Hospitals, Public Health, and National Disaster Preparedness:

A Systematic Literature Review

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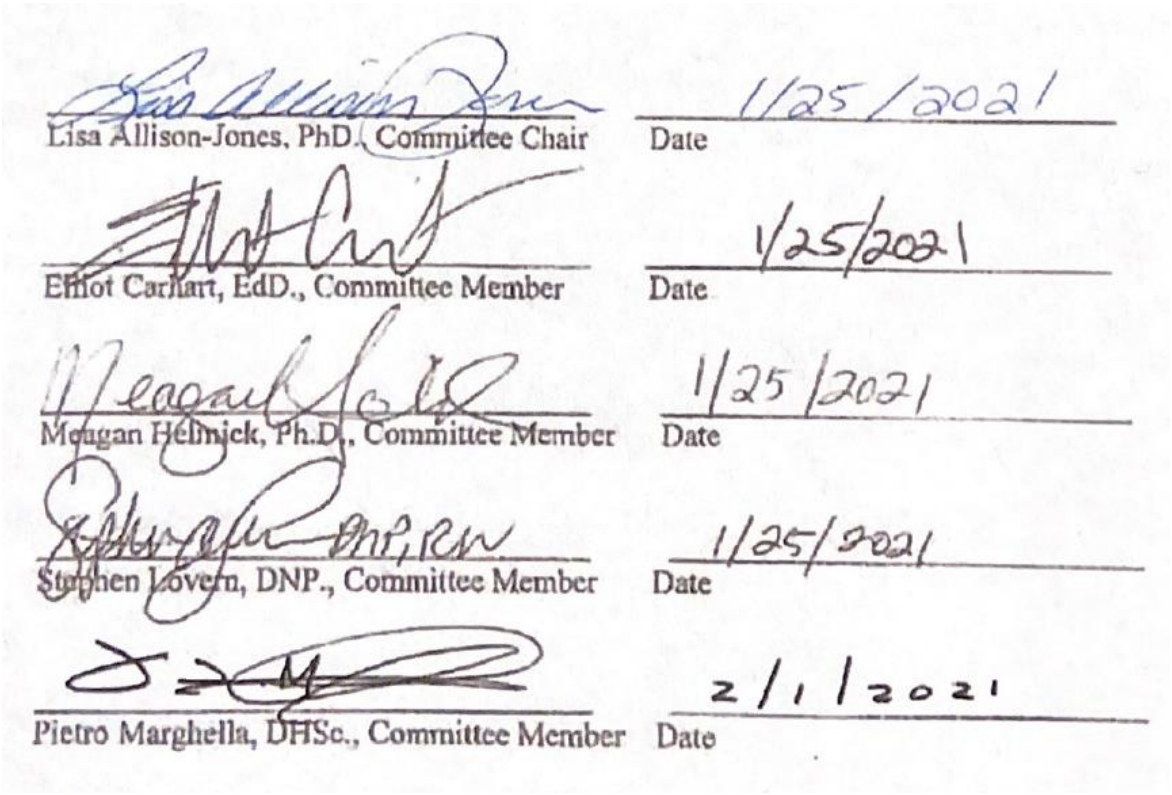

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Abstract

The potential for disasters and large-scale catastrophes exists in all communities. Hospitals / healthcare organizations (HCOs) and local public health agencies, emergency management and public health state agencies, and the federal government are principal stakeholders for contributing to an effective community response. The organizational culture within and across these institutions relies on appropriate disaster planning, training, communication, learning, and adaptation. This literature review provides a synthesis of disaster preparedness literature concerning some of the key challenges these organizations face to appropriately manage disasters. It is timely to consider how hospitals, public health agencies at the county and state level, and the federal government understand and engage to build improved resilience.

Keywords: Disaster Preparedness, Leadership, Planning, Collaboration, Communication, Resilience

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List of Abbreviations

ACHE …… American College of Healthcare Executives

CBE …… Community Based Enterprise

CMS …… Centers for Medicare Services

COI ……. Community of Interest

DHS …… Department of Homeland Security

EMP …… Electronic Magnetic Pulse

ESF-8 ……. Emergency Support Function #8

FEMA …… Federal Emergency Management Agency

HAM ……. Home Amateur Mechanic

HCO ……... Healthcare Organization

IT …… Information Technology

JC …… Joint Commission on Accreditation of Healthcare Organizations

LEPC……... Local Emergency Preparedness Committees

LFA …… Lead Federal Agency

NGO ……... Non-Governmental Organization

NIMS / ICS …… National Incident Management System / Incident Command System

NRF …… National Response Framework

PAR …… Population-At-Risk

SERC ……. State Emergency Response Commissions

SME ……... Subject Matter Expert

TCO …… Theory of Community Organization

Chapter One

Introduction

Despite years of preparation, our nation is ill prepared to respond to large-scale disasters. Significant shortcomings exist in the healthcare arena — involving hospitals / healthcare organizations, state public health agencies, and the federal government, which further threatens health security in our nation's communities. The challenges related to disaster preparedness can be attributed to shortcomings in leadership, partisanship in public and private organizations, and disparate planning. The resulting effect is status quo reactionary disaster response to large-scale catastrophes, rather than proactive disaster readiness. To appropriately address these matters, all sectors of society, not only public health and emergency management, must recognize their roles in disaster preparedness and public health emergency management. Proactive, timely leadership is needed to keep the United States from falling further behind. The consequences of continued status quo in this field of study will unequivocally lead to human suffering and strife. Proactive collaboration and cultural change are necessary to achieve measurable gains.

Disaster preparedness is a critical function of healthcare organizations, where protocols should be in place to protect individuals in society in the event of natural or human-caused disasters (Himes-Cornell et al., 2018). Hospitals are at the frontline of disaster preparedness, but, due to numerous challenges, questions remain about their ability to effectively respond to large-scale incidents or catastrophic disasters (Ayeb-Karlsson et al., 2019). This study will offer several key components including regulatory factors and requirements, compliance measures, and inaction in areas where disaster preparedness has failed and has increased risk for many Americans. This study will offer

a systematic review of various research articles and other forms of literature that address these topics in detail and emphasize key criteria. The outcomes of the study demonstrated numerous gaps in leadership, collaborative planning, and transparent, proactive communication related to large-scale disaster preparedness with HCOs, local and state public health agencies, and the federal government over the past two decades.

Preparedness may have different meanings to different groups; however, the general concept of preparedness related to disaster management is contingent upon the delivery of a coordinated response to the problem that will have a positive impact on outcomes (Rambsbottom et al., 2017). Disasters can give rise to a swift increase in hospital service demand (defined in the community of interest [COI] as surge demand), therefore suppressing normal operational ability. Having said that, emergency preparedness and the accessibility of quick response information can usually aid medical care establishments in planning and reacting to all risks (Waugh & Streib, 2006). In many parts of the United States, communities are not prepared for natural or human-made disasters on almost any level. Disaster preparedness provides a possibility to make efficient, realistic, and coordinated efforts, which help to reduce ineffective, uncoordinated actions during a crisis (Perrow, 2005).

The United States has experienced a dramatic increase in the frequency and the scope and scale of the impact of natural and human-made disasters over the past two decades, affecting small towns as well as large metropolitan areas. Federal Emergency Management Association (FEMA) statistics show that natural disaster declarations increased 300% from 1980 to 2018 (18 to 124 events), while the costs have also grown exponentially (USA Facts, 2019). Marghella (2019) noted in the aggregate the following:

1. The world's human population has tripled to more than 7 billion since the last significant disease pandemic (i.e., the so-called "Spanish Flu" of 1918 - 19), which simply means we have larger global "population-at-risk" (PAR) that can be affected by the all-hazard's spectrum of disaster threats (Kunzig, 2011).
2. Over 50% of the population across the globe currently resides within 60 kilometers of an ocean. By the year 2020, approximately 75% of the population is expected to do so, further increasing risks to humans of hydrological, meteorological, and seismic threats (United Nations Environmental Progamme, 2013).
3. The predominance (75%) of the "mega-cities" (geographic areas with 20 million or more people) are located on the coast ("littorals") with fragile infrastructure and limited disaster support services, which tend to propel towards collapse quickly when disasters do occur (Strauss, 2015).
4. Modern intercontinental air travel has exponentially increased the rate in the spread of disease — which has always been known to leverage man's most expeditious means for traveling along lines of transportation (Bray, 1996).
5. Climate change is causing a panoply of negative conditions, including the higher frequency of high impact storms; increasingly significant flooding, and conversely, larger and more severe conditions of drought; and the (at least theoretically) facilitation of the spread of disease and other negative human and zoonotic health concerns. This last concern becomes exponentially problematic when considering new and highly pathogenic

> viruses, which we have never seen before these current conditions of global warming (National Aeronautical Space Administration, 2020).

Disasters, including disease outbreaks, hurricanes, earthquakes, wildfires, and terrorist attacks, have caused insurmountable damage, devastation, and loss of life. Each disaster has also demonstrated many weaknesses in response practices. Organizations face a serious reality: If their response efforts are not effective, they will be subject to intense scrutiny and other risk factors that directly impact how they respond to future disasters (Kapucu & Van Wart, 2008).

Preparing at the national, state, and local levels requires a coordinated response effort whereby agencies have the knowledge, financial resources, and response capabilities available to improve the response effort and to minimize the damage sustained. Lessons are learned from each disaster from which organizations can build their response for the next disaster. However, these lessons are not always heeded. Problems continue to emerge in some organizations, including local communities, healthcare organizations, state public health entities, and the federal government. Lack of effective preparedness contributes to loss of community resilience and has a negative effect on quality of life for the survivors (Kapucu et al., 2013). Furthermore, a poor response effort increases the number of lives lost after the disaster hits. Understanding the scope of the problem and its effects on populations is critical to promote greater preparedness as a rationale to promote public safety and security (Lakoff, 2007). Under these conditions, organizations face the reality that they are ill-prepared to manage disasters that affect communities and states.

The costs associated with managing large-scale natural or human-made disasters in the United States are typically in the billions of dollars due to the many issues and challenges related to these events. The cost burden has a direct impact on the lives of residents directly displaced if they lose their homes or face other tragedies such as the loss of loved ones (Cornell et al., 2012). Tremendous emotional tolls and anxieties are generally associated with catastrophic events related to water contamination, sanitation in crowded living conditions, healthcare infrastructure damages, food availability, communicable disease, availability of medications for treating chronic illnesses, exposure to extreme heat or cold, and power outages. The vulnerable populations may feel that they are trapped or have lost control because of these unforeseen emergencies.

Therefore, organizations must address some of the key challenges that they face and consider how to best address areas where gaps in knowledge exist and research is required. They also should develop a clear understanding of critical aspects that affect decision-making among experts and government officials who plan and prepare for disasters. Weaknesses and shortfalls must be considered because they have a direct effect on residents in the communities where disasters occur. It is an axiom of the emergency management community that practically all emergencies are inherently local first (FEMA, 2016). Addressing the response effort requires a clear understanding of the resources that are readily available as well as those that will be available in the future. These options must be considered at the organizational level to ensure that those who have urgent medical and other needs are treated in a timely manner and will not suffer any prolonged issues that are the fault of government and other agencies. The effects of organizational design and planning likely impact how disasters are outlined, managed,

and conducted. Understanding key risk factors that affect this issue is critical and will demonstrate the importance of achieving a comprehensive response in order to meet the demands of the public in a time of crisis. A systematic approach to preparedness including engagement of the whole community is essential to overall success in these endeavors.

Statement of the Problem

Despite years of preparation, numerous executive orders, and the expenditure of billions of dollars, tremendous challenges persist for protecting U.S. citizens. Disaster preparedness is still a significant problem for U.S. healthcare organizations and communities. Progress towards accomplishing readiness has been hindered by partisan concerns, entrenched interests, and the reluctance to change (Institute of Medicine, 2004). The medical, public health, and emergency management agencies and organizations are not working with one another — even though they have a common mission and purpose (i.e., community preparedness, response capacity, and resilience). We see significant discord between these groups, including disparate planning, and command and control challenges. A common communication approach is extremely deficient across the field, causing reactive rather than proactive actions and efforts. The achievement of optimal disaster preparedness depends on strong leadership, collaborative support, and effective, proactive management. However, today's system of stakeholders is shortsighted on personal beliefs, and generally fails to see the full dimension of critical steps for preparedness. Marcus referred to this as the "Dilemma of the Cube," a theoretical construct that lacks a common perspective (Marcus et al., 2019). Additionally, the federal government has a very real condition known as siloization, meaning "to isolate such as a

grouping or department in a way that hinders communication and cooperation with others" ("Documentation," n.d.). In this instance, all layers of the operational continuum and between the layers of the operational continuum are siloed. Even though the phenomenon of siloization is not endemic to just the federal government, siloization involving 14 federal agencies, each having a role in disaster preparedness, prevents establishment of a unified vision for disaster preparedness (P. Marghella, personal communication, May 10, 2020). The extreme variation in perspectives at each level of the operational continuum thwarts coordination and commonality in planning. This federal agency hierarchical leadership culture of competing while focusing on their separate issues restricts systems thinking (P. Marghella, personal communication, May 10, 2020). As a result, there is a significant void of uniform planning or orchestral direction for coordination of disaster readiness concerns domestically (Marghella, 2014). To date, the Department of Homeland Security (DHS) has neither designed nor executed a common domestic preparedness architecture. Cooper and Block (2006) noted that in just under five years, the federal government spent billions of dollars on preparedness; however, DHS — as the Lead Federal Agency (LFA) for preparedness and response — was ineffective in handling Hurricane KATRINA (Hurricanes are capitalized per federal interagency protocols). We can expect natural and human-made disasters to keep occurring on a regular basis.

Disaster preparedness is a serious concern across different parts of the United States. Surveys taken among Americans indicate that 80% of respondents are fearful of additional terrorist attacks while 47% believe that they will be directly affected by a natural disaster or terrorist attack within a 5-year period (Redlener et al., 2007). At the

same time, only 34% of individuals are adequately prepared for a disaster if one occurs and 60% would not have the necessary supplies ready to vacate their homes (Redlener et al., 2007). These statistics demonstrate the level of urgency that is associated with a disaster and the issues faced by many communities as they prepare for or are faced with a disaster in their areas. As a rule, HCOs struggle with the reality of these situations and many do not have the resources available to prepare and manage disasters effectively. The Centers for Medicare Services (CMS) mandate stipulates that HCOs must develop emergency plans; however, having a plan does not translate into being adequately prepared.

Significance of the Research

The study is designed to address weaknesses and shortfalls of disaster preparedness that include physical resources and supplies as well as human capital that are properly directed to the appropriate areas as needed. Organizations must explore their options to expand disaster preparedness efforts because these disasters will not disappear. To determine if progress has been made over the past two decades (2000 - 2020), a variety of literature sources are necessary to address specific topics related to hospital preparedness, government preparedness at the federal level, and preparedness at the state and local levels. These factors will make a difference in determining how organizations respond to disasters once they occur. This research project is not intended to answer all questions related to this topic, but it will provide some insights into the challenges and continued risk factors associated with disaster preparedness that may be harmful to the affected communities. The study will also recognize the importance of communication

and planning efforts across different spectrums that will promote greater engagement among residents and other leaders to improve the response to disasters at the local level.

Research Questions and Outcomes

The following research questions will guide this study:

- **Research Question #1**: What factors are keeping healthcare organizations, state-based public health agencies, and the federal government from establishing a common disaster preparedness architecture?

  Outcome: To identify significant barriers and challenges in United States disaster preparedness and response over the past two decades. This analysis will include planning weaknesses, regulatory and compliance requirements, and continued inadequacies among key stakeholders.

- **Research Question #2:** What essential collaborative practices need to occur among healthcare organizations, state-based public health agencies, and the federal government agencies to prepare for large-scale disasters?

- **Outcome:** To identify foundational practices to expand collaboration, increase communication, and promote planning activities to improve the safety of all Americans.

Chapter Two

Review of the Literature

The purpose of this review of the literature is to provide an overview of the literature related to disaster preparedness in the United States. First, previously completed systematic reviews are described. Then issues impacting disaster preparedness and response by healthcare organizations at the local, state, and federal levels are examined.

Previous Systematic Reviews

Multiple systematic reviews have been conducted between 2000 and 2020 regarding disaster preparedness, covering topics such as communication in public health, HCO emergency preparedness tools, healthcare worker training, and the evaluation process for emergency exercises. There was a paucity of studies that specifically highlighted the challenges, proactive approaches, and interconnectedness of the three critical segments—HCOs (including hospitals), local and state public health agencies, and the federal government.

The first systematic review, produced in 2006 by Williams, addressed the effectiveness of disaster training for healthcare workers. A total of 10 studies were included for synthesis. The author focused the research on various training interventions in disaster preparedness to determine whether training exercises improve knowledge and skills in large-scale events. The review was inconclusive in determining objective measures of knowledge and skills; however, it noted the value of using a standardized and rigorous methodology for achieving more effective disaster preparedness training.

The second systematic review on disaster preparedness was completed by Savoia et al. in 2013. This review evaluated the effectiveness of communication provided to the

public during emergency preparedness conditions, with particular emphasis on socio demographic and behavioral communication factors. Forty of the studies were analyzed for communication techniques. The findings indicated an intense need for additional research to determine a more effective means of communication with disaster preparedness across various population groups. Savoia et al. (2013) concluded that even though federal, state, and public health agencies attempt to inform the population on preventive measures, the underserved population groups and members of racial and ethnic minorities must receive greater attention from the scientific community.

The third systematic review, conducted by Heidaranlu et al. (2015), focused on various hospital disaster tools known as "psychometric properties" for evaluating the quality of disaster preparedness outcome measures. Psychometric properties are defined as tools that provide a level of measurement specific to reliability and validity. Thirty-three studies were evaluated, in which 11 hospital disaster tools were identified. This study concluded that valid and reliable tools should be created by disaster preparedness experts given the current weakness of preparedness evaluation tools. Furthermore, the review brought forth significant concerns by the World Health Organization (WHO) regarding the inadequacy of hospital disaster preparedness, highlighting the current lack of standard tools necessary for validating proper preparedness evaluation.

The fourth systematic review was published by Labrague et al. (2018). The focus of this review was peer reviewed publications that assessed nurses' level of preparedness with large-scale disasters. This review synthesized 17 scientific articles for inclusion from the years 2006 to 2016, with results showing that nurses are insufficiently prepared to effectively respond to disasters. It concluded that nurses' level of disaster preparedness

hinges on their previous disaster response experiences, their participation in disaster training exercises and courses, and their involvement in disaster preparedness enhancement strategies.

Sheikhbardsiri et al. (2018) published the fifth systematic review. The principle aim of the study was to assess disaster evaluation techniques for large-scale events. This was a comprehensive assessment of pertinent literature involving 5,578 studies, then narrowed to 2,787 articles. Only peer reviewed research journals published during 2000 through 2017 with a disaster exercise focus were included. The study concluded that hospitals / HCOs can limit the damage and effects of large-scale events through adopting preparedness plans and strategies that:

- are transparent in design and are well known by key stakeholders.
- detail the components of transferring and discharging hospital patients.
- regularly and consistently communicate regarding the crisis.
- are kept up to date, and all staff are familiar with disaster plans.
- are regularly simulated, so team members can improve their mental and physical skills in disaster situations.

Each of these reviews points to various critical challenges that affect how HCOs manage routine patient care activities prior to and during a disaster. For these situations, the action typically involves an “all hands on deck” approach to protect and improve outcomes and to preserve the needs of all patients.

Healthcare Organization Preparedness

It is essential that HCOs embrace disaster preparedness measures for sustaining community-based resilience. HCOs face critical issues and risk factors when disasters occur because the number of patients that require emergency care may be more than the organization has the capacity to hold at a given moment. This situation causes a variety of challenges for which the HCOs are not well prepared (Krajewski et al., 2005) and that may lead to an abundance of loss and hardship (Marghella, 2014).

Disaster preparedness requires a persistent effort and systematic advance. Marghella (2014) promoted the "Eight Pillars of Catastrophic Casualty Event Management," which are universal functional areas of importance based on lessons learned from planning related to catastrophic casualty events in the Post - 9/11 environment:

1. Surge capacity planning
2. Patient movement and transportation
3. Access to medical logistics and supply
4. Mass fatality management
5. Managing the psychosocial impact of disaster-affected populations
6. Medical and public health crisis communications
7. Support to special needs populations
8. Allowing for expected degradations in the standards of care; and the critically important role proper triage plays in the management of mass casualties in a severely resource constrained environment.

These eight pillars provide for intensified disaster planning for all healthcare organizations, which in turn translates into strengthened community-wide planning for all major hazard events.

One of the major concerns affecting healthcare organizations during disasters is hospital surge capacity, as it is a complex issue. The components of surge capacity are uniform in the HCO industry and consist of personnel, equipment, supplies, facilities, and a management structure (Schultz & Koenig, 2006). The concept requires a multidisciplinary effort involving numerous local team members and collaborators such as public health, emergency medical services, law enforcement, mortuary firms, and temporary housing (Schultz & Koenig, 2006). Expanding hospital surge capacity or having immediate bed capacity is not only an organizational problem but is also a regional problem because many areas are ill equipped to manage all the patients that will need to be seen after a disaster (Terndrup et al., 2012).

To manage surge capacity effectively, HCOs must focus on making improvements in the following areas: acknowledging assets and capabilities; creating and testing planning activities to manage surge capacity across their catchment region; creating agreements to provide mutual aid support to other hospitals as needed; creating new partnerships; complying with the National Incident Management System and Incident Command System (NIMS/ICS); and expanding volunteerism among healthcare providers to support these efforts (Terndrup et al., 2012). Organizations that are responsible for leading disaster preparedness efforts must have the resources available in their communities to address some of the most concerning challenges affecting residents;

therefore, effective leadership is essential to improve performance (Waugh & Streib, 2006).

The HCO's chief executive officer is ultimately responsible for emergency preparedness; however, many organizations delegate this task to a director or junior executive. The mere delegation of this role can often send a message that emergency preparedness is considered a lower priority. Emergency preparedness directors are generally tasked with designing training courses for personnel, collaborating with local government officials, and establishing workshops or disaster preparedness mock sessions for the organization (Waugh & Streib, 2006). Other members of the hospital staff, including clinical professionals and non-medical team members, also need to be informed about the disaster preparedness strategy. The hierarchy must feature representatives from all service areas such as hospital administration, medical staff department team members, safety and security, infection control, maintenance, nursing leadership, and others (Waugh & Streib, 2006).

Emergency preparedness requirements imposed by the Centers for Medicare and Medicaid Services (CMS) and the Joint Commission (JC) are viewed as mandates, albeit unfunded ones; they are still necessary to comply with if hospitals want to receive CMS reimbursement for services provided under Medicare and Medicaid, and if they expect to receive JC accreditation—the national gold-standard for operating as a healthcare delivery organization (Marghella, 2014). The JC "state-of-the-art standards set expectations for organizational performance that are reasonable, achievable and surveyable" (JC, 2020). As such, disaster preparedness is a "condition of participation" in which compliance with CMS mandates is required for participation in Medicare (CMS,

2020). The CMS essential requirement is that HCOs must develop emergency plans and perform risk assessments annually (CMS, 2020). These standards and mandates set expectations for patient safety and organizational performance but exhibit little influence regarding disaster preparedness management and in establishing evidence-based practices (JC, 2020). Having a plan, performing an exercise, and possessing a defined NIMS / ICS staffing architecture (the core requirements mandated by the JC to pass the emergency management/preparedness portion of the accreditation process) simply does not equate to being prepared. Likewise, simply meeting CMS requirements for facility management readiness does not meet this same goal. CMS cannot shut down a hospital, but it has the legal authority to terminate a HCO's Medicare agreement for non-compliance with conditions of participation (CMS, 2020).

HCOs are a critical infrastructure asset for every community. In 2011, the U.S. government identified disaster preparedness as a national goal for stability of the nation (DHS, 2011). The Centers for Medicare and Medicaid Services mandates that HCOs are to provide critical and essential services and to operate in a specific manner when emergency incidents occur (Rives et al., 2011). HCOs are also required to "adequately plan for both natural and human-made disasters and must coordinate with federal, state, tribal, regional and local emergency preparedness systems" (CMS "Final Rule," 2020). Furthermore, the JC on Accreditation of Healthcare Organizations emergency management standards for all accredited HCOs (those receiving Medicare funding) stipulate that a HCO must be able to "manage during any and every type of emergency," including communications, resources and assets, safety and security, staff responsibilities, utilities, patient clinical and support activities, and disaster volunteer

management. A well-designed, coordinated, and all-around effective hospital emergency preparedness plan will adequately maintain a constant state of readiness for all types of risks and hazards, including:

- Simultaneousness with hospital operations
- Timely and efficient use of resources
- Adaptation to patient surge and increased patient demand
- Effective and succinct lines of communication
- Essential service continuity (American College of Healthcare Executives [ACHE], 2020)

Before a disaster strikes, monitoring and mindfulness should be the order of the day for efficiently managing a no-warning event. Individual role clarity, expedient action by all stakeholders, and team play are all critical success factors for emergency management and disaster preparedness. Kaji and Lewis (2006) examined 45 hospitals in Los Angeles County in areas such as surge capacity, planning, and variation in practices using a descriptive, cross-sectional survey method. Among these hospitals, numerous limitations associated with failures to provide training among organizations and to plan effectively for surges in patients were found, despite an adequate availability of supplies and equipment in these locations (Kaji & Lewis, 2006). These factors are of critical importance in conveying a disaster response at hospitals, and if corrected, will have a positive impact on patient care and will enable surges in patients as well as other risk factors to be managed appropriately. Organizations must be adequately prepared to address many of the challenges faced in healthcare during response and should continue

to explore new options to make improvements that will have a lasting impact on performance during future disasters.

In many rural communities that are affected by disasters, hospitals in these areas are not equipped to manage large-scale disasters and to handle a surge in patients. The lack of preparedness is due in large part to limited resource allocation. Hospitals' financial conditions are also typically exacerbated during disasters. The public does not readily understand that "rural hospitals are challenged by greater difficulty sparing personnel for preparedness training and planning, greater distances for training opportunities, and often, higher costs for equipment and supplies because of inability to negotiate volume discounts" (Edwards et al., 2008). Under these conditions, rural hospitals cannot meet the demands for disasters, and the patients ultimately suffer. It is important for these organizations to receive additional resources in a variety of areas such as equipment, medicines, and supplies, as well as personnel, to ensure that patients who visit the hospital during a disaster are properly cared for and treated in a respectful manner (Edwards et al., 2008). The efforts made by hospital leaders, in coordination with other agencies, will influence outcomes and improve disaster response. The situation facing hospitals is exacerbated by issues in disaster preparedness at the state and local levels. It is critical that stakeholder organizations and communities administer flexible approaches to preparedness that will ensure appropriate anticipation, efficient response, and timely recovery (Ramsbottom et al., 2017).

Local and State Public Health Preparedness

At the local and state levels, disaster preparedness activities such as mock exercises, risk analysis presentations, stakeholder progress reports, conferences, and symposia are instrumental in advancing public readiness. Community leaders, especially hospital administrators, have key roles in the effective management of these activities, with the aim of being better prepared to face disasters.

Significant lessons were learned from the Hurricane Katrina disaster regarding how to manage populations that were disproportionately affected due to racial status and health disparities (Eisenman et al., 2007). The number of community risk factors associated with Hurricane Katrina was significant, leading to the response effort that was inadequate and poorly managed on many levels. Had risk assessments been proactively performed and meshed into the preparedness efforts, some of the crises could have been averted (Heidaranlu et al., 2015).

Issues such as evacuating residents who lost their homes and were in flood zones are not uncommon during hurricanes, but the evacuation process was practically impossible during Hurricane Katrina (Eisenmann et al., 2007). Therefore, it was difficult for organizations to develop a response that was cohesive and would have the desired impact on the community.

Basolo et al. (2009) conducted a cross-sectional study of populations in Los Angeles County and New Orleans using telephone surveys to measure confidence in the local response of each community. The results indicated that greater confidence in local governments is contingent upon greater knowledge of preparedness tools and information offered by these governments. Information regarding disaster preparedness at the local

level is required to increase perceived preparedness and to maximize trust in local government responses to these disasters (Basolo et al., 2009).

Planning and preparedness may not be in full written form because these processes require flexibility and are dynamic as the situation changes; therefore, organizations must learn how to use critical thinking skills and apply them to different situations in real time (Perry & Lindell, 2003). Preparing for an emergency requires specific indicators of communities on how to address their needs effectively to improve performance; this process requires a critical understanding of the elements that are used to address areas of need and to facilitate a system-wide response that will address the situation effectively.

Kapucu (2008) administered a questionnaire instrument to emergency managers in each of the 67 counties of Florida after four hurricanes that affected the area in 2004. With a 92% response rate, it was determined that in many communities, there is a coordinated response effort that directly impacts the level of preparedness of the public for future disasters. When a coordinated emergency response is less than optimal, there may be a degree of complacency among community residents that could cause further harm in the wake of a disaster (Kapucu, 2008). Coordinated emergency responses require a clear understanding of the key elements affecting disaster preparedness.

First, actions by local and state leaders responsible for disaster planning and preparedness should reflect the needs of the public above all other priorities. Leaders must provide family appropriate messaging to the public that is truthful and transparent. They should administer a practical response based upon the conditions that are present at that time. The efforts that are made to improve the situation should address some of the

key factors that affect residents, such as acute and chronic health issues along with lack of medicine, food, security, and shelter. With expanded emergency management capabilities across all levels of government, it is necessary for organizations to take their role seriously and to lead by example (Waugh & Streib, 2006). In this manner, state and local organizations are more likely to secure adequate and appropriate resources to improve their response to catastrophic disasters, which affect public health and well-being. The federal government can provide leadership to efforts by hospitals and by state and local governments.

Federal Government Preparedness

At the federal level, understanding the factors associated with a coordinated response effort is critical to protect the public from risk or harm; this requires greater clarity regarding how the government response should be disseminated on the ground (Obama, 2011). Two significant national disasters, 9/11 and Hurricane Katrina, raised significant concerns about the nation's ability to adequately respond to large disasters. September 11th was considered perhaps the most critical. After Hurricane Katrina, questions were raised about preventative efforts that could have been made to reduce the number of deaths and the damage sustained in New Orleans and the surrounding areas (Lakoff, 2007). Both disasters reflected some of the glaring weaknesses of the federal government and its inability to manage a disaster effectively in some of the most vulnerable populations (Eisenmann et al., 2007).

The response to Hurricane Katrina demonstrated breakdowns in communication and lack of preparedness at the federal level. During this disaster, messaging of the government took one stance while the reality on the ground was quite different. This was

a difficult disconnect to manage and overcome. Lessons learned from Hurricane Katrina led to a series of changes as officials had neglected floodwall maintenance for decades. Had leaders kept citizens apprised on floodwall maintenance and efforts to secure the barrier, fewer residents would have been in harm's way. A major lesson was to increase communication with the public and to provide greater transparency in disaster planning and preparedness.

In 2011, the White House released Presidential Policy Directive 8 (PPD-8) specific to national preparedness (Rambhia, 2011). This directive attempted to bolster the security and resilience of disaster preparedness and readiness through systematic preparation against threats to the United States (Rambhia, 2011). President Obama presented PPD-8 to protect the country from significant risks such as acts of terrorism, pandemics, natural disasters, and cyber-attacks. PPD-8's primary objective was to establish a national preparedness goal for the purpose of describing core capabilities of preparedness activities. Unfortunately, evidence suggests that disaster preparedness in the federal government (as well as in the federal government's counterparts at state public health agencies and healthcare organizations) has not matured in a way that demonstrated meeting the intent of PPD-8 (Marghella, 2020). Since 2011, disaster preparedness and response have experienced extremely limited success. In the current system, disaster plans are poorly integrated into the overarching planning process (Ciottone, 2016).

Despite PPD 8, federal agencies remain competitive, divisive, siloed, internally focused, and deficient in uniform planning (Caneva & Marghella, 2016). Approximately 14 federal agencies currently exist that administer a multitude of response- and recovery-related programs (P. Marghella, personal communication, May 10, 2020). These

organizations rely greatly on the rapid participation by local and state governments for effective implementation (P. Marghella, personal communication, May 10, 2020). The Department of Homeland Security (DHS) and the Federal Emergency Management Agency (FEMA) fall under general operational responsibility. Under the medical oversight arm, the Department of Health and Human Services (DHHS), the Centers for Disease Control and Prevention (CDC), and the National Institutes of Health (NIH) are aligned under the rubric of Emergency Support Function #8 (ESF-8) of the National Response Framework (NRF) (FEMA, 2016). Unfortunately, the DHS and FEMA disaster preparedness teams are not sufficiently coordinated with HHS and the CDC brethren. This is in large part the result of the "dilemma of the cube" issue described by Marcus et al. (2019). It can also be attributed to feedback from subject matter experts in the CDC and the recent focus on specific opportunities for modernizing capabilities within local health departments, and state and national organizations (CDC, 2018).

Siloization of disaster preparedness and response is a real concern in the federal government, as it stunts a unified vision for disaster preparedness and response and deters long-term goals from being accomplished. It is known that "preparedness marks out a limited but agreed-upon terrain for the management of collective life. Its techniques focus on a certain set of possible events, operating to bring them into the present as potential future catastrophes that point to current vulnerabilities" (Lakoff, 2007). A level of national preparedness is required to ensure public safety and should demonstrate a commitment to resource allocation for those with the greatest need.

One of the key issues at the federal government level is to coordinate and communicate effectively with other groups who have knowledge and experience to share

important information and event-related intelligence, such as local agencies and health departments (Obama, 2011). A preparedness planning directive was conducted at the federal level to improve management and response efforts related to disasters and how to create a response that will have the necessary impact on individuals at the local level (Obama, 2011). Specifically, a strong and coordinated communications infrastructure is required in an organization to ensure that messages shared with the public are timely and appropriate and will have the desired impact on the health and well-being of residents (Comfort & Haase, 2006). Critical communication networks are required and must demonstrate resilience despite any issues that affect the infrastructure so that messaging is shared in a timely manner and will have the desired impact on performance to improve outcomes. Since communications must be cohesive and provide a realistic, but not panicked, approach to the situation, it is important for the messages to provide some degree of realism and real-time information regarding the current situation in the affected communities, regardless of the cause of the disaster.

Challenges specific to our nation's response network are deemed "under-determined" as they have been focused largely on knowledge gained from responding to practice scenarios and actual organic disasters, which may not be an exact predictor of situations responders can experience (Benedek et al, 2020). Disasters impacting our country may take many forms. Terrorists are very capable of targeting command, control, and communication functionalities along opposing military lines, but may also direct their attention at "soft" targets such as the banking network, the electric grid, as well as HCOs. Some attacks may focus on personal computer devices or the hardware of a weapons system. The Internet could potentially be commandeered to disperse gossip and

disinformation or possibly be the intended assault. In truth, this is an area that should be included in training programs (Schmitt et al., 2007).

In addition to the threat posed by terrorist strikes**,** we can see the possibility of viral infections and diseases infecting multiple groups. Three-quarters of emerging individual pathogens may be quickly transferred backward and forward in between humans, domesticated creatures, and wild animals. Even if animal conditions do not affect humans, they may cause significant and wide-spread economic impacts (Watson et al., 2007). Consider, for example, what occurred in 2018 with just the threat of Mad Cow Disease (as announced — inappropriately — on the air by Oprah Winfrey) (P. Marghella, personal communication, May 10, 2020). While transmittable disease is an ever-present hazard in a globalized planet, the probability of revolutionaries intentionally presenting contagions or nurturing the spread of disease presents an integrated measurement to the threat.

The increasing likelihood of bioterrorism and cyber-attacks have become well-recognized concerns. As in the case after 9/11, a strike will likely produce unparalleled local levels of disruption, significantly stressing hosting servers and some web Internet sites, including various gateways, and restraining emergency responder access to vital Web-based information (Schmitt et al., 2007). Digital jamming may be utilized to interrupt emergency frequencies; loss diagnosis, early precaution, and checking systems; or attack vital facilities. Any type of electromagnetic radiation, such as GPS indicators, is a prospective target for attack (Mukherjee et al., 2014). Terrorists may conduct near simultaneous or even concurrent assaults. Such strikes are likely to create greater chaos and cause greater difficulty in providing aid. Ultimately, terrorists might employ nuclear,

chemical, or other approaches that might create disasters on an extensive scale, which could swiftly overwhelm the ability of our system and first responders (Waugh & Streib, 2006).

Kapucu and Van Wart (2008) identified some of the risk factors that are associated with catastrophic disasters affecting different communities and they specifically address some of the key issues that affect how organizations and officials respond to disasters at the local level. It is evident that "…catastrophic disasters have become extreme tests, too, in which cameras record the performance and have emergency operations in minute detail from the moment the disaster occurs. Administrative and political heads can roll if performance is not exemplary" (Kapucu & Van Wart, 2008). Organizations that are responsible for leading disaster preparedness efforts must have the resources available in their communities to address some of the most concerning challenges affecting residents, and therefore, effective leadership is essential to improve performance (Waugh & Streib, 2006).

Collier and Lakoff (2008) indicated the importance of critical infrastructure based on the following concept: "The economic prosperity, military strength, and political vitality of the United States all depend on the continuous functioning of the nation's critical infrastructures." Under these circumstances, organizations are responsible for directing specific resources at the national level to provide a basis for allocating resources at the local level (Collier & Lakoff, 2008). This concept is largely focused on threats to national security that are undoubtedly affected by natural disasters as well as terrorist attacks.

The identification of key areas that are at risk of disasters is one factor in promoting an effective response. However, identifying the populations who live in these areas is another critical step in disaster preparedness. Organizations have created new tools and resources to improve disaster preparedness efforts and have a clearer understanding of the risks that they face relative to specific population groups (Garb et al, 2007). Specifically, different types of population data that are available include the U.S. census, LandScan, The American Business Directory, and Journey to Work, among others (Garb et al., 2007). In using this data, it is possible to evaluate populations using satellite imagery and transportation resources to estimate population statistics as well as risk factors (Garb et al., 2007). As technologies continue to evolve, it is likely that new tools will be available to estimate populations better at the highest level of risk so that disaster preparedness efforts are more productive and provide greater value to these groups (Garb et al., 2007). This is a type of improvement that continues to evolve at the federal level and will have a greater impact regarding future disaster events.

In a similar context, different types of information technologies (IT) are useful in addressing some of the key challenges of disaster preparedness. Rao et al. (2007) acknowledged that "IT provides capabilities that can help people grasp the dynamic realities of a disaster more clearly and help them formulate better decisions more quickly … IT has as-yet-unrealized potential to improve how communities, the nation, and the global community handle disasters" (Rao et al., 2007, p. S-1). Information technologies can improve the response effort in real time and provide additional coordination and resources without delays. These tools can also influence hard decisions that are made at different levels of government to ensure that Americans affected by disaster are properly

cared for and treated in a timely manner (National Research Council, 2007). Some of the most common and less challenging uses of information technologies include database management and call centers to identify supplies and equipment; the application of sensors and data mining tools to share information with other experts; the use of smartphones to communicate in the wake of disasters; and the application of planning tools to track specific tasks and issues as they occur (Rao et al., 2007). Information technology in general would indeed help to mitigate the communication challenges involving large-scale disasters, with one significant exception — non-nuclear electronic magnetic pulse (EMP) weapons are capable of destroying, damaging, and disrupting electronic systems at various ranges (Pry, 2013). Terrorists, criminals, or unstable individuals can construct a non-nuclear EMP weapon, which could destroy electronics and collapse the electric power grid causing permanent blackout (Pry, 2013).

Planning for a disaster requires a series of steps that have a direct impact on the actions and decisions of providers. Planning tools and resources must be managed with the best interest of the public in mind. These actions should occur across all levels of government and should provide greater insight regarding areas of strength and weakness. The preparedness of organizations for a disaster requires a critical set of elements affecting the response efforts that include preparation for terrorist attacks. Specifically, this area requires efforts that are likely to affect how actions and decisions are made at different levels.

Managing a disaster effectively requires a coordinated response effort from a variety of agencies who have the skills, experience, and knowledge to manage the problem in a comprehensive manner. From the top down, there are significant obstacles

faced by federal, state, and local government agencies as they attempt to better understand some of the key concerns affecting the different groups that are responsible for managing disasters and who have direct involvement on the ground. The following presents a more detailed explanation of the factors that are keeping critical stakeholders from establishing a common disaster preparedness architecture, including statements to improve collaborative practices with large-scale disasters.

Theory of Community Organization

One lens for understanding the factors impacting disaster preparedness and response is the theory of community organization (TCO). TCO links preparation, leadership development, mobilization of communities, and evaluation of success or failure in achieving goals and objectives. The theory is grounded in community-driven approaches to assessing and solving health and social problems (Gamboa-Maldano et al., 2012). A community-driven development initiative extends considerable control to the development process, whereby resources and decision-making authority is directly connected to the community. In other words, it is incumbent upon the community to take an active role in the process of disaster preparedness. The value of engaging a significant number of community members in the assessment of potential risks, the development of forward-thinking disaster preparedness contingency plans, and by matching society resources to the areas of greatest need will ultimately lead to more resilient communities. In attempting to understand and evaluate behaviors that relate to the topic of disaster preparedness and response readiness, TCO appropriately aligns with assessment of the role that community plays in the continuum of disaster preparedness. TCO considers the key elements of community building capacity, empowerment of the participants,

relevance of the action to be taken, a shared vision, and critical consciousness of the members. These theoretical constructs are key elements in understanding disaster preparedness and response readiness (Gamboa-Maldonado et al., 2012).

The first construct of the TCO is community building capacity (Gamboa-Maldonado et al., 2012). Peredo and Chrisman (2006) addressed the significance of community-based enterprise (CBE) as a means of addressing some of the key factors that affect the actions and decisions of community organizations in economic terms that are difficult to separate from cultural and social norms. In some areas of the world where many of the poor reside, it is difficult to integrate an entrepreneurial spirit in the same manner as in other communities where organizations are likely to be less influential; therefore, new models must be explored that will lead to greater integration of ideas and concepts to impact the most vulnerable (Peredo & Chrisman, 2006). In these areas, an entrepreneurial approach to managing activities at the community level will likely promote engagement and create new opportunities for growth that will encourage new forms of change and achieve greater progress among individuals and groups (Peredo & Chrisman, 2006). Nonetheless, with the challenges faced when natural disasters occur, the traditional models of support that are largely hierarchal and structured may not benefit the masses in a desirable manner and could affect how actions and decisions are made that influence community members (Peredo & Chrisman, 2006).

Empowerment of the participants is the second construct of TCO (Gamboa-Maldonado et al., 2012). Laing (2009) indicated that any community-based response should incorporate a variety of cultural elements that may be used to improve performance and to address some of the key challenges faced by those in need.

Rothman's community organization framework is relevant in addressing some of the most important needs of these groups with an emphasis on culture to solve problems in specific ways (Laing, 2009). The effectiveness of community-based responses demonstrates the importance of developing meaningful strategies that utilize culture and other specificities affecting a community to empower participants to target specific requirements (Laing, 2009) rather than throw a group of resources at a problem to see what may stick. In the aftermath of a disaster, specific needs are not always addressed, and only larger resources may be available. There must be a coordinated effort among community organizers to engage participants to address some of the most challenging and complex issues facing each community, such as discrimination and racism, food shortages, homelessness, and infrastructure needs. At the same time, the cultural identities and experiences of the public must be considered because these will have a greater impact on achieving effective results and in promoting an environment where change and progress will occur after a disaster occurs.

Although it may be challenging for larger scale agencies to understand community and cultural identities, their efforts should be organized and coordinated with other agencies. Knowledge and understanding of key factors affecting a community's activities and behaviors is critical in the process of addressing the most challenging and complex needs of a community (Laing, 2009). To support a community organizing effort during a disaster, key factors for consideration include cultural competence related to knowledge, awareness, skills, and encounters (Laing, 2009). When government agencies understand the cultures that they are dealing with on the ground, they will be better prepared to manage the response needed to address the large-scale needs of each

community. Due to the complexities and bureaucratic norms of governments, however, it is difficult for members to take the time required and to develop an understanding of cultural identity. A community-based response effort will ensure that government agencies and other organizations may distribute resources appropriately and provide additional knowledge that will produce relief for those who have the greatest needs.

It is also essential to ensure that the action taken is relevant for the community. This is the third construct of TOC (Gamboa-Maldonado et al., 2012). Key interventions are required to provide much-needed support and guidance to communities in need. Community-based organization and coordination are required to support disaster management. Therefore, policies should be based upon existing data and reporting from prior disasters, social advocacy efforts to minimize social inequities, and community-level capacity development to facilitate changes and to create practical solutions based upon a clear understanding of problems (Rothman, 2007). A data-driven response is largely based upon a model created at the community level, which includes master plans and other resources that specifically define a community, such as its physical space and parameters that affect how the response will occur (Rothman, 2007).

The fourth construct of TOC is the essential element of developing a shared vision (Gamboa-Maldonado et al., 2012). To expand the capacity of communities in preparation for future disasters, resident involvement is essential and will have a greater impact on understanding the culture and identity of the affected groups along with creating an environment where relationships are fostered and an emphasis on the people rather than economics is most appropriate (Rothman, 2007). Addressing the specific issues of the community, therefore, requires a cohesive message and a response that is

directly focused on the affected area. The actions of leaders and other community organizers in developing a shared vision for their community is extremely necessary. A shared vision involves building of a sense of commitment in the group, where members project a future state desired. Disasters cause insurmountable damage in communities and to accommodate these issues, community-based efforts must be in place that will address some of the key challenges affecting residents. Without an organized effort at the community level, disasters will cause irreversible damage and harm to residence and create difficulties that will affect residents for many years to come.

Many communities are ill-equipped to manage disaster preparedness when it is largely focused on a one-size-fits-all model where there are few opportunities to modify the model for different groups. In this context, integrating services into smaller communities for areas where key norms exist is problematic and government resources may not always be used appropriately or even allocated to begin with. This is a serious risk for communities and creates difficult challenges as they attempt to support their residents in the wake of a disaster. For instance, a rural area in the United States that is affected by a tornado or another event may not have the resource infrastructure to rebuild or to manage some of the needs of its residents who are displaced and cannot access basic options such as food, medicine, and clothing. Current structures of government do not necessarily accommodate these groups effectively. To manage this type of crisis, a community organizing effort should integrate different groups and develop a cohesive message to improve disaster preparedness while also coordinating a response effort that will have a lasting impact on meeting the needs of those most affected by a disaster.

Gaps in the Literature

The literature review offers a variety of resources important to addressing some of the key areas of disaster preparedness that affect healthcare organizations, local and state public health, and the federal government. Much of the literature is concerned with addressing different areas of disaster preparedness and in providing some statistics regarding risk factors and the affected communities. However, the information does not necessarily provide a glimpse into new research studies that were conducted regarding disaster preparedness, but instead takes a retrospective view of history over the past two decades to identify lessons learned and other challenges that affect communities. Over a period of 20 years, there have been countless disasters in the United States, from terrorist attacks to hurricanes and wildfires, among others. The challenges of addressing each situation individually will never disappear, but it is important for researchers and scientists to examine some of the key factors that could improve the response effort going forward. This process will demonstrate a commitment to understanding the needs of the public and in providing the necessary guidance when they will be displaced from their homes and require individual resources to meet their needs. Some of the most basic functions of disaster preparedness may not be addressed in the literature, but they are implied and offer an opportunity to explore different areas of disaster planning that have a direct impact on community members.

Chapter Three

Methodology

This research project was a systematic review of relevant literature and independent studies to address some of the key aspects related to disaster preparedness across healthcare organizations, state-based public health agencies, and the federal government. The overarching belief guiding this work is that a more proactive and holistic approach to disaster preparedness may promote reduced risk and sustainable development related to enhanced readiness. The researcher appraised pertinent research, synthesized publications, and compared evidence to answer two primary research questions:

1. What factors are keeping healthcare organizations, state-based public health agencies, and the federal government from establishing a common disaster preparedness architecture?
2. What essential collaborative practices need to occur among healthcare organizations, state-based public health agencies, and the federal governmental agencies to prepare for large-scale disasters?

Because the project was a systematic review of current data, neither Institutional Review Board (IRB) approval nor sample size computations was required. There were no human subjects tested during this systematic review.

The search strategy followed a Preferred Reporting Items for Systematic Review (PRISMA) framework, including the use of both a PRISMA checklist and flow diagram to safeguard material quality. Selected articles for the study were documented in accordance with the preferred reporting items for systematic reviews and meta-analyses

(PRISMA) (Moher et al., 2009). Articles from peer-reviewed journals and grey literature published between January 1, 2000 and January 1, 2020 were eligible for inclusion in this study. Articles addressing scenarios outside an emergency or large-scale crisis context, published in languages other than English, or for which full-text documents were not found were excluded.

Scientific electronic databases including Google Scholar, PubMed, and MEDLINE, as well as journal articles, books, and grey literature sources measuring hospital / HCO, public health governmental body, and federal government disaster preparedness and response readiness, were searched using Medical Subject Headings (MeSH) terms and keyword searches. The terms were combined in various ways with Boolean operators, including hospital OR public health disaster preparedness AND hospital emergency management OR public health AND federal government emergency preparedness OR community collaboration AND disaster management OR healthcare organizations AND public health AND federal government disaster preparedness OR large scale disasters AND terrorism OR healthcare organizations OR public health state agency AND federal government collaboration.

For each of the initial electronic databases, the number of articles was recorded. Duplicate publications were removed. Titles and abstracts of the remaining publications were reviewed, and those not meeting the inclusion criteria were excluded. Additionally, the reference section for each remaining article found was searched to locate other relevant articles. The collection of relevant studies found as meeting the inclusion criteria were included with final articles for synthesis and review.

Peer-reviewed articles that incorporated keywords and subject headings, and which met the following criteria, were included: (1) studies that reported descriptive information and data about disaster preparedness and readiness performance for hospitals, public health governmental bodies, and the federal government; (2) studies pertaining to promoting readiness, expanding collaboration, and improving communication; and (3) studies regarding internal operational issues, external challenges, or simple inaction regarding disaster preparedness. Table 1 (see Appendix B) refers to grading evidence of peer-reviewed studies. Level of evidence guidelines were developed based on judgment of the applicability, consistency, and validity of the whole body of evidence that was germane to the research questions. Consideration was additionally given to practical points emphasized with, or without, research evidence. The rating system involved the evaluation of "good," "fair," and "poor" assessment of the material. "Good" studies provided strong support for responding to research questions, where the results were important and consistent, without indication of bias, generalizability, or research design flaws. Studies in the "fair" category showed evidence of uncertainty attached to the content because of inconsistencies or doubt about generalizability, bias, or research concerns. Studies graded as "poor" exhibited substantial uncertainty about the content and conclusion because of inconsistencies among the results, or due to doubts concerning bias, generalizability, or research (IOM, 2011).

Table 1

Peer-Reviewed Articles Included in Systematic Review: Data Extraction Table

No.	Popul-ation	Reference	Study Sample	Study Design	Inter-vention	Findings and Conclusions	Evidence Grade	Strengths	Limit-ations

To ensure thorough understanding of the critical issues affecting disaster preparedness, grey literature was reviewed in addition to peer-reviewed literature. Grey literature can consist of government and committee reports, ongoing research, committee papers, and academic studies such as theses or dissertations — all of which provide a valuable forum with varying results. The material is generally considered up-to-date research of high quality, which is either published or potentially unpublished in non-commercial form (Paez, 2017). The use of grey literature likely reduces publication bias and improves the review's breadth and parity (Paez, 2017). The evaluation of grey literature was critically considered. Articles were assessed on 6 objectives: (1) authority — to determine who is responsible for intellectual content; (2) accuracy — to evaluate whether the information presented is accurate; (3) coverage — to assess if the content coverage is clearly stated; (4) objectivity — to review whether there is bias, and if bias is unstated or acknowledged; (5) date — to determine if the date confirms relevance to the project and informs research; (6) significance — to evaluate if the material is relevant to the research (Tyndall, 2010). The data extraction table for grey literature is provided in Table 2 (see Appendix B).

Table 2

Grey Literature Included in Systematic Review: Data Extraction Table

No.	**Authority:** *Responsibility for intellectual content*	**Accuracy:** *Is the information presented accurate?*	**Coverage:** *Is the content coverage clearly stated?*	**Objectivity:** *Is there bias? Unstated / acknowledge bias?*	**Date:** *Does date of item confirm relevance & inform research?*	**Significance:** *Is material relevant to this research?*

For the final stage of data collection, results of these search strategies were analyzed by a subject matter expert / committee member. This final review ensured that

all identified articles were pertinent to the areas of focus and of appropriate quality for inclusion.

As documented in the PRISMA Flow Chart located in Appendix A, the literature search located n = 549 potentially relevant disaster preparedness records including 24 from grey literature. Another n = 24 records were identified during the review of full-text records. There were 310 duplicate records that were removed, leaving n = 263 records. Of these, the screening process led to the removal of 168 because the articles lacked critical elements specific to disasters and operational challenges for the HCOs, local or state public health, or federal government entities, or because they did not report sufficient disaster preparedness or emergency medicine collaborative benefits or opportunities. The researcher read the full text of the remaining n = 95 determine if they met the criteria for inclusion. This process resulted in the elimination of 50 records that did not meet one or more of the established criteria, thus leaving the records included in the qualitative synthesis at n = 45.

In summary, the methodology described was designed to provide a review of the current peer-reviewed and authoritative grey literature addressing disaster preparedness in the United States. Results of this literature search are provided in the next section of this report.

Chapter Four

Results

Using the procedure described in the methodology, 45 articles were identified that address factors inhibiting preparedness and essential collaborative practices designed to enhance disaster preparedness. Numerous factors overlay and, in many instances, parallel the barriers and collaborative practices associated with each research question. Data extraction tables for peer-reviewed literature and for grey literature in the synthesis are provided in Appendix B.

Factors Inhibiting Disaster Preparedness

Seventeen of the articles (14 peer-reviewed and 13 grey literature) assessed the first research question (What factors are keeping healthcare organizations, state-based public health agencies, and the federal government from establishing a common disaster preparedness architecture?).

Five factors identified within healthcare organizations included 1) hospital preparedness and emergency response, 2) leadership failures for managing disasters, 3) broken confidence in government, 4) infrastructure issues, and 5) planning shortcomings. Factors identified as impacting the establishment of a common disaster preparedness architecture included hospital preparedness and emergency response (CDC, 2020; GAO, 2020; Kaji et al., 2006; Krajewski et al., 2005; Niska & Shimizu, 2011; Sutton & Tierney, 2006), leadership failures for managing disasters (CMS, 2020; Kapuca & Van Wart, 2008; Kunreuther & Michel-Kerjan, 2011; Labrague et al., 2017; Slepski, 2007; Waugh & Streib, 2006;), broken confidence in government (Basolo et al., 2009; FEMA, 2020; IOM, 2004; Rambhia, 2011), infrastructure issues (Collier & Lakoff, 2008;

Comfort & Haase, 2006; Savoia & Viswanath, 2013), and planning shortcomings (DHS, 2007; DOD, 2020; Eisenman et al., 2007; Perry & Lindell, 2003; Pitts et al., 2008; Rambhia et al., 2012; Terdrup et al., 2012; Wisner et al., 2002).

Hospital Preparedness and Emergency Response

The first factor identified was hospital preparedness for emergency responses. The researcher identified three peer-reviewed studies and three sources of grey literature that had been conducted on hospital/HCO's general preparedness and emergency response for large scale disasters (CDC, 2020; GAO, 2020; Kaji & Lewis, 2006; Krajewski et al., 2005; Niska & Shimizu, 2011; Sutton & Tierney, 2006). Kaji et al. (2006) surveyed 45 hospitals in Los Angeles County, California, to evaluate disaster preparedness. The study found there were declines in hospital preparedness and funding to support preparedness. These findings were supported by Krajewski et al. (2005) in their evaluation of critical response capabilities. The article highlighted how preparedness failures were linked to insufficiency of medical supplies, unavailability of essential equipment, the non-integration of training, and overall poor planning. Emphasis on establishing unique preparation plans was noted due to the great variation in large-scale disasters. A study by Niska and Shimizu (2011) assessed hospital disaster plans' ability to manage a variety of public health issues. It was noted that additional resources and more robust planning are required for most HCOs. A major factor of these articles shows how a greater understanding of the essential elements of disaster planning is needed for the healthcare organizations. The CDC (2020) report provided information specific to public health roles and responsibilities, and further highlighted what an effective response to large-scale disasters entails. This material noted that health departments will not take the

lead in responding to an incident but should function within the emergency operational plans, procedures, and guidelines for incident management in each community. The report also listed public health emergency response functions, tasks, and prevention services that should be implemented during an emergency or disaster. The U.S. Government Accountability Office (GAO) (2020) literature claimed that federal programs are mostly implemented through convoluted partnership arrangements. Furthermore, an executive order referencing federalism stipulated the federal agencies are required to collaborate with local and state bodies as they develop policy. Sutton and Tierney (2006) assessed disaster preparedness concepts, levels of support, and disaster research in the United States. This research also explored how recent disasters show the essential need for local coordination efforts, the value in devising continuity plans with detailed timely response and recovery actions, and the overarching importance of individual responsibility. These sources all agreed that hospitals have low to moderate levels of general emergency preparedness and limited coordination efforts with state and federal stakeholders.

Leadership Failures for Managing Disasters

The second factor identified was the failure of leadership in managing disasters. Four peer-reviewed articles and two sources of grey literature dealt with importance of leadership capabilities and effectiveness during extreme events (CMS, 2020; Kapucu & Van Wart, 2008; Kunreuther & Michel-Kerjan, 2011; Slepski, 2007; Waugh & Streib, 2006). Kapucu and Van Wart (2008) explored the emerging role of public policy implications regarding disasters. They highlighted critical leadership imperatives for proactive and timely communication when imminent danger is at hand, efficient decision

making, the balance of teamwork with limited command and control direction, and extensive coordination of activities with all local agencies.

Labrague et al. (2017) evaluated levels of nurse preparedness and reported that nurses collectively fall short in overall preparedness skills. The findings suggest that nurse leaders and nurse educators play a critical role in this evolution. Results indicate how effective leadership is a major factor when considering performance and effective resolve for disaster preparedness. Kapucu (2008) further advised how leaders' actions and overall competence can minimize or maximize difficult disaster scenarios.

Slepski (2007) examined the perspectives of healthcare providers after hurricanes Katrina and Rita. The findings indicated limited knowledge deficits among the participants; however, respondents provided approximately 500 ideas for improving preparedness, training, and overall disaster preparedness competency.

Waugh and Streib (2006) also assessed leadership effectiveness, noting its critical importance for developing a larger vision needed for positive change in emergency management. The findings show how disaster preparedness and response closely align with political and administrative interactions for improving strategic advantage. The CMS (2020) material highlighted how the agency requires that hospital leadership ensures adequate planning for natural and human made disasters as part of the national emergency preparedness requirements and rule. CMS provides *Hospital Conditions of Participation* that provide quality standards that are to be met for patient care and when receiving appropriate services. Hospitals must maintain compliance with these federal requirements, in their focus on overall performance with patient care, functions, and processes.

Kunreuther and Michel-Kerjan (2011) assessed leadership factors relating to disaster preparedness and insurance. The study evaluated the exponential increase of large-scale disasters across the United States, emphasizing the associated significant financial losses. Major findings noted the importance of various governmental agencies performing an economic assessment of insurance and risk reduction opportunities. Additional recommendations included identifying strong leaders who have skills in handling high-consequence issues such as large-scale disasters, and in devising public policy to address these changes.

Broken Confidence in Government

The third factor identified in the systematic review associated with a common disaster preparedness architecture pertains to broken confidence in government. One peer-reviewed article (Basolo et al., 2009) and three grey literature sources (FEMA, 2020; IOM, 2004; Rambhia, 2011) referred to this opportunity. Basolo et al. (2009) assessed the perceived and actual preparedness effort by the federal government involving earthquakes in Los Angeles, and hurricanes in the New Orleans metropolitan area. Study results note how the level of confidence in government was negatively affected by poor performers in communicating risks and in providing preparedness information to households in these two focal states and communities.

The FEMA (2020) grey material provided insight into the National Incident Management System (NIMS) and national response plan as a national priority. NIMS provides a common platform and operating system that guides personnel on working together in major catastrophes. The NIMS operating model is meant to enhance unity of all levels of government, the private sector, as well as non-government organizations, by

contributing to a consistent approach in handling large-scale events**.** IOM literature claims how today's bustling emergency care system is failing many citizens, due to the high numbers of uninsured, the focus on chronic care rather than preventive medicine, and few alternative care options in the U.S. communities. Furthermore, the study emphasizes how issues such as patient flow (surge) and availability of specialists in disaster preparedness challenges has placed today's hospital-based emergency care at a breaking point. In 2005, the IOM identified a public health imperative regarding a possible pandemic and attempted to lead a worldwide study of disaster preparedness. The findings showed that deficiencies were identified regarding the U.S.'s ability to handle a large-scale disaster — whether a disease outbreak such as a pandemic, natural occurring events, or biological acts of terrorism. The study's recommendations in 2005 were to encourage academic medical centers to focus on emergency and trauma research, to request DHS to further evaluate gaps and opportunities in emergency care, to train new investigators, and to obtain additional funding of general clinical research.

The grey material referred to as Presidential Policy Directive (PPD-8) (Rambhia, 2011) was signed by President Obama with the intent to guide the United States in preventing, protecting, and mitigating any or all threats of natural disasters, human made incidents, or acts of terrorism. The directive emphasized the importance of a national preparedness goal, which included an end state objective for preparedness, and modified elements of a planning methodology based on national capabilities. Additionally, five national planning frameworks were identified: prevention, protection, mitigation, response, and recovery. The impact of PPD-8 was noted as being unknown until the provisions were fully tested during actual large-scale disasters.

Infrastructure Deficiencies

The topic of communication infrastructure deficiencies was the significant barrier identified as a fourth factor for its effect on establishing a common disaster preparedness architecture. Two peer-reviewed articles and one grey literature source explored the perceived level of concern with communication shortcomings (Comfort & Haase, 2006; Savoia et al., 2013). Comfort and Haase (2006) researched the degree of emergency response personnel and the public awareness through an information exchange process. The evaluation proved that a New Orleans hurricane destroyed the community communication infrastructure, which in turn caused negative consequences down the line for emergency responders. This occurrence proves the value of deploying a HAMS radio system for emergency preparedness. Savoia (2013), who explored disaster preparedness communications and public health disaster scenarios, revealed inequalities in various population groups. This research measured the relationships of socio demographic and behavioral concerns, including timely messaging for public health preparedness. Deficiencies in the study pertained to an inability to source creative solutions for improving communication in multiple population groups. Also, the hearing-impaired population was given a lower priority.

Grey literature produced by Collier and Lakoff (2008) focused on the critical infrastructure protection framework and its value in mitigating security threats to U.S. citizens. The findings reveal the essential value of protecting our nation's infrastructure to protect the nation's prosperity, political vitality, and military might. Hence, the Collier and Lakoff (2008) study parallels the PPD-8 "call to arms" and the protection of our critical infrastructure as a key federal government objective to prevent "system-

vulnerability." Findings denote the value of performing vulnerability analysis / contingency planning scenarios as they are necessary for defense of our nation.

Disaster Planning

For the fifth factor, the researcher identified four peer-reviewed studies and four grey literature sources relevant to disaster planning (DHS, 2007; DOD, 2020; Eisenman, et al., 2007; Perry & Lindell, 2003; Pitts et al., 2009; Rambhia et al., 2012; Terndrup et al., 2012; Wisner et al., 2002). Articles in this section covered emergency planning guidelines (Perry & Lindell, 2003), disaster planning - vulnerable populations (Eisenman et al., 2007), collaborative planning with community coalitions (Rambhia et al., 2012), and hospital to hospital coalitions for handling surge capacity concerns (Terndrup et al., 2012). The grey material refers to issues with collaboration, importance of continuous planning, emergency department difficulties, and value in including environmental health matters in disaster preparedness large-scale planning.

Eisenman et al. (2007) evaluated Hurricane Katrina relating to evacuation decisions in poor, minority sections of New Orleans hit hardest by a large-scale disaster. Evacuation of the impoverished citizens was primarily affected by their ties with nearby family members, transportation factors, access to shelter, and the ability to send / receive messages. Pertinent study aspects noted the degree of sensitivity shown to vulnerable and minority communities in need during disasters. Additionally, the study identified social response bias and cognitive dissidence with limited recall.

The Eisenman et al. (2007) and Perry and Lindell (2008) studies covered similar aspects pertaining to critical elements of planning, including guidelines for effective management of catastrophes. A central concept in these two studies highlighted the value

of establishing planning guidelines due to their intellectual and practical benefits towards preparedness. Insufficient planning indeed impacted the establishment of a common disaster preparedness architecture.

Both Rambhia et al. (2012) and Terndrup et al. (2012) identified the significance of coalitions and how they support hospital planning efforts with their partnership involvement and array of stakeholders. The absence of coalitions was detrimental to disaster preparedness efforts, given the exclusion of community members such as ambulatory facilities, long-term care providers, coroners, and primary care practices, to name a few. The DOD grey literature source referenced the joint strategic planning and execution system (JSPES). This as a military planning, command, and control system for joint planning used for deliberate, and by extension, crisis action planning. It was developed as a unified planning approach / execution system, which incorporates joint policies, procedures, and automated data processing for conducting military operations in preparation for war. Additional planning opportunities are referenced in the DHS grey literature source regarding homeland security, specific to preparing for and responding to disasters. The report highlights a broad national preparedness system to prevent, respond to, and recover from large-scale disasters such as natural, human made, and acts of terrorism. This report noted the value of proactively planning and promoting the concept of preparedness as a continuous cycle of organizing, training, equipping, exercising, evaluating, and taking corrective action to ensure effective coordination during incident response.

Niska and Shimizu (2011) studied emergency departments nationally to retrieve and analyze data and information regarding emergency department care being provided

across the United States. The report stipulated how emergency departments are being overrun, as caregivers treat an increasing number of patients causing extended patient wait times, low productivity for physicians, and poor patient outcomes. These concerns compound issues related to disaster preparedness, as they heighten patient surge issues during emergencies and large-scale disasters. The nationally represented data reveals that approximately 10% of ambulatory care visits, whether life threatening or primary care issues, occur in emergency departments across the United States. A Wisner and WHO (2002) study explored environmental health management in disasters, placing emphasis on factors and measures such as water supply and sanitation facilities to reduce the significance of disasters on environmental health infrastructure. The findings revealed the overarching need for quick, efficient, well-coordinated response efforts to protect human life and ensure a healthy environment. Study results emphasize how important the concept of integration is to disaster preparedness, including 1) public and private sectors must work together, 2) environmental health must be incorporated into large-scale planning, 3) urban and rural communities must be involved in every phase of large-scale disasters, and 4) accountable professionals and volunteers are vital to community success in battling disasters.

The review of literature identified five major factors that restrain or limit healthcare organizations, state-based public health agencies, and the federal government from establishing a common preparedness architecture: hospital preparedness and emergency response, leadership failures for managing disasters, broken confidence in government, infrastructure issues, and planning shortcomings. Overcoming these factors is essential and will require collaboration between multiple groups and agencies.

Collaborative Practices in Disaster Preparedness

Eighteen of the articles (12 peer-reviewed and 6 grey literature) assessed the second research question (What essential collaborative practices need to occur among healthcare organizations, state-based public health agencies, and the federal government agencies to prepare for large-scale disasters?). Essential practices identified as collaborative in nature, and that will help healthcare organizations, state-based public health agencies, and the federal government agencies prepare for large-scale disasters, included community and public health preparedness (Kapucu et al., 2013; Kapucu & Van Wart, 2008; Lakoff, 2007; Peredo & Chrisman, 2006; Plough et al., 2013; UNEP, 2013; USA Facts, 2020; Young et al., 2009), tools training methods, and disaster preparedness approaches (Heidaranlu et al., 2015; Joint Commission, 2020; Williams et al., 2008; Yarmohammadian et al., 2018), and population preparedness in the United States (Edwards et al., 2008; FEMA, 2020; Garb et al., 2007; NASA, 2020; Redlener et al., 2007; UNEP, 2013).

Community and Public Preparedness

The first factor regarding collaborative practices for disaster preparedness was community and public preparedness. The researcher identified six peer-reviewed studies and two grey literature sources that addressed community and public preparedness practices to prepare for large-scale disasters. Three articles (Kapucu et al., 2013; Lakoff, 2007; Young, 2009) measured community organizing efforts, realizing that various hazards will be socially, politically, and economically understood, negotiated, and shared. Kapucu and Van Wart (2008) researched community coordination efforts at the county level, and identified that proactive community coordination and collaboration produced

higher levels of disaster preparedness. Lakoff (2007) and Young (2009) took similar paths in their studies by exploring public culture and how community organizing frameworks promote culture development in local community organizational activities. Lakoff (2007) researched the level of community preparedness based on the types of emergencies that occur on a regular basis and found that the United States is not prepared, adding that maintaining adequate insurance for such major catastrophes is critically important. Young (2009) analyzed the community organizing framework to better understand community practice. The study pointed to weakness in the framework pertaining to competency level, intellect, and the perpetuation of cultural incapacity. This finding may limit community engagement in disaster preparedness efforts.

Kapucu (2008) and Peredo and Chrisman (2006) evaluated community preparedness and response for disasters. Kapucu's (2008) study determined that hospitals should place greater emphasis on hospital policies to achieve improved disaster preparedness performance. Peredo and Chrisman (2006) examined the value of communities building a vision, which would potentially lead to the stimulation of greater community involvement and innovative disaster preparedness approaches. Plough et al. (2013) explored community resilience capabilities for preparedness and recovery effectiveness. The results of this study indicated how community resilience grows from individual, group, and social involvement and preparedness activities. Additionally, community resilience was noted as a key element of national policy for disaster preparedness.

Lipton (2005) assessed the FEMA efforts in New Orleans regarding Hurricane Katrina, highlighting how the agency was overwhelmed by the storm's power and

devastation. Elements of poor communication, inadequate coordination, and extremely limited collaboration occurred. The findings present that FEMA was unsure what was needed and presumed that state and city officials would manage their own disaster response and mitigation strategies. The study found that state and federal teams had attempted to devise a plan 2 years prior, in anticipation of a major hurricane; however, efforts were unsuccessful. Two critical issues were identified relative to their planning failures — an inability to impose law and order, and difficulties in transporting evacuees.

Grey literature from USA Facts (2020) provides data on the impact of natural disasters over the past 10 years in the United States. The report evaluated five natural disasters over the past 10 years on measures such as frequency, cost, and loss of human life, revealing that FEMA's data tracking of disaster declarations increased 300% over the past 28 years, while associated costs from the damage have exploded into the billions of dollars. The findings also indicated that hurricanes are not only costly but are also the deadliest natural disasters — causing 4,814 deaths from Katrina in 2005 and Maria in 2017.

Tools, Training Methods, and Disaster Preparedness Approaches

The second vital factor related to collaborative practices was tools, training, and disaster preparedness approaches. Three peer-reviewed studies (Heidaranlu et al., 2015; Williams, 2006; Yarmohammadian et al., 2018) and one grey literature source (Joint Commission, 2020) explored hospital training, with emphasis on preparedness tools and techniques for improving HCO disaster preparedness.

Heidaranlu et al. (2015) evaluated 33 preparedness tools and their associated psychometric properties (i.e., levels of reliability, validity, and measurement) pertaining

to aspects of assessing hospital preparedness for disasters. Findings determined that hospitals are deficient in their disaster preparedness evaluation, in large part due to hospital disaster preparedness tools not being developed in a psychometric evaluation framework. The study also highlighted how current tools are ineffective at evaluating the functional hospital preparedness aspects, and how they should be designed by knowledgeable experts with considerable experience.

Williams (2006) explored the training considerations for medical and public workers specific to disaster training. The study found that disaster preparedness training efforts lead to improvements in knowledge, performance, and readiness in large-scale disasters. Also, there was recognition that evidence-based medical approaches should be incorporated in the training exercises.

A study conducted by Yarmohammadian et al. (2018) assessed eight disaster preparedness techniques and methods for evaluating readiness exercises. Consistently performing test exercises were deemed critical to maintaining emergency readiness. This raises the question as to whether hospitals are performing enough mock exercises to maintain disaster readiness. The findings also indicate two critical success factors — multiple evaluation methods should be deployed, and the use of more current evaluation techniques will improve hospital employee readiness performance.

Grey literature specific to the Joint Commission on Accreditation of Healthcare Organizations (JC, 2020) referred to disaster preparedness as a national security priority. The JC promotes the hospital preparedness program (HPP) as a foundational component for national healthcare preparedness. Through the U.S. Department of Health and Human Services (HHS) and the Office of the Assistant Secretary for Preparedness and Response,

the JC has developed a 2019 - 2023 HPP performance measures implementation guide as a performance measurement approach to improve communication of program results to elected officials, hospital personnel, and external agencies. The JC presents that HPP seeks to improve disaster program effectiveness, determine funding sources, and identify ways to increase U.S. preparedness to large-scale events.

Population Performance in the United States

Three studies aimed at enhancing collaborative disaster preparedness practices were specific to large population areas or land mass (rural) considerations. Both Garb et al. (2007) and Redlener et al. (2007) suggested examining a subset of the U.S. population regarding personal preparedness attitudes towards large-scale events. Edwards et al. (2008) evaluated regional disaster preparedness among rural HCOs. The research noted extremely limited regional cooperation. This study utilized a table-top exercise where participants assessed regional challenges during a pandemic scenario. Redlener et al. (2007) assessed post 9/11 attitudes, with interest in better understanding the public's view of terroristic threats as it pertains to disaster preparedness. Alternatively, Garb et al. (2007) evaluated population at risk data and the geographical areas that may be considered targets for bioterror attacks. Lessons learned from these studies indicated the need for additional personnel during incident command activities, emphasis on further developing regional coalitions of support partners, and various facility limitations that may hinder preparedness.

FEMA (2007) grey material retrieved relevant to population performance within the United States aligns with the national preparedness goal of a "whole community" preparedness model for major disasters and emergencies. The goal seeks to prevent,

protect, mitigate, and respond to various threats across the whole of society, while focusing on the strongest threats that are most relevant or likely to occur. A NASA report (Buis, 2020) claimed that climate change and extreme weather events are connected, emphasizing how U.S. scientists had determined global warming increases extreme participation. The research indicates that sufficient data does not exist to establish reliable trends; however, climate change and extreme weather are population factors that need due consideration in large-scale preparedness planning.

Coastal zone management was referenced in a grey study having linkage to disaster preparedness concerns. A study from the United Nations Environment Programme and the World Bank (2013) revealed that heavy population in coastal regions is causing increasing levels of natural environment erosion. The research found that 34% of coastline and ecosystems across the world are very susceptible to continued degradation. The results also indicate the necessity for and promotion of environmentally sound practices to prevent further problems.

The population expansion near the U.S. coasts is a relevant issue to disaster preparedness (UNEP, 2013). Population density at twice the global average brings greater risk to individuals in those areas. All told, proactive measures and collaborative practices were deemed essential for large population centers and rural communities that generally face significant risks and obstacles during crisis events.

Chapter Five

Discussion

Forty-five articles gathered from peer-reviewed and grey literature were studied to answer the two research questions: 1) What factors are keeping healthcare organizations, state-based public health agencies, and the federal government from establishing a common disaster preparedness architecture? 2) What essential collaborative practices need to occur among healthcare organizations, state-based public health agencies, and the federal government agencies to prepare for large-scale disasters? Twenty-seven articles were assessed to better understand the five factors that inhibit the establishment of a common disaster preparedness architecture within healthcare organizations, state-based public health agencies, and the federal government. Eighteen articles were assessed to understand the three factors that can play a role in combining efforts to address large-scale disasters.

Well-planned, organized, and timely orchestrated disaster preparedness directions can save lives. Given that society cannot prevent unexpected large-scale disasters or events from occurring, the prioritization of an all-hazards approach is extremely necessary for planning purposes and safeguarding citizens. Disaster preparedness is routinely viewed as consisting of behavior and actions that enable stakeholders such as individuals, communities, organizations, and government to respond appropriately and recover swiftly when large-scale catastrophes occur. Despite the measures taken, the costs incurred, and the mandates and executive orders announced, disaster preparedness continues to be a national dilemma that places Americans at significant risk.

This systematic review was unique in that it assessed and synthesized the individual and collective critical value of HCOs, local and state public health agencies, and the federal governments' effectiveness in disaster preparedness. The overarching goal was to determine what is working and what is not working amongst these organizations, the major reasons for poor performance, and to consider alternative approaches and collaborative actions to more effective disaster preparedness. The protocol established for this study identified 45 compatible studies conforming the criteria from three databases and multiple legitimate literature sources. The literature describes foundational issues such as leadership failures (Kapucu & Van Wart, 2008), poor institutional performance (Kaji & Lewis, 2006), loss of trust in government relating to political polarization (Basolo et al., 2009), an absence of collaborative planning processes (FEMA, n.d.), and limited communication strategies for ensuring citizens are informed in a consistent and timely manner (Savoia & Viswanath, 2013).

In consideration of the first research question, multiple studies identified planning shortcomings that inhibit the establishment of a unified disaster preparedness architecture (DHS, 2007; DOD, 2020; Eisenman et al., 2007; Perry & Lindell, 2003; Pitts et al., 2008; Rambhia et al., 2012; Terndrup et al., 2012; WHO, 2015). These studies also demonstrated -the importance and necessity of –collaborative and continuous planning. Based on the fractured and ineffective planning approaches noted heretofore, study results provide real world evidence of federal, state, and local governments' crucial role in protecting, preserving, and developing the public's health and safety (Gostin et al., 2002).

General preparedness and emergency response difficulties experienced by HCOs were brought forward (CDC, 2020; GAO, 2020; Kaji et al., 2006; Krajewski et al., 2005; Niska & Shimizu, Sutton & Tierney, 2006). The review also captured relevant real-world evidence of "system" ineffectiveness and overall dysfunction due to federal siloization as a longstanding concern (Marghella, 2020). Findings demonstrate that federal siloization is displayed as a level of tribalism, silo-building, turf protection, and finger pointing that alienates team members across today's system (Marghella, 2020). Marghella noted that we appear to be experiencing too many smart people in the federal disaster preparedness space attempting to control, influence, or direct a work effort, whereby the quality of work results in major disappointment.

While federal, state, and local governments share responsibility for ensuring the public's health, the federal government has an overarching obligation, the critical resources, and the proficiency to assess disaster preparedness as well as to prescribe a plan to protect the public and to improve population health (IOM, 2011). Currently, disaster planning efforts ineffectively integrate governmental regulations and requirements. As a result, plans are difficult to operationalize as they are cumbersome and non-user friendly (Cittone, 2016).

Four studies specific to broken confidence in government (Basolo et al., 2009; FEMA, 2020; IOM, 2004; Rambhia et al., 2011) indicated how poor performance in preparedness and response efforts involving earthquakes and hurricanes in the United States has led to overall levels of distrust, and concerns of competency in political leadership. The literature speaks of siloization in the federal government and how it has led to ineffective disaster preparedness (Marghella, 2020). At the same time, the United

States has experienced a steady increase in political polarization (Marghella, 2020). These political camps appear to be driving a wedge in a multitude of areas, making it harder to solve key problems and concerns in emergency management. The disparate approaches to elections in the United States, with each state coordinating its own manner of electing leaders, in many ways parallels the dissimilar approaches to disaster preparedness by state. The findings lead us to ask if diverse directions by states are wise or if they provide effective approaches for keeping citizens safe and mitigating further crises. Certainly, findings raise doubts on the varied and inconsistent practices across the United States. They also highlight the need for additional research that examines disparate approaches to disaster preparedness versus a unified, common planning and response architecture.

A new national security structure is needed to replace our countries current ineffective actions in planning and execution of large-scale events. One example of a uniform and consistent planning structure is DOD's Joint Strategic Planning and Execution System (JSPES). A structure such as this would bring significant value to our country today, given the limited knowledge, experience, and time that public leaders and healthcare leaders possess (Marghella, 2020). The same systematic joint planning process could be established as a consistent methodology for HCOs, state public health, and the federal government. This type of structure would allow leaders to collectively determine disaster preparedness capabilities and to pursue a collaborative approach in examining potential risks for U.S. communities (Marghella, 2020).

Evidence specific to regulatory and compliance requirements (CMS, 2020; Joint Commission, 2020) demonstrated that CMS mandates and Joint Commission standards

for ensuring disaster preparedness and emergency readiness are ineffective. The CMS Disaster Preparedness and Emergency Response "Rule" of 2016 set forth preparedness requirements for ensuring adequate disaster planning; however, it merely applies to participation (and/or receiving funds) in the Medicare or Medicaid programs (CMS, 2020). The Joint Commission "state-of-the-art standards set expectations for organizational performance that are reasonable, achievable and surveyable" (JC, 2020). As such, disaster preparedness is a "condition of participation" in which compliance with CMS mandates is required for participation in Medicare (CMS, 2020). The CMS essential requirement is that HCOs must develop emergency plans and perform risk assessments annually (CMS, 2020). These standards and mandates set expectations for patient safety an organizational performance but exhibit little influence regarding disaster preparedness management and in establishing evidence-based practices (JC, 2020). CMS cannot shutter a hospital/HCO, but it has the legal authority to terminate a HCO's Medicare agreement for non-compliance with conditions of participation (CMS, 2020).

While the literature reveals there are HCO deficiencies regarding general disaster preparedness and awareness, numerous leadership failings are considered significant contributory factors in the overall spectrum (CMS, 2020; Kapucu & Van Wart, 2008; Kunreuther & Michel-Kerjan, 2011; Labrugue et al., 2017; Slepski, 2007; Waugh & Streib, 2006). Studies in this category report that disaster preparedness competencies (knowledge and skills) are required, including proactive contingency planning, training, use of technology, and inter-organizational collaboration as being essential. Alternately, when considering the challenges of disaster preparedness, many leaders resort to tunnel thinking and become narrowly focused if a disaster occurs. As such, it is often difficult

for these individuals to consider divergent perspectives, and to consider secondary factors related to the disasters. Marcus (2016) referred to this theoretical construct as "Dilemma of the Cube," whereby leaders are invested in personal perceptions and fail to see the full dimension.

The "Dilemma of the Cube" describes how two different but confluent levels of organization or specialty (e.g., HCOs and public health) can see the same three-dimensional object, and yet describe the object in a completely disparate perspective (Marcus, 2016). This type of thinking is extremely limiting as each of the leaders in these scenarios believes they have the correct or best approach based on their perspective or piece of evidence. Rather than advocating for specific interests and goals of their silos, the more collaborative meta-leaders focus on principles that require a substantial cross-government and sector cooperative effort with private non-profit groups (Marcus, 2016). Leadership inadequacies are also considered where emergency operating plans have been developed, but staff are unaware of their roles or how to activate the plan should a catastrophe occur. Directing the team in extensive and repetitive training for multiple disaster scenarios, including performing actual drills to instill confidence and familiarity in staff, were considered requisites for leadership (Heidaranlu et al., 2015; Joint Commission, 2020; Williams et al., 2008; Yarmohammadian et al., 2018).

The second research question investigated collaborative practices that need to occur between HCOs, state-based public health agencies, and the federal government in the preparation for large-scale disasters. The literature described a series of collaborative remedial actions and efforts to help establish greater coordination, goodwill, and network development (Kapucu et al., 2013; Kapucu, 2008; Lakoff, 2007; Lipton, 2005; Paredo &

Chrisman, 2006; Plough et al., 2013; USA Facts, 2020; Young, 2009;). The studies provide support for establishing a community culture and network that produces timely risk assessments, contingency planning, and information sharing. Furthermore, emphasis was directed in achieving a certain balance of community involvement, role delineation, and comprehensive information dissemination, which is meant to encourage stakeholders to prepare for future catastrophes. The findings present a critical task for most every community and organization — to address, adjust, and adapt to various potentially hazardous conditions or features in the environment in which they live (Oliver-Smith, 2018).

Another major finding associated with community and public preparedness - collaborative actions is the value of advancing extensive population performance and regional cooperation between rural and urban areas (Buis, 2020; Edwards et al., 2008; Garb et al., 2007; National Preparedness Goal, 2020; Redlener et al., 2007; UNEP, 2013). A view is presented that families, business owners, and the community in general look to the leaders for peace of mind and reassurance that measures are being taken to protect them from disasters. Proactive planning sessions considering risk scenarios were carried out, indicating significant attention must be directed towards further developing regional coalitions of support partners.

The importance of proactive leadership and collaborative action in dealing with disaster preparedness matters cannot be overstated relative to infrastructure issues (Collier & Lakoff, 2008; Comfort & Hasse, 2006; Savoia & Viswanath, 2013) and about tools, training methods, and disaster approaches (Heidaranlu et al., 2015; Joint Commission, 2020; Williams et al., 2008; Yarmohammadian et al., 2018). According to

Savoia and Viswanath (2013), communication is the lifeblood that must be constant — as threats change, disaster plans must adapt as well. Roles need to be clearly delineated and updated consistently as staff rotate in and out of the organizations. Executive leaders have a major role in disaster preparedness in setting the direction of the communication plan and ensuring preparedness for multiple disaster scenarios.

The theory and model of community organization is of primary interest when evaluating society's role in the continuum of disaster preparedness, response, and recovery. A leading consideration and characteristic of the community organization model is a participatory decision-making practice that legitimizes communities in becoming fully engaged in devising strategies for positive change. Rothman's community organizing analysis framework (Young, 2009) identifies four foundational elements that effectively mesh with this research study's outcomes: 1) social philosophy, 2) nature of power relationships, 3) change orientation, and 4) change strategies. The most basic reason for incorporating this theory in disaster preparedness is that empirical knowledge alone (direct experience absent of theoretical knowledge) restrains our ability to achieve significant strategic purpose in the professional practice realm. The theory must help communities navigate from micro to macro variants, or from individual concerns to organizations and large neighborhoods or districts. As such, the theory of community organization is a beacon of sorts relative to psychological, political, sociological, and economic interests, providing clarity to the barriers that exist in each segment — hospital/HCOs, state-based public health agencies, and the federal government. The desired outcomes for this research study will be achieved by the complete acceptance, involvement, and integration of this theory into each community, including understanding

the context of disaster preparedness risks or threats, collaboration in problem solving, focusing energies on specific issues, openly engaging in community groups and organizations, building redundancies, and maintaining capacities for lasting change, and through continuous and regular feedback to the community. By utilizing the theory of community organization principles, communities will experience greater success in identifying significant barriers and challenges that not only cause greater risk to their districts but also better established how citizens can remain safe from large-scale disasters and increasing threats.

Strengths and Limitations of the Study

This study's strengths are displayed through evaluation and assessment of the subtleties and complexities inherent in today's disaster preparedness arena involving HCOs, local and state-based public health agencies, and the federal government. The researcher's extensive experience as a healthcare executive in four distinct system ownership models (not-for-profit, for-profit, faith based, and public health) provided valid and credible substance pertaining to continued difficulties in disaster preparedness performance. The data and findings relative to human experience and associated longstanding failings in the individual sectors (HCOs, state-based public health, and federal government) are powerful and compelling.

Limitations in the study rest in the qualitative aspect, where the material may not be as understood or accepted as quantitative research within a scientific realm. The research quality was based on the researcher's individual skills, which were likely influenced by personal biases and traits. Another limitation was the dates chosen for the literature review, 2000-2020. The coronavirus pandemic of 2020 further exposed many of

the issues impacting disaster preparedness at the HCO, local and state public health, and federal level. In-depth exploration of the response to this disaster is essential.

Implications for Practice, Research, and Policy

Identification of factors that inhibit HCOs, local and state-based public health agencies, and the federal government from establishing a common disaster preparedness architecture as well as the relevance of collaborative practices among these same stakeholders is critical. This review reported the dysfunctional and unprepared condition of HCOs, public health, and federal government infrastructure in the United States, which is in large part due to competing forces, fragile human challenges, and the inability of collectively planning for large-scale disasters. A collaborative national effort regarding disaster preparedness and response hinges on stakeholder awareness and understanding of essential roles and responsibilities among local, state, and federal entities in groups. The ability to create a resilient community begins with understanding the multitude of risks and vulnerabilities that exist for a defined area or population. These findings place an emphasis on HCOs, state public health agencies, and the federal government to create joint policies that will address the overall lack of preparedness and collaborative actions seen today. In building a unified vision of success, more confident and prepared communities will evolve.

In consideration of implications for further research, hospital surge capacity challenges are deemed an essential area of focus. Schultz identified hospital surge capacity components consisting of facilities, equipment, personnel, supplies, and management systems (Schultz & Koenig, 2006). Again, the issues with surge capacity were emphasized during the 2020 pandemic. Further research in this area is extremely

important given the need to care for an inordinate number of patients unexpectedly stricken with infectious disease or by large-scale physical catastrophe. Elements needing further study and attention relate to short-term incidents (such as a major hurricane or earthquake) or widespread, prolonged surge events such as a pandemic. Future studies should involve systematic triage, rationing considerations, and overall timely resource activation.

Conclusion

Over the past two decades, many large-scale disasters occurred in the United States that wreaked havoc on many communities. Disasters do not discriminate, but they disproportionately affect different communities based upon current resources, infrastructure, and an overall level of preparedness.

This study set out to identify significant barriers and challenges that inhibit the development of a common disaster preparedness architecture for hospitals / HCOs, state based public health agencies, and the federal government. The research indicates several preparedness and response dimensions exist that must involve strong leadership, collaborative and timely planning processes, renewed trust in government, and transparent, proactive communication.

One of the more significant findings to emerge from the study is that government division, or siloization, is dramatically limiting disaster preparedness and response success. Improved coordination with governments at different levels is necessary to facilitate the appropriate changes and should provide a variety of resources that will be useful in addressing many of the key challenges. At the community level, there must be greater physical and economic resources as well as human capital to manage the needs of

residents and to facilitate recovery efforts. Perhaps the most innovative solutions in the United States regarding disasters have yet to be discovered. Creative decision-making is required to introduce new solutions to direct resources straight to the people in need and to encourage policies that will protect their safety.

This thesis has provided a deeper insight into the complex, time sensitive, and rapidly evolving field of disaster medicine. The research findings are relevant to HCO leaders and practitioners, state government administrative and medical directors, county government and community coalitions, and federal government policy makers. These findings have additionally provided evidence with respect to limited progress in disaster preparedness and response collaboration and coordination.

ACTA NON VERBA CUM CONTURBATIO – IN OMNIA PARATUS….

Deeds not words with disasters – ready for all things.

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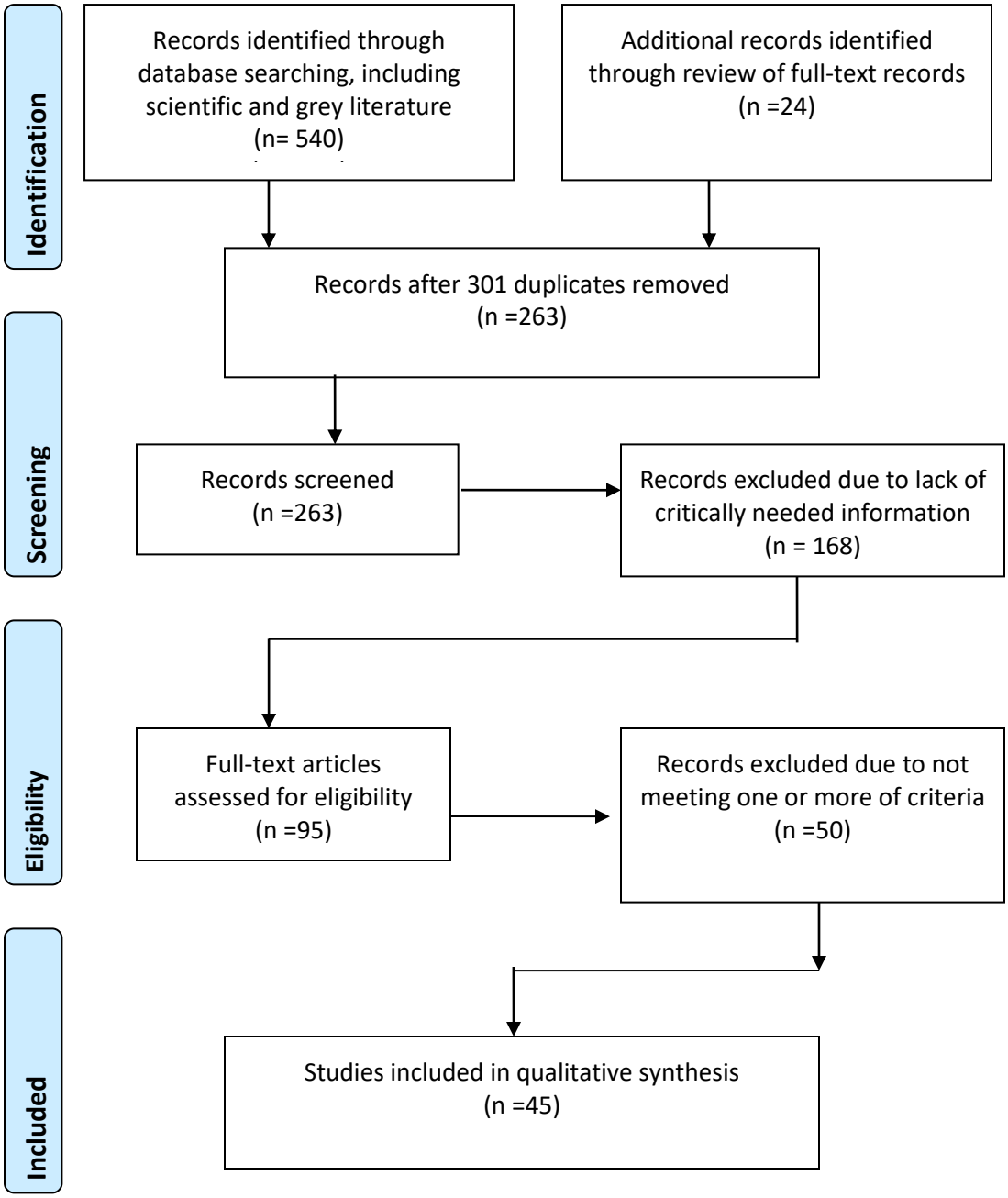
Appendix A: PRISMA Flow Diagram



Adopted from Moher D., Liberati A., Tetzlaff J., Altman D.G. (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

For more information, visit www.prisma-statement.org.LOW DIAGRA

Appendix B: Data Extraction Tables

Table 1

Peer Reviewed Articles Included in Systematic Review: Data Extraction Table

No.	Reference	Population	Study Sample	Study Design	Intervention	Findings and Conclusions	Evidence Grade	Strengths	Limitations
1	Basolo, V., Steinberg, L. J., Burby, R. J., Levine, J., Cruz, A. M., & Huang, C. (2009). The effects of confidence in government and information on perceived and actual preparedness for disasters. *Environment and Behavior*, *41*(3), 338-364.	HCO Local/ State Public Health Agency Federal Government	Interviews of individual households: 182 in Los Angeles and 222 in New Orleans	Cross-sectional study using a telephone survey	An examination of household preparedness to manage natural disasters in New Orleans and Los Angeles County	Higher levels of preparedness are associated with greater confidence in local government to engage in disaster management activities	Good	Findings may be generalizable in perceived and actual preparedness	Small sample size, cross - sectional study design.
2	Comfort, L. K., & Haase, T. W. (2006). Communication, coherence, and collective action: The impact of Hurricane Katrina on communications infrastructure. *Public Works Management & Policy*, *10*(4), 328-343.	HCO Local/ State Public Health Agency Federal Government	Content analysis of responder network involving 535 organizations in New Orleans Metro region	Prospective design	A study of emergency response personnel and the public regarding information exchange	Hurricane destroyed communications infrastructure, which negatively affected coordination of response	Good	Review shows striking patterns of asymmetry in processes, proactive efforts needed	Insubstantial data presented on proactive efforts or measures

3	Edwards, J. C., Kang, J., & Silenas, R. (2008). Promoting regional disaster preparedness among rural hospitals. *The Journal of Rural Health*, *24*(3), 321-325.	HCO Local/ State Public Health Agency Federal Government	17 rural hospitals that were associated with the Rural and Community Health Institute of Texas A&M University	Prospective design	A tabletop exercise was used to address avian influenza in a regional context	There was inadequate staff to manage incident command, limitations on facilities, limited regional cooperation, and other issues	Fair	Findings have national health policy implications; one size solutions are not appropriate for rural preparedness	There were a limited number of hospitals that participated in the exercise; the study acknowledges the importance of regional preparedness
4	Eisenman, D. P., Cordasco, K. M., Asch, S., Golden, J. F., & Glik, D. (2007). Disaster planning and risk communication with vulnerable communities: Lessons from Hurricane Katrina. *American Journal of Public Health*, *97*(Supple ment_1), S109S115.	Local/ State Public Health Agency	58 evacuees from Houston evacuation centers during September 9-12, 2005; low income, primarily African American, from New Orleans	A qualitative research study	To address the significance of evacuation decisions related to the aftermath of Hurricane Katrina	Evacuation was affected by ties to family along with transportation, shelter access, and messaging perceptions	Good	Study promotes sensitivity to vulnerable and minority communities regarding disaster preparedness	Social response bias and cognitive dissonance limited recall; participants were selected from outside the target community
5	Garb, J. L., Cromley, R. G., & Wait, R. B. (2007). Estimating populations at risk for disaster preparedness and response. *Journal of Homeland Security and Emergency Management*, *4*(1).	Local/ State Public Health Agency Federal Government	Eight sources of U.S. population data for day and nighttime evaluation	A qualitative research study	To assess the utility of various population data sources for proactive disaster preparedness and response	Available geographical population counts are not aligned with disaster context; refinement of techniques is required	Poor	Research identified population at risk data - geographical areas affected in future bioterror attacks	Various methods for evaluating geographic scale and accuracy of data are unreliable

6	Heidaranlu et.al, Eladi, A., Khankeh, H., & Ardalan, A. (2015). Hospital disaster preparedness tools: A systematic review. *PLoS Currents.* doi: 10.1371/currents.dis.7a1ab3c89e4b433292851e349533fd77	HCO	Quality outcome study with evaluation of 33 preparedness tools	A systematic review study	An examination of the level of reliability, validity and measurement for hospital disaster prep tools	Valid and reliable disaster prep tools should be developed by experts with considerable knowledge and experience	Good	A standard, valid tool does not exist for evaluating and improving hospital disaster prep	Tools studied mainly focused on evaluating structural, non-structural hospital prep aspects, but not functional aspects
7	Kaji, A. H., & Lewis, R. J. (2006). Hospital disaster preparedness in Los Angeles county. *Academic Emergency Medicine*, *13*(11), 1198-1203.	HCO Local/ State Public Health Agency	45 hospitals in Los Angeles County receiving 911 calls	A descriptive, cross sectional survey study	To evaluate disaster preparedness at a cohort of hospitals in Los Angeles County, CA	Most hospitals had various emergency preparedness plans in place, but some plans were inadequate to manage large-scale disasters	Poor	Findings indicate declines in hospital preparedness, funding to support, and in federal and state collaboration	The study includes reporting bias and a small sample size
8	Kapucu, N. (2008). Collaborative emergency management: Better community organizing, better public preparedness and response. *Disasters*, *32*(2), 239-262.	HCO Local/ State Public Health Agency Federal Government	Managers in 67 counties in Florida affected by several hurricanes; 66 responses were obtained	Retrospective design using a survey instrument	A survey was distributed to emergency managers in Florida counties affected by several hurricanes	Community coordination efforts are required at the county level to better prepare for hurricanes and other disasters	Good	Hospitals must place emphasis on policies to address lack of preparedness	The study response rate was high at 92 percent, but the information provided may not be generalizable in other communities

9	Kapucu, N., Hawkins, C., & Rivera, F. (2013). Disaster preparedness and resilience for rural communities. *Risks, Hazards of Crisis in Public Policy, 4*(4), 215-230.	HCO Local/ State Public Health Agency Federal Government	Study of rural and urban emergency management leaders in 8 central Florida counties	Prospective study design using mail and online survey pre-hurricane season of 242 organizations	Identified the need for increasing community focused events: pre-planning: training, mock drills and marketing	Survey results denote importance of collaboration to address social, economic, and technical challenges; funding and apathy deemed highest obstacles; resilience difficult to achieve	Good	Expansive survey involving 242 organizations; survey highlights funding and infrastructure problems in dispersed (rural) areas	Training, drills and marketing seen as low priority; focus group held in only one community
10	Kapucu, N., & Van Wart, M. (2008) Making matters worse- An anatomy of leadership failures in managing catastrophic events. *Administration and Society*, Retrieved from society online first, doi:10.1177/009539970 83231 43	HCO Local/ State Public Health Agency Federal Government	Detailed case study of disaster management and public policy	A prospective design study	To understand the emerging role of public policy implications regarding disasters	Research shows the public desires greater public sector leadership before, during, and after large scale disasters	Fair	Proactive contingency planning, training, technology, and inter-organizational collaboration is needed	Reporting bias relative to routine disasters; generalizations about 9/11
11	Krajewski, M. J., Sztajnkrycer, M., & Baez, A. A. (2005). Hospital disaster preparedness in the United States: New issues, new challenges. *The Internet Journal of Rescue and Disaster Medicine*, *4*(2), 22-25.	HCO Local/ State Public Health Agency Federal Government	A study of hospital disaster preparedness considering terroristic threats	A qualitative review	An evaluation of critical response capabilities / staffing, pharmacy, emergency department	Preparedness requires enhanced staffing plans, integration of pharmacy services, and public health surveillance tools	Fair	Research states that large-scale disasters are unique; hospitals need unique preparation plans	The study takes a broad view of hospital disaster preparedness; lacks elements of surge capacity, training, and communication

12	Labrague, L., Hammad, K., Mcenroe-Petitte, D., Fronda, D., Obeidat, A.,...Mirafuentes, E. (2017). Disaster preparedness among nurses : a systematic review of literature. *International Nursing Review, 65*(1), 41-53.	HCO	Research of 17 peer review articles on nurse's preparedness for disaster response	A systematic review of literature	An examination of nurse preparedness and steps to address under preparedness	Findings to be incorporated into nurse education courses to help prepare nurses	Good	Hospitals must place emphasis on policies to address being unprepared	Potentially relevant material, studies from other languages was excluded
13	Lakoff, A. (2007). Preparing for the next emergency. *Public Culture, 19*(2), 247-271.	HCO Local/ State Public Health Agency Federal Government	An essay	A domestic security research article	To understand the importance of disaster preparedness for future emergencies	The U.S. is not prepared for the types of disasters and emergencies that occur on a regular basis	Fair	Essay addresses important issues such as insurance and lack of preparedness across organizations and communities	Reporting bias relative to security rationality, and insurance versus disaster preparedness
14	Niska, R. W., & Shimizu, I. (2011). Hospital preparedness for emergency response. *National Health Statistics Reports, 37*, 1-7.	HCO Local/ State Public Health Agency Federal Government	Data collected from the NHAMCS, a survey of ambulatory medical care visits at different facilities	An evidenced-based essay	To examine hospital preparedness to manage public health emergencies	Almost all hospitals had disaster plans in place to manage a variety of public health issues	Fair	Disaster preparedness survey data of key results-preparedness plans, drills, supplies, equipment, alternate care sites and agency MoU's	Additional resources and planning are required at many facilities to improve outcomes

15	Peredo, A. M., & Chrisman, J. J. (2006). Toward a theory of community-based enterprise. *Academy of Management Review*, *31*(2), 309-328.	Local/ State	Study of community-based enterprise theory	A qualitative research study	To evaluate characteristics of theory-economic development, interconnected community actions, and culture	Communities should establish vision – to address vulnerabilities, economic and social stressors	Good	Local community culture can build innovative responses, and encourage community action	Challenges exist in maintaining community versus individual balance, collective action can be difficult
16	Perry, R. W., & Lindell, M. K. (2003). Preparedness for emergency response: Guidelines for the emergency planning process. *Disasters, 27*(4), 336-350.	HCO Local/ State Public Health Agency Federal Government	10 planning process guidelines evaluated for effectiveness	A descriptive cross-sectional survey	To assess the relationship of planning, training, and written plans with emergency preparedness	Planning guidelines provide intellectual and practical approaches to preparedness	Good	The study emphasizes the importance of planning processes to achieve community preparedness	Natural and human made threats go unheeded
17	Plough, A., Fielding, J. E., Chandra, A., Williams, M., Eisenman, D., Wells, K. B., ... & Magaña, A. (2013). Building community disaster resilience: Perspectives from a large urban county department of public health. *American Journal of Public Health*, *103*(7), 1190-1197.	Local/ State Public Health Agency Federal Government	Multiyear study of community resilience by Los Angeles County Department of Public health	A qualitative research study	To assess CDC community resilience capabilities for preparedness and recovery effectiveness	Community resilience can build from individual, group, and social preparedness activities	Fair	A key element of national policy for disaster preparedness is community resilience	Health departments internal practices need revision, and should establish measurable outcomes

18	Rambhia, K. J., Waldhorn, R. E., Selck, F., Mehta, A. K., Franco, C., & Toner, E. S. (2012). A survey of hospitals to determine the prevalence and characteristics of healthcare coalitions for emergency preparedness and response. *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science*, *10*(3), 304-313.	HCO Local/ State Public Health Agency Federal Government	A sample of 4,632 hospitals in the United States including nonfederal and nonveterans hospitals: 477 responses were received (10.3% response rate)	A survey instrument emailed to presidents, CEOs, and other executives at the target hospitals	Participation in collaborative healthcare coalitions to improve emergency preparedness and response	Coalition perspectives to manage disasters are almost universal in nature	Good	Study provides coalition preparedness characteristics versus non-coalition preparedness characteristics; Coalitions improve disaster response	Self-reporting was used, and verification is not possible; some bias in the results is evident
19	Redlener, I. E., Abramson, D. M., Stehling-Ariza, T., Grant, R. F., & Johnson, D. G. (2007). The American preparedness project: Where the US public stands in 2007 on terrorism, security, and disaster preparedness. *National Health Statistics Reports*, *7*, 1-7.	HCO Local/ State Public Health Agency Federal Government	1,352 adults over the age of 18 years living in the Continental United States	A national survey using telephone interviews to obtain information from study participants	To examine a subset of the population regarding personal preparedness as well as public perceptions after the September 11 attack.	Continued concerns regarding new terrorist attacks; the Iraq war drives the risk of future terror attacks; almost one-half of participants will experience a major disaster; only one-third are prepared for a disaster; 60 percent require additional time to prepare for a disaster	Good	Randomly dialed telephone surveys of U.S. population on preparedness attitudes occurring since 911	The study population was small making it difficult to generalize

20	Savoia E., Lin, L., & Viswanath, K. (2013). Communications in public health emergency preparedness: A systematic review of literature. *Biosecurity and Bioterrorism: Biodefense strategy, Practice and Science*, 11(3), 170-184.	Local/ State Public Health Agency Federal Government	131 scientific articles evaluated for essential communication to public in disaster prep scenarios	A systematic literature review	To assess the communication inequalities and relation to overall preparedness	Essential need for more research on types of communication for enhanced preparedness across population groups	Good	Review evaluates the relationships of socio demographic and behavioral considerations in messaging for public health preparedness	Study considerations of hearing-impaired elderly was given low priority
21	Slepski, L. A. (2007). Emergency preparedness and professional competency among health care providers during hurricanes Katrina and Rita: Pilot study results. *Disaster Management and Response*, *5*(4), 99-110.	HCO Local/ State Public Health Agency	A sample of 200 healthcare providers who attended 2 different disaster conferences including nurses (37%), physicians (24%), clinical care providers (39%) and triage (26%)	Exploratory descriptive study using convenience sampling	To examine the perspectives of healthcare providers after Hurricane Katrina and/ or Rita	There were limited knowledge deficits among the participants; however, they had to change their method of practice to accommodate a disaster; training programs may require transition education in future settings	Good	Study shows 200 respondents provided 495 ideas for improving preparedness, training, and overall disaster preparedness competency	A convenience sample only evaluated one event and the information may not be applicable to larger populations; the information was collected from a diverse group of individuals to expand its value

22	Terndrup, T. E., Leaming, J. M., Adams, R. J., & Adoff, S. (2012). Hospital-based coalition to improve regional surge capacity. *Western Journal of Emergency Medicine, 13*(5), 445.	HCO Local/ State Public Health Agency	16 hospitals participated in a coalition that also included 8-county EMAs and the Office of Public Health Preparedness	A coalition known as the Healthcare Facilities Partnership of South-Central Pennsylvania	To evaluate emergency preparedness and expand surge capacity regionally	Six separate objectives improved over a 24-month period	Fair	Research identified how a coalition improved 6 objectives in disaster response	The study population is difficult to duplicate in other parts of the country but some of the strategies may be duplicated
23	Waugh Jr, W. L., & Streib, G. (2006). Collaboration and leadership for effective emergency management. *Public Administration Review, 66,* 131-140.	HCO Local/ State Public Health Agency Federal Government	An essay	The article is an informative article written in report form	To evaluate the significance of collaboration in the context of leadership to address issues related to emergency management	Leadership effectiveness is critical to improve outcomes and to explore a larger vision for change in emergency management	Good	Findings show how disaster preparedness and response closely align with political and administrative interactions for improving strategic advantage	The article addresses only the broader aspects of emergency management affecting communities and teams
24	Williams, J., Nocera, M., & Casteel, C. (2008). The effectiveness of disaster training for healthcare workers: A systematic review. *Annals of Emergency Medicine, 52*(3). doi:10.1016j.annemergmed.2007.09.030	HCO Local/ State Public Health Agency	An assessment of 186 articles specific to disaster training for healthcare workers	A systematic literature review	To evaluate medical and public health workers on disaster training measures	Findings show how disaster prep training efforts equate to improved knowledge, performance and readiness in large scale disasters	Poor	Recognition that evidence based medical approaches should be incorporated in disaster preparedness training	The assessment falls short on proposing types of training which are deemed effective – noting ineffectiveness of computer training and lectures.

25	Yarmohammadian, M., Sheikhbardsiri, H., Khankeh, H., Nekoei-Moghadam, M., & Raeisi, A. (2018). Meta evaluation of published studies on evaluation of health disaster preparedness exercises through a systematic review. *Journal of Education and Health Promotion, 7*(1), 15.doi: 104103/jehp.jehp-159-17	HCO	An assessment of 8 disaster preparedness techniques and methods for evaluation of readiness exercises	A systematic literature review	Study results on various methods can be utilized to improve health system preparedness, and training approaches	Consistently performing test exercises are critical to maintaining emergency readiness; latest evaluation techniques can improve participant performance	Good	Findings indicate multiple means of evaluation disaster preparedness exercises	
26	Young Laing, B. (2009). A critique of Rothman's and other standard community organizing models: Toward developing a culturally proficient community organizing framework. *Community Development, 40*(1), 20-36.	HCO Local/ State	A research study on theory of community organization model	A critique	An evaluation of community organizing framework created by Rothman to address issues related to culture	Additional cultural issues must be addressed to expand the framework and its impact on communities	Fair	The study promotes the value of cultural development in local community organizational activities	The framework does not address some of the critical aspects of culture and requires further analysis of community organizing activities

Table 2

Grey Literature Included in Systematic Review: Data Extraction Table

No. (cont.)	**Authority:** *Responsibility for intellectual content*	**Accuracy:** *Is the information presented accurate?*	**Coverage:** *Is the content coverage clearly stated?*	**Objectivity:** *Is there bias? Unstated / acknowledge bias?*	**Date:** *Does date of item confirm relevance & inform research?*	**Significance:** *Is material relevant to this research?*
27	CDC. (2020, March 23). *Public Health Emergency Preparedness and Response Capabilities.* Retrieved from https://www.cdc.gov/nceh/emergency.htm	1	1	1	1	1
28	The Hospital Conditions Participation and Interpretive Guidelines (n.d.). Retrieved August 7, 2020, from https://cdn.hc marketplace.com/media/wysiwyg/CMSHCPIG8_Browse .pdf	1	1	1	1	1
29	Collier, S., & Lakoff, A. (2008). The vulnerability of vital systems: How 'critical infrastructure' became a security problem. *The Politics of Securing the Homeland: Critical Infrastructure, Risk and Securitization*, 40-62.	1	2	2	2	1
30	JP5-0, Joint Planning-Joint Chiefs of Staff (n.d.). Retrieved May 15, 2020, from https://www.jcs.mil/portals/36/Documents/Doctrine/pubs /jp5-0-20171606.pdf	1	1	2	1	1
31	Office, U. (2007, March 09). Homeland Security: Preparing for and Responding to Disasters. Retrieved May 15, 2020, from https:// www.gao.gov/products/GAO-07-395T	2	2	3	1	1

32	National Disaster Recovery Framework. (n.d.) Retrieved May 17,2020, from https/www.fema.gov/emergency-managers/national-preparedness/framework/recovery	1	1	2	3	2
33	National Preparedness Goal. (n.d.). Retrieved May 15, 2020, from https://www.fema.gov/emergency-managers/national-preparedness/goal	1	1	2	2	1
34	U.S. Government Accountability Office. (2020). Opportunities Exist to Improve Collaboration and Consultation with State and local Governments GAO-2-560	1	1	2	1	1
35	Institute of Medicine Report: The future of emergency care in the U.S. (2004). Seven disaster preparedness hospital-based emergency care: At the breaking point. Retrieved from https://doi.org/10.1197/j.aem.2006.07.011	1	1	1	3	1
36	Kunreuther, H., & Michel-Kerjan, E. (2011). People get ready: Disaster preparedness. *Issues in Science and Technology*, *28*(1), 39-50.	2	2	3	2	2
37	Joint Commission on Accreditation of Healthcare Organizations. (2020). The Joint Commission standards. Oak Brook Terrace, IL: Joint Commission Resources	1	1	1	1	1
38	Buis, A. “How climate change may be impacting storms over tropical oceans.” NASA, 10 March 2020, https://climate.nasa.gov	1	2	2	1	1

39	Pitts, S., Niska, R., et al., National Hospital Ambulatory Medical Care Survey: Emergency Department Summary. National health statistics reports; no 7. Hyattsville, MD: National Center for Health Statistics. 2008. Retrieved from www.cdc.gov/nchs.	1	1	1	2	1
40	Sutton, J., & Tierney, K. (2006). Disaster preparedness: concepts, guidance, and research. *University of Colorado*. Retrieved from https://www.colorado.edu/hazards	2	2	2	3	3
41	Lipton, E. (2005, September 11). Breakdowns marked path from hurricane to anarchy. *The New York Times.* https://www.nytimes.com2005/09/11/us/national special/breakdowns-marked-path-from-hurricane-to-anarchy.html	2	2	2	2	1
42	Rambhia, Kunal J. “Obama Administration releases Presidential Policy Directive 8.” Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science, vol. 9, no.2, 2011, p.80+. Gale Academic OneFile Accessed 7 July 2020.	1	1	1	1	1
43	United Nations Environment Programme. (2013). Coastal zone management: Cities and coastal areas. Retrieved from https:// www.unenvironment.org/explore-topics/oceans-seas/what-we-do/working-regional-seas/coastal-zone-management	1	1	2	2	1
44	USA Facts. (2020, October 15). Exploring the impact of natural disasters. Retrieved June 10, 2020, from usafacts.org/articles/exploring-impact-natural-disasters/	1	1	2	2	1
45	Environmental health in emergencies and disasters: (2015, June 15). Retrieved August 5, 2020 from	1	1	1	2	1

https://www.who.int/water-sanitation-health/emergencies/emergencies2002/en