient drinking water access.

There are two groups of questions, demographic questions and questions that ask you more about communication and collaboration between emergency managers and water systems professionals.

The next questions focus on your thoughts about the work that you do, and the conditions in which you perform your job. As a reminder, the situation for this study is insufficient drinking water access

PRB
What makes something rise to the level of a disaster in your mind?

WS03
A disaster would be something that would have a very negative impact on a large portion of your service area or your customers and your community in regard to water services.

PRB
How likely are you and others in your field to describe insufficient access to drinking water as a type of issue that must be addressed?

If no, why not?

If yes, can you tell me more?

WS03
I do in the utility where I have my experience. We were we were already a utility that had taken measures to build a more resilient drinking water utility through planned, indirect potable reuse so that, you know, we weren't relying on others or the weather or other things. And it was, you know, more of a truly sustainable system because of the reuse aspect.

PRB
What would you say should be done about insufficient access to drinking water ?

WS03
It’s related to climate change. You know, a loss of your water resources because of climate change is a condition that decreases yields and source waters. Or causes a disastrous event that wreaks havoc on your infrastructure, rendering the utility in a position where they're not able to serve the entire community.

PRB
How often have you encountered a situation in which residents in the community that you work in had insufficient access to drinking water?

If yes, Tell me more.

If no, given that it's a thing more and more communities may face, what would you say should be done?

WS03
Yes. That would be disconnection of water services caused by some type of disastrous event, therefore rendering our people without services for clean drinking water, sanitation, and stormwater services.

PRB
If a colleague of yours who is also a water systems professional was experiencing issues with insufficient drinking water access in the community that you work in, what advice would you give them for engaging with their fellow emergency managers to deal with this issue?

WS03
I would say get on the phone and talk to them.

PRB
As a water systems professional, how do you think that other people outside your field perceive that you should engage with emergency managers in dealing with the issue of insufficient drinking water access?

WS03
Again, people are more concerned with getting water services disconnected, making sure their drinking water is clean, etc.

PRB
The next questions focus on communication and collaboration between emergency managers and water systems professionals, specifically regarding any challenges that may or may not exist between the two groups that could make it more difficult for them to work together.

PRB
What challenges have you personally experienced any communication challenges between emergency managers and water systems professionals, before, during, or after any types of disasters have occurred?
WS03
I think one of the bigger challenges s is when the water utility is not in the same governmental organization as the emergency management services. And that's kind of an area where I came from is that I work at a water authority, which was a publicly owned treatment works that was a separate organization from the governmental entities. So it's more difficult to communicate and

plan when you're not part of the same governmental organization. That was a challenge. I think another big challenge is finding time to keep your emergency plans up to date and to actually conduct drills that that are useful, and help you learn and help you improve your situation in regard to potential emergencies that you might face as a utility.

Keeping an open line of communication, we have to communicate on other things with our emergency managers from EPA regulations around to community right to know, etc. If you're not in the same governmental entity, it's makes it difficult.

PRB
Now, specifically think about insufficient drinking water access as an issue. What challenges might there be with communication between emergency managers and water systems professionals?

WS03
It's the communication of that and keeping people up to date. So utilities and emergency managers are joined at the hip in regard to fire prevention services. It takes an abundance of water to provide fire services in your community. So if there is a shortage, or even a slow kind of reduction, in the amount of water available in the system, that's going to have a huge effect on fire services and possibly, you know, decrease the quality of fire services.

PRB
Tell me about examples of when communication between emergency managers and water systems professionals worked.

WS03
They can be done if there is education around the need to do so, and then, if you can get agreement from the people who make the decisions on budget and resources, then they can be done. But I think it's an uphill climb to start the educational process.

And then, there's a lot of different stakeholders involved that need to be educated so that you can make it happen, and have the resources and the finances needed to dedicate to this issue. The problem with this issue is that many times when you take action, it's too late, right? Because you're at a point of no return, if you will.

PRB
Why do you think that these communication challenges between emergency managers and water systems professionals exist?

WS03
In many cases, a lack of resources on both sides or a lack of time available to dedicate to this very important topic would be the number one cause. And I think it's on both sides of the house. It's not, you know, one or the other, but lack of resources, lack of time to dedicate to it because of stretched budgets, and open staff positions that haven't been filled. You know, those kind of things, labor challenges and financial challenges, that both entities face.

PRB
The next questions focus on the concepts of self-efficacy and social support. Self-efficacy is defined as a person's belief in their capacity to start behaviors necessary to produce an end-goal, with the end-goal in this case being an increase in communication and collaboration between emergency managers and water systems professionals to lessen the impact of issues associated with insufficient access to drinking water.

Questions about social support focus on the relationship you have with others in your profession, and with professionals from emergency management.

PRB
What are some examples of how much support do emergency managers and water systems professionals typically get from their employers (emergency management agencies and water utilities) to communicate and collaborate with each other – especially regarding issues associated with insufficient drinking water access?

WS03
We have a relationship with existing around fire services. There's a relationship there and a cooperation and collaboration of things that need to get done in regard to fire services. And then so there's a familiarity and communication that's already happening. And if you are a good utility and you're putting resources towards emergency planning and you're actually doing drills, then you've taken it the next step. So I have a positive outlook on that because most water utilities or water managers are cooperating with their emergency managers in regard to fire services and then taking the next step to around emergency planning and emergency drills, those kind of things.

PRB
Thinking about your own situation as an individual within water systems, have you been able to communicate with your colleagues in emergency management regarding insufficient drinking water access issues?

If yes, tell me more.

WS03
Yes, I think so. One of the most challenging things to get a handle on with emergency management plans are the communication aspects and the turnover in positions and the changing of phone numbers and things. So, you know, I like to think that if you're good at looking at your plan at least once a year or even more often, you're keeping that information up to date and then you have the contact information of the people that you know you need to collaborate with and then they would know you as well, if their emergency plan on their side was also being updated. But there are two different plans on both sides that have to kind of mesh together. But I would take a positive outlook on that.

PRB
Joint activities include meetings, trainings, and conferences. For your profession, what joint activities occur between emergency managers and water systems professionals?

WS03
I am a big fan of a very well-designed tabletop exercise. And, you know, a lot can be learned by all the different players, for whatever the simulated disaster was, so.

You have to dedicate the resources and the time, and you have to create realistic mock disasters so that you can go through the motions and learn and improve your plans.

The tabletop exercises are in regard to emergency management plans. I think training, you know where both entities would get together, sharing of plans, collaboration, working together on plans. There's a lot of communication just around fire services and everything that needs to happen there between utilities and emergency managers.

So, there's actually a lot of different areas where communications are occurring already that sometimes they fall by the wayside when a certain person leaves. It's kind of a constant struggle and then you end up with different personalities and different people. But I think it can be done.

PRB
How often have joint activities included efforts to prepare for potential issues associated with insufficient drinking water access? If so, what did those activities involve ?

WS03
Yes, so several tabletop exercises that I've participated in did revolve around major disasters with transmission mains or distribution mains or large pipes that were critical assets to the delivery of safe drinking water or just water to the distribution system.

PRB
How often do you have any joint activities, such as professional certifications or workshops, provided support for communication and collaboration efforts between the two groups? If so, can you tell me more about them?

WS03
Yes. If FEMA (Federal Emergency Management Agency) always has a decent amount of money and they've done training on this topic from time to time, but then it kind of goes away, and then there's no funding or support. Having more tabletop simulations as a part of training events on an ongoing basis would be super.

PRB
How can your organization be encouraged to increase communication and collaboration between emergency managers and water systems professionals?

WS03
I would say there is no one right thing to do. I think it's just it needs to be brought up more often by emergency managers or by higher level federal regulatory agencies. Sometimes that's a starter, you know, for the conversation, or for things to happen in regard to improvement of emergency management plans and those kind of things. But we owe it to our community to do

this, to have it be a part of your public relations, part of who you are as a community, ensuring or showing you know that that you've taken this level of effort and you take this seriously because you want to serve your community. You want to serve your customers. I think it's a part of community service, customer service, and public relations.

PRB
What other improvements would you like to see in communication and collaboration between emergency managers and water systems professionals?

WS03
Well, I think there should be something where there's forced, required communication between the two groups, such as a community right to know mandate where you're forced to do a report annually, you know, to submit it to all the different emergency management services that may be impacted. SARA Tittle 3 (Superfund Amendments and Reauthorization Act) is an example of this. So having something, like SARA Title 3, built into a regulation, the preparation of a report, and the exchange of data around this topic is super important. I think it takes maybe a higher regulatory authority, the federal government for example, to implement something, but it could be something as simple as an annual report, you know, that requires the communication or collaboration on this topic.

PRB
Is there anything else that I should know regarding communication between emergency managers and water systems professionals? For example, what lessons might you share with emergency managers and water systems professionals concerning communication issues associated with insufficient drinking water access?

WS03
There should be some case studies, you know, that that could be shared with utilities that may be going through this. For example, what are they doing in regard to communication or just, you know, coming up with solutions for it?

I think the sharing of lessons learned is always a great thing, and it gives others a reason to explore this further or to take action to improve their situation in regards to their emergency plans.

PRB
That’s the end of the survey. Thank you for taking time today to participate in this study.

WS04

PRB
In this study, I am trying to understand how emergency managers and water systems professionals communicate, in identifying and addressing insufficient drinking water access as an issue to be addressed. Gaining a better understanding of the specific interactions between emergency managers and water systems professionals is an important part of improving the coordination efforts between both groups to more effectively understand and respond to the issue of insufficient drinking water access.

There are two groups of questions, demographic questions and questions that ask you more about communication and collaboration between emergency managers and water systems professionals.

The next questions focus on your thoughts about the work that you do, and the conditions in which you perform your job. As a reminder, the situation for this study is insufficient drinking water access

PRB
What makes something rise to the level of a disaster in your mind?

WS04
It would be some kind of system, mechanical event, or contamination event that disrupts community services and damages infrastructure.

PRB
How likely are you and others in your field to describe insufficient access to drinking water as a type of issue that must be addressed?

If no, why not?

If yes, can you tell me more?

WS04
Yes, but it tends to be localized, you know, geographically, because of obvious weather conditions in certain areas, although there can be other geopolitical reasons. There could be some kind of agreement that somebody signed or some kind of permitting action that reduced availability to an area. But typically, you know, we would see it more as something that results from climate.

PRB
What would you say should be done about insufficient access to drinking water ?

WS04
We are dealing with this issue in our utility on a daily basis.
PRB

How often have you encountered a situation in which residents in the community that you work in had insufficient access to drinking water?

If yes, Tell me more.

If no, given that it's a thing more and more communities may face, what would you say should be done?

WS04
Yes, but it's more water main breaks. We now have a storage facility that provides 30 days of water supply for the entire city.

PRB
If a colleague of yours who is also a water systems professional was experiencing issues with insufficient drinking water access in the community that you work in, what advice would you give them for engaging with their fellow emergency managers to deal with this issue?

WS04
We are lucky to have emergency managers in our water utility, so it would be easy to reach out to one of them.

PRB
As a water systems professional, how do you think that other people outside your field perceive that you should engage with emergency managers in dealing with the issue of insufficient drinking water access?

WS04
I don't think the public sees this as an issue, but we do have outreach and education programs to help deal with this.

PRB
The next questions focus on communication and collaboration between emergency managers and water systems professionals, specifically regarding any challenges that may or may not exist between the two groups that could make it more difficult for them to work together.

PRB
What challenges have you personally experienced any communication challenges between emergency managers and water systems professionals, before, during, or after any types of disasters have occurred?

WS04
Yeah, I think some of them are just like governmental organizational barriers that exist.

For instance, in a nearby count, the Water Authority was a separate entity from the county government and where the emergency management personnel were. We might have different communication protocols and equipment, and we might not interface with them as often as if we

were a county department. They may implement some action within the county government, and the water authority wouldn't find out about it, or vice versa.

The Water Authority takes some action, but it doesn't get clearly communicated to emergency management personnel just because we're not part of the same organization.

And then there is just communication tools, and we often used different radio equipment and had different radio frequencies. But now, most everybody is now going some mobile phone-based ground communications. So that has gotten better.

There are always personality issues that influence how well those communications occur. There's always turf issues that can get in the way. Most of the barriers I see are mostly driven by people issues. There can be conflict between emergency management people and water people, and their objectives may be different. The fire department wants to make sure all the fire hydrants operate, and they want to go after all the hydrants. And in doing so, they create water quality issues for the utility. So you get at odds over those things. You get all these relationship obstacles that can get in the way of clear communications.

PRB
Now, specifically think about insufficient drinking water access as an issue. What challenges might there be with communication between emergency managers and water systems professionals?

WS04
I can't think of anything that would be different except for the fact maybe it takes a while for it to become urgent enough to want to connect it to the way we might have used emergency management in the past, as they might assist with some drinking water supply, some emergency supplies or bottled water, water tanks or distribution of a piece of equipment. I know a nearby county's fire department was going to purchase water delivery systems and even some filtration systems that they could use in the case of a disaster.

So it may take a while for us to think, Oh, these guys could help us.

You know, the utility might try to address the issues on their own and emergency management, you know, may not see the issue as needing their assistance. When drought was occurring, it had to get really bad before emergency management people thought they should be involved in it.

PRB
Tell me about examples of when communication between emergency managers and water systems professionals worked.

WS04
Challenges are related to simple governance issues or relationship issues. And usually, people are pretty good at setting aside relationship issues. When there's an emergency occurring, the governance issues can sometimes be stickier and tougher. But, you know, there is usually not anything you can't work through.

PRB
Why do you think that these communication challenges between emergency managers and water systems professionals exist?

WS04
I think it's just how, structurally, people see their jobs, the definition of their jobs. We each have our own lanes. For example, emergency managers deal with things that go “Kaboom,” and not things that slowly, gradually happen over time. Emergency managers have the attitude that you in the water industry could have done something already to address this. And the water utility folks kind of have the same thing when something goes “Kaboom,” we're not thinking of enlisting help and services from emergency managers. We're trying to figure out on our own how to address the issue. So I think it's just, you know, a logical saying that each party can play a significant role in that problem.

PRB
The next questions focus on the concepts of self-efficacy and social support. Self-efficacy is defined as a person’s belief in their capacity to start behaviors necessary to produce an end-goal, with the end-goal in this case being an increase in communication and collaboration between emergency managers and water systems professionals to lessen the impact of issues associated with insufficient access to drinking water.

Questions about social support focus on the relationship you have with others in your profession, and with professionals from emergency management.

PRB
What are some examples of how much support do emergency managers and water systems professionals typically get from their employers (emergency management agencies and water utilities) to communicate and collaborate with each other – especially regarding issues associated with insufficient drinking water access?

WS04
We're all professionals. We all understand the issues. I've seen it happen. I've seen utilities that were even not associated with the emergency management structure, communicate well. Desktop exercises are helpful. Most utilities have spent some time coordinating with their emergency management personnel. Working through exercises together improves communication and the ability to work together. I certainly think they're very capable.

PRB
Thinking about your own situation as an individual within water systems, have you been able to communicate with your colleagues in emergency management regarding insufficient drinking water access issues?

If yes, tell me more.

WS04
Yes. It's just that you must account for the things that get in the way, and taking the time to do it, and seeing it as a priority. Sometimes, like I mentioned earlier, personality issues get in the way a little bit. But I think we all understand the value in communication.

PRB
Joint activities include meetings, trainings, and conferences. For your profession, what joint activities occur between emergency managers and water systems professionals?

WS04
Primarily what I've seen are the tabletop exercises or field exercises in preparation for an event. There is also coordination on more routine matters, such as fire system maintenance. From my perspective, usually the emergency management personnel and the fire department personnel are one and the same, but that's not always the same.

I do realize, especially when you get to a state level, a lot of those people run in the same circles. And yes, there's been coordination when there's a pending hurricane, tornado, or weather event. The State Emergency Management System cranks up and there are water personnel who are part of that system and plugged in to help coordinate relief efforts after the event. There's not a lot of just kind of routine professional workshops that go on, but it's more preparatory events and activities that occur when event does happen.

PRB
How often have joint activities included efforts to prepare for potential issues associated with insufficient drinking water access? If so, what did those activities involve ?

WS04
Most coordinate of events are for power outages related to some weather event and coordinating the delivery of generators to power up, you know, necessary equipment. There might be some flooding issues where we are working with them on access to facilities. And there are some instances where you might work with them on delivering emergency water supplies to the community.

PRB
How often do you have any joint activities, such as professional certifications or workshops, provided support for communication and collaboration efforts between the two groups? If so, can you tell me more about them?

WS04
These issues are rarely discussed together in a professional setting, so there should be more linkage between the two groups for this issue. I think that would be a significant value. It always helps to develop those relationships ahead of time before a crisis occurs to understand what my priorities are as a water professional and what their priorities are as an emergency management official. We've had times where some emergency officials were trying to pass some legislation that we feel was detrimental to the water industry and vice versa, you know, and so just trying to be on the same page on those kind of things.

PRB
How can your organization be encouraged to increase communication and collaboration between emergency managers and water systems professionals?

WS04
I think it's just a matter of, you know, trying to make it a priority. As I said, there are so many things that are grabbing your attention these days and this this comes up periodically, but usually only comes up when there's an emerging event on the horizon. But it's really just figuring out how you make it a priority and set time aside and get the attention of the individuals that you need. It would be interesting to think about interfacing with whatever our counterpart would be on the emergency management side, probably the state's EMA (Emergency Management Agency).

You know, there's some relationship there. It's just not real strong.

PRB
What other improvements would you like to see in communication and collaboration between emergency managers and water systems professionals?

WS04
I think it goes back to the priorities, understanding each other's priorities a little better. We've been going through something similar with the solid waste industry where we've got things we need to dispose of and you know, they've got issues with it and it's putting us both in a bind.

So. I think just helping to understand each other's priorities, for example, when it comes to emergency management, what time do you need water for a fire? And I need it fast, and I don't care about anything else, but sometimes that's at odds with providing the best quality, safest water you can supply your customers.
Most utilities work very closely with the fire department on their insurance ratings, and so you build some collaboration there.

We developed a little training video for the fire department, showing them how to properly open and close a hydrant so it didn't cause plumbing problems and water quality issues. But you just had to constantly reinforce that. And you know, their goal was to flush as many fire hydrants as they could in a day, and that sometimes resulted in problems with the water system. Just understanding each other's priorities and needs and finding common ground in is important.

PRB
Is there anything else that I should know regarding communication between emergency managers and water systems professionals? For example, what lessons might you share with emergency managers and water systems professionals concerning communication issues associated with insufficient drinking water access?

WS04
No, I think we covered it. You know, it goes back to priorities, and aiming for safe drinking water is sometimes in conflict with providing a lot of water, and so just making sure both sides understand what the need is and how to best meet that need. For example, providing a lot of water to fight a fire can impact the quality of that water. And there are certain things you know you need to take care of, and you can't let water sit in a pipe for a long time or in a tank for a long time and it still be safe to drink. So just understanding, you know, the needs and the priorities on the inside.

PRB
That’s the end of the survey. Thank you for taking time today to participate in this study.

WS05

PRB
In this study, I am trying to understand how emergency managers and water systems professionals communicate, in identifying and addressing insufficient drinking water access as an issue to be addressed. Gaining a better understanding of the specific interactions between emergency managers and water systems professionals is an important part of improving the coordination efforts between both groups to more effectively understand and respond to the issue of insufficient drinking water access.

There are two groups of questions, demographic questions and questions that ask you more about communication and collaboration between emergency managers and water systems professionals.

The next questions focus on your thoughts about the work that you do, and the conditions in which you perform your job. As a reminder, the situation for this study is insufficient drinking water access

PRB
What makes something rise to the level of a disaster in your mind?

WS05
Anything that stops the flow of water to a customer. Anything.

PRB
How likely are you and others in your field to describe insufficient access to drinking water as a type of issue that must be addressed?

If no, why not?

If yes, can you tell me more?

WS05
Yes, and we've taken great strides to ensure that we still have access to water, which is why the city created its new water storage system.

PRB
What would you say should be done about insufficient access to drinking water ?

WS05
We are doing it. It's been a long time coming, but that water storage system took us from two to three days of being able to supply water to a minimum of 30 days, anywhere from 30 to 90 days. So, drinking water access, it is very high on our radar.

PRB

How often have you encountered a situation in which residents in the community that you work in had insufficient access to drinking water?

If yes, Tell me more.

If no, given that it's a thing more and more communities may face, what would you say should be done?

WS05
That's what the water storage system is for. With this project, the City is able to supply two billion gallons of water to the City if we were to ever be without water.

PRB
If a colleague of yours who is also a water systems professional was experiencing issues with insufficient drinking water access in the community that you work in, what advice would you give them for engaging with their fellow emergency managers to deal with this issue?

WS05
This isn't an issue for us since we have water storage as a part of the City's plan.

PRB
As a water systems professional, how do you think that other people outside your field perceive that you should engage with emergency managers in dealing with the issue of insufficient drinking water access?

WS05
I don't think people think this is an issue.

PRB
The next questions focus on communication and collaboration between emergency managers and water systems professionals, specifically regarding any challenges that may or may not exist between the two groups that could make it more difficult for them to work together.

PRB
What challenges have you personally experienced any communication challenges between emergency managers and water systems professionals, before, during, or after any types of disasters have occurred?

WS05
I don't see a lot of challenges right now. We used to have some maybe six or seven years ago, but we've done a lot over these past six, seven years to ensure that everyone knows one who our emergency management team is, who the safety officers are. And from a training perspective, since that's my job, we've instituted an e-learning platform that allows them better access to information. So we have done a lot to make sure that everyone knows who we are, what we do, and how we do it.

PRB
Now, specifically think about insufficient drinking water access as an issue. What challenges might there be with communication between emergency managers and water systems professionals?

WS05
Again, there's not any challenges right now.

PRB
Tell me about examples of when communication between emergency managers and water systems professionals worked.

WS05
Again, we've done a lot, and even from the way we communicate with having Everbridge, One Call, and all these electronic notification systems. When something goes down, everybody knows about it, so communication barriers are very limited.

PRB
Why do you think that these communication challenges between emergency managers and water systems professionals exist?

WS05
If there are any, I think it's just because of a transition, for example, if there's a new person that comes into play that just doesn't know that we have certain things in place, or in the transition of the system. So it's important to make sure that the notification contacts lists are regularly updated. So that would be the only reason that communication wouldn't occur.

PRB
The next questions focus on the concepts of self-efficacy and social support. Self-efficacy is defined as a person's belief in their capacity to start behaviors necessary to produce an end-goal, with the end-goal in this case being an increase in communication and collaboration between emergency managers and water systems professionals to lessen the impact of issues associated with insufficient access to drinking water.

Questions about social support focus on the relationship you have with others in your profession, and with professionals from emergency management.

PRB
What are some examples of how much support do emergency managers and water systems professionals typically get from their employers (emergency management agencies and water utilities) to communicate and collaborate with each other – especially regarding issues associated with insufficient drinking water access?

WS05
Absolutely. We do. We operate on the NIMS, National Incident Management System, incident command system, and we train our staff on that. We require them to take the NIMS incident

management system training through FEMA, and they have to report back their certificates to us through the training program. And so it is vital to everything that we do.

At a minimum, everyone must have NIMS ICS 100 and 700 courses from FEMA. And then from a managerial level, everyone must have NIMS ICS 200, 300, 400, and 800 courses from FEMA.

So we are adamant about making sure that everyone is speaking the same language so that they understand what the processes are, and everyone has an emergency action plan for their facilities, and they are trained on those plans every year. Like I said, we take a lot of efforts to make sure that everyone understands the emergency management process and that communication is there. These NIMS courses tell you how to set up a command center if there is an emergency and then the way in which you communicate.

PRB
Thinking about your own situation as an individual within water systems, have you been able to communicate with your colleagues in emergency management regarding insufficient drinking water access issues?

If yes, tell me more.

WS05
I do. I've worked in water safety for several years now, I have trained in emergency medical services, and I have done disaster recovery training. I've done incident response to bombing threats and whatnot, gone to bombing classes. I think I have a pretty good knowledge of how to respond to people about emergency management situations.

PRB
Joint activities include meetings, trainings, and conferences. For your profession, what joint activities occur between emergency managers and water systems professionals?

WS05
Yes. So we do an annual drill for a fire, for emergency response. And as I mentioned, we do professional development training as well, like the emergency action planning.

Actually, there's a lot of training onsite that is specifically targeted to a site, so they have that. Then we also have hazardous waste operations training as well.

PRB
How often have joint activities included efforts to prepare for potential issues associated with insufficient drinking water access? If so, what did those activities involve ?

WS05
I believe so. I can't necessarily speak fully on that one, but I know we have staff who work very closely with the emergency management team to make sure that they identify any issue, any access issues, or any trouble with the systems they work with. The Emergency Management Team and the Safety Team and go in to see if there are problems with the buildings with the

structure, so that if there is a water loss, they all work together to try to mitigate that. And yes, they do tabletop exercises on this issue too.

PRB
How often do you have any joint activities, such as professional certifications or workshops, provided support for communication and collaboration efforts between the two groups? If so, can you tell me more about them?

WS05
I absolutely believe that people need to get certifications. If you're going to work in emergency management, I do think that you need to become a certified emergency manager. I do think that you need to take the NIMS courses. I think that you need to take certain response classes often offered by FEMA just so that you can fully understand what this entails from a water side.

Our water professionals take the water certification classes through the Secretary of State, their operators' licenses, etc. So there's a lot that goes into being a water professional on that side. They have to be very well certified.

And I will just say this because one of the things about watershed that's so unique is that unlike many of the other areas, in basically every profession that you can think of, you can find a watershed. And so we've got engineers that have to be certified engineers, you know, project managers, IT professionals. So you've got to know it all. You've got to have it all.

PRB
How can your organization be encouraged to increase communication and collaboration between emergency managers and water systems professionals?

WS05
As I said, we are pretty good with communication, but there are some silos. I think that breaking down those barriers so that everyone understands what each office does and how they tie into one another will help with communication.

PRB
What other improvements would you like to see in communication and collaboration between emergency managers and water systems professionals?

WS05
We already do a lot, but we can always do more. So just more of the things that we're doing, more of the tabletop exercises, more drills, more full-on simulations. I think having those type of activities would kind of help our people, our staff to understand better how to respond to certain incidents.

PRB
Is there anything else that I should know regarding communication between emergency managers and water systems professionals? For example, what lessons might you share with emergency managers and water systems professionals concerning communication issues associated with insufficient drinking water access?

WS05
Not that I can think of.

PRB
That’s the end of the survey. Thank you for taking time today to participate in this study.