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Opportunities and Challenges from Major Disasters Lessons Learned of Long-Term Recovery Group Members

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LESSONS LEARNED OF LONG-TERM RECOVERY GROUP MEMBERS

by

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ABSTRACT

OPPORTUNITIES AND CHALLENGES FROM MAJOR DISASTERS
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Natural hazards caused by the alteration of weather patterns expose populations at risk, with an outcome of economic loss, property damage, personal injury, and loss of life. The unpredictability of disasters is a topic of concern to most governments. Disaster policies need more attention in aligning mitigation opportunities with disaster housing recovery (DHR). The effect of flooding, which primarily impacts housing in coastal areas, is one of the most serious issues associated with natural hazard. Flooding has a variety of causes and implications, especially for vulnerable populations who are exposed to it. DHR is complex, involving the need for effective coordination of resources, and labor. Understanding how the relationship between the build back better philosophy (i.e.: wherein the rebuild is intended to reduce future risk), the quality of the houses, and the income of the householder's works is beneficial to prepare a resilient housing recovery plan.

What are the main sources of obstacles experienced in the DHR process? How might outcomes be improved? This study attempts to answer those questions using data collection from Long-Term Recovery Group (LTRG) members in disaster areas. The analysis of LTRG member experiences provides a valuable perspective with the potential to improve the DHR process and mitigate future impacts.

The goal is to understand and create awareness of factors impeding the recovery from previous disasters using the information obtained from the LTRG members to analyzed with

various content analysis software to ascertain best practices to inform disaster policies for potential improvement of the recovery process. Using a content analysis technique provides a big picture of the main issues affecting the recovery.

The key lessons learned from the LTRG members are that three major delay factors: planning, governance, and communication are impeding the improvement of the DHR process. It is essential to have an LTRG running before a disaster occurs -including a disaster plan focused on funding, labor, and resilient recovery. A more transparent governance – with some decentralization of the process, and more up-to-date disaster policies. A direct line of communication to overcome gaps including lack of communication and trusting in the process.

I dedicate this dissertation to my parents – Juan Ernesto (rest in peace) and Magaly, who always supported, and encouraged me; and taught me that education is the best investment I can get.

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NOMENCLATURE

ABBREVIATIONS

BBB - Build Back Better

DF - Delay Factor

E- Economic

F- Funding

FEMA - Federal Emergency Management Agency

G- Governance

I- Infrastructure

L- Labor

LL - Lessons Learned

LTRG - Long Term Recovery Group

LTRG-A - Long Term Recovery Group (Accounting)

LTRG-F - Long Term Recovery Group (Formation)

LTRG-M - Long Term Recovery Group (Multiple)

MI- Household Median Income

P- Planning

Po- Policies

PDHR - Post Disaster Housing Recovery

TG- Type of Government

VOAD - Voluntary Organizations Active in Disasters

BASIC TERM DEFINITIONS

Adaptive Capacity

A function of both community's asset-based components and flexibility that can reduce flooding vulnerability (Bevacqua et al., 2018; Weis et al., 2016).

Assessment

The number of damages to a home is determined by the assessor. Typically, the preliminary assessment is made by local governments to identify housing issues and solutions to make strategic decisions (Mahmood et al., 2017; Yankson et al., 2017).

Coastal Storm

Storm surge and/or large wind waves that hit the coastal zone. It has constant destructive winds, heavy rainfall, storm surge, coastal flooding, and erosion (FEMA, 2022).

Declaration

Statement that expresses formal intentions to take action in response to a disaster (Godfrey et al., 2019; Luft 2016).

Disaster Declaration

A disaster is classified as an emergency, or a major disaster based on the effect it has on a community and its capacity to recover. The ability of local governments to offer the first level of response is crucial to the Emergency Management system. Disasters can be declared in different ways: such as:

State-declared disaster: Outside the local community, state governments are required to attend to their residents' urgent needs. To do this, each state works in cooperation with local governments, voluntary groups, companies, and others in the community to build an

Emergency Operations Plan (EOP). After a state of emergency has been declared, all available governmental resources can be used to address the issue (NVOAD, 2012).

Federal-declared emergencies and disasters: The Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 93-288, the *Stafford Act*, specifies two types of disaster declarations: emergency declarations and major disaster declarations. Both types of declarations allow the President to provide additional federal disaster aid (FEMA, 2022; VOAD, 2012).

Major Disaster Declaration: Any natural hazard such as a hurricane, storm, or flood - regardless of course- that the "*President determines has caused damage of such severity that it is beyond the combined capabilities of state and local governments to respond*" (FEMA, 2022).

Disaster Governance

Involves a set of norms, laws, regulations, practices, and policies that are designated to reduce the impact of natural hazards (Daly et al., 2015).

Displaced Population

A group of people that have been forced to leave their homes to avoid the impact of natural hazards without the necessity to cross an international border (Peacock et al., 2018; OHCHR, 2021).

Downward Spiral

Occurs when a failure causes a situation to worsen, resulting in more failures. It is also called a feedback loop in which a system disturbance causes more disturbances. Essentially, it results in a loss of balance within a system that could collapse (Abdullah et al., 2016; Valenzuela et al., 2021).

Grounded Theory

A systematic approach to inquiry to develop a theory (Charnaz, 2012; Glaser & Strauss, 2017). It is now the most widely used qualitative research method in the social sciences globally. It is an excellent tool for accessing and developing knowledge in the social sciences because it provides description, interpretation, and the ability to explain and analyze individual and group experiences (Glaser, 1967; Morse et al., 2021). It also makes it easier to develop the analysis conceptually and theoretically (Morse et al., 2021).

Holistic Approach

Focuses on the entire system (Maly, 2018; Synnefa et al., 2017). In the case of housing recovery, it involves the entire problem, rather than just covering a phase, such as electrical, roofing, or plumbing issues.

Householder

The person who owns, rents, or maintains the house. Not necessarily the owner (McLennan et al., 2017; Mould et al., 2017; Watanabe & Maruyama, 2021).

Long term *recovery group (LTRG)*

A community-based group made up of representatives from non-profit, government, business, and other organizations that work together to help with recovery from disasters (CDP 2022; NVOAD, 2012; Stough et al., 2016).

Improvisation

An essential component in every disaster, otherwise, it is unlikely to be a disaster. Improvisation has a long history in the emergency management field because it’s part of the disaster response (Kendra & Wachtendorf, 2006; Tierney, 2002).

Inequality and Income Inequality

Represents the amount of money available to a single-family per year, in which the household's income is divided among its members, with adjustments made to reflect differences in needs for households of various sizes (OECD, 2021). Refers to the difference in earnings among different people. The more evenly distributed those earnings are, the more equal (Dorn, 2018; OECD, 2021).

Mitigation Actions

There are two types of mitigation actions to reduce the risk of hazard associated with housing recovery: (i) pre-disaster involves actions from public awareness, insurance, and governmental policies, and (ii) post-disaster that include public information and insurance distribution (Botzen et al., 2019; Fridahl et al., 2015).

Planning Horizon

Refers to preparing a strategic plan for an organization to invest or look into the future. Commonly, companies use a five-year planning horizon, but the average planning horizon is around one year (Jiang et al., 2015; Pandey et al., 2016).

Post disaster housing recovery

The process of creating a set of plans to help a community rebuild after a disaster is known as post-disaster recovery planning. Planning for recovery can also be seen as creating a blueprint for the community's reconstruction following a tragedy. Recovery processes should be scalable and founded on recovery needs that have been identified (FEMA, 2022; NWS, 2022).

Recovery

Recovery includes both the ability of individuals and families to move past their losses and the restoration of structures, processes, and services (NDRF, 2010; NVOAD, 2012). There are two phases of the recovery:

Short term recovery: Several emergency programs finish their tasks. Infrastructure and essential life support systems are restored. The formation of a long-term recovery group is identified by the community, and planning for permanent housing are started (NVOAD, 2012).

Long term recovery: There is a shift between the presence of international organizations and the neighborhood. The local community's disaster case management and recovery programs start their implementation phase. This phase sees the continuation of home construction activity (NVOAD, 2012).

Resource Allocation

Assigning available resources to different uses. It can allocate resources in an entire economy using a variety of methods, such as markets or planning (Castaneda et al., 2017; Maritan & Lee, 2017).

Safety

The state of not being subjected to or causing harm, injury, or loss. For instance, the use of education to increase safety and resilience for natural hazards (Amundrud et al. 2017; Hollnagel, 2014; Nifa et al. 2017).

Severe Storms

When a storm produces wind gusts of at least 58 mph, the National Oceanic and Atmospheric Administration (NOAA) classifies it as *severe*. Tornadoes, hail, strong winds,

lightning, and flooding are just a few of the natural hazards that can occur during a thunderstorm. According to NOAA (2022), 200 people die every year from Severe Storms.

Stakeholder

Someone who is involved and can influence a project, such as a householder, contractor, and or suppliers (McGrath & Whitty, 2017; Milles, 2017; Opdyke, 2017).

Supply and Demand

The quantity of resources available to offer and the needs of the consumers. In economic terms, how many producers want to sell and how many consumers want to buy (Agarwal et al., 2019; Wang et al., 2022).

Unmet Needs

The disparity between available disaster relief, such as insurance assistance, Federal and State assistance, personal resources, and confirmed disaster damages (FEMA, 2022).

Voluntary Organization in Active Disasters (VOAD)

Is a grouping of organizations that works to minimize the impact of disasters, offers a platform for cooperation, communication, coordination, and collaboration, and supports more efficient service delivery to disaster-affected areas. For instance, The Red Cross, Habitat for Humanity, and the Salvation Army are just a few of the well-known VOADs (NVOAD, 2012).

Voluntary Agency Liaison (VAL)

The liaisons keep in touch with volunteer organizations such as the LTRGs to make sure they are aware of the programs run by federal and state agencies as well as private and nonprofit resources. To help the groups, become more effective within their communities, they also support ongoing training.

Vulnerable Populations

Because of a variety of barriers during a natural hazard can be defined as racial or ethnic minorities, children, the elderly, low-income, and those with certain medical conditions (Bakkensen et al., 2016; Alexander, 2018).

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CHAPTER 1

INTRODUCTION

1.1 PROBLEM OVERALL

This chapter develops the introductory section addressing the problem of climate change and its effects on the increase of disasters with a high number of flooding events, mostly in coastal zone states that are causing more housing damage amongst the most vulnerable population. This dissertation researches the possibility of decreasing the impact on natural hazards on the housing of vulnerable populations through the analysis of U.S. Long Term Recovery Group (LTRG) members' experiences.

Climate change has risen to the top of the global agenda because of its rapid effects compared to issues such as food security and migration (Spiegel, 2005; Thomas et al., 2018). It has many causes and impacts, particularly for vulnerable populations who withstand the consequences. Climate change is an issue that is not possible to solve in the short term (Tol, 2018). The number of declared disasters has increased, and it is expected that millions more people will experience flooding by the 2080s as the sea levels rise (Carter et al., 2015; Wu, 2002).

Sea level rise is an impact of climate change on coastal communities. The increase in temperature causes thermal expansion and melting of polar ice caps, which creates more volume of water in the oceans (Erten-Unal & Andrews, 2018; Withey et al., 2016;). According to Carter et al. (2015) sea level rise is expected to affect the most densely populated and low-lying areas, temporarily displacing some parts of the population, while permanently displacing others (Hauer et al., 2020) as the higher frequency of flooding effects infrastructure (Erten-Unal & Andrews, 2018).

The impact of natural hazards will have repercussions on resource-constrained regions (Miller & Hutchins, 2017). When a disaster occurs, an important step is receiving the needed aid. Agencies offer support to affected areas. However, usually, aid distribution can take some time (Chapagain & Raizada, 2017). For instance, in the United States, when the local government notifies the state government, its agencies can begin responding. It also takes some time to respond (Patel & Hastak, 2013). Ideally, local governments need to have a more robust contingency fund to react. Nevertheless, the importance of the federal government's role in reducing the risk posed to its constituents by major hazards is becoming more widely recognized as a critical issue in public policy (Husted & Nickerson, 2014). Federal disaster policies recognize *emergency declarations* and *major disaster declarations* as two types of disaster declarations. Both types of declarations give the President the authority to provide additional federal disaster assistance (FEMA, 2022).

Emergency declarations from the local and state governments advocate for providing emergency services such as protecting lives, property, public health, and safety, as well as reducing or averting disaster threats in any part of the United States. The major disaster declaration opens up a slew of federal assistance programs for people and infrastructure, including money for both emergency and long-term repairs. Storms and floods are some examples of major disasters that cause damage exceeding the combined capabilities of state and local governments to respond (FEMA, 2022).

A variety of natural and built factors can influence the magnitude and severity of flooding. Rainfall duration and intensity, land cover and land use, and watershed characteristics are all factors to consider. Changes in land use, particularly urban development, can exacerbate flooding (Schroeder et al., 2016). Jamshed et al. described flooding as a direct impact on people's quality

of life as it can create displacement, which forces people to leave their homes for an unknown period (Esnard, 2017; Jamshed et al., 2019).

1.2 HOUSING IMPACT

When the impact of flooding is severe, it can demolish houses, cause deaths and injuries and slow the local economy (Boustan et al., 2017). Housing is the most valuable social and economic asset, and it is an important source of loss in disasters, generating homelessness and severe humanitarian conditions (Bilau et al., 2018). Housing is one of the most important aspects of disaster recovery. Social needs and long-term viability are factors to consider in the approach to a DHR. If this phase does not pay enough attention to the needs of those who are affected, newly built facilities could fail to address flood risk. After reconstruction strategies should be implemented by studying the desires of those who have been affected (Safapour & Kermanshachi, 2021).

Many issues arise in the aftermath of a disaster, making the management of DHR projects difficult. The failure of interventions to achieve their intended outcomes may be caused by ineffective management (Yuldashev, 2018), which could be related to disaster governance in the formulation, implementation, and compatibility of federal and local policies (Sheykhmousa et al., 2019; Rouhanizadeh & Kermanshachi, 2019). Emergency management leaders must make the best decisions possible, as the situation can change quickly, otherwise, windows of opportunity can close.

To identify disaster impacts and measure resource requirements, usually local governments conduct a damage and loss assessment. Identification, classification, and quantification are all possible parts of this process (Peacock et al., 2014), as well as the application of policies for

collaboration to make the right decisions (Diaz et al., 2022). Identification of the needed construction materials, techniques, and technology options are important, as well as their disaster resilience characteristics, such as health and safety (Sandler & Smith, 2013; Sandler, 2019).

Within the recovery phase, the housing recovery assessment follows up the preparation (Sandler & Smith, 2013). Accurate evaluation of post-disaster housing recovery, including building permits and property appraiser data, is essential to enhancing the understanding of how things work and making improvements to decision-making with a well-organized and focused plan in place to address the issues and minimize long-term consequences (Peacock et al., 2014) that. Planning also helps to set the recovery direction by involving many stakeholders in decision-making (Sandler & Smith, 2013; Sandler, 2019). Housing and social change planning before a disaster can aid communities in overcoming inequalities (Peacock et al., 2014) and improve local outcomes (Horney et al., 2016). For instance, the World Bank has received pressure on post-disaster housing and livelihood recovery procedures, resulting in policies and practices development and revision (Tafti & Tomlinson, 2015).

Extreme weather events have brought new challenges for emergency workers and limited planners and supply chain managers (Patel & Hastak, 2013). States play an important role in community support, serving as an essential connection between federal agencies and local communities, as well as formulating policy (Jacob, 2014). Housing concerns and problems following a disaster are challenging, global in scope, and attached to social, economic, and political factors (Sapat et al., 2019). Nevertheless, the role played by the state does not always solve the socio-economic and political problems. It is critical to understand the barriers to recovery, as this can lead to the creation of policies that aid in the recovery process, and lead to increased resiliency (Plat, 2017; Rouhanizadeh et al., 2020). One of the most critical issues is household income, which

has a variety of effects on recovery (Chuang et al., 2019), social barriers also impact the recovery progress taking, such as delaying the receipt of a certificate of occupancy for several months (Sutley et al., 2019). A lack of information and of implementation for recovery policies is also problematic (Sheykhmousa et al., 2019).

Householders whose homes have been affected or destroyed because of a disaster follow a post-disaster housing recovery (PDHR) process. However, not everyone will go through all stages of PDHR such as the framing, plumbing, roofing, painting. A full recovery could take months or even years. Several factors can influence how long it takes to recover (Diaz et al., 2022), including the family's housing situation before the disaster, the extent of the house's damage, the scale of destruction in the area, and access to financing, materials, and labor (Johnson & Lizarralde, 2012). Disasters frequently destroy hundreds of homes, displacing entire communities, and leaving victims homeless. According to Patel & Hastak (2013), there is a high frequency of flooding occurrences just in the United States, happening over 60 times a year.

Supply resources such as materials, equipment, donations, must be organized and staged before and after a disaster for housing reconstruction activities. This movement of material toward the disaster site is part of the material convergence process (Arnette & Zobel, 2016). Moreover, as recovery progresses it becomes more difficult to coordinate resources because many of the resources and trades are no longer available (Diaz et al., 2020). The problem is further exacerbated when large amounts of unsolicited donations obstruct the flow of critical supplies, diverting resources away from more important tasks, dealing with complex logistics (Chong et al., 2019).

Finding homes for homeless people as quickly as possible is one of the most arduous tasks facing policymakers and aid providers. For the planning agencies and political/community leaders in charge of providing shelter for displaced citizens, this creates a logistical and contractual

challenge (Patel & Hastak, 2013). Individuals or populations can have different outcomes from the same level of natural hazards. Some are more affected than others are, especially when a natural hazard is faced by vulnerable populations. For instance, low-income households that have no savings living in hazardous conditions, or with a medical fragility that depends on medical equipment to live, could increase their vulnerability to hazards, or permanently displaced if there is not a shelter option for them to stay (Yoon, 2012).

1.3 MAIN OBJECTIVE

This dissertation proposes a disaster policy approach to the DHR process by eliciting information from long-term recovery group (LTRG) experts to facilitate the DHR process diminishing the impact to anticipate the most important issues with the housing recovery process that impact vulnerable populations. This DHR project has four components: (1) the planning implementation; (2) impact of relevant disaster policies and political support; (3) importance of communication; and (4) the application of the project. The major goal of this dissertation is to develop a framework to classify the most important issues to facilitate the housing recovery process and diminish the impact on vulnerable populations by analyzing what has been done in the past and proposing implementations of a policy-oriented approach to improve the DHR process. This dissertation looks at the effects of climate change on natural hazards, specifically on major disasters provided by severe storms with flooding impact on housing.

1.4 RESEARCH DESIGN

A mixed approach of qualitative and quantitative research methods is performed for this dissertation. For qualitative research, data was collected from experts in LTRGs through

interviews to help understand the barriers in the process of–planning, policies, resources, and labor. For quantitative research, data was coded and categorized into content analysis software to gain a better understanding of the DHR planning process. To describe the impact of flooding on housing recovery, this study uses an exploratory research approach as it helps to answer what, where, when, and how.

1.4.1 Research Questions

The goal of this research is to find an answer to the following theoretical questions: What are the main sources of obstacles experienced in the DHR process, and how might outcomes be improved?

1.5 METHODOLOGICAL APPROACH

The following method is used to achieve the objectives proposed in this investigation: (1) defining the research questions, (2) understand the literature to determine to what extent it addresses the research question, (3) address the unknown by developing a conceptual model that addresses the research question, (4) defining the research scope by developing original claims and achievable objectives, (5) utilize data collection instruments to operationalize the research, (6)employ content analysis software to implement data analysis, (7) use analysis to determine how the research claims are related to findings, and (8) present final research findings.

To address the research questions, a content analysis software using elicited information about the DHR process offering a broad examination of the role of LTRGs in post-disaster recovery was conducted, specifically focusing on the fluidity of recovery. In that regard, I conducted a web search in February 2022 identifying 13 states and 1 U.S. territory with major

flood disasters. The next step was a search in March 2022 of LTRGs that existed or were active in those states by that time. I then, in April 2022, reached out to all LTRG members of the executive board on those states for whom contact information was available. I provide them with invitations through email and telephone calls. In addition, I used referrals from members who were willing to sit for an interview. These snowball methods allowed me to interview members that were not reached before. The interviews were performed April to August 2022. The collected information came from around two experts per state. The data was collected through interviews with open/closed-ended questions. Responses were transcribed, open coded, categorized, and processed using content analysis software, NVivo - Leximancer.

1.6 CONTRIBUTION

The aim of this dissertation is to contribute to the body of knowledge, addressing and providing a novel insight into the housing recovery process and policy-relevant issues using valuable information from members of LTRGs in 14 affected states to improve understanding of the issues in the PDHR process. Insights are used for content analysis improvements to create awareness of the process. The outline of this dissertation is as follows:

Chapter 2 provides relevant literature related to disaster housing recovery. The impact of natural hazards on housing and its effects on the resources for the reconstruction recovery and the effect that brings to the vulnerable population. It also expresses the importance of eliciting information from previous disasters with members of Long-Term Recovery (LTR) groups and reviews the literature on the use of different software techniques to alleviate DHR problems.

Chapter 3 provides the methodology that has been used for the dissertation, the steps that were followed, the different software techniques used to gather the important information from the

data collection. The content analysis software has been used to sort, code, and categorize valuable information that helped to approach the important issues on the DHR.

In Chapter 4, the planning phase is addressed from the findings obtained during the data collection as one of the main issues to reduce the impact on DHR and helps manage the logistical issues. It's critical to enlist the help of experts with experience in post-disaster housing reconstruction to assess and plan for skilled and unskilled human resource requirements that will aid in the housing recovery process. It guarantees the process' quality and timeliness.

In Chapter 5 disaster governance is examined as a critical point to decrease the impact of natural hazards. The data collected from the LTRG members suggested that policies need to be more realistic to be able to adapt to the actual situations counties are facing where local governments are not able to respond - economically and logistically, as quickly as they could. One of the most arduous tasks facing policymakers and aid providers is finding homes for homeless people as quickly as possible. Although some population groups are more adaptable than others, they feel vulnerable.

Chapter 6, the importance of disaster communication is addressed. These findings were also obtained from the data collected of LTRG members. Communication is critical as it helps to coordinate the appropriate response among stakeholders, minimize the impact on householders, the unnecessary mobilization, and increase the trust of the process from householders. Those affected whose homes have been impacted by disaster go through a housing recovery process that needs a clear communication channel to avoid any kind of gap.

Chapter 7 provides conclusions of the dissertation by summarizing the major findings and their importance in planning, communicating, and updating the disaster policies to reduce the

frustrations of the DHR process for vulnerable populations. Suggestions for future research are also expressed.

CHAPTER 2

LITERATURE REVIEW

"Recovery is not only about the restoration of structures, systems, and services – although they are critical. A successful recovery is also about individuals and families being able to rebound from their losses, and sustain their physical, social, and economic well-being." (NDRF 2010).

This chapter analyzes the body of literature that examines problems with the post-disaster housing recovery processes. I identified two key gaps in the literature: the relative absence of information from LTRG members involved in previous disasters, and insufficient attention to disaster governance as an important point to address in the recovery's effectiveness. My research is focusing on getting the information from LTRG members to propose updates in disaster policies and improve post-disaster housing recovery.

2.1 INTRODUCTION

Since disasters have been occurring more frequently than ever before, climate change has been significantly influencing our daily lives. More harm is being caused to our communities as a result (et al. 2015). Climate change is associated with the severe damage that hurricanes, storms, and floods are creating. For instance, recent events, such as Hurricanes Katrina 2005 and Irma in 2017, received media attention and served as a warning to the public to understand and be prepared for possible future disasters. Even with all the study and funding devoted to research on the effects of natural hazards, there is still much work to be done and no clear road toward preparedness (Cavallo et al. 2013).

Housing recovery after a flood presents capacity, and adaptability challenges. Rapid recovery is important as delay leads to households' displacement to other cities or states, dispersing the local community and economy. Recovery requires resources, both physical and financial. However, local governments usually are not economically and logistically prepared when they declare disasters: they need the support of the federal government, which takes some time to respond (Cavallo et al. 2013; FEMA 2022). The goal of the research is to learn from previous disasters to be more resilient to future events. For instance, after an LTRG is created, it takes some time to get federal funding, causing a lack of adaptability that frustrates recovery. My research is intended to explore the importance of LTRG operations in flooding zone areas.

2.2 CLIMATE CHANGE IMPACT

Because of its unpredictable nature compared to other global challenges, climate change has been one of the most pressing issues. Climate change has been impacting everyone's daily lives in a variety of ways, including energy usage, health, and the economy. There are various causes and effects of climate change, particularly for vulnerable populations who are most affected by it. The accuracy of predicting the future under the effect of climate change is one of the most important concerns of our day. Nevertheless, there is no perfect analogue to present-day actions in past geologic periods. Climate change is a long-term issue that should be addressed properly (McNutt 2013; Tol 2018; IPCC 2022).

It's challenging to understand all the consequences, such as the rise in sea levels, the spread of infectious diseases, and the increase in extreme temperatures or environmental stresses (Tol 2018). Coastal erosion and other dangers will certainly become more prevalent because of climate change and sea level rise. As human-induced pressures on coastal areas rise, the effect will be

amplified. As sea levels continue to rise, coastal states expect that millions more people will be flooded over the coming decades. The most vulnerable areas include those that are populated, low-lying, and have little capacity for adaptation, but also those that are already at risk from other hazards like tropical storms or coastal subsidence (Carter et al. 2015).

Climate change will impact regions with scarce resources, particularly those in coastal and riverine zones. Location, economy, and size are the three main causes of vulnerability (Miller & Hutchins, 2017). However, there is no clear solution. According to Neumann et al. (2015), many large cities are in low-lying regions or close to coasts, making them more susceptible to storms and the rising sea level. Coastal cities are heavily inhabited and the hub of important regional and global economic activities. Larger urban areas are more common in low elevation coastal zones, with approximately 65 percent of cities with populations greater than 5 million living in these areas (Watts et al., 2018).

Many geographical locations have densely inhabited coastal areas and important cities that are already below average high tide levels and susceptible to storm surge flooding (Watts et al. 2018; Harris & Roach, 2017). Extreme occurrences of flooding, extended heatwaves, and drought are the main potential vulnerabilities of the built environment to climate change (Srivastava, 2020) as well as storms, which are currently the most expensive weather events (Vogel et al., 2015), but there is not enough community awareness or programming to diminish the impact of flooding in at-risk areas with vulnerable populations.

Many disasters have been brought on by the impact of climate change, which has led to malfunction in the relationship between people and their environment on a scale that calls for unprecedented measures to help the population cope and which frequently requires outside assistance at the local, regional, and occasionally international level (Felsenstein & Lichter, 2014).

Disasters attract the public's attention because of the destruction created and the relative weakness of human response, however, there is not enough preparedness to eliminate the impact on the vulnerable. Especially when it will depend on the location and population groups it affects, a hazard may have different effects (Felsenstein & Lichter, 2014).

One of the most important steps for a rapid recovery is an accurate assessment of the impact of disasters on communities, which will encompass a wide range of concerns like the economy, health, and housing. Leaders of the community can use the knowledge gained to assess the cost of the damages and whether they will require outside assistance after a disaster. Information on disaster effects can pinpoint certain demographic segments that may be disproportionately affected, such as low-income households, racial and ethnic minorities, and the elderly (Masozera et al., 2007; Koliou et al., 2020).

Planners can develop disaster impact projections to analyze the likely implications of various hazards before disasters strike (Koliou et al., 2020). However, the assessment should include a more flexible and persuasive awareness plan for the affected populations, they need to rely on and get more involved in it. My research aims to understand the housing recovery process of disasters involving through recovery to improve recovery for the vulnerable population.

2.2.1 Severe Storms, Coastal Storms, and Sea-level Rise

Storms are one of the common reasons for major disaster declarations. A variety of natural and human factors can influence the amount and severity of flooding, including the length and intensity of the rainfall and the type of land cover. Land use changes over the time, especially urbanization can make flooding worse (Schroeder et al., 2016). It is expected that as severe storms

occur more frequently, the situation for the population that is most at risk will get worse. Risks to human health and coastal infrastructure are extremely high (World Bank, 2013).

Hazards have a variety of effects, some of which are related to sea level rise and flooding (Nash, 2014). For instance, climate change has accelerated sea level rise, which has increased the frequency of coastal flooding, which damages housing. The flooding brought on by tides, waves, and storm surges over years to decades in most coastal regions has increased. Even gradual effects impact how frequently and how severely coastal flooding occurs (Vitousek et al., 2017). Adaptive strategies can help lessen some effects of a rapidly changing shoreline that is becoming more susceptible to tropical cyclone flooding (Woodruff et al., 2013).

Most people live in coastal regions and are expected to be impacted by sea level rise. Even when policies for sea level rise are well developed, it is crucial to address the fact that the relocation policies of affected communities remain less clear and lack guidance to ensure equity in many cases (Hauer et al., 2020).

In recent decades, coastal flooding in the United States has increased, particularly in coastal regions like Mississippi, Virginia, and Louisiana (FEMA 2022). Rising sea levels indicate this pattern will probably continue (Neumann et al., 2015). Residents of affordable low-lying housing, particularly low-income individuals living in outdated and inadequate structures, are vulnerable (Handwerger et al., 2021).

Flooding has a direct impact on people's quality of life, such as a socioeconomic- expenses (Tagliacozzo, 2015). The disturbances to life include living in a wet and damaged home and having to leave home for an extended period (Jamshed et al., 2019). Nevertheless, what it is not known is how effectively those affected people can recover their homes and belongings.

2.2.2 Flooding

More than a billion people are expected to be affected by flooding, especially in coastal areas. Depending on the damage to their homes, this population could be displaced and suffer long-term effects (Hauer et al., 2020). According to Mirza (2011), flooding results in significant harm to people, homes, infrastructure, and other things. This is true of various-sized events with various causes (Koliou et al., 2020). Heavy rains are one of the main causes of flooding. These can range from almost random conventional storms that cause flash floods over small basins to semi-predictable seasonal rains over large geographic areas that cause the yearly monsoonal floods in tropical areas (Yang et al., 2013). Factors will then influence the magnitude, speed of beginning, and duration of the flood. For instance, the landscape, river alteration, land use, and urbanization worsen floods by reducing the permeability of ground surfaces and increasing runoff rates (Green, 2004; Hackney & Williams, 2012; Platt, 2017).

Flooding can also clearly take different forms from regular water-logging of the ground after rainfall to more severe but relatively predictable seasonal flooding to disaster flood events that overwhelm coping capacities and make up disasters. Koliou et al. (2020) suggests that the term '*flooding*' can cover a continuum of events from barely noticeable through catastrophes of diluvian magnitudes. However, it is important to recognize that there is no universal distinction between mild and severe forms of flooding—as the same event can have differential effects on neighborhoods and even households (Koliou et al., 2020).

For vulnerable populations, flooding is always a serious problem because it affects nearby houses and infrastructure. Studies conducted over the past few decades have shown climate change affects flooding events, increasing the dangers, and making communities, especially those in flood-prone areas, more vulnerable. A variety of techniques has protected the population using

structures, but these structures have certain limitations, and flooding affects areas previously perceived to be protected when the structures fail (i.e., the levee effect) (Few, 2003; Nur & Shrestha, 2017).

However, there is not enough research in terms of facilitating post-disaster housing. recovery in flood prone areas. My research is trying to understand the different options to decrease the impact of flooding on householders in damaged areas, how reliable and rapid those options are, and offer disaster policies improvements to make communities more resilient.

2.3 DISASTER DECLARATIONS

Usually the mayor and/or the governor make a formal disaster declaration realizing they cannot respond to the disaster and are involved with FEMA assessing the impacts The disaster declaration comes with the idea of receiving federal support (McCarthy, 2010; FEMA, 2022). There are concerns about the implied tradeoff with equity and efficiency in current federal disaster policy (Davis et al., 2018), but also with potential moral hazards, such as political incentives arising from disaster policies (Sutley & Hamideh, 2018). There are two types of disaster declaration:

Emergency Declaration. The President has the authority to authorize it in any situation where he believes federal assistance is required. Emergency declarations support state, local, and tribal government efforts to provide emergency services, such as protecting lives, property, public health, and safety, or reducing or averting the threat of disaster in any part of the United States.

Major Disaster Declaration. Many federal assistance programs for people and infrastructure, including funds for both emergency and long-term repairs are opened. The President authorizes it when a major disaster has caused damage that exceeds the joint capabilities of state

and local governments to respond, some major disasters are storms, or floods (FEMA, 2022). I am researching the second type of disaster declaration (Major Disaster Declaration), as there is no clear path for a prompt recovery. I am focusing on the roadblocks that are frustrating recovery because of not getting the needed assistance at the proper time, in specific major disasters that brought housing damages as a cause of flooding.

There is research related to major disaster declarations focusing on different areas, including mitigation and recovery. However, there is limited research being done related to major disaster declarations from many coastal states that involve lessons learned from LTRG members. My research is trying to understand the creation and operation of an LTRG, and the importance of planning it before a disaster declaration is signed at the federal level to facilitate recovery.

2.4 DISASTER RECOVERY

Recovery aims to restore a new normal. The process comprises two stages: some of the emergency and relief programs finish their work in the short term of recovery (NVOAD, 2012). Many issues arise in the aftermath of a disaster, contributing to DHR project management challenges. Ineffective management of these issues means interventions may not achieve their intended outcomes (Yuldashev, 2018). Management issues can be related to disaster governance in policy formulation and implementation (Sheykhmousa et al., 2019) but can also be related to the compatibility of federal and local policies (Rouhanizadeh & Kermanshachi, 2019).

A crucial component of post-disaster housing recovery is the prioritization of permanent housing since it has a multiplier effect on community resilience, social and economic recovery, and most reconstruction projects (Acosta et al., 2018; Browne & Even, 2018). There are many

challenges that can be poorly managed during implementation, resulting in housing reconstruction programs failing to achieve their intended purpose.

It is essential to prioritize the housing recovery for the benefit of the homeowner and the community. Previous research has revealed the importance of social support networks in the decision-making process, such as neighbors, church members, and others who share local communal spaces (Nejat, 2018).

Moradi also addresses the importance of housing recovery as one of the most important aspects of recovery because it has a falling effect on the overall recovery of a community. Housing is an important part of people's lives that has a big impact on their wellbeing. For instance, in the United States, housing structures account for most of the building stock (Moradi, 2020). Involving households and community members in the housing reconstruction is critical. In the right circumstances, collective decisions outperform even the smartest individuals in the community. A variety of factors -including household characteristics influence these collective decisions (Nejat, 2017).

Research has shown that those affected by housing damage because of a natural hazard will eventually face displacement if the damages of the house are more than moderate or if the reconstruction for any reason takes more time than expected. It is normal for those householders to feel attached to their homes. There are four major categories of determinants of place attachment, according to Nejat (2017) and those are demographic, socioeconomic, spatial, and psychosocial. Many studies have found that people have distinct place attachment behavior. Furthermore, the economic and social conditions of people living in urban and rural areas are a causal factor that may lead to differences in place attachment (Nejat, 2017).

There have been criticisms of the conventional project management method for post-disaster restoration work in terms of long-term success in improving communities' resilience. Ideally, the timing to do a DHR can take several months for moderate housing damages, however, some projects take a few years (Vahanvati & Mulligan, 2017).

Following organizations that implemented post-disaster housing recovery projects, Vahanvati and Mulligan (2017) highlighted the best practices of reconstruction projects. For instance, the use of an agile approach to mitigate and prepare will acquire the trust of the community ahead of time but also allows for the needed materials, equipment, and labor, ensuring the recovery of the house and the community in what householders perceive to be a reasonable time (Vahanvati & Mulligan, 2017).

Post-disaster housing reconstruction is required to ensure a society's long-term viability. As a result, the survivors' and communities' social and cultural backgrounds must be considered. Affordability, technical feasibility, and quality of life must be balanced when designing and implementing any post-disaster housing reconstruction project (Rahmayati, 2016). Certain population groups are more adaptable than others, but temporary housing insecurity creates a sense of vulnerability among them. They do not always possess the characteristics and tools that can mitigate negative consequences or capitalize on positive opportunities that arise because of a hazardous incident. As a result, those temporary housing are lacking robustness, reflecting this in their ability to foresee, withstand, and rebound from the consequences of a potentially hazardous incident (Costa & Kropp, 2013; Tauzer et al., 2019).

A significant portion of the recovery process involves repairing damaged infrastructure and homes after a disaster. This process consumes a lot of time, money, and resources and has a significant negative impact on the economy (Ghannad et al., 2019). Some effects of post-disaster

recovery include that it takes a long time for affected communities, resulting in both social and economic consequences. In addition, it has indicated previous recovery processes to exacerbate spatial and social inequalities, resulting in a partial and unequal recovery in socially vulnerable areas (Ghannad et al., 2019; Peacock et al., 2014).

Considering the dynamic processes and interdependencies of housing recovery, as well as how inequalities in housing recovery might be more effectively addressed and better if we clearly understood the interconnected factors and dynamic processes that slow the recovery process. There is currently a lack of knowledge about such factors and processes (Sutley & Hamideh, 2018), especially when the lack of the initial plans is caused by the uncertainty of post-disaster conditions (Hosseini et al., 2020).

Consecutive and organized reconstruction planning should offer optimal recovery strategies to maximize socioeconomic benefits, provided limited federal, state, and local resources. For that, decision-makers need a systematic method to select and implement an optimized reconstruction plan that relies on the allocation of reconstruction resources to reduce recovery time and cost while avoiding negative post-disaster community effects in the demanding post-disaster landscape (Ghannad et al., 2019; Montiel et al., 2020).

It is expected that with a natural hazard will come the stocking of resources and access to the capability to recover the damaged houses, as well as the surroundings. Restoring capacity and business continuity is critical for leveraging resources, but the process takes time, especially when the affected region experiences an unexpected surge in housing demand (Diaz et al., 2020).

Although disaster recovery occurs on a local level, it is important to receive support from the larger region and society for a successful recovery and to become more resilient (Gall et al., 2015). External help can take the form of technical assistance and training to build local capacity,

as well as the provision of personnel and financial resources to aid recovery (Aldrich & Meyer, 2015). States play a critical role in community support, acting as an essential mediator between federal agencies and local communities, and providing a wide range of recovery-related services (Smith & Flatt, 2011).

Local communities are frequently left alone for hours or days after significant events. Thus, local governments may have a critical role in leading the charge to protect their citizens (Daly et al., 2015). How programs can effectively provide immediate and effective relief to households affected by the crisis while also leading to long-term poverty alleviation is a particular issue with the structure and design of government responses during times of crisis (Sawada & Takasaki, 2017).

It is the responsibility of the local government to protect the community from vulnerability and mitigate disaster impacts as they are responsible for the planning and managing the recovery of the community. Something related is an error coming from a local government in disaster prevention based on rigid institutional values that are ignoring outside concerns and challenges in dealing with various sources of information (Amaratunga et al., 2018; Col, 2007).

Frequently, a local government has a coherent structure, function, and partnership with other levels of government. The strategic factors of human resources capabilities become clear when the local government has enough resources and division of labor within the agency to handle the disaster. The key factors to succeed lead to policies for successful implementation related to capabilities such as the availability of laws, guidelines, and regulations - for deciding, and involving relevant public or private entities. (Amaratunga et al., 2018). Whether they focus on risk reduction or vulnerability reduction, it is aimed at public policies to mitigate the effects of natural events such as hurricanes (Boyer et al., 2015; Das et al., 2021).

The approach to a DHR should consider social needs, disaster mitigation, and long-term viability. DHR should implement reconstruction strategies after studying the desires of those who have been affected (Jacobs, 2019; Safapour & Kermanshachi, 2021). One of those strategies is the formation of a long-term recovery group (LTRG) by the community – which includes different local actors, including the local or state Voluntary Organization Active in Disaster (VOAD) - and the start of the planning process for permanent housing. Case management and recovery programs managed by the local community put the plan into action (NVOAD, 2012).

There is ample research providing the importance of the post-disaster housing recovery, and how the duration of housing recovery is important to households and impacts the decisions to permanently relocate to new areas. Residents want the recovery to take the less time possible to return to normalcy – school, business, etc. My research aims to provide enough information that will allow disaster policies and local communities to be ready to improve recovery and limit displacement.

2.4.1 Long-Term Recovery Group (LTRG)

The LTRG's involvement in the healing process is another crucial stage. In counties or cities that the crisis has affected, the LTRG organization is expressly established as needed. They are typically developed following a disaster. They have a life cycle of approximately two years (estimated time for the recovery) after which they are often disbanded or transformed into another NGO. They are typically formed before FEMA leaves the area. LTRGs exist to support the communities and individuals' unmet requirements for disaster recovery; they are autonomous to any federal agencies (IBTS, 2022).

The purpose is to involve as many community members as possible to ensure locals are involved in the recovery process. The LTRG must appoint a leader who will be the face of the group. They must create some sense of a Memorandum of Understanding (MOU) with roles and responsibilities of the members. They leverage the funds for the disaster area. Ideally, the LTRG will provide vouchers to homeowners to buy necessary materials, food if needed. Because there is not a federal or regional shared data of disaster affected population, LTRGs should know not to offer duplication of benefits to homeowners and have equal opportunity for all people affected (IBTS, 2022).

It is critical to understand the roadblocks in the recovery process to implement the best policies. The creation of a database of previous post-disaster recovery experiences is thus intended to lessen the disaster's harmful consequences by raising public and government decision makers' awareness (Stough et al., 2016). Pre-disaster exercises can be accessed from a database to prevent obstacles (Lee et al., 2020). The participation of LTRGs is an example of how human subject experts offer valuable information to build a database, not only to create more accurate disaster policies but also to increase public understanding and facilitate the housing recovery process (Marks, 2015).

Management and governance are critical to a successful long-term recovery process. Regardless of the structure of the LTRG, it will oversee financial resources, confidential information, and help community members who have been traumatized by the disaster (Acosta et al., 2018). Good disaster governance will ensure the quality and effective application of policies through the wise use of LTRG data collection. As a community-based organization, LTRGs are formed to work together to help individuals and families recover from disasters. Whatever a

group's structure or name, the goal is to match recovery resources to community needs so that even the most vulnerable members of the community can recover from disaster (CDP, 2022).

There is not enough research related to the work of LTRGs or the importance of their work. It is important to address how LTRGs can understand the situation and diminish the impact of disasters. Their ability to provide lessons learned from previous disasters allows them to offer a robust scenario to be better prepared. LTRGs can see the bigger picture to address the dilemma of too many leaders and insufficient leadership. LTRGs are also ready for collaborating across organizations and choosing coalition-oriented leaders to facilitate community response to disasters to possibly improve the recovery process (Tornello, 2020).

2.4.1.1 Why is it important to understand the LTRG function and formation

As noted earlier, the LTRG is a local non-profit organization formed by a broad coalition of community stakeholders to facilitate community response to disasters (NVOAD, 2012). These groups could be referred to in different ways such as "*community roundtable*," "*unmet needs committee*," or "*recovery coalition*," nevertheless, the goal is always the same: coordinating services to help everyone in the community to heal. If there are any local Volunteer or Community Organizations Active in Disasters (VOAD/COAD) in the region, they frequently develop LTRGs from within (CDP, 2022; NVOAD, 2012). For instance, as mentioned earlier, The Red Cross, Habitat for Humanity, and the Salvation Army are few of the NGOs that are actively involved in disaster relief.

Building a solid foundation for an LTRG is essential, and the typical advice is these entails involving as many local partners and stakeholders as is necessary/possible. The process for forming the LTRG is suggested by graph 2.1 below. Another important point to address is that an

administrative team may be required, depending on the LTRG's organizational structure (described below in table 2.1.). A team of paid employees or volunteers from affiliate organizations typically oversee managing the day-to-day activities. A program cannot succeed without effective administration, even if it is not expensive (NVOAD, 2012).

2.4.1.2 LTRG Steps and Rules

It is important to describe the process used to form an LTRG. With, I am describing the process, explaining the mission, structure, policies, governance, and financial resources based on the (NVOAD, 2012) advice for formation and operation of LTRG.

Mission: provide community's disaster-affected individuals and families with recovery services. "*Services can be offered to everyone, regardless of their race, creed, color, gender, sexual orientation, or preferred religion." Structure*: After the initial meeting, they should be aware of the kind of organizational structure the LTRG needs to succeed. Depending on the actors and the extent, this formation could be somewhat structured (NVOAD, 2012).

Policies: another important point is establishing the rules on how it is to provide the assistance and the types of services that could be offered, in that sense everybody is on the same page. *Governance*: regardless of the LTRG's organizational structure, "*effective governance is crucial to a long-term recovery process' success.*" LTRG should oversee managing the community's financial resources for those who were impacted by the disaster. "*It is critical to demonstrate reliability*" (NVOAD, 2012).

Legal Status & Financial Resources: an LTRG should function as a non-profit organization, with the person in charge managing funds entrusted to them by contributors. These funds must be managed by a fiscal agent with a non-profit designation. There are two options to

address the legal status of an LTRG: (1) LTRG can find a non-profit organization in the area to act as fiscal agent, or (2) it can apply for and be granted by the Internal Revenue Service (IRS) 501(c)3 status, allowing it to engage in charitable activities and enabling donors to deduct their donations from their taxes (NVOAD, 2012). "*It could take some time to become a not-for-profit organization, and there are requirements for regular financial reporting. The LTRG's organizational structure and relationship to the community will be defined through its bylaws."* (NVOAD, 2012).

It is important to address that Long-term recovery programs might succeed or fail based on their financial resources. No matter the setup, the LTRG needs money to function. The LTRG must seek and secure resources to address unmet needs in the community as well as funding for overhead costs. Typically, a preliminary budget is developed by the governing body of the LTRG and should encompass expenses categories such as supplies, services, paid contractors, etc. (NVOAD, 2012).

2.4.1.3 LTRG Cycle

In the following figure, we are describing the creation and cycle of the LTRG.

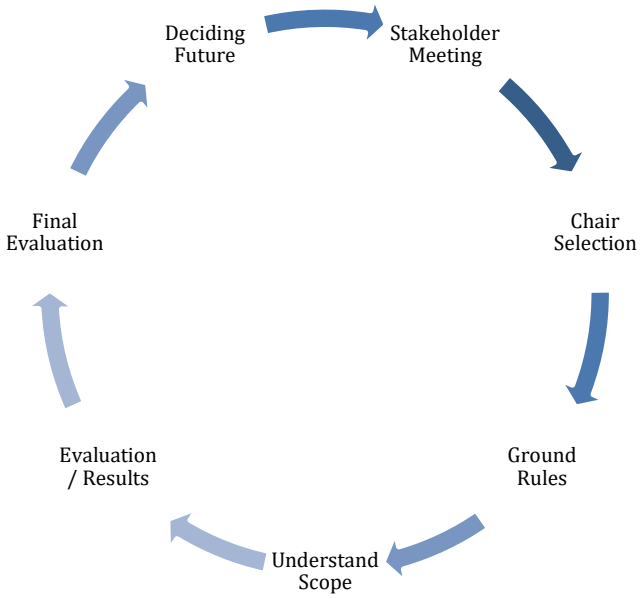

Figure 2.1 LTRG Formation Flow Chart

Stakeholders: the composition of the LTRG could be formed with stakeholders, some of the most involved ones, such as: a member of the Federal Emergency Management Agency (FEMA), local governments, civic organizations, business sector, among others. They are useful to know about while planning for a disaster, since they can serve as partners throughout the recovery. "*The National Voluntary Organizations Active in Disasters document aimed at advising those forming LTRG advises that it is important to involve as many stakeholders as possible*" (NVOAD, 2012).

Chair selection: It is recommended to have a temporary chair chosen by the group. "*It is important to agree on some fundamental ground rules before meetings may begin."* As mentioned earlier,

the most necessary steps and rules forming an LTRG are, mission, structure, policies, governance, and financial resources based on the (NVOAD, 2012) advice for formation and operation of LTRG.

Scope: It is crucial to know the scope, have the information needed such as: "*population demographics, informal/formal community leadership structures, geographic size, individual/family affected, homeowner/renter affected, others affected, politically/culturally involved, vulnerable population affected is essential."* To get access to that information, it is crucial to be in direct contact with the Voluntary Agency Liaison (VAL) from the FEMA office. The case manager should oversee the scope working with that group (described in graph 2.2). With the intake procedure for the potential customers for the recovery program. "*Doing an assessment to identify and prioritize unmet requirements is the other crucial strategy"* (NVOAD, 2012).

Continue Evaluation: It is essential to revise results regularly as it could help determine how effective the LTRG has been, moreover, provide confidence to possible donors and data to prepare for possible future disasters (NVOAD, 2012).

Final Evaluation: a final evaluation should be done by the leader of the LTRG, including feedback from stakeholders involved (NVOAD, 2012).

Looking into the Future: the LTRG may consider several variables after their final evaluation in terms to see if there is a possibility of continuing having the LTRG active. In that sense, an LTRG could have some potential directions: (1) continue the LTRG in a scaled-back version, where it

could include annual reviews, networking, among others. (2) change the LTRG to a mitigation organization - this could be beneficial if the community has vulnerabilities that future disasters could increase. (3) switch to a regional VOAD - Ideally, this option is meant to strengthen and widen the connections between local institutions and organizations as it could provide the chance to connect with both the State and the National VOADs. Or (4) acknowledge the mission has been completed and close the LTRG. (NVOAD, 2012).

2.4.1.4 Why does LTRG provide a useful window into disaster recovery?

LTRGs are formed to support recovery in the affected areas by the disaster, having them around is beneficial as being a community-based group they not only are familiar with the community, but should have some sense of the recovery. However, it is important to mention that LTRGs need to set up clear priorities as it is unlikely that there would be enough money to help everyone who requires support (CDP, 2022). Saying that, most of the LTRGs focus on providing case management assistance to the most at-risk groups impacted by a disaster (CDP, 2022) through the daily program activities such as case management, resource allocation, and service provision. The main program components that characterize most of the day-to-day work are listed in Figure 2.2.

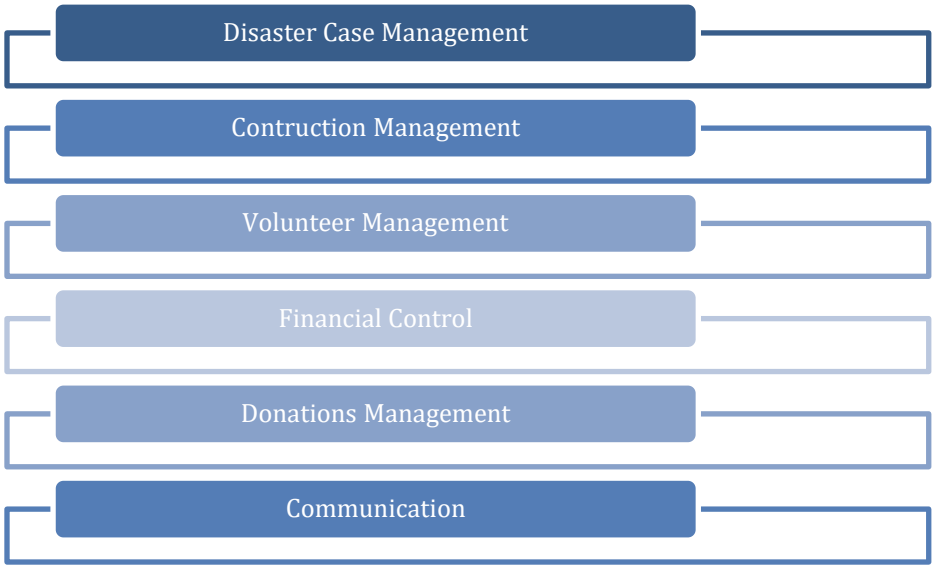

Figure 2.2 Major Program Elements

Disaster Case Management: a skilled expert collaborates with persons impacted and their families to plan for and obtain reasonable objectives for the recovery after the disaster. "*This person goes above and beyond to help those in need by offering services and relief*." The person is in touch with the client coordinating the services and resources required for the client to resume regular life. They could be employed or unpaid volunteers. It is important to address that disaster case managers from various voluntary organizations can use the LTRG, but they run their case management services independently of the LTRG administration and infrastructure. Yet, "*for a clear collaborative process, there must be contact between disaster case management and LTRGs"* (NVOAD, 2012).

Construction Management: oversees the recovery of clients' homes to a condition that is secure, sanitary, and functioning. Early choices should have a positive impact on the effectiveness of the LTR construction activities, planning for construction management typically starts as the LTRG

is developing. "*The construction management must make sure the building meets code criteria for quality construction, effectiveness, efficiency, timeliness, and compliance with local zoning regulations, mitigation strategies, floodplain levels, cost, etc*." Provide a repair estimate that should be completely financed and approved by the LTRG so that it can be repaired or rebuilt (NVOAD, 2012).

Volunteer Management: "*The National Voluntary Organizations Active in Disasters (NVOAD) acknowledges the value of volunteers and that they are a crucial component of the human resources required to respond to disasters of all dimensions."* People are naturally drawn to assist their neighbors emotionally, physically, and spiritually during disasters (NVOAD, 2012).

Several kinds of volunteers include *Affiliated volunteers*, who are associated with a reputable organization, and have received training for a particular disaster response task. *Unaffiliated volunteers* are characterized as emergent, impulsive people who offer assistance without properly planning their activity. And *convergent groups* are individuals that may be identifiable and share a common desire to help. To respond to disasters, volunteers are essential. It is recommended by NVOAD for volunteers to work through the local LTRG or a partner organization throughout the long-term recovery as a guarantee that the resources are managed properly and unmet needs are more effectively addressed (NVOAD, 2012).

Financial Control: An LTRG must guarantee to its donors that the expenditure of the resources has been responsible. To ensure financial management, the governing body and fiscal agent have responsibility, and transparency and accountability are the main goals of a good financial control system. Expenditures, for instance, must be approved by a different person than the one who writes

the checks. Another example would be keeping track of how the money is handled (NVOAD, 2012).

Donations Management: Responders who are aware of the issues in their community convey the value of monetary contributions in addressing those needs. Since they invest in their relationships with other responders and the media, effective communicators and collaborators are better at meeting demands. The earlier the LTRG can inform potential donors of their requirements, the better. "*Cash, construction materials, hand tools, safety gear, appliances, and other items may also be donated."* The best kind of giving, however, is cash because it enables LTRG to both purchase what they need and stimulate the local economy (NVOAD, 2012).

Communications: An effective communication plan is crucial to an LTRG's success. A recovery group can maximize possibilities to interact with funders and volunteers by telling a relevant, accurate, and interesting story. Also, keeping the neighborhood informed as the disaster recovery process develops promotes goodwill and reduces the effect of misinformation or possible complaints. "*A successful communication is clear, concise, team-based, believable, compelling, and creative"* (NVOAD, 2012).

My research intends to offer an understanding of the importance of LTRGs and how the lessons learned from previous disasters are a key component to fill gaps in post-disaster housing recovery. In addition, my research aims to explore the capacity to activate LTRGs before a disaster occurs.

2.4.2 Planning

Though the recovery process planning is an important step. DHR planning helps to reduce the impact of disasters and enhance the recovery process, especially when the main stakeholders are involved and work to develop a plan around the recovery priorities (Sandler & Smith, 2013; Patel & Hastak, 2013). Planning helps form site blueprints and infrastructural activities, such as the construction of water supply and sewer systems, as well as finding routes for mobilizing resources (Jaller, 2012; Patel & Hastak, 2013). The involvement of stakeholders should address the connection between the federal and local government through the states and serve as the communication channel for recovery goals and decision-making procedures (Sandler & Smith, 2013; Sandler, 2019).

State recovery plans should help set a direction for recovery and develop corresponding policies that the broad network of stakeholders involved in recovery can implement to effectively guide decision-making and encourage community resilience (Sandler & Smith, 2013). Planning post-disaster recovery is a valuable tool for recognizing the essential conflict between speed and negotiation, as well as creating a mechanism to resolve differences ahead of time. Balancing both creates competing interests during reconstruction, as resilient communities try to build their capacity to manage their disaster's impact (Koliou et al., 2020).

It is proven that recovery planning improves local outcomes (Horney et al., 2017), especially when they come with an implementation structure. Even though there is research based on the planning process to decrease the negative DHR impacts, it has not been enough to create a positive recovery plan. Donations, fundings, labor, and more resilient housing, are part of my research to improve the recovery process.

There is some agreement on the fundamental ideas of the quality of a good plan to represent the key duties (Berke et al., 2015). The body of knowledge on disaster recovery provides important insights for comprehending the need and opportunities for planning, as well as the difficult environment in which it is frequently carried out. In terms of the difficulties and lessons learned from LTRG members for recovery planning practice following disasters, researchers have rarely attempted to aggregate findings. However, it is vital to determine the requirements and difficulties of disaster recovery planning to apply planning theories to the unique instances (Hamideh, 2015).

The lessons learned from LTRG members for recovery planning based on previous studies can be summarized under four major themes: funding, labor, and resiliency (Hamideh, 2015). My research aims to provide additional data from lessons learned by LTRG members on planning to facilitate recovery.

2.4.2.1 Funding

The built environment is becoming more complex and dynamic as time goes on. These changes place an increasing burden on construction professionals in terms of disaster risk reduction (Bilau et al., 2017). Disaster recovery is an important capability of the federal, state, and local governments. Reconstruction programs are funded through a variety of domestic and external sources. Domestic resources could include public financing, donations from civil society and philanthropy, and insurance. Even though external sources could include funds from multi/bilateral donors and international NGOs., this may cause a highly complex financial management environment with competing accounting requirements and allocation timeframes (Bilau et al., 2017). Organizations in charge of the reconstruction have strict deadlines for spending allocated funds, forcing them to rush the housing reconstruction and potentially compromise on efficiency,

quality, and safety issues (Bilau et al., 2015). To effectively support recovery, practitioners require useful and validated metrics to document how well a community is recovering from a specific disaster (Horney et al., 2016). The goal is to improve on pre-disaster conditions. Projects that adapt to changing circumstances to move toward project objectives show, according to the U.S. Economic Development Administration (EDA), effective progress, even if this causes changes to the original project timeline.

An important area of anthropological research is the social and cultural responses of communities to the major environmental challenge represented by disaster (Dyer, 2019). Economic recovery in the aftermath of a disaster differs from normal economic development. Every disaster is unique and teaches different lessons, such as how to respond, where to keep resources, what to do first, who plays an important role during such events, the role of organizations in micro to macro-level activities, how to prepare for the next disaster, and how to coordinate people and humanitarian agencies. To mitigate the effects of disasters on society, the economy, and the environment, humanitarian organizations should focus on long-term sustainable development that will lead to a better future (Yadav & Barve, 2016).

Following large disasters, money is made available from donors and governments to finance the recovery to meet the recovery goals. Throughout the recovery, it must monitor its progress to assess what has been accomplished and where readjustment is required. Thus, recovery assessment is critical for policymakers and donors, while it also improves process transparency, the capacity of implementing agencies for ongoing work, auditing efforts and accountability (Sheykhmousa et al., 2019).

2.4.2.2 Donations

Researchers investigate donation patterns to see if the socioeconomic circumstances of the donors can explain them. It is significant because it can assist organizations providing humanitarian aid in estimating the volume of material convergence they will encounter in the event of a catastrophe. They might be better equipped to manage donations during the response if they know this beforehand. Donors who were designated as headquarters gave more than donors who were classified as individuals or non-organizations, who served as the estimation process's starting point (Chong et al., 2019). Chong et al. (2019) claims that as donors who live closer to the affected area send more in-kind donations than donors who live further away, the value of in-kind donations, also known as non-cash donations, decreases. This suggests that the effects of distance on monetary and in-kind donations are diametrically opposed. It makes sense that donors who live far away would prefer to give money rather than goods, given the logistics (Chong et al., 2019). Further, High-rent residents are reportedly more likely than low-rent residents to send more donations of goods.

Competition for limited funding and donors' separate budget lines for emergency relief and redevelopment may hamper the development of more integrated projects. Implementing more integrated projects is being hampered by tensions, which is consistent with earlier reports (Bilau et al., 2018). There is proof that giving to those affected by disasters leads to future charitable giving, with donations to compassionate and in needy organizations showing the strongest correlation. But there is no proof that unanticipated donations to a disaster led to future spending being diverted away from other charitable causes (Brown et al., 2019).

2.4.2.3 Labor

In terms of labor, it is critical to engage human resource experts with experience in DHR to conduct an assessment and planning of personnel resource requirements -skilled and unskilled that would help in the housing recovery project. Depending on the situation, some strategies for resolving personnel resource needs for the rapid construction of resilient, sustainable, and acceptable housing could be used. Mobilization and recruitment of local builders, volunteers, and/or householders; engagement of construction industry actors, particularly those in the reconstruction area who can use their network to recruit skilled workers or import skilled workers and experts; and the use of a multi-skilled labor are among these strategies (Bilau et al., 2017). Affordability, technical feasibility, and overall quality of life must all be considered in housing reconstruction. The householders must also be active stakeholders who are aware of their own needs and desires, including active recipients who must be educated (Bilau et al., 2018).

Workers' capacities should be developed regardless of the methods used to find workers to ensure that they are skilled to meet emerging production demands and the buildings' long-term sustainability. Education, training, awareness workshops, and on-the-job mentoring can all help. Workers will gain the skills and competencies, as well as be educated on incorporating risk mitigation measures into the housing construction process. To perform at their best, it must motivate employees. This should engender enthusiasm, improve efficiency and performance, and ensure that they remain employed by the reconstruction organization and area (Bilau et al., 2017).

2.4.2.4 Build Back Better

The restoration of a private and secure home, as well as the continuation of work and other sources of income, are all part of this recovery. The concern to provide relief in a longer-term

recovery should do more than save lives and ease suffering in advance for the next disaster and using the *build back better* (BBB) option could help on this matter (Johnson & Lizarralde, 2012). Following a disaster, the reconstruction period provides a chance to address and correct community vulnerability issues (Fan, 2013; Mannakara & Wilkinson, 2014). The desire to rebuild better should be common, however, it is not always the case; even though nobody wants to rebuild with the same weaknesses or restore vulnerable conditions when there is an opportunity for something better (Fen, 2013).

Quick decisions must be made about rebuilding regarding where, how, and financing. It is common to apply BBB in post-disaster reconstruction where new structures are better than pre-disaster structures and provide the affected community with a better living environment, including their homes (Johnson & Lizarralde, 2012). It is important to determine who, where, and how to measure the build back "better", the stakeholders involved, the benefits, and the consequences of investing in BBB (Fen, 2013).

Many governments and stakeholders have found it to be a major challenge, but efforts undertaken without a BBB aim are more exposed to repeat the same environment of vulnerability (Biswas, 2019; Mannakara & Wilkinson, 2014). As a result, governments, stakeholders, and disaster-affected communities must create stronger and more resilient communities, otherwise, it has been common that recovery works unsuccessfully to restore those affected communities to the same risk (Dube et al., 2021; Sarewitz et al., 2003).

Aside from the traditional notion of rebuilding better, there are numerous ways to improve the DHR phase. A faster recovery can ensure that people return to their normal lives as soon as possible, but it must also be accompanied by a more inclusive recovery that ensures that vulnerable populations receive the assistance they require rebuilding their homes, if not, they could face

catastrophic consequences, such as getting their houses destroyed by future disasters (Hallegatte et al., 2018). BBB is now widely used in disaster risk reduction and recovery, as well as post-disaster recovery plans. In the case that BBB uses innovative technology or adapted existing infrastructure systems, it generates additional economic benefits, making it more attractive to capitalize on the DHR (Hallegatte et al., 2018). For instance, in 2006, BBB was used to advocate for post-tsunami recovery that reduces risk and improves people's lives (Maly, 2018).

Planning processes are increasingly using catastrophe and hazard models, such as the Oregon Resilience Plan project, which makes use of FEMA's Hazus model. These techniques have traditionally been used to help establish disaster preparedness, emergency response, and hazard mitigation policies and plans rather than pre- or post-event recovery plans (Miles et al., 2019; Yu et al., 2020). Nevertheless, the importance of having the right information from members of LTRG on previous disasters is a key component for decreasing the recovery time. My research is intended to use the data collection from LTRG members to create awareness to improve post-disaster housing recovery and adapt disaster recovery policies accordingly.

2.5 DISASTER GOVERNANCE

The purpose of disaster governance is to offer a better understanding of the roles of the actors participating in disaster management to offer more efficient outcomes (Zurita et al., 2015). To attain good disaster governance, it is important to have a balance of power from a centralized government that normally on post-disaster events exceeds the local governments' capacity to manage. Miller and Douglass (2016) express that rigid bureaucratic frameworks, organizational hierarchies, and politicized budget, demonstrate that centralized governance systems are not adaptive enough to respond to complex emergencies.

Daly et al. (2015) recommended a political and fiscal decentralization to allow local governments and community-based institutions quick response by providing a faster solution as they have closer ties to the people they serve as the link between governmental institutions, NGOs, international donors, and disaster victims. Decentralizing the governance structure with adaptive reconstruction policies should improve local participation and collaboration for resilience building (Lam & Kuipers, 2019).

The key components for good disaster governance remain essentially having a conceptual and descriptive goal (Lam & Kuipers, 2019), especially with urban disaster management as it becomes a hot topic in academic and policy circles with the rapid development potentially contributing to rising vulnerability (Daly et al., 2015). The need for cities to reduce vulnerability and hazard exposure while improving effective social protection characterizes good disaster governance (Diagne, 2007; Gall et al., 2015; Leitmann, 2014). Providing new governance approaches improves the risk management capabilities (Albris et al., 2020). One benefit of having good disaster governance is the opportunity to react fast, especially with natural hazards that are causing chaos - mainly in coastal cities. Managers must make various decisions to recover from a disaster; however, what makes post-disaster decision-making unique is the lack of time to make the best decision. The thing that helps to manage good disaster governance is the ability to understand the barriers to recovery, as they can help to improve policies for the recovery process and increase resiliency (Plat, 2017; Rouhanizadeh et al., 2020). The purpose of my research is to understand disaster governance from the perspective of the LTRG members and from lessons learned, creating awareness that workable improvements will be offered.

2.5.1 Policy Barriers

The most concerning policy barrier is a flaw in the formulation and implementation of policies and goals. One issue is that the responsible party for a specific task in the recovery process is not always clear (Sheykhmousa et al., 2019). Another factor that influences the disaster recovery process is the consistency of federal policies, along with local recovery plans. In addition, community consultation is another recovery barrier if it is not inclusive during the development and implementation of a policy. As a result, there is a high risk that the action and policy will not be aligned, leaving the policy useless in a post-disaster situation (Rouhanizadeh & Kermanshachi, 2019).

Policymakers must address the changing nature of risk exposures and social-economic capacities without increasing inequities. However, because of disaster recovery, immediate pressures can lead to reactive policies that cannot address or even amplify key vulnerabilities. One of the most difficult aspects of disaster recovery is meeting short-term needs quickly without creating new or exacerbating existing long-term societal needs that can increase a community's vulnerability to future disasters. Because low-income areas require more funding for reconstruction and recovery, policies and legislation should be flexible to ensure that they receive financial aid and loans as quickly as possible. However, strict rules prevent some from receiving aid, which delays their recovery (Krellenberg et al., 2017; Rouhanizadeh & Kermanshachi, 2019).

An efficient response is critical for keeping the community active, especially businesses, providing shelter - temporary or permanent - for disaster victims, but also rebuilding critical infrastructure for community functionality (Finucane et al., 2020). Following disasters, nongovernmental entities (NGEs) provide critical services related to public safety and health, as

they can offer quick and flexible service and have the unique ability to reach vulnerable populations that may distrust governments.

2.5.2 Economic Barriers

One of the main factors is household income, as it can impact the recovery in different ways. According to Chuang et al. (2019), a community with a smaller gap between their citizens' annual incomes is better able to survive a rapid economic shock than a society with a larger monetary gap (Nejat, 2018). The pre-disaster economic situation of a household, according to Alipour et al. (2015) is an important issue to understand, in terms of how people will live in the days post-disaster. Within six months after a disaster there is a direct link between income inequality and economic depression.

The community's socioeconomic status and standard of living impact disaster recovery in a variety of ways (Tasnuva et al., 2021). Employment and the source of employment are also metrics for disaster recovery. Housing numbers, values, and quality are significant impediments as well (Rouhanizadeh & Kermanshachi, 2019). For instance, luxurious houses are complicated to replace but are more resilient to survive storms than mobile homes (Tasnuva et al., 2021). Despite efforts in recent decades to improve community resilience, disasters' economic impacts have increased significantly (Bahmani & Zhang, 2021; McCaughey et al., 2018).

Sutley et al. (2019) indicated that social and economic barriers can be powerful predictors of recovery progress. High levels of damage can expose and intensify communities' and households' physical and socioeconomic vulnerabilities (Peacock et al., 2014). Inequitable risk exposure combined with unequal access to resources leads to socioeconomic vulnerability (Bolin & Kurtz, 2017) as well as ethnicity, ability, gender, education influencing the capacity of

vulnerable populations to resist and recover from the effects of natural hazards (Aerts et al., 2018; Bolin & Kurtz, 2017; Kumar et al., 2015; Wisner, 2016) that often lead to language and cultural divisions, which act as a barrier to disaster recovery (Kamiohkawa & Maruyama, 2021).

There is an important relation between stakeholder participation and socio-economic barriers, which includes participation from businesses, governments, non-governmental organizations, volunteer groups, international organizations, civil society, and affected communities (Bahmani & Zhang, 2021). Stakeholders are key contributors to the recovery and mitigation phase of the disaster by providing many benefits, such as local knowledge (Castro-Correa et al., 2020). However, a lack of trust among organizations and individuals can isolate people from their social groups and their organizations, making disaster recovery more difficult (Amaratunga et al., 2018). Social trust can improve recovery resilience and social services, such as medical and social welfare services (Tasnuva et al., 2021). Having a close family member and/or relative in a disaster helps people recover mentally, acting as a facilitator for innovation and self-protection (Hu et al., 2018; Monteil et al., 2020). It is also important to address the connection with businesses and the community before and after a disaster because it will help to improve recovery (Urquiza et al., 2021). Many researchers have long been interested in disaster-related financial issues (Rouhanizadeh & Kermanshachi, 2019), and many of them have stated that a community's ability to recover quickly and survive the effects of a disaster would be improved if it had a connection to higher levels of government (Spielman et al., 2020). However, there are many examples where following institutional knowledge was more effective than following the authority (Moreno, 2018). The absence of experience handling a similar disaster is also a significant recovery stumbling block.

2.5.3 Infrastructure Barriers

In times of disaster, the structural integrity of physical infrastructure. is readily assessed However, recent research has indicated that social infrastructure is important too (Aldrich & Sawada, 2015). Social ties have long been important in disasters, and more attention is being paid to the social and community aspects of resilience, besides individual resilience (Drury et al., 2019; Mitsova et al., 2019). Understanding the relationship between infrastructure recovery and population movement in the aftermath of large-scale disasters is critical for developing policies that promote effective community recovery and sustainable development in hazard-prone areas (Aerts et al., 2018; Yabe et al., 2020).

Building institutional and infrastructural capacities is critical for many cities to minimize economic loss and maintain the well-being of their citizens in the event of disasters (Eakin et al. 2017). Recent disasters have revealed a wide range of recovery trajectories among communities that have suffered similar levels of damage due to societal factors (Aldrich & Meyer, 2015; Rufat et al., 2015; Rufat et al., 2019).

2.6 COMMUNICATION

It is common to read about responsiveness and effectiveness in disaster communication. More effective communication procedures have improved disaster related outcomes (Howard et al., 2017). Giving community members the knowledge, they need requires proper disaster communication (Paton & Irons, 2016). Authorities and the public, especially those affected, have access to an expanding number of communication methods for transmitting information during a crisis, and the media’s role is increasingly recognized in disseminating important information (Deepak et al., 2019; Howard et al., 2017).

It's challenging to communicate during a disaster. People need timely, consistent, and accurate information to respond and decide how to best meet their needs during a disaster because they interact with unpredictable circumstances (Paton & Irons, 2016). Studies indicate the importance of communication and information to increase the safety and knowledge of people in affected areas, especially those who have limited access to information and have never been involved in a disaster (Whytlaw et al., 2021). The information available also allows emergency managers and planners to make decisions that consider new requirements and changing community conditions (Yeo et al., 2020). Continuous communication among stakeholder groups is crucial during a recovery process. Through continual contact, the stakeholders share useful knowledge on a range of subjects, including housing, economics, infrastructure, the environment, psychology, and culture (Yeo et al., 2020).

There is much research in disaster communication; however, it is still a problem in recovery efforts (Knox, 2013). Even though local demands for recovery information are rising, the public's interest in disasters declines after disaster response, as their attention instead turns to new events (Yeo & Knox, 2019). Communities still in the long-term recovery phase need access to information from officials to be informed on any improvement or issues in the recovery process (Rivera, 2019). The importance of disaster communication and trusting is essential. My research intends to show that there is a lack of information and trust among household members, government officials regarding the process of DHR.

2.6.1 Lack of Communication

While it is established that to improve public messaging during a disaster, it will be crucial to locate and use alternate information sources (Yusuf et al., 2020) the population's information

and communication requirements during the disaster reconstruction phase are poorly understood. Determining the information and communication requirements of the affected communities is a crucial part of the post-disaster needs (Tagliacozzo & Magni, 2016). To improve local engagement and collaboration, for example, local and regional authorities have expressed concerns that key local partners' lack of involvement in planning, implementation, and decision-making are obstacles in housing recovery (Finucane et al., 2020). My research aims to understand the lack of communication in the housing recovery process that affects household members.

2.6.2 Trusting the Process

The views and thoughts of those who has similar values and objectives among householders and members of the community play a role in how people interpret high-risk situations and decide how to respond to natural hazards (Lion et al., 2002), specifically, when people are processing complex and uncertain situations (Paton & Irons, 2016). Communication practices must quickly collect, validate, and distribute information about the actions that must be taken to reduce risk to many community members (Paton & Irons, 2014). Nevertheless, long-term communication initiatives are usually created in a context with lower risk and communicate messages intended to develop capacity and encourage accountability and feedback mechanisms. During immediate crises, communications may differ from those that occur during long-term disaster recovery (Tagliacozzo & Magni, 2016). Effective recovery depends on ongoing disaster communication to reduce the effects of the disaster and facilitate the recovery process. Stakeholders should ideally cooperate to maintain a smooth and clear line of communication. To identify the various gaps impeding the post-disaster recovery process, my research will make use of the information gathered from LTRG members.

2.7 HOUSEHOLDS

One of the most crucial aspects of disaster recovery is housing. A good housing reconstruction strategy will consider social needs, disaster mitigation, and long-term viability. If this phase does not receive the proper attention to the needs of affected people, then newly constructed facilities may become obsolete. Reconstruction strategies should be implemented after studying the desires of those who have been affected (Safapour & Kermanshachi, 2021).

The people whose homes have been damaged or destroyed follow a housing recovery process because of the disaster. Not everyone who is impacted by a disaster will experience all the stages of DHR, and full recovery may take months or years. Several factors can influence how long it takes to recover, including the family's housing situation prior to the disaster, the extent of the house's damage, the scale of destruction in the area, and access to financing, materials, and labor (Johnson & Lizarralde, 2012).

Disasters frequently destroy hundreds of homes, displacing entire communities and leaving victims homeless. In the United States, such disasters occur several times within a year. This creates a logistical and contractual nightmare for the planning agencies and political/community leaders in charge of providing shelter for displaced citizens. One of the most arduous tasks facing policymakers and aid providers is to find homes for displaced people as quickly as possible (Patel & Hastak, 2013).

Housing recovery is divided into four stages in the aftermath of a disaster -emergency shelter, temporary shelter and housing, and permanent housing; as a result, rebuilding housing stock after a disaster is not the same as providing shelter immediately following an event. In each stage, non-governmental organizations play a critical role (Bilau et al., 2018). My research intends

to show the importance of LTRGs as a non-governmental organization in flood prone areas for a smooth recovery.

2.8 VULNERABILITY

Whether it is a natural hazard like a hurricane or a pandemic, communities must face and react to different hazardous situations. In the event of a disaster, the degree to which a community exhibits certain social conditions may affect the community's ability to prevent suffering and financial loss (CDC, 2018). In terms of vulnerability, individuals or populations can experience different outcomes from the same natural hazards. One of the many issues addressed when discussing resilience is its association with vulnerability and whether they are sufficiently likely to be considered as aspects of the same range. While vulnerability is associated with risk management, Kammouh et al. (2017) pointed out that the idea of vulnerability has also long been associated with resilience in various scientific disciplines (Kammouh et al., 2017; Béné, 2014). Vulnerability is a central theme in research on climate adaptation and disaster risk mitigation. The language is being contested because it has different definitions in different contexts and disciplines (Costa & Kropp, 2013). For the Centers for Disease Control and Prevention (CDC), social vulnerability is described in four categories: socio-economic status, household composition and disability, minority status and language, and housing type and transportation (CDC, 2018). For Felsenstein and Lichter (2014), the vulnerability index is made at the local or neighborhood level based on disabilities, low income, age, language barriers, housing, and infrastructure.

If majority populations endure the damage from heavy floods in absolute terms, the vulnerable populations carry the brunt of the damage in relative terms experiencing greater harm, owing to their reduced ability to cope (Narayan et al., 2017). These effects can be cumulative, with

long-term intergenerational effects, and initiate a downward spiral of vulnerability as there is limited access to the services necessary for recovery (Deria et al., 2020; Felsenstein and Lichter, 2014). For those who live in flood-prone areas, each flood deepens their suffering by depleting incomes and asset bases (Oakes et al., 2020). The purpose of my research is improving the recovery process, decreasing displacement, and providing better assistance to vulnerable populations.

2.9 RESEARCH CLAIMS

To generate the following claims, I analyzed the relationships between the elements of the research questions and the research design.

- Having an LTRG established before a disaster hit will improve the recovery process.
- Understanding the PDHR obstacles will help create awareness and actions to improve the recovery process.
- Clear disaster communication channels will reduce the impact.

2.10 CONCLUSION

I present an integrated literature review for the disaster housing recovery process in this chapter and what is unknown so far about the recovery process w a focus on the impact of natural hazards associated with flooding, the post-disaster housing recovery process, the recovery planning stages, the significance of the LTRG during the recovery process, and the various barriers to recovery.

Climate change has had a significant impact on our daily lives because disasters have been happening more frequently than ever and damages are more than before. Climate change is associated with severe damage from prolonged rains and increased flooding during weather related

natural hazards. When disasters are declared, local governments are typically not prepared financially and logistically because they must rely on the federal government, whose response takes time.

A smooth post-disaster, housing recovery is essential, as delays in the process lead to displacement. The importance of planning, the right communication, and having an LTRG settled before a disaster hit could help to facilitate the recovery process and displacement. However, there is not enough research that has been done about this. My research is planning to understand the different obstacles that are impeding the housing recovery process.

The technique used to gather and analyze important data about the various barriers to the DHR process time will be covered in the chapter that follows. The grounded theory method will be used to gather information from LTRG participants and content analysis software employed to understand the obstacles of the PDHR process.

CHAPTER 3

METHODOLOGY

This chapter discusses the method used to collect valuable information about the different obstacles impeding the DHR process. The research method first includes interviews and coding using a grounded theory method of collecting data from experts in the recovery field. Second, the use of content analysis software, NVivo and Leximancer, to analyze the collected and categorized data to create awareness of best practices to facilitate the post disaster housing recovery (PDHR) process.

The method, which provides an explanatory-descriptive framework, is useful for social scientists and future research projects to gain a better understanding of previous disasters. I used exploratory research for the interviews and provided details about the PDHR. It discovers fundamental facts regarding the subject and plans research questions for further investigation. The goal is to answer the "what" rather than the "why" to identify and quantify the causal relationship with the problem to better comprehend it to predict its future (Creswell ,2003).

3.1 RESEARCH DESIGN

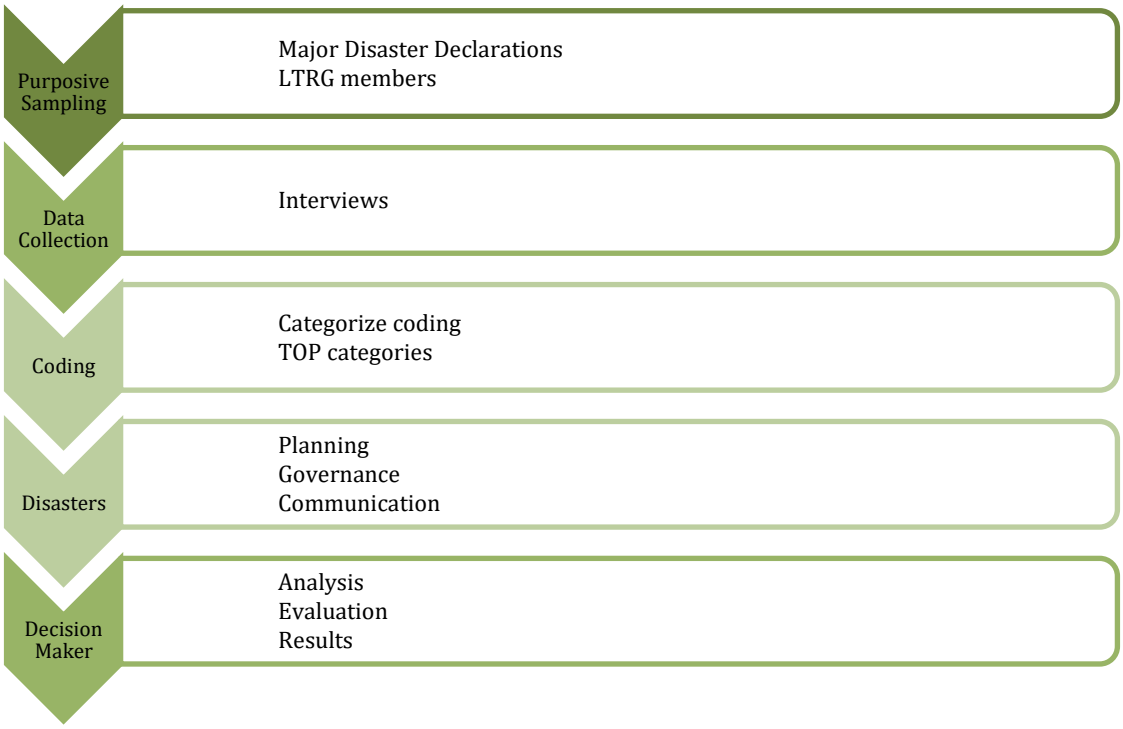

Figure 3.1 Research Design

3.1.1 The Overall Research Design

The purpose of the research plan described above in Figure 3.1 is to explain the required steps to find the goal of decreasing the recovery time. The initial approach was creating a purposive sample of states of the United States that have been processing a declared severe storm that creates flooding impact damaging houses. Next, I conducted a data collection through Zoom interviews performed in 13 states and 1 U.S. territory in which I interviewed 32 experts that were or are part of long-term recovery groups to collect valuable information related to major disasters that brought flooding impact to their communities affecting housing. Interviews were recorded and transcribed.

Following, I performed a manual coding to capture the main topics followed by using a software for content analysis, NVivo and Leximancer, which helped me to not only code but to categorize, sort the TOP categories and provide topic guidance. The results of the categorization were applied to disaster practices and found the commonality among them with the coding categories to offer decision-makers suggestions.

An iterative process was used to revise the research questions based on observations throughout the data collection process.

The questions changed from:

1. What leads to a delay in post-disaster housing recovery?
2. How might the outcomes be improved in terms of time to recovery?

to:

1. What are the main sources of obstacles experienced in the DHR process?
2. How might outcomes be improved?

The initial purposive sampling phase involved choosing expert members from LTRGs in states with major flood disasters. The data collection -which includes the interviews of experts, was an important step to complete our understanding of the DHR process. I collected information regarding the DHR process, specifically in terms of the roadblocks to recovery such as the planning, governance, and communication.

The states I analyzed that were affected by flooding were: California, Florida, Kentucky, Louisiana, Maryland, Mississippi, Nebraska, New York, North Carolina, Ohio, Puerto Rico, South Carolina, Texas, and Virginia (FEMA 2022). On graph 3.2 below, we can observe the major disasters over the past 20 years. In each of the states we interviewed LTRG members.

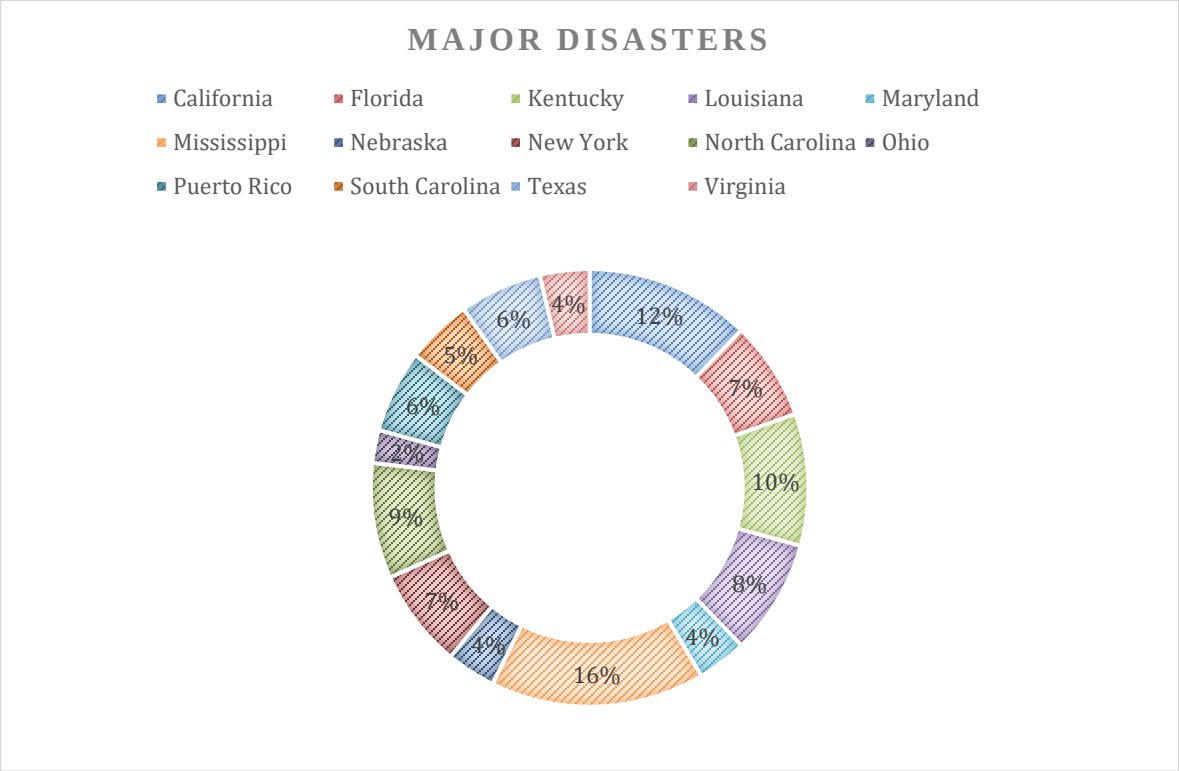

Figure 3.2 Major Disasters by States

3.2 GROUNDED THEORY

Grounded theory is a research method in which a theory that explains what is going on emerges from data of LTRG members gathered systematically during the research process using interviews as part of the data collection (Glaser & Strauss, 1967). Using grounded theory allows me to get a systematic analysis based on clearly defined analytic steps while remaining flexible during the process (Ruppel & Mey, 2015).

Grounded theory, according to Glaser (1978), "*transcends specific data collection methods"* because data that relates to the explanation or theory for the topic under investigation can be useful. For researchers in the social sciences, grounded theory has become a popular research method (Denscombe, 2014; Harris, 2015). It is ideal for researching areas that have never

been investigated before, or where previous research has major oversights, and a fresh perspective is desired (Schreiber & Stern, 2001). It has been widely used in social science research to investigate and explain human social behavior (Maz, 2013). The method was selected because to my knowledge there is no prior research related to the range of LTRG members that this study investigates. Thus, the exploratory toolkit provided by Grounded Theory is appropriate.

Concepts and theories emerge because of constant comparison with data, the generation of questions to explain behavior, and the testing of these questions with more data. While the grounded theory is primarily an inductive method, it contains some deductive elements (Harris, 2015). The development of an extension of the theory always brought the importance of originality by Glaser and Strauss (Chun Tie et al., 2019). It allows for systematic analysis based on clearly defined analytic steps while remaining flexible enough to allow researchers room to maneuver in their application. It can be adaptable depending on the subject, like many other qualitative research methods, and change its approach based on the narrative (Ruppel & Mey, 2015; Strauss, 1998).

3.2.1 Purposive Sampling

As a first step in the purposive sampling, I chose ten (10) coastal states, three (3) non-coastal states and a U.S. territory (Puerto Rico) with major disasters affected by flooding. It is important to address that the non-coastal states came up as part of the research referred by LTRG members of coastal states to include them for having similar flooding issues and major disasters. We can observe from Table 3.1. The major disasters from those states.

Table 3.1 Major Disasters by States and Date

State	Major Disaster	Declaration Date
California (10)	DR-4434-CA	May 18, 2019
	DR-4431-CA	May 1, 2019
	DR-4425	April 8, 2019
	DR-4423	March 18, 2019
	DR-4422	March 26, 2019
	DR-4353-CA	January 2, 2018
	DR-4312	May 2, 2017
	DR-4308-CA	April 1, 2017
	DR-4305-CA	March 16, 2017
	DR-4301-CA	February 14, 2017
Florida (6)	DR-4673-FL	September 29, 2022
	DR-4564-FL	September 23, 2020
	DR-4468-FL	October 21, 2019
	DR-4399-FL	October 11, 2018
	DR-4341-FL	September 27, 2017
	DR-4337-FL	September 10, 2017

Table 3.1 (continued)

State	Major Disaster	Declaration Date
Kentucky (8)	DR-4663-KY	July 29, 2022
	DR-4643-KY	February 27, 2022
	DR-4630-KY	December 12, 2021
	DR-4595-KY	April 23, 2021
	DR-4540-KY	April 24, 2020
	DR-4428-KY	April 17, 2019
	DR-4361-KY	April 26, 2018
	DR-4358-KY	April 12, 2018
Louisiana (7)	DR-4611-LA	August 29, 2021
	DR-4606-LA	June 2, 2021
	DR-4577-LA	January 12, 2021
	DR-4570-LA	October 16, 2020
	DR-4559-LA	August 28, 2020
	DR-4462-LA	September 19, 2019
	DR-4458-LA	August 27, 2019
	DR-4345-LA	October 16, 2017

Table 3.1 (continued)

State	Major Disaster	Declaration Date
Maryland (3)	DR-4583-MD	February 4, 2021
	DR-4376-MD	July 2, 2018
	DR-4374-MD	June 25, 2018
Mississippi (13)	DR-4626-MS	October 22, 2021
	DR-4576-MS	December 31, 2020
	DR-4551-MS	July 9, 2020
	DR-4538-MS	April 23, 2020
	DR-4536-MS	April 16, 2020
	DR-4478-MS	March 12, 2020
	DR-4470-MS	December 6, 2019
	DR-4450-MS	June 20, 2019
	DR-4429-MS	April 23, 2019
	DR-4415-MS	February 14, 2019
	DR-4350-MS	November 22, 2017
	DR-4314-MS	May 22, 2017
	DR-4295-MS	January 25, 2017

Table 3.1 (continued)

State	Major Disaster	Declaration Date
Nebraska (3)	DR-4446	June 17, 2019
	DR-4420-NE	March 21, 2019
	DR-4387-NE	August 27, 2018
	DR-4625-NY	October 8, 2021
New York (6)	DR-4625-NY	October 8, 2021
	DR-4615-NY	September 5, 2021
	DR-4567-NY	October 2, 2020
	DR-4472-NY	December 19, 2019
	DR-4397-NY	October 1, 2018
	DR-4348-NY	November 14, 2017
North Carolina (7)	DR-4617-NC	September 8, 2021
	DR-4588-NC	March 3, 2021
	DR-4568-NC	October 14, 2020
	DR-4543-NC	May 8, 2020
	DR-4465-NC	October 4, 2019
	DR-4412-NC	January 31, 2019
	DR-4393-NC	September 14, 2018

Table 3.1 (continued)

State	Major Disaster	Declaration Date
Ohio (2)	DR-4447-OH	June 18, 2019
	DR-4424-OH	April 8, 2019
Puerto Rico (5)	DR-4649-PR	March 29, 2022
	DR-4571-PR	November 5, 2020
	DR-4560-PR	September 9, 2020
	DR-4339-PR	September 20, 2017
	DR-4336-PR	September 10, 2017
South Carolina (4)	DR-4479-SC	March 17, 2020
	DR-4464-SC	September 30, 2019
	DR-4394-SC	September 16, 2018
	DR-4346-SC	October 16, 2017
Texas (5)	DR-4572-TX	December 9, 2020
	DR-4466-TX	October 4, 2019
	DR-4454-TX	July 17, 2019
	DR-4416-TX	February 25, 2019
	DR-4377-TX	July 6, 2018
	DR-4332-TX	August 25, 2017

Table 3.1 (continued)

State	Major Disaster	Declaration Date
Virginia (3)	DR-4628-VA	October 26, 2021
	DR-4111-VA	December 18, 2018
	DR-4401-VA	October 15, 2018

From the result provided in Table 3.1, I concluded that the most affected states have been Mississippi, California, and Kentucky. After targeting the states with major flood disasters, I reached out to the different LTRGs in each state, specifically the leaders of the LTRGs as experts that were involved in previously major disasters. Collecting data from individuals that were part of LTRGs was beneficial to understand the barriers and find possible ways to improve the DHR process.

3.2.2 Data Collection

To elicit information from the experts on LTRGs, I conducted thirty-two interviews during the months of April to August 2022 with the approval of the Institutional Review Board at Old Dominion University (see APPENDIX A – Letter from Human Subjects Review Committee). All the experts interviewed were or are members of LTRGs in different counties. They were or are holding a seat at the LTRG Board of Directors from those counties, some as President, Executive Director, or Secretary. Some are part of the local/regional Voluntary Organization in Active Disasters (VOAD), and others are holding a position as Public Health Professionals. A complete

list of titles is not available due to IRB restrictions for this research to be anonymous to earn exempt status.

The interviews were used to conduct a qualitative analysis. These interviews were recorded - for security and accuracy of the conversations and to avoid losing data during the interview. Then they were transcribed, coded, and categorized, resulting in a database that was analyzed for patterns that correspond to theories from the literature (Baharein & Noor, 2008; Reyes et al., 2003). Virtual meetings with the experts took part in a scheduled interview to collect the data to compile the information. APPENDIX B – An Introductory Letter to LTRG Members provides the letter submitted to the experts requesting an interview. APPENDIX C – Set of Questions for LTRG Members has a preliminary set of questions for the interview, with the number of experts interviewed and the length of the interviews. It is important to mention that based on their knowledge and past disaster experiences, not all the questions applied to every LTRG member who was interviewed.

Documentation, such as interviews, contributes to the data (Yin 1994; Zucker 2009). By far, the most frequent approach for gathering qualitative data is using the interview method (Donalek, 2005; Powell et al., 2003). I commonly employed the interviews for qualitative research, allowing me to collect insight and understand from experts' perspectives, experiences, processes, or even forecasts (Rowley, 2012). I made sure that the interview questions were appropriate and capable of assisting me in achieving the goal of obtaining a detailed answer to the research question (Roberts, 2020).

The questionnaire provided in Appendix C provides structured and semi-structured research questions. The benefits of using structured research questions were for consistency, reliability, and documentability (Byrman, 2001; Rowley, 2012). In addition, the use of semi-

structured research questions provided me enough flexibility to approach different respondents in different ways while still collecting data in the same areas. Semi-structured interviews came with varied numbers of questions and degrees of inquiry and question sequence customization to fit the interviewee's needs (Baharein & Noor, 2008; Rowley, 2012).

Table 3.2 Connection of Questions with Each Chapter

Question	Chapter
1. How the LTRG was initially established. Who took the lead? Was the energy to set up the LTRG from the business sector, government sector, nonprofit sector? Are there standard pathways to set up LTRGs?	The findings from this question helped me support the literature review in chapter 2 regarding the LTRG formation, functions, etc. In addition, in chapter 4 this question provided support to describe the importance of having an LTRG established before a disaster hit.
2. Were there multiple LTRGs operating for the same disaster? If so, what were the boundaries for the several LTRGs? Did these LTRGs interface regularly?	The findings from this question are provided in chapter 4, for the formation of the LTRG. Additionally, in Chapter 6 describing the importance of communication.

Table 3.2 Continued

Question	Chapter
3. What factors were experienced that frustrated the speed of recovery? Were due to material availability, general materials vs specialized material? Were due to labor availability, general labor vs specialized labor? Were due to process roadblocks, such as permitting, inspections, and financing? Were due to special zones such as historic districts that require an additional layer of oversight/approval prior to repairs being made?	The findings from this question helped me to define the major factors that are impeding the improvement of the PDHR process in chapters 4, 5 and 6. It also provides support in chapter 4, describing the importance of planning to improve the PDHR process. In Chapter 5, describing the importance of good governance to improve the PDHR process. In Chapter 6, describing the importance of a clear communication channel to improve the PDHR process.
4. What are the differences across the median income of those impacted, and other household characteristics?	The findings from this question are covered in Chapter 5, especially in the discussion of the importance of funding to support the PDRH process.
5. Did the locality have a Build Back Better philosophy that is reflected in a recovery plan?	The findings from this question are addressed in Chapter 4, offering the planning phase a preparation for a resilient recovery. Some responses were also analyzed in chapter 5, concerning the role of governance in the reconstruction of the houses.

Table 3.2 Continued

Question	Chapter
6. What type of government was during the disaster? (i.e., city manager)	The findings from this question are addressed in Chapter 4 and 5, in terms of showing the importance of having a good relationship with local/state/federal entities.
7. Plan to do differently next time? What are the lessons learned?	The findings from this question helped me to define the major factors impeding the improvement of the PDHR process – chapter 4, 5 and 6.
8. Any other comment or suggestion you feel it's important to add?	The findings from this question helped me to define the major factors impeding the improvement of the PDHR process - chapter 4, 5 and 6.

3.2.3 Data Analysis

Glaser and Strauss (1967) discovered that sequential collection of the data and analysis, allows researchers to focus on the most important issues in their field of study sequentially and allows researchers to maintain a steady focus on developing concepts about the data while also gathering additional data to flesh out promising concepts. The study has a qualitative examination of the housing recovery process, transcribed, and coded using content analysis software tools to make sense of the data. I analyzed the interviews to answer the research question and a set of claims based on the patterns discovered in the case, tested using data analytics in the later stages of the investigation.

Using computer software was beneficial as it is imperative to make notes, transcribe interviews, editing, coding, and finally provide a content analysis (Weitzman, 1999). I read the transcripts on different occasions for a better understanding, then I started the initial coding process. During the initial coding, important codes appearing as having a large amount of frequency “recovery”, “management”, and “disaster” were found. I then read the transcript again and continued applying the following codes that lead to promising analysis, which was then part of the overall coding process.

3.3 CODING, AUTO CODING, SENTIMENT ANALYSIS, THEME TOPICS

Data analysis techniques, such as coding, are used to seek concepts, connections, and conceptual recurrences. For codes to function, my research and the data collected must communicate. As I worked with the data, I produced labels that make up codes between acquiring or producing data and preparing claims to explain it (Charmaz, 2012; Chun Tie et al., 2019). The data for the coding helped me introduce the material and start some fundamental analytical processes (Saldana, 2013).

I divided the coding into three steps: open, axial, and selective. Open coding, as being the first step in qualitative research, is used for data collection. For instance, in my model, the interview with the experts is divided and marked with codes. Following axial coding, the process differs from open coding as it begins by connecting codes together, and underlying data to see how they might be sorted into categories. I could construct a category based on an existing code, or a new category could incorporate multiple codes. Last, is the selective code in which I unify all the subcategories together around a central theme - primary focus of my research, connecting different

categories I built from qualitative data in prior coding cycles (Charzman, 2006; Chun Tie et al., 2019; Williams & Moser, 2019).

3.4 CONCLUSION

This chapter has explained and covered the methods utilized for this dissertation to collect the data with the purpose of understanding the different obstacles for the recovery process. I described the research design, the importance of using a grounded theory approach to collect the information from LTRG members. How the data was analyzed and coded with the use of a content analysis software to propose a workable way to improve the DHR process.

In the following chapter, you will learn the importance of the planning phase in a disaster housing recovery. Based on the elicited information during the interviews we will understand the process of creating an LTRG, and why it is essential to have it prior to a disaster to improve the DHR process.

CHAPTER 4

THE IMPORTANCE OF PLANNING

"When a disaster happens unless you are very close to the last disaster, it may take a while to get a long-term recovery group up and running and to a great extent able to do the work it needs to do" (LTRG member).

Considering the increasing importance placed on the necessity of long-term disaster housing recovery to reduce the impact of disasters, it is essential to perform more systematic analyses of recovery outcomes and processes. Planning for recovery can be influenced by describing the big picture of recovery and quantifying housing recovery to get important patterns. In the chapters that follow, I analyze the different interviews with members of the LTRG. As described in Chapter 3, these interviews covered their perspectives on the difficulties of post-disaster housing recovery.

Most of the members would like to do better and differently if a similar disaster occurred. Based on the lessons learned during the data collection, I found three obstacles related to the post-disaster housing recovery: planning, governance, and communication. Each of these is covered in each one of the chapters that follows. All interviewees stressed the importance of preparation before a disaster, a more transparent disaster governance - including a more up-to-date and realistic disaster policies that affect those impacted by the disaster, and the need to improve and have reliable communication between those affected and the government. In this chapter I examine planning, in Chapter 5, governance, and in Chapter 6, communication.

4.1 LONG-TERM RECOVERY GROUP CREATION

Based on the discoveries made during the data collection process, this chapter analyzes the planning phase. It explains the importance of planning the creation of a Long-Term Recovery Group (LTRG) prior to a disaster happening, as it will facilitate the DHR process. The various kinds of planning challenges faced by all LTRGs including planning for funding, labor, and resilience are part of this chapter, and how they interact with the different categories such as lessons learned, type of government, and household median income.

One of the key issues I encountered during the interviews with the experts was the importance of LTRG creation and planning. The differences between the various LTRGs showed that the likelihood of facilitating recovery increases with the time of creation and more planning.

Thus, the first part of this chapter examines the consequences of planning (or not planning) in terms of intentional pre-disaster LTRG creation. The subsequent sections delve more deeply into planning government and other funding, labor resources, and resilient construction.

As with the other chapters, the importance of this chapter derives in part from the data source: although there is research that has been done related to disaster planning, specifically, post-disaster housing recovery planning, there is scant research that focuses on the experiences of LTRG members. With that being said, we can summarize the discussions of the results of prior studies and the content analysis of the interviews with the lessons learned from LTRG members of the recovery planning under three major subcategories. First, planning funding from government, NGOs, or private institutions, and in-kind donations; second, planning labor resources; and third, planning a resilient reconstruction.

4.2 WHY PLANNING CAN IMPROVE DHR, BUT RARELY OCCURS

Deciding about repairing infrastructure, economic development, housing restructuring, hazard mitigation, and other tough issues in overlapping or compounding disasters causes extensive analysis of difficult tradeoffs (Finucane et al., 2020). For instance, discussions about post-disaster housing recovery have often focused on the programs' cultural and technological adaptability. The larger socio-economic and political implications of the housing recovery have always been the main issue focusing on materials, technology, and climate (Mukherji, 2017).

Nevertheless, the field has advanced considerably in discussions centered not only on resources, but on funding procedures of public and private interventions, human resources, and the configuration of a more resilient community affect the outcomes of housing recovery (Mukherji, 2017).

Although it is advisable to start disaster recovery planning before a disaster event, people typically create recovery plans after a disaster (Horney et al., 2018). Existing data and information may not be effectively used to inform recovery decision-making without effective pre-disaster recovery planning (Spiekermann et al., 2015).

The lack of a state recovery planning mandate for local planning, a relatively low level of investment in local technical assistance efforts aimed at planning, such as workshops, or a lack of data for plan making are some examples of the factors that may cause data and planning gaps (Berke et al., 2015; Brody et al. 2009; Smith, 2013). The principal functions of the plan: goals, facts, policies, implementation, coordination, among others, are represented and have measurable indicators to customize the planning domain in the needed area (Berke et al., 2015). The fundamental ideas are more appropriate than the conventional strategy of forecasting future trends (Berke et al., 2015). For instance, a community resilience planning process based on the National

Institute of Standards and Technology (NIST) is developed under the assumption that quantifying hazard losses, social impacts, recovery goals, and the impact of resilience planning measures are necessary for measuring community resilience (NIST, 2016).

The rapid growth of the population and urbanization puts a lot of pressure on the housing supply at a global level. In addition, the increment in disasters, especially for post-disaster housing recovery, brings more supply problems, which lead us to a better planning of donations, including in-kind donations of resources. Not having enough research related to the issue leads to a limited understanding of how households and communities can rebuild their homes following a disaster event (Mukherji, 2017).

By enhancing pre-disaster recovery planning and supplying information for decision-making during recovery, the development of a plan with indicators and quantifiable metrics will help to better coordinate the capacity of donations at the local level. The indicators could aid in the development of providing facts with the intention of a more accurate recovery plan for potential future disasters (Horney et al., 2016).

Many important factors influence the long-term post-disaster housing recovery processes and outcomes. One of those is funding, mainly provided by the government, as well as NGOs and private entities; especially when examining how governance practices affect recovery processes and results (Mukherji, 2017).

Without a plan, it is much harder to determine how well a community is recovering. Using metrics to understand post-disaster status helps to provide a roadmap, including for comparison with communities lacking strong planning capacity. This helps to make the best use of resources and arranges the labor and focuses the energy and attention where it is most needed (Horney et al., 2018).

One of the important steps promoting resilience under conditions of high uncertainty and rapid change is a pre-disaster recovery plan based on how a community should be redeveloped after a disaster, especially how houses should be reconstructed to be more resilient. Not only assessing options for the time ahead but also considering potential outcomes that they may not fully control are part of a recovery plan based on the goals and the future of the communities (Berke et al., 2014; Olshansky & Johnson, 2010). It is significant to note that depending on the disaster the community is addressing, each disaster recovery plan will require a different amount of time, effort, participation, and analysis.

4.3 VARIATION IN THE EXTENT OF PLANNING

The LTRG members interviewed experienced extensive variation in the extent to which there was an LTRG organization in place prior to disaster striking. This variation allows us to examine the importance and impact of LTRG-based planning efforts before the disaster, an issue which has never previously been addressed directly in the literature. Figure 4.1 and Table 4.1 illustrate this variation in the preparedness of the local LTRGs for a disaster. They derived these results from the question related to the creation of the LTRG in their county/city. As shown in Figure 4.1 and Table 4.1 there are differences among the states and localities regarding the disaster planning phase of the LTRGs. The three stages were: always prepared, prepared within 2 years, and not prepared. Localities in the “always prepared” category always have an LTRG in existence, ready to tackle disaster recovery when needed. Localities in the “prepared within two-years” category were prepared with an LTRG prior to a disaster through happenstance; in this situation, an LTRG created to address a previous disaster was still in operation when a subsequent disaster struck. One of the examples I encountered from the content analysis is how essential is having the

LTRG established if the disaster hits. "*We have been encouraging our long-term recovery groups to remain to perpetuate themselves. There has to be at least some regular meeting. It doesn't have to be monthly if you're between disasters, but some kind of consistent meeting schedule*."

The theme of this section is that, in the absence of planning, disaster recovery is more difficult. One LTRG member aptly expressed the consequences of not planning *"the day after the floods, we had government officials, nonprofit, public, and private people in a sanctuary trying to figure out what we needed to do. The problem with that, there wasn't a plan established, and what happened was we weren't able to respond to this event. We were reacting to this event in real time, which delayed and didn't give us the proper and the best responses we were falling for."*

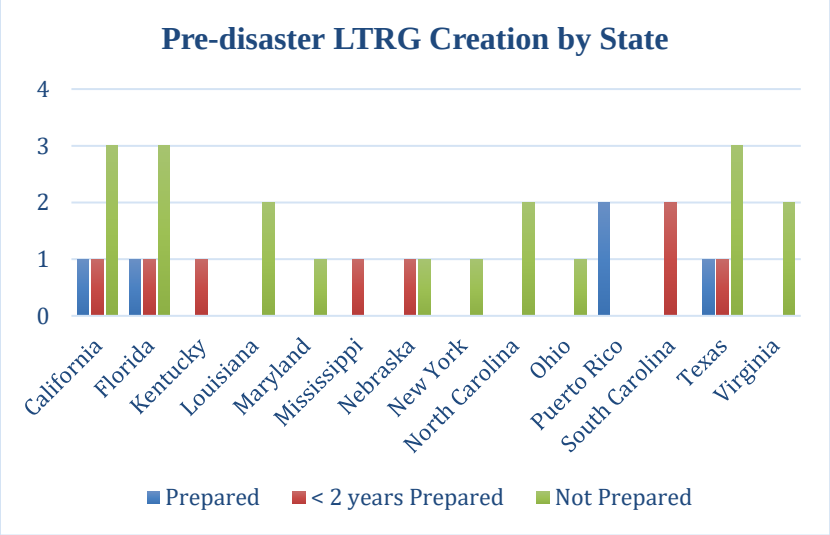

Figure 4.1 Pre-Disaster LTRG Creation by State

It is important to address that not all counties were in the same situation, some had LTRGs in place prior to the disaster. Because they were prepared for it, or because they faced another disaster within a two-year time frame. To get a better picture of the planning importance, Table 4.1 provides the responses below from each state. At least some localities in states/territories such

as Puerto Rico, California, and Texas have LTRGs created ahead of time to be prepared for possible future disasters. This planning lets them react faster to the disasters when they occur. Other localities in states such as South Carolina, California, Florida, Kentucky, Mississippi, Nebraska, and Texas are prepared with an LTRG because the timing between one disaster to the other is usually within the typical two-year time frame of existence of an LTRG. Sometimes, they can react on-time, in others, they are still struggling with the impact of the previous disaster.

LTRG members in areas that coincidentally were organized for one disaster and then had to respond to another disaster faced both challenges and opportunities because of that coincidence. One of the LTRG members discussed the experience, *"Leading the overall recovery effort, as well as establishing long-term recovery planning effort, which is where the LTRG comes into play, it's important. Our area was unique in terms of the number of federally declared disasters that hit our area in one year."* Having different disasters within a one-year period lets them understand the importance of having a plan to facilitate the recovery.

Table 4.1 Planning per State

State	Prepared	< 2 years prepared	Not prepared
California	1	1	3
Florida	1	1	3
Kentucky	0	1	0
Louisiana	0	0	2
Maryland	0	0	1
Mississippi	0	1	0
Nebraska	0	1	1
New York	0	0	1
North Carolina	0	0	2

Table 4.1 Continued

State	Prepared	< 2 years prepared	Not prepared
Ohio	0	0	1
Puerto Rico	2	0	0
South Carolina	0	2	0
Texas	1	1	3
Virginia	0	0	2
Total	**5**	**8**	**19**

4.3.1 Consequences of Pre-disaster LTRG Creation

DHR planning helps to reduce the impact of disasters and enhance the recovery process, especially when the main stakeholders are involved and work to develop a plan around the recovery priorities (Patel & Hastak, 2013; Sandler & Smith, 2013). LTRGs, together with the local government, should help set the direction for the recovery plan (Sandler & Smith, 2013). According to members of the LTRG, planning for disaster housing recovery is one of the three major topics and these are discussed in the following chapters of this dissertation. The interviewees related these concerns to the time invested to create the LTRG, as could be applied before disaster hits. In later sections of this chapter, they also focused on how having the planning will also help to receive fundings, donations, find the labor needed, and prepare for a recovery that renders a community more resilient.

Puerto Rico, along with some other states, has ensured that an LTRG is always in place. One member of an LTRG in Puerto Rico mentioned that*: "After Hurricane Maria and FEMA acted, the Puerto Rico VOAD started the initiative of creating different LTRGs in the different sectors of Puerto Rico. They started from scratch, gathering volunteers from the church. Since then, there have been different LTRGs active in Puerto Rico prepared to react."*

To provide guidance on the analysis made, in this and subsequent sections, I will use content analysis from NVivo. NVivo provides some results related to the coding by sentiment, in which, depending how the interviewee was expressing her/himself about the question, the software can provide an analysis with ordinal categories ranging from very negative to very positive sentiment.

Creating an LTRG is important. Members of LTRGs expressed their sentiments in Table 4.2, through which we can understand their frustrations. In this table, the darker the color, shows a higher frequency of observing a sentiment; the lighter color shows a lower frequency sentiment. The numbers related to each position refers to the number of sentiments involved in the LTRG creation. From the y-axis, the content of planning and LTRG formation for disasters (a category coded as the author analyzed the interview transcripts), and in the x-axis, the level of sentiments from very negative to very positive. The overall response was more negative than positive, with 58.8% negative sentiments through the interview statements about the LTRG formation coded, and 41.2% coded as very positive.

Table 4.2 LTRG Formation Sentiment

	Very negative	Moderately negative	Moderately positive	Very positive
LTRG Formation	82	51	68	25

As an example of the sentiment analysis of the interviewer, statements concerning LTRG formation consider the different opinions from the LTRG members sorted between the different levels of sentiment. First, a very negative sentiment: "*It was interesting because I was there*

immediately following Hurricane Irma. There was no formal long-term recovery group to bring nonprofits to the table, FEMA had an outreach coordinator who worked with us to identify our needs, but it took months to see all this money come in, and then we had to organize everything quickly, and to organize the long-term recovery group." In this statement, we see the challenges associated with attempting to organize a group in the wake of a disaster, and how lack of formal organization impeded some parts of the recovery.

With a moderately negative sentiment, one member of an LTRG in Texas mentioned that: *"Because we've worked with LTRGs for so long, the LTRG has partnered with an NGO, which, while not running the LTRG, is holding a bigger leg in this example. We have excellent process knowledge. So, in this case, we could help start the program. That's highly unusual and not something we typically do. But help us have an LTRG established before the disaster hits to react more promptly."* There are identified concerns and problems in this passage, but overall, the tone is more positive, emphasizing more ways things went well, in combination with challenges.

A moderately positive sentiment is illustrated by this passage from a member of an LTRG in Louisiana who mentioned that: "*When a disaster strikes, we have all the elected officials, and others, to fall under the same repair umbrella that lends itself to post recovery. The Local Office is the entity in charge of disaster anytime a disaster hits. The LTRG organizes the overall recovery effort and develops long-term recovery planning.*" Even though officials help in the initial process, the formation and work that must be done from the LTRG takes some time, which leads them to have an obstacle in the recovery process. Nonetheless, this is primarily a statement expressing positive organizational structures that are in place to facilitate disaster recovery.

An example of a very positive sentiment comes from a member of an LTRG in Puerto Rico who mentioned that*: "It is important for us on the island to have LTRG already established as the*

number of disasters that hit us are always increasing. It is difficult for us as an island to receive help quickly because we are basically isolated. There are other states that have received ground aid in a matter of hours. That is not our case. For that reason, we try to have our LTRG ready to react quickly." This statement describes one of the main reasons to have an active LTRG: to be proactively prepared to engage with disaster recovery challenges.

One essential for planning before a disaster should involve the creation of an LTRG to prepare for a disaster so members are prepared for post-disaster response. Based on this dissertation's results, there is evidence that having created an LTRG prior to disaster is associated with more positive sentiments about the process of LTRG creation in the interviews. In Table 4.3, we can observe the y-axis providing the different responses related to creation of an LTRG: always created, created within 2 years because of a prior disaster, or not created at all. On the x-axis, we see the level of sentiments from very negative to very positive.

We can see that having an LTRG always creates an overall positive sentiment, rather than having an LTRG created before the impact of a disaster (either No LTRG or one created after one disaster and prior to a second disaster) that is giving an overall negative sentiment. The difference between the active LTRG category and the other two (when pooled) is statistically significant ($x^2 = 9.4$, df = 3, $p < 0.05$).

Table 4.3 LTRG Formation

	Very negative	**Moderately negative**	**Moderately positive**	**Very positive**
Active LTRG	27%	19%	39%	16%
<2yrs LTRG	41%	26%	22%	10%
No LTRG	37%	24%	27%	12%

The results in Table 4.3 and the qualitative analysis of the interviews implies that one way to improve the experience with LTRG formation and planning is the simple act of having an LTRG active prior to the disaster. These results support some of the content of the literature, but also expand our understanding, explaining the importance and differences of having an LTRG always active rather than reacting to different disasters within a 2-year period.

With the purpose of having a deeper understanding, I added different topics related to the interview to the data analysis. The most related topics to planning were combined in Table 4.4 where we can observe the sentiments expressed by members of LTRGs. In this table, the darker the color, shows higher frequency sentiment responses; the lighter color shows lower frequency sentiment responses. The numbers related to each position refers to the number of sentiments were involved of planning with the different topic questions related to planning: delay factor (P-DF), lessons learned (P-LL), accounting of an LTRG (P-LTRG-A), formation of an LTRG (P-LTRG-F), multiple LTRGs working on the same disaster (P-LTRG-M), and in the x-axis, the level of sentiments from very negative to very positive.

We can see that the most negative sentiment received by the experts is the ability to create an LTRG with (59%) negative responses as there are numerous obstacles to planning the creation of the group, and actually a very large sum of states creates the LTRG after a disaster impact. Another very negative sentiment was an obstacle with (67.5%) negative responses, expressing that without planning, recovery will be less effective. It is essential to create a pre-disaster planning that will help decrease the impact of the disaster, especially in zones where assistance will take longer time than others.

For some other members, the reaction was different, expressing a positive response of (41%) as they had the LTRG creation without obstacles. It correlated these sentiments with those

states that will provide support before the impact. Another important aspect is their responses to the lessons learned from the LTRGs, as they were providing a mix of sentiments from negative (56.1%) responses to positive (43.9%) responses where some LTRG members expressed their sentiments about their lessons learned from disasters. In which they expressed the value of learning from the past to improve future disaster recovery.

It is normal and necessary to respond when needs come into place following a disaster. However, based on the positive sentiments received by the LTRG members, decisions made early in the recovery process can provide a significant positive impact on the recovery across a community. Overall, the sentiment received from the members of the LTRG in relation to the creation and planning for a disaster was more negative than positive. Combining all results from the sentiments expressed, difficulties at the moment of either a pre-disaster planning or creating an LTRG are essential obstacles for the PDHR.

Disaster management offices should analyze and compare from previous disasters the ability to provide the tools to the most active counties and states, and as different LTRG members mentioned, the idea of decentralizing emergency management offices will help flip the sentiments of members regarding the process for the PDHR. More discussion of decentralization will be included in Chapter 5.

Table 4.4 Planning Coding by Sentiments

	Very negative	Moderately negative	Moderately positive	Very positive
P – DF	92	49	38	30
P – LL	66	35	57	22
P - LTRG -A	22	8	18	6
P - LTRG-F	103	58	83	29
P - LTRG-M	48	19	42	14

Note: P-DF is planning delay factors, P-LL is planning lessons learned, P-LTRG-A is planning LTRG account, P-LTRG-G is creation of an LTRG, P-LTRG-M is multiple LTRG working on the same disaster.

Planning post-disaster housing recovery is a valuable tool for recognizing the essential conflict between speed, as well as creating a mechanism to resolve differences ahead of time. Balancing both creates competing interests during reconstruction, as resilient communities try to build their capacity to manage their disaster's impact (Koliou et al., 2020).

For instance, one of the LTRG members expresses that *"capacity support is important in making the planning effort succeed. Timing should be helpful, for the proximity of the storms being a challenge. The recovery planning allowed us to take into consideration not just a hurricane, but back-to-back hurricanes with flooding."*

The importance of planning and the creation of an LTRG before disaster hits seems to be tremendous. A rising number of local and state governments are engaging a wide variety of stakeholders in resilience planning activities to identify requirements and strategies to reduce the effects of extreme hazard events and enhance disaster recovery. Agencies and organizations put these programs' lessons together and publish suggested resilience planning and policy analysis techniques (Miles 2017).

An LTRG member explained why planning is critical to facilitate recovery as follows *"The importance of having the LTRG created by the moment the disaster hits helped us to react quickly. The fundamental structure was already established and, to fully cover the area that corresponded to us, we assigned leaders in each area. That way we could respond quickly to solve cases by case. The idea of decentralizing the system has been effective."*

Pre-disaster creation of LTRG can facilitate community participation and trust. The long-term credibility of local and national governments is impacted by the growing recognition of community participation as a critical issue in catastrophe preparation (Mazepus & van Leeuwen, 2020; Sovacool et al., 2017). Local plans and their components can severely limit options for reconstruction, such as zoning and land regulations, especially when local input is given without being requested (Fraser et al., 2021).

One of the important features gained from the use of NVivo is the ability to combine the most referential words related to the topic. Through express planning themes aligned by the level of interaction in Table 4.5, we can observe the coding reference count: the darker the color shows the higher number of relationships among the themes; the lighter the color shows the lower numbers of relationships. The numbers related to each position refers to the number of times those themes were involved in the LTRG creation.

The y-axis shows the different topic questions related to planning such as delay factor (P-DF), lessons learned (P-LL), accounting of an LTRG (P-LTRG-A), formation of an LTRG (P-LTRG-F), multiple LTRGs working on the same disaster (P-LTRG-M). The x-axis shows the most involved words related to planning. The results provide us with interesting information. As a result, combining lessons learned (P-LL) with management is a clear reason why the LTRG planning needs to be getting more attention. Also, the importance of the LTRG formation (P-LTRG-F) as it

is aligned with organizations that let us understand why the formation of the LTRG needs to have a planning organization.

Based on the higher interactions, it is observed that more thought and consideration should be given to local stakeholders that can be included in planning the recovery processes at the different stages of the PDHR process. Another analysis is the comparison among the topic questions. We can observe that there were similar responses from the delay factor (i.e. obstacles) and lessons learned from disaster management. Also, the formation of an LTRG and delay factors have similarities with the organization. The higher the similarity of responses among the different topics regarding the long-term recovery, the higher the relation among them will be. Giving us a clear understanding of how the LTRGs are a key factor in the timing of a disaster recovery–such as the delay factor, lessons learned, the formation of the LTRG, the importance of working together multiple LTRGs in the same disaster.

Table 4.5 Planning Coding Reference Count

	Agency	Community	Disaster	Government	Management	Organizations	People	Planning	Recovery	Recovery group
P-DF	2	3	11	7	6	5	8	5	16	9
P-LL	4	6	8	1	11	2	4	10	20	7
P-LTRG-A	2	2	1	2	3	3	4	6	8	0
P-LTRG-F	6	3	8	5	4	11	2	1	17	5
P-LTRG-M	2	3	4	2	3	4	3	3	11	9

Note: P-DF is planning delay factors, P-LL is planning lessons learned, P-LTRG-A is planning LTRG account, P-LTRG-F is creation of an LTRG, P-LTRG-M is multiple LTRG working on the same disaster.

Continuing supporting the analysis of the data obtained from the members of the LTRGs, we now use another software, Leximancer. It provides a sentiment analysis while identifying high-level concepts, outlining key ideas and practical insights (Leximancer, 2022), which is very helpful in supporting this research. With, Leximancer was applied to the same content I did with NVivo to support this research. Table 4.6 provides a matrix highlighting the more involved themes in the planning stage. The themes in the x- and y-axis are integrated among them, giving them a level of importance with the number of times they were interacting with each other. The higher the number, the higher the interaction is among the topic themes, which explains the interaction among the themes.

We can observe from this approach that focusing on the planning of recovery is the most important theme and must be done so, as it is necessary to reduce the impact when a disaster occurs. The other important theme is disaster recovery and case management, as it should be a plan to make the recovery happen, and the person in charge to initiate the recovery should be the disaster case management person.

Grouping the results of Table 4.6 allows the participants to understand that the disaster recovery should involve members of the community within their LTRGs. It is proven that recovery planning improves local outcomes (Horney et al., 2016), especially when they come with a structure focusing on the community.

Table 4.6 Planning Matrix Frequency

	Recovery	**Hit**	**Disaster**	**Case**	**People**	**Groups**	**Community**	**Work**	**Organizations**	**County**
Recovery	**277**	62	57	41	31	82	38	35	29	28
Hit	62	198	34	20	22	17	13	26	16	11
Disaster	57	34	124	24	10	21	22	16	13	9
Case	41	20	24	98	17	8	19	17	11	12
People	31	22	10	17	116	8	22	13	8	10
Groups	82	17	21	8	8	89	14	13	13	8
Community	38	13	22	19	22	14	94	7	10	10
Work	35	26	16	17	13	13	7	95	17	7
Organizations	29	16	13	11	8	13	10	17	60	10
County	28	11	9	12	10	8	10	7	10	54

Even though there is research based on the planning process to decrease the DHR impact, it has not been enough to create a positive recovery plan. The idea of focusing on the fundings, donations, labor, and a more resilient housing, are part of my research to improve the recovery timing process. LTRGs are an important component to the recovery of a community impacted by a disaster. For instance, for those vulnerable populations, one of the LTRG members expressed the importance of planning, "*so you're an individual who has some type of medical necessity and then the last thing is your plan. Do you have a plan? What are you going to do? Do you have the resources you need to take care of yourself for a minimum of 72 hours? But then on hour 73, the community blowing up the phone's gone. Do you know who to call? Do you know where the paperwork is?"*

4.3.1.1 Funding and Donations: Not Always Arriving at the Right Moment

One of the most important components in the recovery is having the funds and donations at the right time. Furthermore, an LTRG must prioritize which are the first to receive support and as a LTRG member expressed, "*Typically, the approach we recommend which is best supported by leadership of the long-term recovery group is to start with supporting individuals with very low income from a median household income standpoint."*

With, is important to get the funds on time as it is expressed in Table 4.7 as one of the obstacles: receiving funding from governments and having the ability to manage an LTRG. There is no work that can be done in terms of recovery without having the funds and planning head of time under blue skies. The funds possible needed are essential for the success of the planning to start. One of the LTRG members expressed the frustration of receiving funds on time, *"Once you get congressional approval that we can get the funding, we have to wait on the Federal Register for at least six months. Then you have to develop your plan, your action plan that gets approval, and develop your programs and put that out. So, by the time you actually have any agency or anybody has funding available for people to apply for, it's been about a year, year and a half. And that can be very frustrating for folks."*

Following large disasters, the Federal Government and other donors frequently made a significant amount of money available to finance the recovery to meet the recovery goals. However, the timing of receiving the funds and donations is not always the best. Another important factor that must be involved in the recovery process is planning for the managing of the money. Throughout the recovery, LTRG must monitor its progress to assess what has been accomplished and where readjustment is required. Thus, recovery assessment is critical for donors, while it also

improves process transparency, the capacity of executing agencies for ongoing work, and it supports auditing efforts and accountability (Sheykhmousa et al., 2019).

The development of elaborated planning among the different counties created competition for donation for emergency relief and redevelopment. Implementing planning projects brings some tensions to prepare reports in the early stages (Bilau, 2018).

One of the LTRG members expressed the importance of being prepared as *"one thing we started was having meetings every other month, creating subcommittees for the planning, donation management, labor management, and immediate reaction group, so we can be ready to respond."*

Funding plays an important role in planning for disasters. The sentiments expressed in Table 4.7 shows how the LTRG members are seeking more disaster funding. In this table, the darker the color, shows a higher frequency sentiment of responses; the lighter color shows a lower frequency sentiment of responses. The numbers related to each position refers to the number of sentiments involved in planning the funding. On the y-axis, we can observe the different questions related to planning-funding such as lessons learned (F-LL), formation of an LTRG (F-LTRG-F), type of government (F-TG), and on the x-axis the level of sentiments from very negative to very positive. In this subcategory of funding, the results from the content analysis with NVivo provide similar results to the major category–planning.

Besides the issue creating LTR groups, one difference between the planning and the funding are observed in Table 4.5 where delay factors are not part of the table and lessons learned but are the second important sentiment with negative responses of (56.4%) and positive responses with (43.6%), expressing a combination of sentiments of the lessons learned from LTRG members. Moreover, responses to questions about funding frequently fell into the LTRG formation category

(320 total), and the emotion was more negative than positive (58.8%). Concerning that without the proper funding an LTRG formation will be hard to perform.

Overall, the LTRG members' opinions on funding for disaster planning were more negative than positive. Getting funds in advance for potential disasters has different obstacles that increase the timing of a PDHR. It is important to address that at all governmental levels - including NGOs and private institutions, disaster recovery is a strategic instrument. To effectively support communities, LTRG members need to collect, and valid metrics that show how well a community should recover from a disaster. Provide a disaster action plan that will take place in the event a disaster hits.

Table 4.7 Funding Coding by Sentiment

	Very negative	Moderately negative	Moderately positive	Very positive
F-LL	80	48	65	34
F-LTRG-F	117	71	91	41
F-TG	66	39	45	20

Note: F- LL is funding lessons learned, F- LTRG-F is funding creation of LTRG, F-TG is a funding type of government.

It is important to address that these sentiments help us understand the patterns of an important factor in planning funding and donations. Researchers investigate donation patterns to see if the socioeconomic circumstances of the donors can explain them and how it could be beneficial to receive them before a disaster occurs. The importance of receiving the donations in earlier stages can assist the LTRGs in estimating the volume of material convergence they will

encounter in the event of a catastrophe. They might be better equipped to manage donations during the response if they know this beforehand (Chong et al., 2019; Destro et al., 2011).

DHR projects are frequently funded for housing reconstruction programs through a variety of domestic and external sources. Domestic resources, for example, could come from budgetary allocations, contributions from civil society and philanthropy, and insurance, whereas external sources would include funds from multi/bi-lateral donors, as well as international NGOs (Bilau et al., 2017). With the LTRGs, it is quite complex, for instance, one member mentioned that *"funding is always a problem, especially in these areas that are hit year after year after year after year."* where the member expressed the frustration to get the money needed for the recovery.

Another obstacle is the timing of case management. For instance, an LTRG member expressed that *"Getting case management up and running can be a huge delay putting together who is going to be the case manager and find the fundings from FEMA. However, the positive outcome is that once it's approved, it covers the funds for two years."*

Other member has the similar situation with the case management, "*we didn't have trained disaster case managers to immediately address unmet needs, beyond what the government would do in search and rescue and sort of saving people's lives and the federally funded case management that comes in after a declared disaster takes many months to set up. So, our long-term recovery group benefited from the federal disaster case management, but it took several weeks for that to start.*"

As an LTRG member said that "*one of the biggest frustrations was a funding source for the state of Florida that has a volunteer program and funding came through the state because almost every county in the state was impacted by Irma, but anyway, they had this pool of money and the frustration a lot of time is to get approved for that money.*"

A frustrated member of an LTRG said *"you must develop your plan, your action plan that gets approval, and develop your programs and put that out. By the time you have any agency, or anybody has funding available for people to apply for, it's been about a year, year, and a half. And that can be very frustrating. So, implementing that local group of people who can do some of that patchwork until there's that big batch of funding that comes down the line."*

In some situations, the way LTRG has solved the funding problem has been through NGOs, for instance, *"my organization's local initiative, support Corporation and a couple of other nonprofit leaders including the United Way that set up the First Coast Relief Fund, which is a pool of money. Those organizations saw the need for a coalition to deal with long-term recovery issues. As you know, there's a time during the immediate response where there needs to be a transition to long-term recovery where the government emergency management really sort of falls back from their logistical work."*

In other cases, the strategy has been to continue being active. For instance, a respondent remarked, *"we are going to make sure that the LTRG does not go dormant and stays active so it's ready to respond to the next hurricane or tornado hits so funding can be received a little more quickly."*

It is important to understand other patterns of donation to adapt to the planning. For instance, donors who were designated as headquarters gave more than donors who were classified as individuals or non-organizations. Also, high-rent residents are reportedly more likely than low-rent residents to send more donations of goods (Chong et al., 2019). Moreover, it is necessary to keep in mind for planning fundings that donors who live closer to the affected area send more in-kind donations than donors who live further away, the value of in-kind donations, also known as non-cash donations, decreases.

This suggests that the effects of distance on monetary and in-kind donations are diametrically opposed. It makes sense that donors who live far away would prefer to give money rather than goods, given the logistics of doing so (Brown et al., 2019; Chong et al., 2019).

Another factor for planning fundings is finding the connection of the donor being affected from previous disasters, as there is proof that giving to those affected by disasters leads to future charitable giving, with donations to compassionate and in needy organizations showing the strongest correlation (Brown et al., 2019).

Unceasing in the data analysis process, the more related topic themes to plan funding can be observed on Table 4.8. The darker the color, the higher the relation among the themes is; the lighter the color, the lower the relation is. The numbers related to each position refers to the number of interactions among planning funding with lessons learned (F-LL), formation of an LTRG (F-LTRG-F), type of government (F-TG) on the x-axis, and at the y-axis the most related themes to this research. The combination of LTRG formation with the recovery was the most important one expressing the needs of fundings to get an LTRG established for the DHR. In addition, lessons learned related to recovery and management are also important when funding is part of the main issue. In terms of comparison among the topic questions with them, we can observe that the most responses were involved in the recovery and in the management giving the importance of planning the funding/donations for the facilitation of the PDHR.

Table 4.8 Funding Coding by Themes

	Case management	Community	Disaster	Emergency	Funding	Government	Group	Management	Organizations	Recovery
F-LL	9	6	10	2	11	1	13	14	6	16
F-LTRG-F	5	3	11	4	6	5	8	8	11	17
F-TG	1	1	6	11	13	5	9	10	10	14

Note: F- LL is funding lessons learned, F- LTRG-F is funding creation of LTRG, F-TG is funding type of government.

As funding is an important topic in disaster planning, we continue providing content analysis. In Table 4.9, we are expressing an analysis using Leximancer. We can observe the relations between funding and the main topic themes below. The higher the number, the higher the relationship is among the themes. The importance of planning the funding to be prepared for the possible different disasters. It gave the x- and y-axis integrated themes a level of prominence based on how frequently they interacted with one another.

Conclusions from this interaction show that funding is a crucial step in the planning stage and must be prioritized because doing so will facilitate the recovery and diminish the damage of the disaster. Grouping the different themes from the table below, indicate to us the importance of the government playing with the affected counties in the disaster recovery. It is essential to address that each disaster recovery is different, and what will make a smooth recovery will be the people involved with it, including the householders.

Table 4.9 Funding Matrix Frequency

	Recovery	Different	Disaster	People	Work	Community	Management	Groups	County	Government
Recovery	192	59	41	22	23	25	26	43	25	16
Different	59	144	23	18	21	24	14	16	16	13
Disaster	41	23	83	9	13	13	12	10	8	8
People	22	18	9	81	14	14	8	5	11	9
Work	23	21	13	14	72	8	11	8	8	11
Community	25	24	13	14	8	70	9	11	8	9
Management	26	14	12	8	11	9	59	4	16	9
Groups	43	16	10	5	8	11	4	53	5	4
County	25	16	8	11	8	8	16	5	49	13
Government	16	13	8	9	11	9	9	4	13	49

Much research has been done to understand the importance of funding for a PDHR. After analyzing all the data regarding funds and donation, we can add that providing the opportunity to counties having a more decentralized system that allow them to react more quickly and more diligently will help to be better prepared and to reduce the impact on the PDHR process.

4.3.1.2 Labor: An Essential Human Resource

A crucial factor in terms of the planning is the labor. Human resource is essential for the housing recovery in different areas. These include those who work on site, as well as those who buy and transport the materials. Planning the labor work is a key for the success of a rapid recovery.

It is critical to engage human resource experts with experience in DHR to conduct an assessment and planning of human resource requirements -skilled and unskilled that would help

in the housing recovery project. For instance, one of the LTRG members expressed their frustration with laboring *"we were having challenges with a lot of things, but particularly volunteering labor."* Another member said, *"probably the worst problem they have is where to put the volunteers."*

Every disaster is unique and teaches different lessons, such as how to respond, where to keep resources, what to do first, who plays an important role during such events, how to prepare for the next disaster, and how to coordinate people and humanitarian agencies. To mitigate the effects of disasters on society, the economy, and the environment, humanitarian organizations should focus on long-term sustainable development that will lead to a better future (Yadav & Barve, 2016).

In terms of obstacles, one frustration LTRG members faced was that they *"would see delays I guess for recoveries and then if you're talking about getting volunteers there, the huge thing that is hard, is finding housing for volunteers can be another delay if that's what you're that's how you're saving money on doing repairs to the homes by having volunteers.*"

The essential involvement with those experienced disasters and the labor obstacles they faced can be observed in Table 4.10. In this table, the darker the color, shows a higher sentiment; the lighter color shows a lower sentiment. The numbers related to each position refers to the number of sentiments were involved with planning labor such as delay factor (L-DF), lessons learned (L-LL), formation of an LTRG (L-LTRG-F), type of government (L-TG), and on the x-axis, the level of sentiments from very negative to very positive. In this subcategory of labor, the results from the content analysis with NVivo provide similar results to the major category–planning, as we include again the delay factor (i.e., obstacle) as an important factor for labor.

The most negative sentiment continues to be the creation of an LTRG regarding finding the right to labor, following an obstacle that impedes the recovery with responses that frequently fell into the category with (251 total), where the emotions were more negative than positive (66.5%). There is still much work to be done to change people's sentiment in relation to labor and planning for disaster recovery because the LTRG members' opinions were more negative than positive. Having the right labor at the right time is essential, especially for the intent to reduce the impact of a disaster and reduce the PDHR.

Additionally, responses to questions about labor for LTRG formation category had a total of 315 responses, and the emotion was more negative than positive (59.3%). Concerning that labor should be important for disaster recovery through the LTRG formation.

It is important to address that every disaster is unique, and disaster planning cannot account for every circumstance. This means that disaster case managers must be able to adapt or improvise to solve new problems, especially with labor - their skills, and experiences. From the lessons learned we can encounter that disaster case management officers could be hesitant to include labor workers in their counter-disaster plans and that affect the sentiment of the LTRG members.

Table 4.10 Labor Coding by Sentiment

	Very negative	Moderately negative	Moderately positive	Very positive
L-DF	112	55	49	35
L-LL	86	41	68	27
L-LTRG-F	123	64	94	34
L-TG	72	32	48	13

Note: L-DF is labor delay factor, L-LL is labor lessons learned, L-LTRG-F is labor creation of LTRG, L-TG is a labor type of government.

Depending on the situation, some strategies for resolving human resource needs for the rapid construction of resilient, sustainable, and acceptable housing could be used. Mobilization and recruitment of local builders, volunteers, and/or householders are among these strategies; engagement of construction industry actors, particularly those in the reconstruction area who can use their network to recruit skilled workers or import skilled workers and experts; and the use of a multi-skilled labor strategy is also among these strategies (Bilau et al., 2017).

An example of how the LTRG are handling is the experience from this member, *"the price of labor being so high the availability of labor being so low, it puts a strain on, on anybody who hasn't experienced the disaster, and it puts you multiply that significantly when you're talking about an area who has a higher demand for services, and a higher demand for some of these things than in than other areas because we're not just starting from zero we're starting from negative 100."*

Workers' capacities should be developed regardless of the methods used to find workers to ensure that they are adequately skilled to meet emerging production demands and the buildings' long-term sustainability. Education, training, awareness workshops, and on-the-job mentoring can all assist with this. Workers will acquire the skills and competencies, as well as be educated on incorporating risk mitigation measures into the housing construction process.

To perform at their best, it must motivate employees. This should engender enthusiasm, improve efficiency and performance, and ensure that they remain employed by the reconstruction organization and area (Bilau et al., 2017). *"An individual assistance specialist is part of the long-term recovery planning. So, what do I have? I have a gentleman who works in the northern region and the city that he is part of a part of a team long term recovery group. So, we help them*

coordinate more than anything as far as the building and maintenance of the long-term recovery groups now."

There are some fortunate LTRGs that could account for labor: "*the labor is immediate. Fortunately, there are regional and national organizations who have skilled volunteers, and they are ready to be deployed during many of these disasters in our region. We're very fortunate to have multiple groups available. The labor part is very efficient. Some of the positive experiences that we have had in our region, partner organizations that also have similar missions to assist the public. They take time to organize themselves and to deploy staff to a disaster.*"

Providing a deeper analysis, Table 4.11 is focused on the most related themes. Synergy is the key for any success result. In the table, we can observe how labor is related to other major themes. The darker the color, the higher the relation is among the themes; the lighter the color, the lower the relation is. The numbers related to each position refers to the number of times themes were interacting with each other in terms of planning labor.

On the y-axis, the different topic questions related to planning-labor such as delay factor (L-DF), lessons learned (L-LL), formation of an LTRG (L-LTRG-F), type of government (L-TG), and on the x-axis is the most related theme. The results provided us with interesting information. Like results with funding, the main combination is between the LTRG formation of labor and the importance of recovery. One difference between funding and labor is that the labor delay factor with the disaster has to stand up to code references.

Providing a comparison among the different topic questions and the themes, we can observe that the themes recovery, management, and disaster were the one more aligned among the topic questions with the highly responses from the experts, giving the importance of labor for the disaster recovery and management.

Moreover, as disasters happen, it can also give the opportunity for planning the formation of laborers ahead of time. It showed the need for more organized and well-equipped labor response capabilities. The experience of mass laboring could quickly lead to community reconstruction.

Table 4.11 Labor Coding by Themes

	Assistance	Case management	Disaster	Emergency	Government	Group	Management	Organizations	Recovery	Volunteer
L-DF	5	5	12	3	5	10	7	6	14	5
L-LL	2	7	7	2	1	12	12	3	16	7
L-LTRG-F	3	1	8	4	5	8	4	11	19	8
L-TG	4	2	9	11	4	8	11	7	16	6

Note: L-DF is labor delay factor, L-LL is labor lessons learned, L-LTRG-F is labor creation of LTRG, L-TG is labor type of government.

With the purpose of highlighting the most important concepts and useful insights, using the data obtained from the interviews, I used Leximancer to indicate the interaction between disaster labor and the major concepts through a matrix that is sorted by numbers. Table 4.12 shows the current more actively involved in labor regarding the planning process. It gave the x- and y-axis integrated themes a level of prominence based on how frequently they interacted with one another. The higher the number, the higher the interaction is among the themes.

Conclusions from this matrix expressed the importance of managing the right people to work in a disaster recovery as part of the planning phase and working with the community to understand and apply their needs for an improved recovery. Having the right people to work on the recovery is important, especially if those are part of the same affected community. Grouping

the different themes from Table 4.12 shows the importance of managing the right people to work on disaster recovery.

Table 4.12 Labor Matrix Frequency

	Recovery	**Doing**	**Disaster**	**Management**	**People**	**Work**	**Community**	**Case**	**Groups**	**County**
Recovery	253	44	57	39	31	29	33	28	61	27
Doing	44	134	20	21	18	16	12	17	15	11
Disaster	57	20	118	24	11	15	19	21	16	10
Management	39	21	24	90	12	13	16	49	5	16
People	31	18	11	12	111	18	19	7	6	11
Work	29	16	15	13	18	87	9	9	8	9
Community	33	12	19	16	19	9	87	10	12	8
Case	28	17	21	49	7	9	10	68	3	6
Groups	61	15	16	5	6	8	12	3	67	6
County	27	11	10	16	11	9	8	6	6	56

In the PDHR, affordability, technical viability, and overall quality of life must all be considered. Nevertheless, the labor force is essential for an exceptional disaster recovery, including educated householders that preferably are active stakeholders in the recovery should be valuable too. This current analysis proves that, when trying to lessen the effects of a disaster and lower the PDHR process, having the right labor available at the right time is crucial, and pre-disaster planning is essential to effective management of labor resources.

4.3.1.3 Build Back Better (BBB): Planning a More Resilient Community

The other key factor in the planning is the resilient recovery of the housing. Planning the way houses will be recovered with a BBB philosophy is essential for the success of the phase. It is important for understanding to have a plan that will be aligned with labor and funds to create housing more resilient for future disasters.

A logical first step toward promoting resilience under conditions of high uncertainty and rapid change is disaster recovery plan based on how a community should be redeveloped after a disaster. Recovery plans are based on the ideas of foresight and adaptation in which communities assess options for the future while also considering circumstances they may not fully control (Berke et al., 2014; Clark et al., 1997; Olshansky & Johnson, 2010). One of the LTRG members mentioned *"I had people there who remained willing and realized the importance of planning to ensure a more resilient housing recovery."*

The recovery of a private and secure home, as well as the quality of that recovery, are part of a resilient plan. The goal is to plan to provide relief in the longer-term doing more than saving lives and ease suffering in advance for the next disaster. A build back better philosophy is one of those proposals that could ease the impact on those affected by a disaster (Johnson & Lizarralde, 2012; Lyons, 2009).

The desire to rebuild better as an opportunity for disaster response to leave communities in a safer environment should be common; There are situations where it is not workable to rebuild a house that was destroyed completely or it was in a poor situation, especially when there is an opportunity for something better (Fen, 2013). Lessons learned from members of LTRGs through their sentiments regarding the importance of making the right decision of building back better or not are shown in Table 4.13. The darker the color, the higher the sentiment is the lighter the color,

the lower the sentiment is. The numbers related to each position refers to the number of sentiments were involved with planning-BBB such as lessons learned (BBB-LL), formation of an LTRG (BBB-LTRG-F), type of government (BBB-TG), and on the x-axis, the level of sentiments from very negative to very positive.

The darker the color, the higher the sentiment is. The numbers related to each position refer to the number of sentiments involved in the specific theme. In this subcategory of build back better, the results from the content analysis with NVivo provide similar results to the subcategory of funding, as this depends on each other. Essentially, you cannot provide a more resilient recovery without fundings, and you will not receive disaster fundings if you do not propose a post-disaster housing recovery plan.

The main issue continues to be the planning of an LTRG and how this affects the DHR process, including build back better. Responses to this category had a total of 251 responses, and the sentiments tended to be more negative than positive (58.1). Even though the use of the build back better (BBB) philosophy has grown, there are still some barriers among the LTRG members. Additionally, responses to build back better questions frequently fell into the lessons learned category (158 total), and the sentiments were more negative than positive (54.4% negative).

It was discovered that there is not a specific definition of BBB bringing some confusion among them. Nevertheless, there were some that reflect knowledge of good practices at the moment of planning to reconstruct in a more resilient way. We can conclude that the sentiments from the members of the LTRGs were more negative than positive regarding the build back better disaster planning. There is a lot of work to do to improve the planning and reduce the recovery time in a more resilient way. Housing resiliency is a very complex component in the housing

recovery process, as it must be aligned with the fundings, the quality of the house, and the right time.

Table 4.13 BBB Coding by Sentiment

	Very negative	Moderately negative	Moderately positive	Very positive
BBB-LL	52	34	53	19
BBB-LTRG-F	89	57	79	26
BBB-TG	38	25	33	5

Note: BBB-LL is build back better lessons learned, BBB-LTRG-F is build back better creation of LTRG, BBB-TG is build back better type of government.

Other than better rebuilding, there are many other ways to enhance the DHR phase. A more inclusive recovery must go hand in hand with a faster recovery to ensure that people return to their normal lives as soon as possible, otherwise, the vulnerable population may suffer disaster consequences (Hallegatte et al., 2018). One of the fastest ways is planning of time as one of the LTRG members mentioned, *"it's better for us to be talking on a national or state level about materials that are being used, and especially things that could make the homes more resilient."*

The community's involvement is crucial to the planning and resilience processes. Because of climate change and rapid development in environmentally vulnerable areas, planners have faced an increase in the frequency and severity of disasters and having the community involved not only will help with the recovery time but also the way their houses will be restored (Xiao & Van Zandt, 2012; Xiao et al., 2022).

It is important to determine who, where, and how to measure the build back better, and the stakeholders involved, including the benefits of this and its consequences on investing in making the BBB (Mannakkara & Wilkinson, 2013). An LTRG member expressed their experience that *"build back better is obvious in a hurricane region. We can't just say we're going to put in hurricane proof windows when our disasters are mostly flooding. It's not easy."*

It is essential to address that these results give us the opportunity to understand why many governments and stakeholders have found the BBB to be a major challenge, and efforts assumed without a BBB aim are more exposed to repeat the same environment of vulnerability (Mannakara & Wilkinson, 2014). LTRGs, with governments, stakeholders, and disaster-affected communities, are always willing to reconstruct stronger and resilient communities, otherwise the impact on those areas will be the same or worse in future disasters (Dube et al., 2021).

One of the LTRG members expressed that "*We help them coordinate more than anything the housing rebuilding to be more resilient."* As it has been important, to recover the area in a better shape than it was.

Applying the BBB philosophy is about *"the commonality that there is always the desire for a more resilient reconstruction. However, not always is possible having the fundings to do that."* We must make quick decisions about where to rebuild, how to rebuild, and how to finance. It is common to apply BBB, which is frequently used by actors involved in post-disaster reconstruction. New post-disaster structures should be better than pre-disaster structures in every way and should provide the affected community with a better living environment, including their homes (Johnson & Lizarralde, 2012).

Building back better, it is all about having the funds and an eligible house to be recovered. Table 4.14 shows the coding reference count. The darker the color, the higher the relation is among

the themes; the lighter the color, the lower the relation is. The numbers related to each position refer to the number of times the themes were interacting related to planning-BBB such as lessons learned (BBB-LL), formation of an LTRG (BBB-LTRG-F), type of government (BBB-TG), and on the x-axis are the most related themes. The importance of having well organized the formation of an LTRG continues at the top of the counting–in this case related to planning more housing resiliency.

Subsequently, the importance of lessons learned to regard management and recovery confirms the necessity of planning more resilient housing that in the long-term will be less affected by potential future disasters. Offering a comparison among the different topic questions and the themes, we can observe that to offer a build back better philosophy you should have management skills to provide a faster disaster recovery.

Table 4.14 BBB Coding by Theme

	Agency	Case management	Community	Disaster	Government	Group	Long-term recovery	Management	Organizations	Recovery
BBB-LL	4	7	6	7	1	10	8	11	2	12
BBB-LTRG-F	6	1	3	10	5	8	8	5	11	17
BBB-TG	3	1	1	5	3	7	6	11	5	12

Note: BBB-LL is build back better lessons learned, BBB-LTRG-F is build back better creation of LTRG, BBB-TG is build back better type of government.

A content analysis using Leximancer is shown in Table 4.15. The interaction between building back better and the major disaster concepts is shown. The importance of planning the BBB as it is essential to create a more resilient housing recovery. The more frequencies received

are the people involved as the householders, the work that must be done for a BBB, and the good management to get a positive outcome. It gave the x- and y-axis integrated themes a level of prominence based on how frequently they interacted with one another. The higher the number, the higher the relation is between the themes. Conclusions from this show a similar response to labor planning, as it is crucial that it should do the labor that must be done to do the PDHR to recover the zone in a better way of how it was before. The importance of delivering a more resilient community will provide higher chances of resistance to future disasters.

Table 4.15 BBB Matrix Frequency

	Recovery	**Disaster**	**Work**	**People**	**Emergency**	**Management**	**Community**	**County**	**Groups**	**Government**
Recovery	206	47	25	25	28	28	27	26	47	19
Disaster	47	95	18	11	14	14	11	9	13	7
Work	25	18	78	13	12	12	7	9	11	12
People	25	11	13	91	9	9	15	12	5	9
Management	28	14	12	9	62	62	9	17	5	10
Emergency	28	14	12	9	62	62	9	17	5	10
Community	27	11	7	15	9	9	75	8	11	9
County	26	9	9	12	17	17	8	56	6	16
Groups	47	13	11	5	5	5	11	6	56	5
Government	19	7	12	9	10	10	9	16	5	56

There is research related to disaster resiliency, to the quality of the recovery, and the funds needed for the recovery. This dissertation analysis shows that it should encounter an effective build

back better, the required funds, a resilient recovery plan, and the involvement of householders for a positive PDHR.

4.4 CONCLUSION AND FUTURE RESEARCH

This chapter shows the importance of the planning phase before the disaster hits. Information that I could get from the LTRG members as being one of the key topics to manage the logistical problems and lessen the influence on DHR. We have learned that planning for disaster recovery receives limited support within the LTRGs. Even though the LTRGs work at the county level, support comes mostly from the federal level, which lets them in limited-timed resources for a rapid recovery. They relate some comments to the decentralization of the process, giving the ability to the LTRGs to react in a more rapid way.

My research highlighted the significance and difficulties of local level LTRG planning for disaster recovery. Most LTRG participants believed that the recovery plan could be more successful if it had the backing of the government, was financially feasible, and had significant exposure to labor to create a more robust housing recovery to be resilient for potential future disasters. We have learned from the literature that one of the main points in this chapter is understanding the importance of creating LTRGs prior to a disaster and working on the planning phase within a decent time frame. Inviting householders in this planning process not only will help with the recovery but also will allow the householders to get more involved in the decision making.

Moreover, planning to fund, labor, and housing resiliency is essential. Receiving fundings at the right moment helps with the recovery. A housing recovery fund comes with a variety of domestic and external sources. For instance, domestic or local ones come from NGOs of private donors, and federal or international ones come from the government or international organizations. By receiving donations in advance, the LTRGs can better predict the amount of material

convergence they will experience in the event of a disaster. For successful planning on funds, LTRGs must provide the way of spending allocated funds for efficiency, quality, and safety issues. Thus, recovery assessment is crucial for donors because it increases process transparency, executing agencies' capacity for ongoing work, and auditing and accountability efforts.

To assess and plan for the opportunity of having a human resource in the disaster housing recovery, it is imperative to enlist the assistance of human resource experts with experience in post-disaster housing rebuilding. Usually those come as part of the LTRG members. It ensures the promptness and effectiveness of the procedure. There may be some ways to consider the shortage of human resources needed for the quick construction of acceptable and resilient housing. mobilization and recruitment of local contractors, volunteers, and/or homeowners combined with the involvement of industry players who can use their network to recruit skilled laborers.

After combining the literature with the results, we have learned that a logical first step toward promoting resilience under conditions of high uncertainty and rapid change is a disaster recovery plan based on how a community should be redeveloped after a disaster. Recovery plans are based on the ideas of adaptation in which communities assess options for the future while also considering circumstances they may not fully control. There are a variety of other approaches to improving the DHR phase besides the traditional notion of better rebuilding. Planning a BBB will ensure that householders will return to their houses in a more secure way. Planning what could be damaged and could be needed to make housing more resilient is one of the quickest ways to handle a situation. Having sense about materials that are being used, and especially things that could make the homes more resilient.

To conclude, the opportunity to plan for a disaster is essential, specifically with an LTRG already established. It will represent the primary objectives of a strategy with quantifiable measures for each principle that are adapted to the specifics of disaster housing recovery.

I recommend future research in four different approaches. First, provide research on the importance of an assessment of how to organize the human resources of skilled and unskilled labor that will support the housing recovery process. The more the expertise, the better the recovery will be. Second, provide a tool to assess the effectiveness of collaborative planning (before and after the disaster). Third, the creation of a framework that will provide support and cooperation to communities to work with donors and the federal government during the disaster recovery efforts. Fourth, the importance of planning risk management is to identify the risks, to perform an analysis, and decrease and monitor the risks.

In the following chapter, I discuss disaster governance as an important obstacle for PDHR. According to the data gathered from LTRG members, governance needs to be more accountable and flexible to adapt to the actual situation that counties are facing. Local governments are unable to respond as nimbly as they should to various challenges.

CHAPTER 5

DISASTER GOVERNANCE

"There's not a lot of action to mitigate or policies that are making it easy for people to transition to a place where they will not be impacted year after year. And I don't see that happening. I don't really know if anyone's taken to the lesson" (LTRG member).

This chapter addresses disaster governance as an essential topic to manage the impact of natural hazards, as it is one important obstacle that must be addressed to improve post disaster housing recovery (PDHR). The data collected from the Long-Term Recovery Group (LTRG) members suggested that governance needs to be more accountable and flexible to adapt to the actual situation's counties are facing. Local governments cannot respond quickly to some of the obstacles they are facing, such as updating policies, economic/funding barriers, and the need to develop proper infrastructure to avoid more barriers. A good example is the experience from one of the LTRG members, *"I think if FEMA was quicker and clearer. It was easier to understand what they're going to do and when and what they're using to decide who gets assistance and what the timing was. That would make things a little faster and easier."*

One of the most arduous tasks disaster governance faces is with the policymakers and aid providers finding homes for homeless people as quickly as possible. Although some populations are more adaptable than others, the issue is an essential topic to address rapidly. The opportunity to get data from the LTRG members allows us to provide novel information to the literature that will help other scholars better understand post-disaster governance challenges.

5.1 DECENTRALIZATION ACTIONS FOR EFFECTIVE DISASTER GOVERNANCE

Several crucial issues shape PDHR processes and outcomes, particularly in urban contexts. The challenges of the mismatch between current policy programs and housing needs after a disaster —particularly for affordable housing recovery, the role of government in PDHR, and how they approach governance practices that drive recovery processes and outcomes are some of the critical aspects (Mukherji, 2017; Rumbach, 2016).

Because of the rising number of housing losses following disasters and the decreasing amount of funding available to rebuild housing stocks, it is more crucial than ever to develop and keep up to date PDHR policies and programs that make the best use of the scarce resources. Instead of solely focusing on loss, developing housing recovery programs could more effectively target scarce resources on those who might require them the most (Bae et al., 2016; Faggian & Moddica, 2020). Such an approach would address the housing recovery of a wide range of groups based on their needs (Mukherji, 2017; Rumbach, 2016) for instance, vulnerable population - low-income, medical fragile, and others.

The growing acceptance of community involvement and procedural justice as crucial issues for disaster planning impacts the long-term credibility of local and national governments (Sovacool, 2017; Van Leeuwen and Mazepus, 2020). For example, with local plans and their components, such as zoning and recovery options, particularly when local input is provided without being solicited (Fraser et al., 2021; Tierney, 2012). However, with the rise of several governments engaging with a diverse range of stakeholders for the planning to identify requirements and strategies to reduce disaster impact and improve disaster recovery, organizations have begun to put together resilience planning and policy analysis techniques (Miles, 2018; Nowell, 2018).

Being transparent in the disaster process is a key factor in disaster governance. We should always allocate funding in the best possible way, not only in terms of quantity but also in terms of availability. An LTRG member mentioned that *"The process is long, like with the General Land Office that uses national funds to help rebuild. They're still doing reconstruction from Harvey 2017. We have all the paperwork, three or four years down the line. It still hasn't happened yet."*

Another LTRG expressed their experience with the importance of having in the local government to be able to get the process moving with less obstacles *"I think the frustration is because it's difficult to begin with, unless you have someone from a local government involved."*

5.2 GOOD GOVERNANCE TO REDUCE THE RISK OF DISASTER RECOVERY

Several essential factors influence the long-term PDHR processes and outcomes, especially in urban areas. The importance of having good governance is a key factor not only in understanding the recovery process but also in working effectively to facilitate the recovery. The disconnect between actual planning for reconstruction and disaster policies after a disaster, the challenges of financing post-disaster housing recovery, and the challenges of bringing about a resilient recovery are some of the crucial factors in disaster governance (Albrecht, 2017; Fuentealba, et al. 2020; Kusumasari et al., 2010; Mukherji, 2017). It is imperative to mention that the more decentralized the process is, the better will be the recovery.

As a LTRG member mentioned, "*a decentralized office will allow communities and counties to get more funding, especially for those counties that are more affected than others, to get more funding could be a good solution. We are fortunate that our county government and city government work closely together. We have the good fortune of having a local office of emergency management.*"

To better understand the wealth of material in the interview transcripts, using a coding by sentiment offered by NVivo is crucial, offering a range from very negative to very positive sentiment related to governance in terms of the different topics explained in Table 5.1. The darker the color, the higher the frequency of sentiments. The lighter the color, the lower the number of sentiments. The numbers related to each position refers to the number of sentiments that were involved of governance with delay factor (G-DF), formation of an LTRG (G-LTRG-F), build back better (G-BBB), funding (G- F), household median income (G–MI), type of government (G–TG), and in the x axis, the level of sentiments.

We can see overall that the negative sentiments are the ones most expressed by the LTRG members. For instance, many statements by the interviewees were coded as falling under governance as a delay factor (G-DF). Of these, 89 were classified by NVIVO as "very negative" and another 61 as "moderately negative" for a total of 150 (64.9%) negative. Addressing governance challenges is thus important. Often the actual disaster governance is not providing enough support for disaster recovery, specifically becoming a delay factor, an obstacle, to the creation of LTRGs, and through the BBB process.

Disaster governance approaches for natural hazards are nested within and influenced by the community; for instance, NGOs that actively participate in governance activities. LTRGs should be part of governance arrangements and offer their valuable input to realign, not only the formation of the LTRGs but redefine the opportunities offered for building back better. As a result, responses to questions about disaster governance often fell into the delay factor category (231 total), and of those responses, the sentiment tended to be more negative than positive (64.9% negative). Negative sentiments significantly exceeded positive sentiments concerning governance and delay factors.

Table 5.1 Governance Sentiment

	Very negative	Moderately negative	Moderately positive	Very positive
G-DF	89	61	48	33
G-LTRG-F	100	70	93	32
G-BBB	56	53	73	17
G-F	30	23	27	8
G-MI	59	45	38	23
G-TG	49	38	47	11

Note: G-DF is governance delay factor, G-LTRG-F is governance creation of LTRG, G-BBB is governance build back better, G-F is governance funding, G-MI is governance median income, G-TG is governance type of government.

One option to improve the process is to determine the needs and strategies to lessen the effects of hazard events. For instance, several governments are doing it, and some other governments are proposing the idea of involving a wide range of stakeholders in resilience planning activities to get more people involved in the process (Klein et al., 2003; Miles, 2017) especially in disaster management.

Such activities can potentially help identify and develop strategies to address critical shortages that arise during disaster response. For example, one of the LTRG members expressed that *"the severe shortage of case managers with training in disaster case management, in my opinion, is a major source of frustration. We discovered that we lacked qualified disaster case managers to address unmet needs right away after the storm."*

Moreover, the importance of having good disaster governance in terms of when and how an LTRG is essential. With a more decentralized government, local offices could have the ability not only to create but to support the LTRG formation and the operations of it. As was said by one

member of the LTRG, *"It's like connecting with the local government and the damage assessment to know where to go. The local government will do things like put red tags on a house that can't be repaired, and there's still people in it. So, there are these conflicts. It's like decision conflicts where a local government does something in the long-term recovery group that is there for the people."*

A similar situation is with the opportunity to rebuild a more resilient home. The essentials of having good disaster governance could offer the ability to be prepared and react in a more effective way to understand the opportunity to see if it's possible to recover a zone in a \ better way, or to decide on offering other options to the householders. For instance, *"If the damage is severe enough, and it's repetitive enough, they will not let you build, and the federal government can offer the county the opportunity to have funding to buy back homes for demolition to create the green space so there's no repetitive damage."*

Is important to address that, some local governments on their disaster planning on zoning and land regulations are opposed to offering a recovery option especially when local input is provided without being requested, and when the recovery is more expensive than offering another option to the householders (Fraser et al., 2021), especially for vulnerable populations. A good example is *"usually it's low-income families who access these services on our end, and who are not eligible for government funding."*

Because of the rising number of housing damages caused by disasters and the decreasing amount of funding available to rebuild them, it is essential to develop post-disaster housing recovery policies and programs that make the best use of the scarce resources (Mukherji, 2017) and help those that are more in need. For instance, one LTRG member said *"Like even the lower-income people that might have insurance, they really didn't take advantage of it. They didn't have*

the political connections with the government to get the attention like wealthier people do." as one of the LTRG members mentioned.

One of the most essential benefits of using NVivo is the ability to integrate the most referential terms relevant to the issue, as it is disaster governance. Table 5.2 depicts the topics linked by the amount of interaction. The darker the color, the higher the frequency among the themes. The lighter the color, the lower the frequency among the themes. The numbers related to each position refers to the number of times those themes were involved of governance with the different topic questions, in the y axis, related to governance such as delay factor (G-DF), formation of an LTRG (G-LTRG-F), build back better (G-BBB), funding (G- F), household median income (G–MI), type of government (G–TG), and in the x axis, the most involved words related with governance.

Combining the most relevant themes to the topic is one of the significant benefits of using NVivo. Lessons learned (P-LL) with management is a clear reason why the LTRG planning needs to be getting more attention. Also, the importance of the LTRG formation (P-LTRG-F) is aligned with organizations that let us understand why the formation of the LTRG needs to have a planning organization. The comparison of the topic questions is another analysis we are using with NVivo.

We can see that the delay factor (G-DF) and the formation of an LTRG (G-LTRG-F) elicited a similar number of responses, followed by the type of government (G-TG). It is important to remember that the higher the number, the more involved the theme with the main topic regarding disaster governance in a PDHR. Meaning that the creation of an LTRG with the different factors that contribute to obstacles in the recovery plays a crucial role in determining how effectively a disaster is recovered.

Several themes emerge from this analysis of topic themes. Type of government (intergovernmental relations) is strongly related to management of the disaster, and to recovery. As we will develop below in more depth, one of the key challenges in post-disaster governance is effective collaboration between different types of governments. Housing is most strongly linked to BBB and in addition, the most common mention of funding is in relation to BBB, themes that we will return to later.

Different organizations that focus on disaster governance should continue to exist with a wide range from global to local institutions, including NGOs and the private sector. In which collaboration among them will exist either as making agreements among the different LTRGs, or as a voluntary offer. In that sense, the PDHR process will improve.

Table 5.2 Governance Topic Themes

	Disaster	Funding	Government	Housing	Long-term recovery	Management	Organizations	People	Recovery
G-DF	12	3	9	3	7	8	6	9	11
G-LTRG-F	9	0	10	3	8	4	13	2	18
G-BBB	12	7	10	6	4	6	4	3	10
G-F	9	5	14	2	0	6	4	5	6
G-MI	5	4	11	1	2	4	4	7	4
G-TG	10	2	10	2	7	11	7	6	13

Note: G-DF is governance delay factor, G-LTRG-F is governance creation of LTRG, G-BBB is governance build back better, G-F is governance funding, G-MI is governance median income, G-TG is governance type of government.

The importance of disaster governance has another analysis. Using a matrix frequency provided from the analysis made using Leximancer, helps us to identify the most important

concepts related to disaster governance. We indicate the results of the Leximancer content analysis in Table 5.3. These results emphasize the value of good governance for an effective PDHR. Based on how frequently they interacted with one another, I assigned the integrated themes on the x and y axes a level of prominence. Conclusions from this interaction show more interaction related to the higher frequency among the themes, especially with management and disaster governance as they are important for a long-term housing recovery. Moreover, the role the government plays in assisting the affected counties in disaster recovery is demonstrated by the interaction of the responses.

Table 5.3 Governance Matrix Frequency

	Recovery	**Long-term**	**People**	**Disaster**	**Governmen**	**Funding**	**County**	**Manageme**	**Income**	**Emergency**
Recovery	61	57	15	13	9	5	8	13	9	13
Long-term	57	57	15	13	7	2	8	12	9	12
People	15	15	63	5	2	3	5	6	11	4
Disaster	13	13	5	47	5	2	5	6	3	6
Government	9	7	2	5	39	7	11	5	2	5
Funding	5	2	3	2	7	41	2	0	1	0

Table 5.3 (continued)

	Recovery	Long-term	People	Disaster	Government	Funding	County	Management	Income	Emergency
County	8	8	5	5	11	2	30	7	2	7
Management	13	12	6	6	5	0	7	27	0	25
Income	9	9	11	3	2	1	2	0	39	0
Emergency	13	12	4	6	5	0	7	25	0	25

There has been some research done related to disaster governance, and how this affects the PDHR process, however, there is not enough information that we can relate the impact of disaster governance on a PDHR process using content analysis software, not their sentiments or the opportunity to use an artificial intelligence component to understand the main factors related impeding the PDHR in terms of disaster governance. How important is having a transparent and effective LTRG formation process, the right use of materials and labor for BBB, and the adequate use of funding for the PDHR process. It is important to address that the data obtained and the content analysis, allow us to contribute to the literature.

Providing more deep information about disaster governance, in the following pages, we are focusing on three subcategories: Disaster policies, as is essential to have up-to-date policies to attend, react and solve possible disasters. Economic governance, as having a transparent use of fundings, is important for the success of the recovery. Having the correct economic governance in place could ensure that PDHR has a positive influence on the impacted areas. Infrastructure

governance, providing a strong infrastructure governance framework, may help to ensure that PDHR has a beneficial impact on the impacted areas.

5.2.1 Disaster Policies

As I mentioned in one of the introductory paragraphs, policies play an important role for the PDHR. Having accurate and updated disaster policies will help LTRG groups to work effectively. Ideally, having flexible policies could help in the preparation for disasters. A crucial part of disaster recovery is being up to date, being involved in the assessments of the different disasters happening around the nation and having the ability to quantify those damages to understand what it should improve for the future (Horney et al., 2017; Skoufias, 2003). The purpose of offering flexible disaster policies is to be able to manage unpredictable situations.

For instance, what should a householder do if, after the contractor repairs the house, the policymaker comes two years after the reconstruction to decide that the home needs to be elevated? Householders could not be able to afford those expenses to pay contractors up front because of delays in insurance payouts. Therefore, this might prevent them from continuing the recovery process (Wolfe, 2021).

I express policy sentiments in Table 5.4 in relation to other main topics to observe their sentiment interaction and understand what has been wrong. The darker the color, the higher the frequency. The lighter the color, the lower the frequency. The numbers related to each position refer to the number of sentiments that were involved of policies with build back better (P-BBB), funding (P-F), LTRG formation (P-LTRG-F), type of government (P- TG), and in the x axis, the most involved words related with policies.

Policymakers should be particularly concerned with activities carried out during non-disaster times that aim to reduce future disaster impacts and promote preparedness and that is something that can be achieved focusing on the importance of having LTRGs created before a disaster hits, including the governance to have a resilient recovery, as discussed in the previous chapter.

Overall, the members of the LTRG expressed a more negative than a positive opinion of the disaster policies, indicating that much work remains to be done to improve the PDHR. We can see that the ability to form an LTRG received the most negative feedback from the experts, receiving (135) responses, although overall views were mixed, with only 58 percent of responses falling in the negative category There are numerous barriers to the formation of the group, though also potential advantages.

The type of government is another topic that affects the disaster recovery and expressed another very negative sentiment with (33) responses (overall 63.4% negative), saying that it will hamper the PDHR without the proper disaster policies. Although it had fewer responses, funding (18, 72%) negative responses, had some of the most negative responses, with the largest portion of any area (56%) falling into the “very negative” category. The area with the most positive responses in proportion to negative was BBB with (74, 54.4%) negative responses, the relation of BBB policies.

Table 5.4 Policies Sentiment

	Very negative	Moderately negative	Moderately positive	Very positive
P-BBB	40	34	52	10
P-F	14	4	6	1
P-LTRG-F	84	51	72	25
P-TG	33	19	26	4

Note: P-BBB is policies build back better, P-F is policies funding, P-LTRG-F is policies creation of LTRG, P-TG is a policies type of government.

Disaster policies are created based on the plans obtained by agencies at all levels with the purpose of being able to mitigate risks, decrease vulnerability to respond and recover from impacts on PDHR (Henstra, 2010; Spence, 2004). To be more resilient, there are policies focused on how the PDHR should be addressed, specifically the requirements that need to be achieved to do the recovery. However, if there is too much damage and happens on different occasions in the same zone the government offers different options to householders.

Another important point is how funding becomes a critical aspect for policymakers, as they should think and design disaster policies that make the best and most significant use of the scarce resources as the number of homes lost with disasters increases and the money available for PDHR decreases (Mukherji 2017). The way those resources are managed is important too: who is going first and why? Especially if they are part of a vulnerable population. For instance, "*funding is the most important issue when the disaster comes, as the disaster gets farther away to the day that happens, LTRGs start to shrink and to have less resources. And the problem is that, especially for those areas in the coast, we will always have disasters.*" as a member of an LTRG mentioned.

Householders need to coordinate their recovery with contractors, insurance adjusters, and decision-makers. Which could have started weeks or years after the disaster. Their frustration with having the necessity of being on top of regulations, lost paperwork, and on contractors trying to avoid repairing are some reasons that policies to fund need to be at the top of the agenda of disaster policymakers (Wolfe 2021). In terms of the LTRG they also create their internal policies, *"based on whatever grants come in, those policies might be further restricted by Grant say, but almost every grant and every long-term recovery group that I have ever had heard of, is to some extent based on income, and there will be an income clarification in their policies."*

Local government and LTRG should work together to establish disaster recovery plans that includes the creation or update of disaster policies that the large network of recovery-related stakeholders can put into practice to efficiently direct decision-making and promote community resilience (Sandler and Smith 2013). For instance, *"an Office of Strategic Partnerships that tries to link the government and nonprofit organizations, so the office also stays active in helping maintain the network with nonprofits and the US."*

From Table 5.5., we can observe the coding reference count of the disaster policies related to the main themes. The darker the color, the higher the frequency among the themes. The lighter the color, the lower the frequency among the themes. The numbers related to each position refers to the number of times those themes were involved of policies with the different topic questions, on the y axis, related to policies such as for build back better (P-BBB), funding (P-F), LTRG formation (P-LTRG-F), type of government (P-TG), and in the x axis, the most involved themes related with policies.

As a result, combining the type of government and the formation of an LTRG are critical topics for disaster policies, particularly when they are related to themes like emergency, long-term

recovery, organizations, and government. We understand the importance of current disaster policies in the formation of an LTRG. These are strongly associated with effective recovery (17 times). Similarly, recovery is strongly associated (14 times) with the type of government, emphasizing the importance of inter-governmental relations.

The ability to engage in BBB is most closely linked to funding (7 instances), reflecting the critical role of available funds for this type of resilient reconstruction (5 instances). The highest similarity of responses related to disaster policies among the various topics regarding long-term recovery are those related to LTRG formation and the type of government, allowing us to understand how LTRGs play a critical role in the timing of disaster policies.

It is important to address that it is common that disaster governance policies are more reactive, focusing on what already happened in recent events rather than being based on comprehensive risk and vulnerability assessments.

Table 5.5 Policies Topic Themes

	Damage	Disaster	Emergency	Funding	Government	Long-term recovery	Organizations	Policy	Recovery
P-BBB	4	5	2	7	1	4	2	3	5
P-F	0	2	1	2	2	2	0	4	3
P-LTRG-F	5	8	6	0	5	8	11	3	17
P-TG	0	6	12	0	4	6	5	4	14

Note: P-BBB is policies build back better, P-F is policies funding, P-LTRG-F is policies creation of LTRG, P-TG is policies type of government.

The importance of disaster policies as a subcategory of disaster governance brings another perspective analysis using a matrix frequency provided from the use of Leximancer that helps us to identify the most important concepts related to policies. We show the results of the Leximancer content analysis in Table 5.6. We learned how crucial it is to keep up-to-date disaster policies for any potential disasters. Based on how frequently they interacted with one another, we assigned the integrated themes on the x and y axes a level of prominence.

Conclusions from this interaction shows the higher interaction among the themes, for instance, governance is an important factor that must be given priority because doing so will improve PDHR. We show the importance of the role that the government plays in assisting the affected counties in the disaster recovery by grouping the various themes from the table below.

Table 5.6 Policies Matrix Frequency

	Recovery	**Group**	**Disaster**	**Emergency**	**Management**	**Government**	**People**	**County**	**Community**	**Organization**
Recovery	155	68	33	22	22	19	18	25	19	18
Group	68	73	9	11	11	9	9	20	10	11
Disaster	33	9	73	12	12	9	9	8	10	8
Emergency	22	11	12	52	52	9	7	16	7	11
Management	22	11	12	52	52	9	7	16	7	11
Government	19	9	9	9	9	57	8	15	9	9

Table 5.6 (continued)

	Recovery	Group	Disaster	Emergency	Management	Government	People	County	Community	Organizations
People	18	9	9	7	7	8	71	10	10	7
County	25	20	8	16	16	15	10	51	7	6
Community	19	10	10	7	7	9	10	7	54	8
Organizations	18	11	8	11	11	9	7	6	8	42

There is research done to understand the work of the disaster policies on decreasing the PDHR process, but not enough to understand housing recovery from the perspective of a member of an LTRG. There is proof that disaster governance policies are part of a reaction mode instead of being part of a disaster recovery plan, and this is something that LTRG members are addressing and willing to be part of a change. Getting involved in previous data that provides different disasters occurring across the country and quantifying the damages should allow policymakers to work on more accurate disaster policies and improve the critical components of disaster recovery.

5.2.2 Economic Barriers

Economy plays an important part of disaster governance, as we mentioned at the beginning of the chapter. It could be an obstacle for the PDHR. Having the right economic governance could guarantee that PDHR will have a positive impact on the affected areas. This is one of some of the several critical issues shaping long-term post-disaster housing recovery processes. One of the LTRG members expressed the frustration of receiving funds on time. As one of the LTRG

members expressed they're bad experience, *"The problem is that it takes time. If you've got a bad political environment like we had during Hurricane Irma, it takes a year to get through that political process. Well, in the meantime, I've got 10,000 residents that have no homes because they got wiped out in the storm."*

It is important to address that the General Land Office (GLO) helps citizens recovering from natural hazards in a way that improves their damaged homes, to build them in a more resilient form. Their relationship with the LTRG is essential, as they could help providing funds to the recovery process. For instance, the GLO in Texas is responsible for the long term recovery program in using Community Development Block Grant – Disaster Recovery (CDBG-DR) funds; however, usually it takes months following the disaster declaration to get funding and being the rebuilding process.

"There are sometimes when the LTRG are presented to clients that have applications to the General Land Office but are so worked that they could fall through the floor within six months. Sometimes we've contributed funds to do very minimal repairs, just so if they wait for four years to get a new home. They're not falling through the floor between now and then."

Essential information related to economic disaster governance is offered in Table 5.7. below through the sentiment analysis that shows the relation between economics and the other main topics, providing us information to understand some obstacles and solutions to improve the PDHR. The darker the color, the higher the frequency. The lighter the color, the lower the frequency. The numbers related to each position refers to the number of sentiments involved in the economy with funding (E-F), household median income (recovery by middle income households) (E-MI), type of government (E-TG), and in the x axis, the most involved words related to policies.

Overall, the members of the LTRG expressed more negative than positive sentiments related to economic governance, meaning that there is still work to do to improve.

For instance, the household median income is the response with more negative sentiment with (57) very negative responses, meaning that is affecting the most vulnerable ones, followed by the type of government involved in it with (47) negative sentiment responses. However, funding once again emerged as an area with less overall mentions but very negative sentiment, with the largest portion of very negative sentiments (45%) across the areas. For some other members, the reaction was not as strong as the first ones, as something related it to funding with (28) negative sentiment responses overall.

It is important to address that having a disaster plan through the different involved institutions, will increase the chances of a smooth recovery. However, when institutions are weaker, large inflows of financial aid are more likely to be misallocated and diverted to less productive activities, reducing the opportunity of a rapid recovery.

Table 5.7 Economic Sentiment

	Very negative	Moderately negative	Moderately positive	Very positive
E-F	28	14	13	7
E-MI	57	36	24	22
E-TG	47	29	33	10

Note: E-F is economic funding, E-MI is economic median income, E-TG is economic type of government.

It is important to address that having a disaster plan through the different involved institutions, will increase the chances of a smooth recovery. However, when institutions are

weaker, large inflows of financial aid are more likely to be misallocated and diverted to less productive activities, reducing the opportunity of a rapid recovery.

Having the funds is not enough for obtaining an effective PDHR. It is important to address that having good governance is essential, especially for disasters, because the impact could be different in every affected county that could bring different outcomes. For instance, the opportunity of obtaining funds not only from the government, but from private institutions is critical for positive results on the PDHR. One good example from the experiences of the LTRG members is *"Community foundations, who are starting to think about what they can do and what they can get and how they can sustain that recovery and fill in those gaps that the government can't fill. This kind of mission is really helpful."*

In addition, being aware of what is available should be essential to allow the recovery to be more efficient. As one LTRG expressed their experience, "*So knowing what's available is important, and having that knowledge in place. What your resources are is a really important thing for those long-term recovery groups."*

Another important factor is how to sort households impacted by the disaster. One way is having an estimate of their income, understanding if they are part of a vulnerable population, and the LTRG can approach them to provide them aid. For instance, as the experience of one LTRG member states that the median household income was "*typically elderly, that owned their homes, so they didn't have insurance. Maybe they don't have a mortgage anymore. They had low income; the note went to no income and couldn't get help from anywhere else.*

Governance of the fundings is essential, an LTRG member expressed one of experiences they had. *"Funding from the nonprofit and in the public sector is always an issue. I think. I hope that you're able to talk to anybody related with an LTRG and will tell you a lot of stories of funding*

issues, they are some things that are related with FEMA government help, households who have children, or you as children are eligible for disaster recovery funding."

It is essential to address that mostly the assistance that FEMA provides is for basic needs such as roof, windows, door, among others and they require a home inspection to calculate and verify the loss, however, some of the experiences from LTRG members is that the process is longer than expected, especially when they are different options of assistance that are not clear to the impacted community. Some of the assistance that FEMA offers are Community Development Block Disaster Recovery (CDBG-DR), Community Development Block Grant-Mitigation (CDBG-MIT), Hazard Mitigation Grant Program (HMGP), Building Resilient Infrastructure and Communities (BRIC) (FEMA, 2023).

Some of the important problems to address is the allocation of funding and understanding at which level of the government the process for the fundings, specifically if they allocated those fundings for a specific process that cannot be used for another situation. Governance plays an important role in the transparency and flexibility of the use of those disaster fundings. For instance, a member of an LTRG mentioned, *"We got funding that was allocated to us through Congress that determined they should be for mitigation purposes. Because we can't use it for nothing else but mitigation funding, we're able to think forward instead of just looking backward. What can we do to prepare for this kind of situation?"* Organizations such as LTRGs in charge of the reconstruction are given strict deadlines for spending allocated funds, forcing them to rush the housing reconstruction and potentially compromise on efficiency, quality, and safety issues (Bilau et al. 2015).

But while money must be spent quickly once it arrives, the time to arrive is often quite long. For instance, one member of an LTRG said that *"It will be probably three years before we*

see the first federal dollar to hit our area. We hope we will finally be able to receive a billion-dollar package that the U.S. Congress approved." In the meantime, this LTRG and their community are facing the problem of recovering their community on-time.

Another example of the importance of receiving funding on-time was expressed by an LTRG member, highlighting the challenges of inter-governmental relations in connection with funding. *"I would say there's lots of funding and help as you go higher up. There's funding from FEMA for certain things, but sometimes they need to go through the states, which can cause a delay. And each state is different. And then you never know, like with us, because the different states there can depend on how each state is organized and be part of the delay too."*

It is important to address the relation between economic disaster governance and the most main themes related to it. In Table 5.8, we can observe the coding reference count. The darker the color, the higher the frequency among the themes. The lighter the color, the lower the frequency among the themes. The numbers related to each position refers to the number of times those themes were economic with the different topic questions related to economic obstacles, on the y axis, such as funding (E-F), household median income (E-MI), type of government (E-TG), and in the x axis, the most involved words related to economic obstacles.

The NVivo content analysis software indicates a result of the interaction of economy with funding, income and the type of government and recovery as a clear reason for the importance of governance. Another analysis is the comparison among the topic questions. We can observe that the most important themes associated with the topic questions were assistance, management, organization, poverty, and recovery — all associated in one or another way with the importance of funding governance. There is still a scarcity of evidence on the economic consequences of disasters. They also serve as historical evidence that accidents influence local economic activity

and alter long-run outcomes. Based on the conversation with LTRG members, the institutional setting has a significant impact on these patterns. Having emergency management offices may be better able to withstand the shock and manage the recovery period.

Table 5.8 Economic Topic Themes

	Assistance	Case management	County	Disaster	Funding	Management	Organizations	Poverty	Recovery	Volunteer
E-F	0	1	0	2	2	1	0	0	3	2
E-MI	5	2	2	2	3	2	2	4	3	3
E-TG	2	1	4	6	0	13	5	0	9	4

Note: E-F is economic funding, E-MI is economic median income, E-TG is economic type of government.

Table 5.9 expresses the economic governance as part of the disaster governance using a matrix frequency provided from the analysis made using Leximancer to help us identify the most important concepts related to economic governance displaying the results of the Leximancer content analysis. We discovered the significance of finances to be prepared for various types of disasters. It gave the integrated themes of the x and y axes a level of prominence based on how frequently they interacted with one another.

Conclusions from this interaction indicate the more engaged themes, in which is showing that the median income from householders is an important theme in the governance stage and should be treated equally with policies and infrastructure because doing so will help them understand their situation. Grouping the various themes from the table below shows the importance of the government's role in disaster recovery with the affected counties.

Table 5.9 Economic Governance Matrix Frequency

	Recovery	Income	Median	People	Governme	Emergency	Manageme	Work	County	Disaster
Recovery	38	7	7	10	6	11	11	5	7	7
Median	7	38	38	10	2	0	0	3	2	2
Income	7	38	38	10	2	0	0	3	2	2
People	10	10	10	46	2	5	5	9	4	2
Government	6	2	2	2	30	4	4	3	8	4
Emergency	11	0	0	5	4	24	24	2	6	4
Management	11	0	0	5	4	24	24	2	6	4
Work	5	3	3	9	3	2	2	31	4	1
County	7	2	2	4	8	6	6	4	23	4
Disaster	7	2	2	2	4	4	4	1	4	30

There has been some research done on disaster economic governance and how it affects the PDHR process. But there is insufficient information related to the impact of disaster governance on a PDHR process using information from LTRG members to understand the main factors impeding the post-disaster housing recovery process in terms of disaster. With the data obtained from the LTRG members, we can conclude that providing counties with a more decentralized and trained system that allows them to respond more q rigorously will help them be better prepared and have a greater influence on the PDHR process.

5.2.3 Infrastructure Barriers

As stated at the beginning of the chapter, infrastructure plays an important role in disaster governance. Without a resilient infrastructure, PDHR could eventually be more tedious to decrease the recovery process and the quality of the reconstruction. Providing a good governance infrastructure could ensure that PDHR has a positive impact on the affected areas. Offering a resilient infrastructure is one of several critical issues that influence long-term post-disaster housing recovery processes.

Focusing on being resilient could fit as a part of the mitigation step by reducing the impacts of a hazard and be prepared for disasters. Encompass anticipatory or proactive efforts to increase the community's capability to respond effectively. Response with the more effective governance infrastructure is part of the operations during an emergency. Disaster resiliency aid in restoring and rehabilitating a community after emergencies is the best possible way. However, when dealing with compound events, the respective events may be at different stages of the emergency management cycle (Yusuf et al., 2020).

Having a robust infrastructure related to other disaster related topics is essential and can be observed through the sentiment analysis from Table 5.10. The darker the color, the higher the frequency. The lighter the color, the lower the frequency. The numbers related to each position refers to the number of sentiments were involved of infrastructure with the different topic questions related to governance-infrastructure, on the y axis, such as build back better (I-BBB), funding (I-F), household median income (I-MI), type of government (I-TG), and in the x axis, the level of sentiments from very negative to very positive.

Overall, the members of the LTRG expressed more negative than positive sentiment about the infrastructure, meaning that there is much to improve to recover and resiliency of the

infrastructure on disaster recovery. Funding a disaster provides the most negative sentiment from experts with 75% negative responses, meaning that there is no way to improve the infrastructure without funding and a resilience plan. The importance of the household median provides a negative sentiment from the experts with 69% negative responses, followed by 65.6% negative responses by build back better involvement in a disaster recovery. Also, another negative response was to BBB with 56.5% negative sentiment response.

The importance of a decentralization of the PDHR process has been mentioned. However, resilience capacities cannot be improved solely at the municipal level, there is a need to connect with federal agencies and regulations that reflect more adequately on problems of infrastructure governance that are also important.

Table 5.10 Infrastructure Sentiment

	Very negative	Moderately negative	Moderately positive	Very positive
I-BBB	41	42	52	12
I-F	15	12	6	3
I-MI	44	34	17	18
I-TG	34	27	26	6

Note: I-BBB is infrastructure build back better, I-F is infrastructure funding, I-MI is infrastructure median income, I-TG is infrastructure type of government.

Governance infrastructure should always be hand-in-hand with BBB (i.e., being resilient, being better prepared for future disasters.) Not every county could have the funds, time, and resources to provide a more resilient recovery. It will mostly depend on how bad the damages were. Ideally, every recovery would be better. For instance, in one county that was affected by a

disaster, an LTRG member expressed their experience. *"We're 100% behind, not only in the individual help world but in the public system where we feel about the government infrastructure. When I understand building that better, I think we're foolish if we don't follow that."*

This is affecting the most vulnerable population that does not have another option but to wait. Not having the resources or capabilities to recover made them depend on the bureaucratic government process. *"Many obstacles come part of the recovery process and suddenly you are not eligible for a house recovery. The only way to recover is for the LTRGs to collaborate with other organizations like us to pool resources to assist so that everyone across the board is affected, but again. If you have more money, you can recover in six to eight months at most, but for those who don't have that luxury, it could take years."*

Besides the potential for significant consequences, the hazards may be at different stages of the emergency management cycle, causing a combination of policies and practices that span multiple phases (Goyal, 2019; Sadri et al., 2017; Yusuf et al., 2020). As a member of the LTRG said *"Everybody pending on the community that you're going to be at is going to be involved from a government standpoint, from your neighborhood stabilization side for housing support to your local county commissioners who've got to sign the authorizations for declarations."*

I express the relationship between the infrastructure of disaster governance and the different main themes in Table 5.11. Observe the coding reference count. The darker the color, the higher the frequency among the themes. The lighter the color, the lower the frequency among the themes. The numbers related to each position refers to the number of times those themes were involved of infrastructure with the different topic questions, on the y axis, such as build back better (I-BBB), funding (I-F), household median income (I-MI), type of government (I-TG), and in the x axis, the most involved words related with infrastructure.

The results obtained from the NVivo analysis provided us with essential data. Combining this type of government with management, recovery, organizations, and county shows us a clear situation of the importance of disaster governance with infrastructure and being more resilient. The importance of having a BBB as part of the governance process might allow a better allocation of fundings and provide recovery housing in a faster way.

Making a comparison among the themes related, we can observe that surprisingly, the responses were not highly associated. For instance, management received more importance than funding and recovery. Sometimes, the responses were low or not associated with the themes. The higher the similarity of responses among the different topics regarding the long-term recovery, the higher the positive reaction to facilitating the recovery.

Nonetheless, we continue to see some key linkages that also emerged in the other subcategories above. Funding is most frequently linked to BBB (7 instances), emphasizing the critical role of funds for this area. Type of government is most strongly linked to management. Infrastructure is most often mentioned in the funding and middle-income categories.

As part of our conversation with LTRG members we found that while for some critical infrastructure governance prompted a focus on a resilient culture, not every county is focused on being resilient: sometimes they just do the recovery as fast as possible, as part of their priorities - either because it is related to funding, or just because the houses were not in good conditions. What is important is that cities must therefore plan for disruptions to reduce their impacts, manage them, recover quickly, and learn from those experiences.

Table 5.11 Infrastructure Topic Themes

	County	Damage	Disaster	Funding	Government	Housing	Infrastructure	Management	Organizations	Recovery
I-BBB	1	5	6	7	1	5	1	2	2	6
I-F	0	1	2	2	2	1	7	0	0	4
I-MI	2	2	1	3	1	0	7	1	2	5
I_TG	4	1	6	0	3	2	2	12	5	11

Note: I-BBB is infrastructure build back better, I-F is infrastructure funding, I-MI is infrastructure median income, I-TG is infrastructure type of government.

Applying the use of Leximancer in the infrastructure governance data related to other disaster main topics to support our research, we can observe in Table 5.12 a matrix highlighting the themes more involved with infrastructure governance, observing the importance of infrastructure governance to be resilient for the possible different disasters. The x and y axis integrated themes were given a level of prominence based on the higher frequency of the themes interacting with one another. Results indicate that the infrastructure of long-term recovery involves the stakeholders, including the householders. But most importantly, it should include funding. It is a crucial step in the governance stage and should be prioritized.

Table 5.12 Infrastructure Barriers Matrix Frequency

	Recovery	**Long-term**	**People**	**Disaster**	**Funding**	**Government**	**Work**	**County**	**Income**	**Build**
Recovery	61	58	15	13	5	9	8	8	9	4
Long-term	58	58	15	13	2	8	8	8	9	3
People	15	15	63	5	3	2	10	5	11	2
Disaster	13	13	5	47	2	5	7	5	3	1
Funding	5	2	3	2	41	7	4	2	1	11
Government	9	8	2	5	7	39	4	11	2	2
Work	8	8	10	7	4	4	42	5	3	0
County	8	8	5	5	2	11	5	30	2	4
Income	9	9	11	3	1	2	3	2	39	0
Build	4	3	2	1	11	2	0	4	0	35

There has been some research done on disaster infrastructure governance and how it affects the PDHR process and combined with the content analysis from the LTRG members interviews we can reiterate the importance of infrastructure within governance for a smooth recovery.

Some research has been performed to find out the essentials of disaster infrastructure governance in the PDHR process. A strong governance framework may aid in ensuring that PDHR has a positive impact on the affected areas. The provision of resilient infrastructure is one of many critical concerns influencing long-term post-disaster housing recovery procedures.

5.3 CONCLUSION AND FUTURE RESEARCH

In this chapter, I discussed disaster governance as a critical point in having a transparent process that can reduce the impact of disasters. This study may help disaster scientists and policymakers alike by providing new perspectives on a potentially common recovery scenario. The data gathered from the LTRG member suggested policies need to be more realistic to adapt to the actual situations that counties are facing where local governments cannot respond as quickly economically and logistically.

My research emphasized the importance of having good governance focus on three main topics - policies, economy, and infrastructure - to better approach the difficulties of a PDHR and reduce recovery time. Most LTRG participants believed that a more decentralized process with up-to-date policies, better funding management, and more resilient recovery would cause a more robust housing recovery in a shorter period.

According to the literature, one of the main points in this chapter is that understanding the importance of adhering to a disaster governance framework will improve housing recovery. However, some of the information gathered from LTRG members suggests that a more decentralized disaster process may improve how policymakers estimate recovery times and analyze the PDHR process, as well as work through the assessments made by the county for the potential difficulties householders may face in the recovery phase following future disasters.

I have learned that a logical first step toward promoting resilience under conditions of high uncertainty and rapid change is a disaster recovery plan based on how a community should be redeveloped after a disaster. Planning BBB will ensure that householders will return to their houses in a more secure way. Planning what could be damaged and could be needed to make housing more resilient is one of the quickest ways to manage a situation. Having in addition to having a

sense about materials that are being used, and especially things that could make the homes more resilient.

There have been studies in disaster policies to understand the role of disaster policies on the PDHR process, but not enough to understand best practices of housing recovery with valuable information obtained from experts. These data analyzed should assist governments in having a more effective governance, including policymakers, in working on more accurate disaster policies.

Providing counties with a more decentralized and trained system that enables them to respond more rigorously will allow them to be better prepared and have a greater impact on the PDHR process. One of several essential concerns influencing long-term post-disaster housing recovery methods is the provision of robust infrastructure, all this with the opportunity to enhance essential components of disaster recovery for a faster reconstruction.

Future research should take three diverse approaches, all of which focus on transparency, efficiency, and productivity. First, the opportunity to evaluate a disaster governance framework that enables policymakers to change disaster policies in a more friendly and timely manner. Second, disaster allocation by counties in states with a history of disasters will allow them to respond more effectively. Third, the development of a framework that would aid in rebuilding communities in a more resilient manner.

I will discuss the necessity of disaster communication in the following chapter, as being an important obstacle to the post disaster housing recovery process. Communication is essential because it helps to organize the right reaction among stakeholders, limits the impact on householders, avoids unnecessary mobilization, and builds householder trust in the process. I derived these conclusions from data gathered from LTRG members. People whose homes have

been damaged or destroyed because of a disaster must have a housing recovery procedure that includes a clear communication channel to avoid any gaps.

CHAPTER 6

DISASTER COMMUNICATION

"Sharing the communication piece, being able to communicate with other agencies is important. So, we can all communicate together and help the clients better with that communication piece" (LTRG member).

The significance of disaster communication is discussed through this chapter. The findings of this chapter were derived from data collected from LTRG members' interviews. Communication is critical because it helps to coordinate the appropriate response among stakeholders, minimize the impact on householders, avoid unnecessary mobilization, and increase householder trust in the process. Householders whose homes have been impacted or destroyed because of a disaster are encouraged to go through a housing recovery process that requires a clear communication channel to avoid any gaps.

6.1 COMMUNICATION INCREASES AWARENESS DURING RECOVERY PROCESS

Communication between a broader range of stakeholder groups is critical throughout the recovery process. Through ongoing communication, stakeholders exchange useful information on a variety of topics such as housing, economics, infrastructure, the environment, psychology, and culture. The shared information enables public managers and planners to make informed decisions that address new requirements and changing community conditions (Comfort et al., 2019; Yeo et al., 2020). Communication and coordination among system components are critical in post-disaster situations where existing practices have been disrupted in terms of technical infrastructure and organizational capacity to meet requests (Lee et al., 2020).

Another important point is the communication among the different stakeholders involved in the creation of an LTRG, without that, creating an LTRG could take more time. For instance, "*So there really wasn't a well-formed organization that could really help everyone communicate and at the time was a pastor on one of the local churches, and he was asked by government officials to lead meetings of nonprofit organizations,"* but at the beginning of the disaster, there was not a clear communication channel on how to start. There was not a plan, nor a type of handbook that provides a clear communication process of the LTRG formation nor to run it.

Public indifference to disasters is a major barrier for a successful disaster recovery, typically. In contrast to issues that intrigue the public's interest, such as transportation improvements or neighborhood revitalization, disaster recovery lacks stakeholders who understand the issues and are actively engaged in addressing them. Lack of support could be because the costs of recovery planning are immediate, whereas the benefits are long-term and uncertain (Hamideh, 2015).

Stakeholder involvement is critical because it addresses not only the link between federal and local governments via states, but also the communication channel for recovery goals and decision-making procedures (Sandler & Smith, 2013).

There are critical issues with communicating with the public while taking vulnerable populations' specific needs into account. The importance of risk communication in emergency management and the ability to effectively communicate risks to the public are the most important aspects of LTRG. Following that, a person can decide what to do based on the risk messaging they were given. Clear communication with the public, reinforcing the use of reliable sources of information, and using the right language—which varies between professionals and the public—

are all critical management tasks for LTRG members to achieve a successful recovery (Yusuf et al., 2020).

It is critical to recognize that improvisation depends on communication processes, and that most barriers to obtaining social support for recovery involve poor coordination and communication. (Lee et al., 2020). Communication is still a weak point in recovery efforts (Hawkins & Knox, 2014). Despite local demands for recovery information increasing, the public's interest in a disaster frequently declines shortly after disaster response and relief efforts are completed, and their focus instead shifts to new focusing events (Birkland, 1997; Yeo & Knox, 2019). However, to facilitate recovery and reduce the likelihood of new or sustained vulnerabilities, the community still in the long-term recovery phase must have access to information from local, state, and federal officials. (Rivera, 2019; Yeo et al., 2020).

People use a variety of formal and informal communication resources in their daily lives to understand or learn new information (Broad et al. 2013). These could include forms of mediated communication. In disaster situations, unique communication could combine both common and novel communication methods (Perreault et al., 2014; Lee et al., 2020). Effective communication from officials is required, and residents must use available information and resources to make decisions about how to protect themselves from the disaster. (Yusuf et al., 2020).

Failure to engage the public in risk communication and response to hazards such as pandemics is a critical issue. It is the responsibility of emergency managers and other public officials to do so (Bernheim, 2016). To reduce the effects of disasters, risk communication must recognize that different hazards necessitate residents taking different protective measures (Paton, 2013; Yusuf et al., 2020).

Furthermore, vulnerable populations such as the elderly and those with disabilities must have access to risk communication (Campbell, 2014). For example, commonly used communication techniques frequently rely on auditory or visual messages that may be inaccessible to those with limited hearing or vision, and the content of the communication may be difficult for those with cognitive impairments or low literacy (Weiss, 2006). Another challenge is knowing English well. Different communication channels may need to be considered to make disaster-related messages more accessible. For example, emergency managers may request assistance from their community and non-governmental partners in contacting vulnerable residents. (Campbell 2014; Yusuf et al., 2020).

To reach as many residents as possible, a participant in an online emergency management workshop's study (May-June 2020) stated a "need to communicate information and resources at every level from toddlers to adults, and to tailor messages to the audience." The same emergency management workshop study (May-June 2020) also stressed the importance of making sure that communication materials are translated into multiple languages. While highlighting the significance and potential effects of an impending event, messaging may need to reflect fatigue in the case of a compound protracted pandemic event. The fact that "people have been sheltering in place for a long time now, "in particular, was brought up by one workshop attendee. There could be a worry about leaving. The messaging will need to address this (Yusuf et al., 2020).

People with minimal access to information, according to research, require communication and information platforms that can boost their safety and awareness. Continuous and sustained communication regarding shelter availability, as well as transparent information about local government and stakeholder duties, can meet some of the needs of persons with limited information access. These methods guarantee that evacuation information is delivered and

successfully distributed, particularly for vulnerable populations who are more likely to have limited access to evacuation information or to lack experience to draw on. It is important to address that these issues were part of an emergency management process (Whytlaw et al., 2021). With, it is essential to create a sense of community engagement in every step of the process, from planning to recovery to review, and to clearly communicate how community inputs informed the plan (Finucane et al., 2020).

6.2 COMMUNICATION BARRIERS

One important way that communications impede resilience in addressing our research is by the various barriers, including a lack of communication as a barrier to improvisation. Disasters affect populations and institutions beyond the normal range of human experience. People must devise creative solutions to new challenges due to the complexity and uniqueness of these demands and their consequences. Disaster communication is critical for providing individuals with the information they need to handle these concerns (Paton & Irons 2016).

As an LTRG member said *"if you don't have the communication part, then you cannot have the cooperation because there's a textual loss in what is being said. And if you are not communicating the same way we're not able to cooperate, then we cannot collaborate."* Communication is essential in a disaster recovery, without it, there could be numerous obstacles in the PDHR process.

We added various interview-related topics to the data analysis to gain a thorough understanding. In Table 6.1, the most related topics with communication were combined. We can see the sentiments expressed by LTRG members. The darker the color, the higher the frequency of sentiments. The lighter the color, the lower the number of sentiments. The numbers related to

each position on the table refers to the number of sentiments were involved of communication with the different topic questions, such as, in the y axis, delay factor (C-DF), lessons learned (C-LL), formation of an LTRG (C-LTRG-F), multiple LTRGs working on the same disaster (C-LTRG-M), suggestions (C-S), type of government (C-TG). In the x axis, the level of sentiments from very negative to very positive.

We can see that the ability to create an LTRG received the most negative sentiment from experts with 56.9% responses, as the communication piece is important in the process of creating an LTRG. Another very negative sentiment with 65.2% responses was a delay factor, expressing that without the proper communication, consideration could affect the recovery process. It is essential to develop a pre-disaster communication agenda to help reduce the impact of the disaster, particularly with vulnerable populations where assistance will take longer than to others.

Some other members had a different reaction, expressing a moderately positive response of 43.1% because the communication to form an LTRG has no major issues. These findings were linked to the states that will provide assistance before the impact. Another important aspect is the responses of the LTRGs' lessons learned in terms of communication, as they provided a mix of sentiments ranging from negative (52.7%) to positive (47.3%) responses.

Overall, members of the LTRG expressed more negative than positive feelings about disaster communication. The integration of all results from the expressed sentiments, as well as the importance of having the communication piece at the time of either pre-disaster planning or creating an LTRG, are critical factors for a PDHR. It is essential that communities must communicate with one another to deal with and adjust to changing disaster circumstances.

It is important to address that the responses to questions about the importance of disaster communication often fell into the delay factor category (198 total), and of those responses, the

sentiment tended to be more negative than positive (65.2% negative) supporting our research of how communication is important and should get improved before, during, and after a disaster occurs. Negative sentiments significantly exceeded positive sentiments (binomial distribution test, $p < 0.01$) concerning disaster communications as a delay factor.

Table 6.1 Communication Barriers Sentiments

	Very negative	Moderately negative	Moderately positive	Very positive
C-DF	84	45	38	31
C-LL	58	31	57	23
C-LTRG-F	95	54	83	30
C-LTRG-M	40	15	42	15
C-S	14	9	19	4
C-TG	44	22	37	9

Note: C-DF is communication delay factor, C-LL is communication lessons learned, C-LTRG-F is communication LTRG creation, C-LTRG-M is communication multiple LTRG working on the same disaster, C-S is communication suggestions, C-TG is communication type of government.

Pre-disaster communication that supports and encourages community governance, decision-making, and resilience may be a crucial element in the recovery phase. According to Howard et al. (2017), especially when it is not possible to assess the disaster damages prior. That's why it is essential to have the right disaster communication. For instance, an LTRG member expressed the experiences of "*given the extensive damage to facilities, governmental facilities, as well as other infrastructure like your electrical that which further strain the ability for these groups to communicate and ultimately the first challenge of overcoming the barriers that everybody's*

experiencing, where people should have the ability to interact." For them it was almost impossible to create a communication channel to express their situation.

One of the most important benefits of using NVivo is the ability to combine the most referential words related to the topic. For instance, Table 6.2 depicts communication barrier's themes aligned by level of interaction. The coding reference count can be seen. The darker the color, the higher the frequency among the themes. The lighter the color, the lower the frequency among the themes. The numbers next to each position represent the number of times those themes were associated with the communication barriers.

On the y axis, the different topic questions related to communication barriers such as delay factor (C-DF), lessons learned (C-LL), formation of an LTRG (C-LTRG-F), multiple LTRGs working on the same disaster (C-LTRG-M), suggestions (C-S), type of government (C-TG) and in the x axis, the most involved words related with communication.

Another type of analysis is a comparison of the topic questions. We can see that there were similar responses to the delay factor and disaster recovery lessons learned. In addition, the formation of an LTRG and delay factors have an impact on recovery. Most notably, the greater similarity of responses among the several topics concerning long-term recovery. Giving us a clear understanding of how important disaster communication is, especially before a disaster strikes, and how LTRGs play a key role in disaster recovery timing.

Table 6.2 Communication Barriers Topic Themes

	Agency	Case management	Community	Disaster	Government	Group	Management	Organizations	People	Recovery
C-DF	2	5	2	11	5	8	7	7	6	10
C-LL	4	7	6	7	1	9	12	3	5	11
C-LTRG-F	6	1	3	8	5	8	4	11	3	17
C-LTRG-M	1	1	1	5	0	10	2	4	2	7
C-S	1	3	2	7	1	2	4	6	2	8
C-TG	3	0	1	4	3	6	10	6	3	10

Note: C-DF is communication delay factor, C-LL is communication lessons learned, C-LTRG-F is communication LTRG creation, C-LTRG-M is communication multiple LTRG working on the same disaster, C-S is communication suggestions, C-TG is communication type of government.

It is essential to explain that a clear explanation of the scope of the crisis must be balanced with messages that offer options and reassurance. Visual messages, particularly those that provide disaster-related advice on topics such as water contamination, can be very powerful for some audiences (Howard et al. 2017). Moreover, share the same information among different counties involved in the same disaster to be consistent in the communication piece. As one of the members of the LTRG said, "*It's important to communicating internally, but then as well as being able to communicate together and help the clients better."*

In most cases, communications must be integrated among the different counties, especially when those counties have a language barrier that impedes a clear communication is "*something that of course, for LTRGs and for the government overall, we need to get more information or more conversations about because serving non-English-speaking populations or serving immigrants or refugees."* It has been said many times, and it's proven by members of the LTRG,

we must offer better communication through all non-English-speaking populations, especially in counties that have many immigrant populations.

To continue supporting the analysis of data obtained from LTRG members, we now use Leximancer. It provides unbiased sentiment analysis while identifying high-level concepts, outlining key ideas, and providing practical insights (Leximancer 2022), which is extremely beneficial to our research. Having said that, we used Leximancer to support our research in the same way that we used NVivo. In this case, Table 6.3 contains a matrix highlighting the communication-related themes. The themes on the x and y axes were interconnected, giving them a level of importance based on the number of times they interacted with each other. The conclusions drawn from this approach suggest that focusing on the communication piece before a disaster hit gets more involved with the recovery management themes and having a disaster communication plan ready to go is essential.

Table 6.3 Communication Barriers Matrix Frequency

	Recovery	**Things**	**Group**	**Disaster**	**Manageme**	**People**	**Work**	**Groups**	**Communit**	**Case**
Recovery	337	88	126	70	45	40	40	96	44	34
Things	88	285	30	44	24	37	50	32	33	23
Group	126	30	126	18	19	16	20	19	21	16
Disaster	70	44	18	148	25	11	17	22	24	23
Management	45	24	19	25	100	15	14	8	18	57
People	40	37	16	11	15	138	19	9	23	11
Work	40	50	20	17	14	19	116	13	9	11
Groups	96	32	19	22	8	9	13	96	15	7
Community	44	33	21	24	18	23	9	15	110	12
Case	34	23	16	23	57	11	11	7	12	81

There is much research that focuses on the communication barriers before, during and after a disaster hits, especially in a PDHR process. However, in terms of the PDHR process to decrease the impact, it has not been enough to create a positive recovery plan that is focused on the experiences from LTRG members that are providing important thoughts to the literature. LTRGs are an important part of a community's recovery after a disaster. For example, many LTRG members emphasize the importance of effective stakeholder communication for vulnerable populations as it is essential for recovery.

6.2.1 Lack of Communication

According to Hawkins and Knox (2014) communication in recovery efforts is still a weakness. The public's interest in a disaster frequently declines shortly after disaster response and relief efforts are completed, and their focus instead shifts to new focusing events, despite local demands for recovery information increasing (Birkland, 1997; Yeo & Knox, 2019).

However, to improve recovery and lower the likelihood of new vulnerabilities, the community still in the long-term recovery phase must have access to information from local, state, and federal officials (Rivera, 2019; Sheppard, 2012; Yeo et al., 2020), in that sense, communication is important at all disaster levels. For instance, *"Communication is always the most difficult thing in any disaster and just having open lines of communication, when there is a disaster, is extremely important."*

According to studies, people with little access to information and no experience with the recovery and evacuation process need clear communication through different information platforms that can increase their understanding of their situation. A few of the needs of those with limited information access can be met by continuous and sustained communication about transparent information of local government and stakeholder responsibilities (Whytlaw et al., 2021).

Nevertheless, in the situation that there is no clear communication, the response and recovery will not be smooth as it should – in terms of a PDHR process. For instance, as one of the members of the LTRG mentioned "*The lack of city communications in the process throughout the disaster gave us a negative impact in our recovery."*

The different negative sentiments expressed from the interviews gave us a better understanding of the different obstacles to the recovery process. For instance, another LTRG

member mentioned that "*The storm really showed everybody the gap for communication between long term recovery groups."* In that sense, the lack of communication contributes negatively to the recovery process.

The sentiments expressed in Table 6.4 demonstrates how LTRG members are providing their sentiments with the communication piece during disaster recovery. The darker the color, the higher the frequency of sentiments. The lighter the color, the lower the number of sentiments. The numbers associated with each position refer to the number of sentiments associated with LTRG members' responses to the lack of communication on disaster recovery.

We can see the different questions related to lack of communication on the y axis, such as lessons learned (LC-LL), formation of an LTRG (LC-LTRG-F), suggestions (LC-S), and type of government (LC-TG), and the level of sentiments on the x axis, ranging from very negative to very positive. The results of the content analysis with NVivo provide similar results with the communication barrier in this subcategory of lack of communication, as do related topics.

Some of the LTRG issues on disaster communications refer to the difference between communications barriers and a lack of communication, as shown in Table 6.4, where the communication piece during the LTRG formation is essential as well as part of the lessons learned from them, expressing a combination of sentiments from LTRG members. Overall, the LTRG members' comments on disaster recovery communication were more negative than positive. Not having the right communication at the right time could jeopardize and complicate PDHR. Responses to questions about lack of communication frequently fell into the formation of an LTRG (231 total), and the sentiment was more negative than positive (59.3%). Concerning that the lack of communication and the LTRG formation expressed negative sentiments significantly outweigh positive sentiments.

Table 6.4 Lack of Communication Sentiment

	Very negative	Moderately negative	Moderately positive	Very positive
LC-LL	48	29	43	18
LC-LTRG-F	85	52	69	25
LC-S	17	10	20	4
LC-TG	34	20	23	4

Note: LC-LL is lack of communication lessons learned, LC-LTRG-F is lack of communication LTRG creation, LC-S is lack of communication suggestions, LC-TG is lack of communication type of government.

In their daily lives, people use a variety of formal and informal communication resources to understand or learn new information (Broad et al., 2013), these could include mediated forms of communication. When it comes to LTRG members, that communication has to be clearer and more organized Enhancing public messaging during a disaster event will also depend on locating and utilizing alternative information sources (Yusuf et al. 2020).

For instance, expressions from LTRG members bring the importance of working together for a better recovery, "*there is a concerted effort throughout the country to connect the long term recovery groups together, and communication is a big deal. Even here in the state of Florida, where you know from Pensacola right by the Alabama state line to the very bottom down in Key West it's 15 hours' drive and every section of the state is completely different. So, when we talk about a hurricane in the Florida Keys, you're talking about storm surge, you're talking about shoreline barrier destruction. You're talking about infrastructure, major infrastructure damage versus here in Pensacola or maybe even in Tampa Bay, or Jacksonville."* So, a clear communication among the different LTRGs through the state is essential, especially when they are dealing with the same disaster.

It has been difficult to measure communication behaviors in long-term recovery. Along with the stakeholders' interests and behaviors during the recovery communication process, new issues and agendas may develop over time. Such dynamic changes are very expensive and time-consuming to monitor and manage. It is extremely difficult for a smaller research team to gather data on long-term disaster recovery using conventional research tools that rely on the respondents (Yeo et al., 2018, 2020).

Not only among stakeholders but as well among employees as it is mentioned by one of the members of an LTRG, "*communication amongst employees and also externally to reinforce that we need to be better at communication before, during, and after any disaster."*

Continuing with the data analysis process, the more related topic themes in terms of the lack of communication can be observed in Table 6.5, which is sorted by the coding reference count. The darker the color, the higher the frequency among the themes. The lighter the color, the lower the frequency among the themes. The numbers related to each position refers to the number of times those themes were involved with lack of communication such as lessons learned (LC-LL), formation of an LTRG (LC-LTRG-F), suggestions (LC-S), and type of government (LC-TG) on the x axis, and at the y axis the most related themes to our research.

The combination of disaster management and the type of government involved are some of the most important lessons learned from the LTRG members. We can see that most responses were involved in disaster management. Giving importance to avoiding a lack of communication to facilitate PDHR.

Table 6.5 Lack of Communication Topic Themes

	Agency	Case management	Community	Disaster	Emergency	Government	Group	Management	Organizations	Recovery
LC-LL	4	7	6	7	0	1	9	11	2	11
LC-LTRG-F	6	1	3	8	4	5	8	4	11	17
LC-S	1	3	3	7	1	1	2	4	6	8
LC-TG	3	2	1	5	9	3	6	11	5	10

Note: LC-LL is lack of communication lessons learned, LC-LTRG-F is lack of communication LTRG creation, LC-S is lack of communication suggestions, LC-TG is lack of communication type of government.

During a disaster event, public messaging will be difficult to coordinate. Communication timing needs to be adjusted. To assist people in making plans, people must be aware of the plans of time and promote transparency. It is, however, dependent on the storm. fewer general evacuations and more targeted evacuation measures (Yusuf et al., 2020).

Unclear communication among the stakeholders is an obstacle to the PDHR process, especially if the affected are not offered the right tools for it. An LTRG member expressed that "*We heard people coming in and we came up to the top of the hill, and the only thing we have are some pictures in the backseat and we didn't know whether to turn left or right because we had no direction from our community. So, I would say, landowners should be clearer in their communication."* Therefore, *"If you don't have the communication part, then you cannot have the cooperation because there's a textual loss in what is being said. And if you are not communicating the same way, we're not able to cooperate, then we cannot collaborate."*

The relationships between lack of communication and the main topic themes are observed below based on our sentiment analysis using Leximancer in Table 6.6. The importance of avoiding a lack of communication during a disaster recovery can assist the recovery team in being better

prepared for the various disasters that may occur. It assigned a level of prominence to the x and y axis integrated themes based on how frequently they interacted with one another. Conclusions from this interaction show that communication is a critical step in the recovery phase and should be prioritized.

Table 6.6 Lack of Communication Matrix Frequency

	Disaster	**Community**	**People**	**Work**	**Management**	**Groups**	**Government**	**County**	**Organizations**	**Case**
Disaster	89	13	8	12	13	11	8	8	9	11
Community	13	78	14	7	9	12	9	8	8	3
People	8	14	85	12	9	6	10	11	7	4
Work	12	7	12	73	11	8	12	9	13	6
Management	13	9	9	11	64	5	10	16	12	25
Groups	11	12	6	8	5	59	5	7	9	3
Government	8	9	10	12	10	5	57	15	9	4
County	8	8	11	9	16	7	15	54	7	6
Organizations	9	8	7	13	12	9	9	7	44	4
Different	9	12	8	7	4	4	5	4	6	2
Case	11	3	4	6	25	3	4	6	4	39

There has been research done related to the lack of communication on disaster recovery, especially, in the PDHR process. Nevertheless, there has not been sufficient research offered to develop a positive recovery plan based on disaster experiences from LTRG members. The interviews provided are contributing essential information to the literature. The LTRGs are playing a significant role in each county working hard to relieve the recovery process when a disaster hits. Many of them emphasize the importance of having clear communication at all levels as they are a key component of the PDHR process with everyone involved.

6.2.2 Trust in the Process/System

The purpose of this subcategory is to create awareness of the importance of trusting in the recovery process – from the householder's point, but as well as from the LTRGs. It is essential that stakeholders communicate in a clear way that allows the recovery process to be successful, especially to find the best communication channels. For instance, an LTRG member expressed that *"the communication, I think if you come up with a way or if you know the best way to provide communication during the disaster. I'd love to hear it because when we tried the radio, not very many people just listened to the radio anymore. We did TV, radio, and communication to the laundromat. Because those were heavily used. We wanted to make sure that the communication aspect is there and work with the communities and the city and the counties and make sure that the best plan is there."* It is not only having a clear communication with stakeholders, but also providing a clear process to all, especially those affected by.

Failure to engage the public in communication about risks, responses and recovery from disasters is critical. LTRG members along with emergency managers and other public officials have an obligation to the community to communicate well and maintain communications

(Bernheim, 2016). To mitigate effects during a disaster, risk communication must acknowledge that different hazards necessitate residents taking various protective measures (Paton, 2013; Yusuf et al., 2020).

A notable example from past disasters is mentioned by an LTRG member *"Communication, though, was the most challenging, especially communicating with new residents. So, in terms of the process I don't know the process of the planning part. I don't think it is about efficiency and effectiveness, but it can expedite the implementation with some things that we learned to get contracts in place for things that we weren't prepared for."*

Understanding and trusting the disaster recovery process, which involves many affected people, is critical. Table 6.7 depicts how people feel about not trusting the process and the various topics related to it. The darker the color, the higher the frequency of sentiments. The lighter the color, the lower the number of sentiments. The numbers next to each position represent the number of sentiments involved in the recovery process with the various topic questions about trusting in the recovery process. The different questions related to trusting in the process, such as an obstacle (T-DF), lessons learned (T-LL), suggestions (T-S), and type of government (T-TG), are on the y axis, and the level of sentiments, from very negative to very positive, are on the x axis.

The most negative sentiment is the communication component as a delay factor, (i.e., obstacle) as well as the lessons learned, which impedes the recovery. Trust in the recovery process is critical, especially if the goal is to reduce the impact of a disaster and the PDHR. Offering appropriate communication to those affected and explaining in detail may help them gain trust. Consequently, responses to trusting in the process typically fell into the delay factor category (200 total), and mood was more negative than positive (65.5%). Considering that trusting in the process and delay factors brings more negative sentiments dominating good sentiments substantially.

Table 6.7 Trust in the Process Sentiment

	Very negative	Moderately negative	Moderately positive	Very positive
T-DF	84	47	39	30
T-LL	58	33	58	22
T-S	27	14	35	8
T-TG	44	24	38	8

Note: T-DF is trust in the process delay factor, T-LL is trust in the process lessons learned, T-S is trust in the process suggestions, T-TG is trust in the process type of government.

Views of others, particularly those thought to have similar values – which includes LTRG members, are particularly significant in influencing how people interpret and react to disaster events and what they might do to confront the conditions they encounter. This is especially true when people are faced with uncertain and challenging circumstances (Lion et al., 2002). Therefore, when attempting to understand and respond to uncertain events, people do so through conversations that result from interacting with those who share their values, interests, and needs. People are more inclined to view information coming from people who share their values and needs as empowering, which increases the likelihood that they will believe the source and use the information to make decisions and act (Paton & Irons, 2016). For instance, as mentioned by an LTRG member *"The communication cohesion is something that was a lesson learned during Hurricane Rita."*

However, people rarely acquire the social interpretive skills necessary to comprehend difficult events before disaster events take place. As a result, they must do so during the phases of disaster response and recovery (McAllan et al., 2011; Paton et al., 2014).

I focused on the most related themes to provide a more in-depth analysis. Synergy is the key to any successful outcome and trusting in the recovery process is related to other major themes in Table 6.8. The darker the color, the higher the frequency among the themes. The lighter the color, the lower the frequency among the themes. The numbers next to each position indicate how many times those themes were involved in trusting the recovery process. On the y axis, the various planning-labor topic questions such as delay factor (T-DF), lessons learned (T-LL), suggestions (T-S), and type of government (T-TG), and on the x axis, the most related theme. The findings provided us with useful information.

When comparing the different topic questions and themes, the themes recovery, management, disaster, and people were the most aligned among the topic questions with the most responses from experts, emphasizing the importance of trusting in the recovery process for disaster recovery and management.

Table 6.8 Trust in the Process Topic Themes

	Case management	Disaster	Emergency management	Government	Management	Organizations	People	Process	Recovery group	Resources
T-DF	6	12	2	5	8	6	8	7	9	4
T-LL	8	11	1	2	13	5	4	4	5	3
T-S	3	9	2	2	5	5	2	6	2	3
T-TG	2	6	11	4	13	7	4	10	6	3

Note: T-DF is trust in the process delay factor, T-LL is trust in the process lessons learned, T-S is trust in the process suggestions, T-TG is trust in the process type of government.

It is imperative to continue explaining the importance of clear communication that leads stakeholders to trust in the process. *"Communicate what long term recovery looks like both to*

individuals, and to people who have the money and the resources. Sometimes we get people from communities that raise money right in the beginning and then they hurry up and spend that money very fast. So, trying to help educate them about spending it right, and making sure you've had the local involvement is great for national folks to come in, but it needs to be local."

Using the data from the interviews, Leximancer shows the interaction between trusting in the recovery process and the major concepts through a matrix sorted by numbers to highlight the most important concepts and useful insights. Table 6.9 shows that people are now more actively involved in the disaster communication process. It assigned a level of prominence to the x and y axis integrated themes based on how frequently they interacted with one another. This matrix concludes that managing the right people to work in disaster recovery is part of the communication piece. It is critical to have the right people working on the recovery.

Table 6.9 Trust in the Process Matrix Frequency

	Recovery	**Disaster**	**Manageme**	**People**	**Community**	**Work**	**Governmen**	**Group**	**Local**	**Funding**
Recovery	158	41	32	22	19	15	17	41	20	16
Disaster	41	90	21	6	12	7	8	7	6	5
Management	32	21	75	9	9	7	7	10	10	6
People	22	6	9	86	11	13	6	7	6	3
Community	19	12	9	11	58	5	5	8	5	3
Work	15	7	7	13	5	62	6	8	4	5
Government	17	8	7	6	5	6	47	6	15	4

Table 6.9 (continued)

	Recovery	Disaster	Management	People	Community	Work	Government	Group	Local	Funding
Group	41	7	10	7	8	8	6	41	4	9
Local	20	6	10	6	5	4	15	4	44	3
Funding	16	5	6	3	3	5	4	9	3	33

There has been some research done related to how stakeholders need to trust in the recovery process., especially, in the PDHR process. Nevertheless, there has not been enough research related in how householders need to be more involved and trust in the recovery process, including getting valuable information of disaster experiences from LTRG members. It is essential to mention that the interviews provided from the LTRG members are contributing to the literature. They play an important role in each county's efforts to aid in the recovery process after a disaster strikes as they are providing essential information about what happened, and what should be improved.

6.3 CONCLUSION AND FUTURE RESEARCH

The importance of disaster communication was discussed in this chapter. As it was mentioned through the chapter, these findings are based on information gathered from LTRG members. Communication is critical because it aids in the coordination of appropriate responses among stakeholders, the reduction of impact on householders, the avoidance of unnecessary mobilization, and the increase of householder trust in the process. People whose homes have been

damaged or destroyed because of a disaster must go through a housing recovery process that requires a constant communication channel to avoid gaps.

When developing a communication strategy, it is critical to keep the targeted demographic groups in mind. Age, gender, educational attainment, and the status of the displaced all required special consideration. The significance of long-term processes for community engagement, leadership, and decision-making in disaster-affected areas. Long-term, tailored communication is essential for reaching out to those most vulnerable to natural hazards.

Consideration of how messages are constructed, as well as how they are received and understood, as well as the boundaries within which they can be acted upon, is an essential first step toward achieving shared responsibility in disaster planning and management. Understanding how communication barriers, the lack of communication, and not trusting in the recovery process are part of the obstacles for PDHR is essential.

There is much research that focuses on the communication barriers before, during and after a disaster hits, especially in a PDHR process. Also, research done related to the lack of communication on disaster recovery. And research done related to how stakeholders need to trust in the recovery process.

However, in terms of the PDHR process to decrease the impact of avoiding communication barriers, it has not been enough to create a positive and proactive recovery plan focused on experiences from LTRG members that should provide important thoughts to the literature. Nor either has there been sufficient research offered to develop a positive recovery plan based on disaster experiences from LTRG members to reduce the lack of communication, nor enough research related in how householders need to be more involved and trust in the recovery process, including getting valuable information of disaster experiences from LTRG members. The LTRGs

are playing a significant role in each county working hard to improve the recovery process when a disaster hits. Many of them emphasize the importance of having clear communication at all levels.

Future research is recommended in three steps. First, analyze the opportunity of creating a standard handbook for each LTRG. This will help members to understand the initial process. Second, provide research to understand the language barriers, and create awareness of the most different languages that are spoken among the communities to provide more clear communication. Third, investigate the opportunity to offer a more transparent PDHR process to all the stakeholders involved to increase the trustiness of the process.

In the following chapter, I will provide integrated conclusions by summarizing the major findings and emphasizing the importance of disaster policy planning, communication, and updating to collectively reduce the impact of the DHR process on vulnerable populations.

CHAPTER 7

CONCLUSION

This dissertation proposed a disaster policy approach to the post disaster housing recovery (PDHR) process from data collected through interviews made to long-term recovery group (LTRG) experts on major disasters to improve the DHR process and mitigate future impacts. I used a mixed methods approach of qualitative and quantitative research methods. For qualitative research, data from experts in LTRGs was collected through interviews to help understand the barriers in the planning, policies, resources, and labor processes. Using data that has been coded and categorized into content analysis software for quantitative research.

The purpose of this dissertation was to find an answer to the following theoretical questions: What are the main sources of obstacles experienced in the DHR process, and how might outcomes be improved. In that sense, we discovered through the data analysis from the LTRG member's interviews that the major obstacles impeding the PDHR were proper planning, the implementation of good governance, and a clear communication channel. Using content analysis software was helpful because it allowed me to determine the main obstacles to the DHR process.

The goal of my research through this dissertation was to add valuable information to the body of knowledge by addressing and providing a novel insight into the housing recovery process and policy-relevant issues obtaining insight from members of LTRGs. Obtain data from members of LTRG from 13 affected states and 1 U.S. territory that help us address my research question into understanding the obstacles of the PDHR process and how outcomes might be improved.

Provide a mixed methodology to obtain and apply information from LTRG members as experts in PDHR that includes a content analysis.

This dissertation investigated natural hazards, specifically disaster declarations caused by severe storms exacerbated by climate change that cause flooding in homes. It provided four components: the importance of planning in Chapter 4; the impact of governance through disaster policies and political support in Chapter 5; the essentials of a clear communication channel in Chapter 6; and conclusions and future research in Chapter 7. The main goal of this dissertation was providing a framework to classify the most important issues to facilitate the housing recovery process and reduce the impact on vulnerable populations by analyzing what has been done in the past and proposing policy-oriented approaches to improve the DHR process.

In Chapter 4, it was demonstrated how important it is to plan during the time before a disaster strikes. The information obtained from LTRG members was essential to understanding the management of logistical issues and reducing the impact on DHR. We discovered that disaster recovery planning receives little support within the LTR groups. Even though the LTRGs work at the county level, most of their funding comes from the federal government, which allows them to access limited-time resources for a quick recovery.

My research highlighted the importance and challenges of LTRGs on disaster recovery planning. Most LTRG participants believed that the recovery plan would be more successful if it had more government support, was financially feasible, and included significant labor exposure to create a more robust housing recovery that would be resilient to potential future disasters. One of the main points in this chapter was understanding the importance of creating LTRGs prior to a disaster and working on the planning phase in a reasonable amount of time. It is essential to recall that inviting residents to participate in the planning process will not only aid in recovery but will also allow residents to become more involved in decision making.

It is essential to address the importance of having a disaster plan that includes funding, labor, and a resilient recovery. Receiving funds in advance, and at the right time helps in the recovery process. Those funds can be funded from different sources -public or private, and/or from local or federal sources. Domestic or local ones, for example, come from NGOs or private donors, whereas federal or international ones come from the government or international organizations. The LTRGs can better anticipate the amount of material convergence and labor they will need in the event of a disaster having the funds and donations in advance. However, it is a key component that LTRGs provide a method of spending allocated funds for efficiency, quality, and safety issues for successfully planning funds.

It is critical to enlist the assistance of labor with experience in post-disaster housing recovery to assess and plan for the possibility of having a human resource in the disaster housing recovery. Those are usually members contractors with expertise on recovery, volunteers willing to learn and collaborate, and those from a LTRG. This will ensure the procedure's timeliness and effectiveness. There may be some considerations for the scarcity of human resources required for the rapid construction of acceptable and resilient housing, mobilization and recruitment of local contractors, volunteers, and/or homeowners combined with the involvement of industry players who can use their network to recruit skilled laborers.

We have learned that a disaster recovery plan should be designed based on experiences of previous disasters, as a logical first step to promote a resilient recovery in conditions that are highly uncertain with rapid changes. Recovery plans are based on adaptation ideas, in which communities assess future options while also considering circumstances over which they may not have complete control. Aside from the traditional notion of better rebuilding, there are a variety of other approaches to improving the DHR process.

Planning to BBB will ensure that residents will have more secure housing. One of the fastest ways to be prepared for a disaster situation is to plan what could potentially be damaged and what might be required to make housing more resilient.

The ability to plan for a disaster is critical, especially when it begins with the creation of an LTRG in place. It will represent the primary goals of a strategy, with quantifiable measures for each principle that are adapted to the unique characteristics of disaster housing recovery.

Future research with various approaches is suggested in this chapter. First, provide a tool for evaluating the efficacy of collaborative planning (before and after the disaster). Second, provide research on the significance of assessing how to organize skilled and unskilled labor resources to support the housing recovery process. The greater the expertise, the better and faster the recovery. Third, the development of a framework to help communities collaborate with donors and the federal government during disaster recovery efforts. Fourth, the importance of risk management planning to identify risks, perform an analysis, and reduce and monitor risks.

Disaster governance is discussed in Chapter 5 as a critical component of having a transparent process that can reduce the impact of natural hazards. This study benefits both disaster scientists and policymakers by providing new insights into a potentially common recovery scenario. The data gathered from LTRG members suggested that policies be more realistic in order to adapt to the actual situations that counties face, where local governments cannot respond as economically and logistically effectively.

My research emphasized the importance of having a good governance focus on three main topics - policies, economy, and infrastructure - to better approach the difficulties of a PDHR and reduce recovery time. Most LTRG participants believed that a more decentralized process with

up-to-date policies, better funding management, and more resilient recovery would cause a more robust housing recovery in a shorter period.

One of the main points of this chapter was that adhering to a disaster governance framework will improve housing recovery. According to some of the information gathered from LTRG members, a more decentralized disaster process may improve how policymakers estimate recovery times and analyze the PDHR process, as well as work through the county's assessments of the potential difficulties householders may face in the recovery phase following future disasters.

A disaster recovery plan based on how a community should be redeveloped after a disaster is a logical first step toward promoting resilience in conditions of high uncertainty and rapid change. Planning a BBB will ensure that residents return to their homes in a more secure manner. One of the quickest ways to deal with a situation is to plan what might be damaged and what might be required to make housing more resilient. Knowing what materials are being used, especially those that could make the homes more resilient.

My research identifies best practices related to the post-disaster housing recovery. Nevertheless, there are few studies in terms of understanding the PDHR process from the LTRG member’s perspective using data collected from LTRG experts. These analyzed data should aid governments in having more effective governance, as well as policymakers in developing more accurate disaster policies.

Another important discovery is that giving counties a more decentralized and trained system will allow them to respond more quickly and to be better prepared and have a greater impact on the PDHR process. One of several critical concerns influencing long-term post-disaster housing recovery methods is the provision of strong infrastructure, all with the potential to improve critical disaster recovery components for reconstruction.

I recommend future research with two different approaches, all of which emphasize transparency, efficiency, and productivity. First, there is the possibility of evaluating a disaster governance framework that allows policymakers to update disaster policies into a more flexible and effective way. Second, a more realistic disaster allocation by counties, initially in the most affected counties to allow them to respond more effectively in future events.

Chapter 6 discussed the significance of disaster communication. The findings confirm the importance of communication in coordinating appropriate responses among stakeholders, reducing the impact on householders, avoiding unnecessary mobilization, and increasing householder trust in the process. It is critical to keep vulnerable demographic groups in mind when developing a communication strategy. Age, gender, race, ability, educational attainment, displaced status, and other indicators all demanded special consideration. Long-term processes are important for community engagement, leadership, and decision-making in disaster-affected areas. Long-term, targeted communication is critical for reaching out to the most vulnerable people during disasters.

There has been a lot of research done on communication barriers before, during, and after a disaster, particularly in the PDHR process. There has been research done on the lack of communication in disaster recovery, as well as research done on how stakeholders must trust in the recovery process. However, in terms of the PDHR process, avoiding communication barriers has not been enough to create a positive recovery plan based on the experiences of LTRG members who are contributing important ideas to the literature.

Future research is advised. First, consider the possibility of developing a standard handbook for each LTRG. This will assist members in comprehending the initial process. Second, conduct research to better understand language barriers and raise awareness of the most common languages spoken in communities to facilitate better communication. Third, investigate the

possibility of making the PDHR process more transparent to all stakeholders involved to increase trust in the process.

In conclusion, reducing obstacles for disaster recovery was the main research point of this dissertation. Having the opportunity to collect data from experts in previous disasters helps us have a better understanding. Given the growing emphasis on the importance of long-term disaster housing recovery in mitigating disaster impact, more systematic analyses of recovery outcomes and processes are required to identify important patterns in recovery planning describing the big picture of recovery and quantifying housing recovery. For instance, the use of optimization techniques.

All interviewees emphasized the importance of disaster preparation, more transparent disaster governance - including more current and realistic disaster policies that affect those affected by the disaster, and the need to improve and maintain reliable communication between those affected, LTRGs, NGOs and the government.

REFERENCES

Abdullah, M. H., A. Saboor, I. A. Baig, & M. Arshad. (2016). *Food Security, Climate Change Adaptation, and Disaster Risk*. https://bit.ly/3XZEfkY

Acosta, J. D., L. Burgette, A. Chandra, D. P. Eisenman, I. Gonzalez, D. Varda, & L. Xenakis. (2018). How Community and Public Health Partnerships Contribute to Disaster Recovery and Resilience. *Disaster Medicine and Public Health Preparedness*, *12*(5). https://bit.ly/3SwXjpw

Adger, W. N., R. S. d. Campos, & C. Mortreux. (2018). Mobility, displacement and migration, and their interactions with vulnerability and adaptation to environmental risks. In *Routledge Hanbook of Environmental Displacement and Migration*. Routledge. https://bit.ly/3mckTvN

Aerts, J., W. Botzen, K. Clarke, S. Cutter, J. Hall, B. Merz, E. Miche-Kerjan, J. Mysiak, S. Surminski, & H. Kunreuther. (2018). Integrating human behaviour dynamics into flood disaster risk assessment. *Nature Climate Change*, *8*, 193-199. https://go.nature.com/2GNRG01

Afkhamiaghda, M., E. Elwakil, K. Afsari, & R. Rapp. (2021). Factors Affecting the Post-Disaster Temporary Housing Construction. *Journal of Emergency Management*, *19*(8). https://bit.ly/3KMcVnr

Agarwal, S., & R. Kant. (2019). Humanitarian supply chain management frameworks: A critical literature review and framework for future development. *Benchmarking: An International Journal*, *25*(6), 1749-1780. https://bit.ly/3Y0w87P

Albrecht, F. (2017). Government Accountability and Natural Disasters: The Impact of Natural Hazard Events on Political Trust and Satisfaction With Governments in Europe. *Risk, Hazards & Crisis in Public Policy*, *8*(4), 381-410. https://bit.ly/3ITs0SN

Albris, K., K. C. Lauta, & E. Raju. (2020). Strengthening Governance for Disaster Prevention: The Enhancing Risk Management Capabilities Guidelines. *International Journal of Disaster Risk Reduction, 47*. https://bit.ly/3Y75s5l

Aldrich, D. P., & M. A. Meyer. (2015). Social Capital and Community Resilience. *American Behavioral Scientist, 59*(2), 254-269. https://bit.ly/3IAMRbT

Aldrich, D. P., & Y. Sawada. (2015). The physical and social determinants of mortality in the 3.11 tsunami. *Social Science & Medicine, 124*, 66-75. https://bit.ly/3EKmT4H

Alexander, D. (2018). *Natural Disasters*. Routledge.

Alipour, F., H. Khankeh, H. Fekrazad, M. Kamali, H. Rafiey, & S. Ahmadi. (2015). Social issues and post-disaster recovery: A qualitative study in an Iranian context. *International Social Work, 58*(5), 689-703. https://bit.ly/3EGwucF

Amaratunga, D., C. Malalgoda, R. Haigh, A. Panda, & H. Rahayu. (2018). Sound Practices of Disaster Risk Reduction at Local Level. *Procedia Engineering*, *212*, 1163-1170. https://bit.ly/3ICzgRB

Amundrud, O., T. Aven, & R. Flage. (2017). How the definition of security risk can be made compatible with safety definitions. *Journal of Risk and Reliability*, *23*(3), 286-294. https://bit.ly/41p5xnP

Arnette, A., & C. Zobel. (2016). Investigation of Material Convergence in the September 2013 Colorado Floods. *Natural Hazards Review*, *17*(2). https://bit.ly/41nDm8C

Ashley, R., D. Balmforth, A. Saul, & J. Blanskby. (2005). Flooding in the future - predicting climate change, risks and responses in urban areas. *Water Science & Technology, 52*(5), 265-273. https://bit.ly/3kup7OI

Bae, Y., Y.-M. Joo, & S.-Y. Won. (2016). Decentralization and collaborative disaster governance: Evidence from South Korea. *Habitat International, 52,* 50-56. https://bit.ly/3IBByjP

Baharein, K., & M. Noor. (2008). Case Study: A Strategic Research Methodology. *American Journal of Applied Sciences, 5*(11), 1602-1604.

Bahmani, H., & W. Zhang. (2021). Comprehensive Success Evaluation Framework for Socio-Natural Disaster Recovery Projects. *Buildings*, *11*(12). https://bit.ly/3Yagkzg

Bakkensen, L. A., C. Fox-Lent, L. K. Read, & I. Linkov. (2016). Validating Resilience and Vulnerability Indices in the Context of Natural Disasters. *RIsk Analysis, 37*(5), 982-1004. https://bit.ly/3KGpUGY

Bank, W. (2015). *Turn Down the Heat: Climate Extremes, Regional Impacts, and the Case for Resilience*. World Bank Group - ELibrary. https://bit.ly/3Zfr6po

Béné, C., A. Newsham, M. Davies, M. Ulrichs, & R. Godfrey-Wood. (2014). Review Article: Resilience, Poverty and Development. *Journal of International Development, 26*(5), 598-623. https://bit.ly/3KBVLst

Berhnehim, R. G. (2016). Ethical Perpectives in Public Health Practice. In Bruce Jennings, J. D. A., Drue H. Barrett, Barbara A. Ellis (Ed.), *Emergency Ethics: Public Engagement in Emergency Preparedness and Response*. Oxford University Press.

Berke, P., J. Cooper, M. Aminto, S. Grabich, & J. Horney. (2015). Adaptive Planning for Disaster Recovery and Resiliency: An Evaluation of 87 Local Recovery Plans in Eight States. *Journal of the American Planning Association*, 310-323. https://bit.ly/3EJTVlE

Bevacqua, A., D. Yu, & Y. Zhang. (2018). Coastal vulnerability: Evolving concepts in understanding vulnerable people and places. *Environmental Science & Policy, 82*, 19-29. https://bit.ly/3ZkHN2g

Bilau, A. A., E. Witt, & I. Lill. (2015). A Framework for Managing Post-Disaster Housing Reconstruction. *Procedia Economics and Finance*, 313-320. https://bit.ly/3lYnskR

Bilau, A. A., E. Witt, & I. Lill. (2017). Analysis of Measures for Managing Issues in Post-Disaster Housing Reconstruction. *Buildings*, *72*(2), 29. https://bit.ly/3ZjJNI1

Bilau, A. A., E. Witt, & I. Lill. (2018). Practice Framework for the Management of Post-Disaster Housing Reconstruction Programmes. *Sustanability*, *10*(11). https://bit.ly/41m2QDn

Birkland, T. A. (1997). *After Disaster: Agenda Setting, Public Policy, and Focusing Events*. Georgetown University Press.

Biswas, A. (2019). Exploring Indian post-disaster temporary housing strategy through a comparative review. *International Journal of Disaster Resilience in the Built Environment*, *10*(1), 14-35. https://bit.ly/3m4zFEF

Blackburn, S. (2019). What Does Transformation Look Like? Post-Disaster Politics and the Case for Progressive Rehabilitation. *Sustainability*, *10*(7). https://bit.ly/3KGiDH5

Bolin, B., & L. C. Kurtz. (2017). Race, Class, Ethnicity, and Disaster Vulnerability. *Handbook of Disaster Research,* 181-203. https://bit.ly/3ZthGX3

Botzen, W. W., O. Deschenes, & M. Sanders. (2019). The Economic Impacts of Natural Disasters: A Review of Models and Empirical Studies. *Review of Environmental Economics and Policy, 13*. https://bit.ly/3IAqgMH

Boustan, L. P., M. E. Khan, P. W. Rhode, & M. L. Yanguas. (2017). Effect of Natural Disasters on Economic Activity in US Counties: A Century of Data. *National Bureau of Economic Research*. https://bit.ly/3EOD5C5

Boyer, E. J., D. M. V. Slyke, & J. D. Rogers. (2015). An Empirical Examination of Public Involvement in Public-Private Partnerships: Qualifying the Benefits of Public Involvement in PPPs. *Journal of Public Administration Research and Theory*, *26*(1), 45-61. https://bit.ly/3IZh59S

Broad, G. M., S. J. Ball-Rokeach, K. Ognyanova, B. Stokes, T. Picasso, & G. Villanueva. (2013). Understanding Communication Ecologies to Bridge Communication Research and Community Action. *Journal of applied Communication Research*, *41*(4). https://bit.ly/3ZnaBHe

Brody, S., S. Zahran, W. E. Highfield, S. P. Bernhardt, & A. Vedlitz. (2009). Policy Learning for Flood Mitigation: A Longitudinal Assessment of the Community Rating System in Florida. *RIsk Analysis*, *29*(6), 912-929. https://bit.ly/3EFENW8

Brody, S., W. Highfield, M. Wilson, M. Lindell, & R. Blessing. (2017). Understanding the motivations of coastal residents voluntarily purchase federal flood insurance. *Journal of Risk Research*, *20*(6), 760-775. https://bit.ly/3xT4Bup

Brown, A. L., J. Meer, & J. F. Williams. (2019). Why Do People Volunteer? An Experimental Analysis of Preferences for Time Donations. *Management Science*, *65*(4), 1455-1468. https://bit.ly/3KuUFyG

Byrman, A. (2001). *Social Research Methods*. Oxford University Press.

Cabezon, E., L. Hunter, P. Tumbarello, K. Washimi, & Y. Wu. (2015). *Enhancing Macroeconomic Resilience to Natural Disasters and Climate Change in the Small States of the Pacific*. International Monetary Fund. https://bit.ly/3J6n24W

Campell, V. (2013). Framing Environmental Risks and Natural Disasters in Factual Entertainment Television. *Environmental Communication*, *8*(1). https://bit.ly/3J0hrNC

Carter, J. G., G. Cavan, A. Connelly, S. Guy, J. Handley, & A. Kazmierczak. (2015). Climate change and the city: Building capacity for urban adaptation. *Progress in Planning*, *95*(January), 1-66. https://bit.ly/2Zt1yW9

Castaneda, E., A. Silva, A. Gameiro, & M. Kountouris. (2017). An Overview on Resource Allocation Techniques for Multi-User MIMO Systems. *IEEE Communications Surveys & Tutorials*, *19*(1). https://bit.ly/3IV8fu2

Castro-Correa, C.-P., P. A. Ide, K. W. Vasquez, D. M. Maldonado, & S. P. Tello. (2020). Transformation of social capital during and after a disaster event: the cases Chañaral and Diego de Almagro, Atacama Region, Chile. *Natural Hazards*, *103*, 2427-2440. https://bit.ly/3kBBo3R

Cavallo, E., S. Galiani, I. Noy, & J. Pantano. (2013). Catastrophic Natural Disasters and Economic Growth. *The Review of Economics and Statistics*, *95*(5), 1549-1561. https://bit.ly/3Z6PV6E

CDC. (2018). *Social Vulnerability Index (SVI)*. Retrieved November from https://bit.ly/41yvH7M

Chakraborty, J., G. Tobin, & B. Montz. (2005). Population Evacuation: Assessing Spatial Variability in Geophysical Risk and Social Vulnerability to Natural Hazards. *Natural Hazards*, *6*(1), 23-33. https://bit.ly/3IXLtSb

Chang, Y., S. Wilkinson, E. Seville, & R. Potangaroa. (2012). Changes in resource need for post-disaster reconstruction: a longitudinal study in China. *Building Research & Information, 40*(3), 327-336. https://bit.ly/3mfR3pW

Chang-Richards, Y., S. Wilkinson, R. Potangaroa, & E. Seville. (2013). Resource challenges for housing reconstruction: A longitudinal study of the Australian bushfires. *Disaster Prevention and Management, 22*(2), 172-181. https://bit.ly/3Swzzlr

Chen, Y., J. Syvitski, S. Gao, I. Overeem, & A. Kettner. (2012). Socio-economic Impacts on Flooding: A 4000-Year History of the Yellow River, China. *AMBIO*, *41*, 682-698. https://bit.ly/3m9SGpt

Chong, M., J. G. L. Lazo, & M. C. Pereda. (2019). Goal programming optimization model under uncertainty and the critical areas characterization in humanitarian logistics management. *Journal of Humanitarian Logistics and Supply Chain Management*, *9*(1), 82-107. https://bit.ly/3SFP0YI

Chuang, W.-C., T. Eason, A. Garmestani, & C. Roberts. (2019). Impact of Hurricane Katrina on the Coastal Systems of Southern Louisiana. *Frontiers in Environmental Science*. https://bit.ly/3m9RZfR

Clark, G., S. Moser, S. Ratick, K. Dow, W. Meyer, S. Emani, W. Jin, J. Kasperson, R. Kasperson, & H. Schwarz. (1997). Assessing the Vulnerability of Coastal Communities to Extreme Storms: The Case of Revere, MA., USA. *Mitigation and Adaptation Strategies for Global Change, 3*(59-82). https://bit.ly/3IXsQhf

Col, J.-M. (2007). Managing Disasters: The Role of Local Government. *Public Administration Review*, *67*(S1), 114-124. https://bit.ly/3IWlXwx

Comfort, L. K., J. Yeo, & S. R. Scheinert. (2019). Organizational Adaptation Under Stress: Tracing Communication Processes in Four California County Health Departments During the H1N1 Threat, April 28, 2009, to March 11, 2011. *American Review of Public Administration*, *49*(2), 159-173. https://bit.ly/3mi31PS

Costa, L., & J. P. Kropp. (2013). Linking components of vulnerability in theoretic frameworks and case studies. *Sustainable Science*, *8*, 1-9. https://bit.ly/3Z3MuxO

Creswell, J. (2003). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. Sage Publications.

Creswell, J., R. Shope, V. Clark, & D. Green. (2006). How Interpretive Qualitative Research Extends Mixed Methods Research. *Research in the Schools*, *13*(1), 1-11.

Daly, P., S. Ninglekhu, P. Hollenbach, J. D. Barenstein, & D. Nguyen. (2015). Situating local stakeholders within national disaster governance structures: rebuilding urban neighbourhoods following the 2015 Nepal earthquake. *Environment and Urbanization*, *29*(2). https://bit.ly/3IAf4zR

Das, S., S. Hazra, A. Haque, M. Rahman, R. J. Nicholls, A. Ghosh, T. Ghosh, M. Salehim, & R. S. d. Campos. (2021). Social vulnerability to environmental hazards in the Ganges-Brahmaputra-Meghna delta, India and Bangladesh. *53*. https://bit.ly/3mdPNUk

Davidson, C., C. Johnson, G. Lizarralde, N. Dikmen, & A. Sliwinski. (2007). Truths and myths about community participation in post-disaster housing projects. *Habitat International*, *31*, 100-115. https://bit.ly/3KKf1nA

Deepak, G., A. Ladas, Y. A. Sambo, H. Pervaiz, C. Politis, & M. A. Imran. (2019). An Overview of Post-Disaster Emergency Communication Systems in the Future Networks. *IEEE Wireless Communications*. https://bit.ly/3KnTsaD

Deria, A., P. Ghannad, & Y.-C. Lee. (2020). *Analyzing Vulnerability of Lower Income Communities to Natural Disasters* Construction Research Congress 2020, Tempe, AR. https://bit.ly/3EGhY4C

Destro, L., & J. Holguin-Veras. (2011). Material Convergence and its Determinants: Case of Hurricane Katrina. *Transportation Research Record: Journal of the Transportation Research Board, 2234*(1), 14-21. https://bit.ly/3KBpW30

Diagne, K. (2007). Governance and natural disasters: addressing flooding in Saint Louis, Senegal. *Environment and Urbanization*, *19*(2), 552-562. https://bit.ly/3maPlq4

Diaz, R., J. G. Behr, & B. Acero. (2022). Coastal housing recovery in a postdisaster environment: A supply chain perspective. *International Journal of Production Economics*, *247*. https://bit.ly/3SHipBz

Diaz, R., J. G. Behr, F. Longo, & A. Padovano. (2019). Supply Chain Modeling in the Aftermath of a Disaster: A system Dynamics Approach in Housing Recovery. *IEEE Transactions on Engineering Management, 67*(3), 531-544. https://bit.ly/3Zud4Qt

Donalek, J. (2005). The Interview in Qualitative Research. *Urologic Nursing*, *25*(2).

Dorn, F., C. Fuest, & N. Potrafke. (2018). Globalization and Income Inequality Revisited. *CESifo Working Paper Series No. 6859*. https://bit.ly/3Sw6ExY

Drury, J., H. Carter, C. Cocking, E. Ntontis, S. T. Guven, & R. Amlot. (2019). Facilitating Collective Psychosocial Resilience in the Public in Emergencies: Twelve Recommendations Based on the Social Identity Approach. *Policy and Practice Reviews*. https://bit.ly/3KHuchA

Dube, E., G. Wedawatta, & K. Ginige. (2021). Building-Back-Better in Post-Disaster Recovery: Lessons Learnt from Cyclone Idai-Induced Floods in Zimbabwe. *International Journal of Disaster Risk Science, 12*, 700-712. https://bit.ly/3SvQQv9

Eakin, H., L. A. Bojorquez-Tapia, M. A. Janssen, M. Georgescu, D. Manuel-Navarrete, E. R. Vivoni, A. E. Escalante, A. Baeza-Castro, M. Mazari-Hiriart, & A. M. Lerner. (2017). Urban resilience efforts must consider social and political forces. *PNAS*, *114*(10). https://bit.ly/3YacFBw

Eisenhardt. (1989). Building theories from case study research. *Academy of Management Review*, *14*(4), 532-550.

Esnard, A.-M., & A. Sapat. (2017). Population / Community Displacement. *Handbook of Disaster Research*, 431-446. https://bit.ly/3YkqQ7n

Faggian, A., & M. Modica. (2020). Natural disasters and the economy. *Review of Regional Research, 40,* 107-111. https://bit.ly/3m5JdiU

Fan, L. (2013). Disaster as opportunity? Building back better in Aceh, Myanmar and Haiti. *Humanitarian Policy Group*. https://bit.ly/3Z6QZHG

Felsenstein, D., & M. Lichter. (2014). Social and economic vulnerability of coastal communities to sea-level rise and extreme flooding. *Natural Hazards*, *71*, 463-491. https://bit.ly/3KKbLZp

FEMA. (2022). Disaster Recovery. https://www.fema.gov/

Ferrier, B., & J. Spickett. (2007). Natural Disasters in Developing Countries: An Environmental Health Perspective. *Asia Pacific Journal of Public Health*, *19*(1), 18-24. https://bit.ly/3ICnuGT

Few, R. (2003). Flooding, vulnerability and coping strategies: local responses to a global threat. *Progress in Development Studies*, *3*(1), 43-58. https://bit.ly/3IXncf3

Finucane, M. L., J. Acosta, A. Wicker, & K. Whipkey. (2020). Short-Term Solutions to a Long-Term Challenge: Rethinking Disaster Recovery Planning to Reduce Vulnerabilities and Inequities. *International Journal of Environmental Research and Public Health*, *17*(2). https://bit.ly/3m90AiS

Fraser, N., L. Brierley, G. Dey, J. J. Polka, M. Palfy, F. Nanni, & J. A. Coates. (2021). The evolving role of preprints in the dissemination of COVID-19 research and their impact on the science communication landscape. *Plos Biology*. https://bit.ly/3y0mZl0

Fraser, T., D. P. Aldrich, A. Small, & A. Littlejohn. (2021). In the hands of a few: Disaster recovery committee networks. *Journal of Environmental Management*, *280*. https://bit.ly/3IAo73M

Freeman, A. C., & W. S. Ashley. (2017). Changes in the US hurricane disaster landscape: the relationship between risk and exposure. *Natural Hazards*, *88*, 659-682. https://bit.ly/3Z44vMt

Fridahl, M., M. Hagemann, F. Roser, & L. Amars. (2015). A Comparison of Design and Support Priorities of Nationally Appropriate Mitigation Actions. *The Journal of Environment & Development*, *24*(2), 237-264. https://bit.ly/3xVZkC9

Fuentealba, R. (2021). Divergent disaster events? The politics of post-disaster memory on the urban margin. *International Journal of Disaster Risk Reduction*, *62*. https://bit.ly/3m8rtTV

Fuentealba, R., H. Verrest, & J. Gupta. (2020). Planning for Exclusion: The Politics of Urban Disaster Governance. *Politics and Governance*, *8*(4), 244-255. https://bit.ly/3IYKu4j

Galindo, J., S. Torok, F. Salguero, S. d. Campos, J. Romera, & V. Puig. (2017). Optimal Management of Water and Energy in Irrigation Systems: Application to the Bardenas Canal. *IFAC-Papers OnLine*, *50*(6613-6618). https://bit.ly/3kxnLms

Gall, M., K. H. Nguyen, & S. L. Cutter. (2015). Integrated research on disaster risk: Is it really integrated? *International Journal of Disaster Risk Reduction*, *12*, 255-267. https://bit.ly/3kpg7us

Gerber, B., & S. Robinson. (2009). Local Government Performance and the Challenges of Regional Preparedness for Disasters. *Public Performance & Manangement Review*, *32*(3), 345-371. https://bit.ly/3EGiNue

Ghannad, P., Y.-C. Lee, C. Friedland, & E. Yang. (2019). *Optimizing the Socioeconomic Benefit of Post-Disaster Strategies by Prioritizing Reconstruction of Damaged Facilities* ASCE International Conference on Computing in Civil Engineering 2019, https://bit.ly/3IwJOBL

Goyal, N. (2019). Disaster Governance and Community Resilience: The Law and the Role of SDMAs. *International Journal Of disaster Risk Management*, *1*(2). https://bit.ly/3Z4cqt5

Green, C. (2004). The evaluation of vulnerability to flooding. *Disaster Prevention and Management*, *13*(4), 323-329. https://bit.ly/3Y48eIu

Haase, D. (2013). Participatory modelling of vulnerability and adaptive capacity in flood risk management. *Natural Hazards*, *67*, 77-97. https://bit.ly/41wpfOA

Hackney, C., & A. Williams. (2012). *Impact of Sea Level Rise and Salt Intrusion On Everglades Peat: Review and Recommendations*. Department of Biology, University of North Florida.

Hallegatte, S., J. Rentschler, & B. Walsh. (2018). Building Back Better: Achieving resilience, through stronger, faster, and more inclusive post-disaster reconstruction. *International Bank for Reconstruction and Development - The World Bank*. https://bit.ly/3ZnmCN1

Hamideh, S. (2015). *Planning for Disaster Recovery: Lessons from Hurricane Ike for Theory and Practice* Texas A&M University]. https://bit.ly/3IyBMbl

Handwerger, L. R., M. M. Sugg, & J. D. Runkle. (2021). Present and future sea level rise at the intersection of race and poverty in the Carolinas: A geospatial analysis. *The Journal of Climate Change and Health, 3*. https://bit.ly/3SHieWV

Harris, J. M., & B. Roach. (2017). *Environmental and Natural Resource Economics* (4th ed.). Routledge. https://bit.ly/3ZnfeB7

Hauer, M. E., E. Fussell, V. Mueller, M. Burkett, M. Call, K. Abel, R. McLeman, & D. Wrathall. (2020). Sea-level rise and human migration. *Nature Reviews Earth & Environment, 1*, 28-39. https://go.nature.com/3Y46WNM

Hawkins, C., & C. C. Knox. (2014). Disaster Events and Policy Change in Florida. In Kapucu N., L. K. (Ed.), *Disaster and Development*. Springer, Cham. https://bit.ly/3KJBpxh

Henstra, D. (2010). Evaluating Local Government Emergency Management Programs: What Framework Should Public Managers Adopt? *Public Administration Review*, *70*(2), 236-246. https://bit.ly/3ZuzVeO

Holguin-Veras, J., M. Jaller, L. N. V. Wassenhouve, N. Perez, & T. Wachtendorf. (2014). Material Convergence: Important and Understudied Disaster Phenomenon. *Natural Hazards Review*, *15*(1). https://bit.ly/3SCpfs3

Holguin-Veras, J., M. Jaller, L. N. Wassenhove, N. Perez, & T. Wachtendorf. (2012). On the unique features of post-disaster humanitarian logistics. *Journal of Operations Management*, *30*(7-8), 494-506. https://bit.ly/3SCpfs3

Hollnagel, E. (2014). *Safety I and Safety II*. CRC Press. https://bit.ly/3KP1B9M

Horney, J., C. Dwyer, B. Chirra, K. McCarthy, J. Shafer, & G. Smith. (2018). Measuring Successful Disaster Recovery. *International Journal of Mass Emergencies and Disasters, 36*(1), 1-22. https://bit.ly/3xUynPd

Horney, J., C. Dwyer, M. Aminto, P. Berke, & G. Smith. (2016). Developing indicators to measure post-disaster community recovery in the United States. *Disasters 41*(1), 124-149. https://bit.ly/3Y0tgaN

Hosseini, S. A., O. Pons, & A. d. l. Fuente. (2020). A sustainability-based model for dealing with the uncertainties of post-disaster temporary housing. *Sustainable and Resilient Infrastructure, 5*(5), 330-348. https://bit.ly/3Y2kkBP

Howard, A., K. Agllias, M. Bevis, & T. Blakemore. (2017). "They'll tell us when to evacuate": The experiences and expectations of disaster-related communication in vulnerable groups. *International Journal of Disaster Risk Reduction, 22*. https://bit.ly/3Y7yHVz

IBTS. (2022). *Long Term Recovery Group*. https://bit.ly/3kzhBCt

Irons, M., D. Paton, L. Lester, & J. S. a. A. Martin. (2014). Social Media, Crisis Communication and Community-Led Response and Recovery: An Australian Case Study. Hazards CRC & AFAC Conference, Wellington.

Jacobs, F. (2019). *An Evaluation of Hazard Mitigation Plan Quality in the Caribbean* University of North Carolina at Chapel Hill]. University Libraries. https://unc.live/3SwipV8

Jaller, M. A. (2012). *Resource allocation problems during disasters: points of distribution planning and material convergence control* (Publication Number 000003114) Rensselaer Polytechnic Institute]. Rensselaer Theses and Dissertations Online Collection. https://bit.ly/3KCXfTn

Jamshed, A., I. A. Rana, U. M. Mirza, & J. Birkmann. (2019). Assessing relationship between vulnerability and capacity: An empirical study on rural flooding in Pakistan. *International Journal of Disaster Risk Reduction*, *36*(May). https://bit.ly/2paQm3Q

Jiang, N., A. Kulesza, S. Singh, & R. Lewis. (2015). The Dependence of Effective Planning Horizon on Model Accuracy. 14th International Conference on Autonomous Agents and Multiagent Systems, Istanbul, Turkey.

Johnson, C., & G. Lizarralde. (2012). Post-Disaster Housing and Reconstruction. *International Encyclopedia of Housing and Home*, 340–346. https://bit.ly/3EHvsNT

Johnson, L. A., & R. B. Olshansky. (2010). *After Great Disasters* (1 ed.). Lincoln Institute of Land Policy. https://bit.ly/3Zo7nDt

Kamiohkawa, S., & A. Maruyama. (2021). Index Assessment of Household Social Vulnerability to Climate Change: A Case Study of Laguna Province, Philippines. *Journal of Environmental Science and Management*, *24*(1). https://bit.ly/3Z7pSw7

Kammouh, O., G. Dervishaj, & G. P. Cimellaro. (2017). A New Resilience Rating System for Countries and States. *Procedia Engineering*, *198*, 985-998. https://bit.ly/3Y57tyM

Kijewski-Correa, T., & A. A. Taflanidis. (2012). The Haitian housing dilemma: can sustainability and hazard-resilience be achieved? *Bull Earthquake Engineering 10*, 765-771. https://bit.ly/3ZnseH2

Kim, P. S., & J. E. Lee. (2014). Crisis and Management in Korea. In *Crisis and Emergency Management*. Routledge. https://bit.ly/3IxPhrP

Klein, R., R. Nicholls, & F. Thomalla. (2003). Resilience to natural hazards: How useful is this concept? *Global Environmental Change Part B: Environmental Hazards*, *5*(1), 35-45. https://bit.ly/3Y7rZPx

Koliou, M., J. W. v. d. Lindt, T. P. McAllister, B. R. Ellingwood, M. Dillar, & H. Cutler. (2020). State of the research in community resilience: progress and challenges. *Sustainable and Resilient Infrastructure*, *5*(3), 131-151. https://bit.ly/41y3ttN

Krellenberg, K., J. Welz, F. Link, & K. Barth. (2017). Urban vulnerability and the contribution of socio-environmental fragmentation: Theoretical and methodological pathways. *Progress in Human Geography*, *4*(4), 408-431. https://bit.ly/3IXyrnL

Kumar, S., R. Diaz, J. G. Behr, & A.-L. Toba. (2015). Modeling the effects of labor on housing reconstruction: A system perspective. *International Journal of Disaster Risk Reduction*, *12*, 154-162. https://bit.ly/3Y40Lt2

Kusumasari, B., Q. Alam, & K. Siddiqui. (2010). Resource capability for local government in managing disaster. *Disaster Prevention and Management*, *19*(4). https://bit.ly/3ICHTeM

Lam, L. M., & R. Kuipers. (2019). Resilience and disaster governance: Some insights from the 2015 Nepal earthquake. *International Journal of Disaster Risk Reduction*, *33*, 321-331. https://bit.ly/3KYBBJx

LeCompte, M. (2000). Analyzing Qualitative Data. *Theory Into Practice*, *39*, 146-154.

Lee, S., B. C. Benedict, C. M. Jarvis, L. Siebeneck, & B.-J. Kuenanz. (2020). Support and barriers in long-term recovery after Hurricane Sandy: improvisation as a communicative process of resilience. *Journal of applied Communication Research*, *48*(4). https://bit.ly/3Z7pNZl

Leitmann, J. (2014). Partnership Systems to Manage Post-disaster Recovery. In Samuel O. Idowu, R. S. (Ed.), *CSR, Sustainability, Ethics & Governance*. https://bit.ly/3Y4Pfxt

Leximancer. (2022). *Introduction to Leximancer*. https://bit.ly/3KHuLIe

Lion, R., R. M. Meertens, & I. Bot. (2002). Priorities in Information Desire about Unknown Risks. *RIsk Analysis*, *22*(4), 765-776. https://bit.ly/3YdD3u9

Luna-Reyes, L. F., & D. L. Andersen. (2003). Collecting and analyzing qualitative data for system dynamics: methods and models. *System Dynamics Review*, *19*(4), 271-296.

Lyons, M. (2009). Building Back Better: The Large-Scale Impact of Small-Scale Approaches to Reconstruction. *World Development*, *37*(2), 385-398. https://bit.ly/3IWZUFZ

Mahmood, M. I., N. A. Elagib, F. Horn, & S. A. G. Saad. (2017). Lessons learned from Khartoum flash flood impacts: An integrated assessment. *Science of the Total Environment*, *601-602*, 1031-1045. https://bit.ly/3xWXOzD

Maly, E. (2018). Building back better with people centered housing recovery. *International Journal of Disaster Risk Reduction*, *29*, 84-93. https://bit.ly/3Z7bRyw

Mannakkara, S., & S. Wilkinson. (2013). Build Back Better principles for post-disaster structural improvements. *Structural Survey*, *31*(4). https://bit.ly/3y0dMt2

Maritan, C. A., & G. K. Lee. (2017). Resource Allocation and Strategy. *Journal of Management*, *43*(8), 2411-2420. https://bit.ly/3ktPILZ

Mark, L. (2015). A Pragmatic, Step-by-Step Guide for Qualitative Methods: Capturing the Disaster and Long-Term Recovery Stories of Katrina and Rita. *Current Psychology*, 34, 494-505. https://bit.ly/3yVtFkR

Masozera, M., M. Bailey, & C. Kerchner. (2007). Distribution of impacts of natural disasters across income groups: A case study of New Orleans. *Ecological Economics*, *63*(2-3), 299-306. https://bit.ly/3IX0jZ1

Mazepus, H., & F. v. Leeuwen. (2019). Fairness matters when responding to disasters: An experimental study of government legitimacy. *Governance*, *33*(3), 612-637. https://bit.ly/3Y96Bck

McCaughey, J. W., P. Daly, I. Mundir, S. Mahdi, & A. Patt. (2018). Socio-economic consequences of post-disaster reconstruction in hazard-exposed areas. *Nature Sustainability, 1,* 38-43. https://go.nature.com/3ZoKyzD

McGrath, S. K., & S. J. Whitty. (2016). Stakeholder defined. *International Journal of Managing*, *10*(4), 721-748. https://bit.ly/3m7kevw

McLennan, J., D. Every, C. Bearman, & L. Wright. (2017). On the concept of denial of natural hazard risk and its use in relation to householder wildfire safety in Australia. *International Journal of Disaster Risk Reduction*, *21*, 176-186. https://bit.ly/41GfAoG

McNutt, M. (2013). Climate Change Impacts. *Science & Technology*, *341*(6145), 435. https://bit.ly/3KGo6h6

Miles, S. (2017). Stakeholder Theory Classification: A Theoretical and Empirical Evaluation of Definitions. *Journal of Business Ethics*, *142*, 437-459. https://bit.ly/3xUdyU8

Miles, S. B. (2018). Participatory Disaster Recovery Simulation Modeling for Community Resilience Planning. *International Journal of Disaster Risk Science*, *9*, 519-529. https://bit.ly/3IzOh6K

Miller, J. D., & M. Hutchins. (2017). The impacts of urbanisation and climate change on urban flooding and urban water quality: A review of the evidence concerning the United Kingdom. *Journal of Hydrology: Regional Studies*, *12*(August), 345-362. https://bit.ly/3m14lXk

Mirza, M. Q. (2011). Climate change, flooding in South Asia and implications. *Regional Environmental Change*, *11,* 95-107. https://bit.ly/3IXzioo

Mitsova, D., M. Escaleras, A. Sapat, A.-M. Esnard, & A. J. Lmadrid. (2019). The Effects of Infrastructure Service Disruptions and Socio-Economic Vulnerability on Hurricane Recovery. *Sustainability*, *11*(2). https://bit.ly/3ICIUn0

Montiel, C., P. Simmons, & A. Hicks. (2020). Post-disaster recovery and sociocultural change: Rethinking social capital development for the new social fabric. *International Journal of Disaster Risk Reduction*, *42*. https://bit.ly/3ktQ0T5

Moradi, S. (2020). *RecovUS: An agent-based model of post-disaster housing recovery* Texas Tech University]. Texas Tech University Library. https://bit.ly/3YaqTCq

Moreno, J. (2018). The role of communities in coping with natural disasters: Lessons from the 2010 Chile Earthquake and Tsunami. *Procedia Engineering*, *212*, 1040-1045. https://bit.ly/3m5hajv

Mould, R., & K. J. Baker. (2017). Documenting fuel poverty from the householders' perspective. *Energy Research & Social Science*, *31*, 21-31. https://bit.ly/3xV2RAD

Mukherji, A. (2017). Post-Disaster Housing Recovery. *Natural Hazard Science*. https://bit.ly/3xYmtUu

Narayan, S., M. W. Beck, P. Wilson, C. J. Thomas, A. Guerrero, C. C. Shepard, B. G. Reguero, G. Franco, J. C. Ingram, & D. Trespalacios. (2017). The Value of Coastal Wetlands for Flood Damage Reduction in the Northeastern USA. *Scientific Reports*, *7*(9463). https://go.nature.com/3YbpMCl

Nash, S. (2014). *Virginia Climate Fever*. University of Virginia Press.

NDRF. (2010). *National Disaster Recovery Framework*. https://bit.ly/3TeY3jo

Nejat, A. (2018). Perceived neighborhood boundaries: A missing link in modeling post-disaster housing recovery. *International Journal of Disaster Risk Reduction, 28,* 225-236. https://bit.ly/3ZqB3Qp

Neumann, B., A. T. Vafeidis, J. Zimmermann, & R. J. Nicholls. (2015). Future Coastal Population Growth and Exposure to Sea-Level Rise and Coastal Flooding - A Global Assessment. *Plos One, 10*(5). https://bit.ly/3Sv1p1v

Neumayer, E., T. Plumper, & F. Barthel. (2014). The political economy of natural disaster damage. *Global Environmental Change, 24,* 8-19. https://bit.ly/3SNLATT

Nifa, F. A. A., S. R. Abbas, C. K. Lin, & S. N. Othman. (2017). Developing a disaster education program for community safety and resilience: The preliminary phase. AIP Conference Proceedings 1891,

NIST. (2020). *National Institute of Standard and Technology*. https://bit.ly/3kEnD4y

Nowell, B., T. Steelman, A.-L. K. Velez, & Z. Yang. (2018). The Structure of Effective Governance of Disaster Response Networks: Insights From the Field. *American Review of Public Administration, 48*(7), 699-715. https://bit.ly/3ktPsfZ

Nur, I., & K. K. Shrestha. (2017). An Integrative Perspective on Community Vulnerability to Flooding in Cities of Developing Countries. *Procedia Engineering, 198,* 958-967. https://bit.ly/3Y3Cao3

NVOAD. (2012). *Long Term Recovery Guide*. https://bit.ly/3J7kqUA

Oakes, R., S. Banerjee, & K. Warner. (2020). 9 Human mobility and adaptation to environmental change. *World Migration Report, 2020*(1). https://bit.ly/3mc6fVl

OECD. (2021). *Income Inequality*. https://bit.ly/3ZsrZL1

Opdyke, A. (2017). *Resilient and Sustainable Infrastructure Systems: A Comparative Analysis of Post-Disaster Shelter Coordination, Stakeholder Participation, and Training* (Publication Number 10617829) University of Colorado]. ProQuest. https://bit.ly/3xX8E8X

Pandey, M., M. J. Zuo, & R. Moghaddass. (2015). Selective maintenance scheduling over a finite planning horizon. *Journal of Risk and Reliability*, *230*(2), 162-177. https://bit.ly/3ZofLmr

Patel, S., & M. Hastak. (2013). A framework to construct post-disaster housing. *International Journal of Disaster Resilience in the Built Environment*, *4*(1), 95-114. https://bit.ly/3KG2cKW

Paton, D. (2012). Disaster Resilient Communities: Developing and testing an all-hazards theory. *Journal of Integrated Disaster Risk Management*, *3*(1).

Paton, D., & M. Irons. (2016). Communication, Sense of Community, and Disaster Recovery: A Facebook Case Study. *Frontiers in Communications*. https://bit.ly/3m8ErRM

Peacock, W. G., N. Dash, Y. Zhang, & S. V. Zandt. (2017). Post-Disaster Sheltering, Temporary Housing and Permanent Housing Recovery. *Handbook of Disaster Research*, 569-594. https://bit.ly/3xVEF0X

Peacock, W. G., S. V. Zandt, Y. Zhang, & W. E. Highfield. (2014). Inequities in Long-Term Housing Recovery After Disasters. *Journal of the American*, *80*(4), 356-371. https://bit.ly/3xY7x96

Perreault, M. F., J. B. Houston, & L. Wilkins. (2014). Does Scary Matter?: Testing the Effectiveness of New National Weather Service Tornado Warning Messages. *Communication Studies*, *65*(5). https://bit.ly/3IK6azU

Platt, S. (2017). Factors Affecting the Speed and Quality of Post-Disaster Recovery and Resilience. In Rupakhety R., Ó. S. (Ed.), *Geotechnical, Geological and Earthquake Engineering* (Vol. 44). Springer, Cham. https://bit.ly/3Y6Fxug

Rahmayati, Y. (2016). Reframing "building back better" for post-disaster housing design: a community perspective. *International Journal of Disaster Resilience in the Built Environment, 7*(4). https://bit.ly/3SARmYx

Rivera, J. D. (2019). Bounded rationality and federal disaster recovery information. In *Risk Communication and Community Resilience*. Routledge. https://bit.ly/3mcvmr1

Roberts, R. (2020). Qualitative Interview Questions: Guidance for Novice Researches. *The Qualitative Report, 25*(9), 3185-3203.

Rouhanizadeh, B., & S. Kermanshachi. (2019). *A Systematic Approach to Analysis and Prioritization of Socioeconomic Policies and Legal Barriers to Rapid Post-Disaster Reconstruction* CSCE Annual Conference, Laval - Montreal, Canada. https://bit.ly/3ITZyz1

Rouhanizadeh, B., S. Kermanshachi, & T. J. Nipa. (2020). Exploratory analysis of barriers to effective post-disaster recovery. *International Journal of Disaster Risk Reduction, 50*. https://bit.ly/3kDMgOJ

Rowley, J. (2012). Conducting Research Interviews. *Management Research Review, 35*(3-4), 260-271.

Rufat, S., E. Tate, C. G. Burton, & A. S. Maroof. (2015). Social vulnerability to floods: Review of case studies and implications for measurement. *International Journal of Disaster Risk Reduction, 14*, 470-486. https://bit.ly/3mbMdu4

Rufat, S., E. Tate, C. T. Emrich, & F. Antolini. (2019). How Valid Are Social Vulnerability Models? *Annals of the American Association of Geographers*, *109*(4). https://bit.ly/3EHmsIr

Rumbach, A. (2016). Decentralization and small cities: Towards more effective urban disaster governance? *Habitat International, 52*, 35-42. https://bit.ly/3ZpsWU9

Sadri, A. M., S. V. Ukkusuri, S. Lee, R. Clawson, D. Aldrich, M. S. Nelson, J. Seipel, & D. Kelly. (2017). The role of social capital, personal networks, and emergency responders in post-disaster recovery and resilience: a study of rural communities in Indiana. *Natural Hazards*, *90*, 1377-1406. https://bit.ly/3Y3N3X0

Safapour, E., S. Kermanshachi, & A. Pamidimukkala. (2021). Post-disaster recovery in urban and rural communities: Challenges and strategies. *International Journal of Disaster Risk Reduction*, *64*(October). https://bit.ly/3mbm9zh

Sandler, D. (2019). Assessing the role of states in disaster recovery: applying plan quality techniques to state recovery plans. https://bit.ly/3EHjBzo

Sapat, A., A.-M. Esnard, & A. Kolpakov. (2019). Understanding Collaboration in Disaster Assistance Networks: Organizational Homophily or Resource Dependency? *American Review of Public Administration, 49*(8), 957-972. https://bit.ly/3Zl3pvd

Sarewitz, D., R. P. Jr., & M. Keykhah. (2003). Vulnerability and Risk: Some Thoughts from a Political and Policy Perspective. *RIsk Analysis*, *23*(4), 805-810. https://bit.ly/3KCKiZL

Sawada, Y., & Y. Takasaki. (2017). Natural Disaster, Poverty, and Development: An Introduction. *World Development*, *94*(June 2017), 2-15. https://bit.ly/3SyGP01

Sheppard, S. R. J. (2012). *Visualizing Climate Change*. Routedge. https://bit.ly/3mcxqiO

Sheykhmousa, M., N. Kerle, M. Kuffer, & S. Ghaffarian. (2019). Post-Disaster Recovery Assessment with Machine Learning-Derived Land Cover and Land Use Information. *Remote Sensing*, *11*(10). https://bit.ly/3EI4QfH

Skoufias, E. (2003). Economic Crises and Natural Disasters: Coping Strategies and Policy Implications. *World Development*, *31*(7), 1087-1102. https://bit.ly/3mddv2Z

Sledge, D., & H. F. Thomas. (2019). From Disaster Response to Community Recovery: Nongovernmental Entities, Government, and Public Health. *American Journal of Public Health*, *109*(3), 437-444. https://bit.ly/3EIamPn

Smith, G., & V. B. Flatt. (2011). Assessing the Disaster Recovery Planning Capacity of the State of North Carolina. *Institute for Homeland Security Solutions*. https://bit.ly/3Z6wxGT

Smith, S. G. (2013). Assessing the quality of state disaster recovery plans: implications for policy and practice. *Journal of Emergency Management*, *11*(4), 281-291. https://bit.ly/3Y7NyPV

Sovacool, B., P. Kivimaa, S. Hielscher, & K. Jenkins. (2017). Vulnerability and resistance in the United Kingdom's smart meter transition. *Energy Policy*, *109*, 767-781. https://bit.ly/3EIk4RL

Spence, R. (2004). Risk and regulation: can improved government action reduce the impacts of natural disasters? *Building Research & Information*, *32*(5), 391-402. https://doi.org/10.1080/0961321042000221043

Spiegel, P. (2005). Differences in World Responses to Natural Disasters and Complex Emergencies. *JAMA*, *293*(15), 1915-1918. https://bit.ly/3IW2lJ6

Spiekermann, R., S. Kienberger, J. Norton, F. Briones, & J. Weichselgartner. (2015). The Disaster-Knowledge Matrix – Reframing and evaluating the knowledge challenges in disaster risk

reduction. *International Journal of Disaster Risk Reduction*, *13*, 96-108. https://bit.ly/2NdMLKp

Spielman, S. E., J. Tuccillo, D. C. Folch, A. Schweikert, R. Davies, N. Wood, & E. Tate. (2020). Evaluating social vulnerability indicators: criteria and their application to the Social Vulnerability Index. *Natural Hazards*, *100*, 417-436. https://bit.ly/3Z24yIu

Stough, L. M., A. N. Sharp, J. A. Resch, C. Decker, & N. Wilker. (2015). Barriers to the long-term recovery of individuals with disabilities following a disaster. *Disasters*, *40*(3), 387-410. https://bit.ly/3J7kFyY

Strauss, A., & J. Corbin. (1998). *Basics of qualitative research: Techniques and procedures for developing grounded theory* (2nd ed.). Sage Publications.

Sutley, E. J., & S. Hamideh. (2018). An interdisciplinary system dynamics model for post-disaster housing recovery. *Sustainable and Resilient Infrastructure*, *3*(3), 109-127. https://bit.ly/41vc687

Sutley, E. J., S. Hamideh, M. K. Dillard, D. Gu, K. Seong, & J. W. v. d. Lindt. (2019). *Integrative Modeling of Housing Recovery as a Physical, Economic, and Social Process* 1th International Conference on Applications of Statistics and Probability in Civil Engineering, Seoul, South Korea. https://bit.ly/3kEbAnI

Synnefa, A., K. Vasilakopoulou, G. Kyriakodis, V. Lontorfos, R. D. Masi, E. Mastrapostoli, T. Karlessi, & M. Santamouris. (2017). Minimizing the energy consumption of low income multiple housing using a holistic approach. *Energy and Buildings*, *154*, 55-71. https://bit.ly/3IOVjWw

Tafti, M. T., & R. Tomlinson. (2017). Theorizing distributive justice and the practice of post-disaster housing recovery. *Environmental Hazards*, *18*(1), 7-25. https://bit.ly/3kvf0cu

Tagliacozzo, S. (2015). *The Concept of Place and Related Issues in Post-Disaster Reconstruction: Existing Knowledge and Gaps* 7th i-Rec Conference 2015: Reconstruction and Recovery in Urban Contexts, https://bit.ly/3IDvaIX

Tang, Y., Q. Sun, R. Liu, & F. Wang. (2018). Resource Leveling Based on Line of Balance and Constraint Programming. *Computer-Aided Civil and Infrastructure Engineering*, *33*(10), 864-884. https://bit.ly/3EDeakD

Tasnuva, A., M. R. Hossain, R. Salam, A. R. M. T. Islam, M. M. Patwary, & S. M. Ibrahim. (2021). Employing social vulnerability index to assess household social vulnerability of natural hazards: an evidence from southwest coastal Bangladesh. *Environment, Development and Sustainability*, *23*, 10223-10245. https://bit.ly/3Y6yGRQ

Tauzer, E., M. J. Borbor-Cordova, J. Mendoza, T. D. L. Cuadra, J. Cunalata, & A. M. Stewart-Ibarra. (2019). A participatory community case study of periurban coastal flood vulnerability in southern Ecuador. *Plos One*. https://bit.ly/3ICKllo

Taylor-Powell, E., & M. Renner. (2003). Analyzing Qualitative Data. *Program Development & Evaluation*.

Thomas, K., R. D. Hardy, H. Lazrus, M. Mendez, B. Orlove, I. Rivera-Collazo, J. T. Roberts, M. Rockman, B. P. Warner, & R. Winthrop. (2018). Explaining differential vulnerability to climate change: A social science review†. *WIREs Climate Change*, *10*(2). https://bit.ly/3IXyrnL

Tierney, K. (2002). *Lessons Learned from Research on Group and Organizational Responses to Disasters* Countering Terrorism: Lessons Learned from Natural and Technological Disasters.,

Tierney, K. (2012). Disaster Governance: Social, Political, and Economic Dimensions. *The Annual Review of Environment and Resources*, *37*, 341-363. https://bit.ly/3m7kmeu

Tol, R. S. J. (2018). The Economic Impacts of Climate Change. *Review of Environmental Economics and Policy 12*(1). https://bit.ly/41u1AOE

Tornello, A. (2020). *The Last Responders: Approaching the Disaster after the Disaster through Community-led Long-Term Recovery Coalitions* Naval Posgraduate School]. https://bit.ly/41yrsJ3

UNHR. (2021). *Internally Displaced Persons*. UNHR. https://bit.ly/3KE6bYD

Urquiza, A., C. Amigo, M. Billi, R. Calvo, L. Gallardo, C. Neira, & M. Rojas. (2021). An Integrated Framework to Streamline Resilience in the Context of Urban Climate Risk Assessment. *Earth's Future*, *9*(9). https://bit.ly/3xLN1Zf

Vahanvati, M., & M. Mulligan. (2017). A new model for effective post-disaster housing reconstruction: Lessons from Gujarat and Bihar in India. *International Journal of Project Management, 35*(5), 802-817. https://bit.ly/3mbJZuL

Valenzuela, S., D. Halpern, & F. Araneda. (2021). A Downward Spiral? A Panel Study of Misinformation and Media Trust in Chile. *The International Journal of Press/Politics*, 1-21. https://bit.ly/3KEcwTJ

Vitousek, S., P. L. Barnard, C. H. Fletcher, N. Frazer, L. Erikson, & C. D. Storlazzi. (2017). Doubling of coastal flooding frequency within decades due to sea-level rise. *Scientific Reports, 7*. https://go.nature.com/41D7ZqG

Vogel, B., & D. Henstra. (2015). Studying local climate adaptation: A heuristic research framework for comparative policy analysis. *Global Environmental Change*, *31*(March), 110-120. https://bit.ly/3EG8XbS

Wang, C., X. Li, L. Guo, & Y. Li. (2012). A seamless operation mode transition control strategy for a microgrid based on master-slave control. *Science China Technological Sciences 55*, 1644-1654. https://bit.ly/3IXU3Ao

Watanabe, H., & T. Maruyama. (2021). Residential preference transitions of disaster victims: A case using three-wave panel data in Mashiki following the 2016 Kumamoto earthquake in Japan. *International Journal of Disaster Risk Reduction, 54*. https://bit.ly/3md2H4Y

Watts, N., M. Amann, S. Ayeb-Karlsson, K. Belesova, T. Bouley, M. Boykoff, P. Byass, W. Cai, D. Campbell-Lendrum, J. Chambers, P. P. M. Cox, M. Daly, N. Dasandi, M. Davies, & M. Depledge. (2018). The Lancet Countdown on health and climate change: from 25 years of inaction to a global transformation for public health. *The Lancet, 391*(10120), 581-630. https://bit.ly/3ZqvbGY

Weiss, S. (2006). *Disaster Response*. Jones and Bartlett Publishers. https://bit.ly/3Ja77D3

Weitzman, E. (1999). Analyzing qualitative data with computer software. *Health Services Research, 34,* 1241-1263.

Whytlaw, J. L., N. Hutton, J.-E. W. Yusuf, T. Richardson, S. Hill, T. Olanrewaju-Lasisi, P. Antwi-Nimarko, E. Landaeta, & R. Diaz. (2021). Changing vulnerability for hurricane evacuation during a pandemic: Issues and anticipated responses in the early days of the COVID-19 pandemic. *International Journal of Disaster Risk Reduction, 61*(July). https://bit.ly/3ECxDlt

Wilkinson, S., & S. Mannakkara. (2014). Re-conceptualising "Building Back Better" to Improve Post-Disaster Recovery. *University of Canterbury. Vice-Chancellors Office*. https://bit.ly/3F4EsNh

Wisner, B. (2016). Vulnerability as Concept, Model, Metric, and Tool. *Natural Hazard Science*. https://bit.ly/41tspm1

Wolfe, R. S. (2021). *"It Seems Like It's Never Going to End": The Experiences of Those Living in Damaged Dwellings Following Hurricane Sandy* University of North Texas]. UNT Digital Library. https://bit.ly/3ZlNOfH

Woodruff, J. D., J. L. Irish, & S. J. Camargo. (2013). Coastal flooding by tropical cyclones and sea-level rise. https://go.nature.com/3ZwKD4q

Wu, S., B. Yarnal, & A. Fisher. (2002). Vulnerability of Coastal Communities to Sea-Level Rise: A Case Study of Cape May County, New Jersey, USA. *Climate Research, 22*(3), 255-270. https://bit.ly/3Z6SZzE

Yabe, T., K. Tsubouchi, N. Fujiwara, Y. Sekimoto, & S. V. Ukkusuri. (2020). Undestanding post-disaster population recovery patterns. *Royal Society Interface, 17*. https://bit.ly/3Y6THeU

Yadav, D. K., & A. Barve. (2016). Modeling Post-Disaster Challenges of Humanitarian Supply Chains: A TISM Approach. *Global Journal of Flexible Systems Management, 17,* 321-340. https://bit.ly/3Y5R4dp

Yang, L., J. A. Smith, D. B. Wright, M. L. Baeck, G. Villarini, F. Tian, & H. Hu. (2013). Urbanization and Climate Change: An Examination of Nonstationarities in Urban Flooding. *Journal of Hydrometeorology*, *14*(6), 1791-1809. https://bit.ly/3m9nsyy

Yankson, P. W. K., A. B. Owusu, G. Owusu, J. Boakey-Danquah, & J. D. Tetteh. (2017). Assessment of coastal communities' vulnerability to floods using indicator-based approach: a case study of Greater Accra Metropolitan Area, Ghana. *Natural Hazards*, *89,* 661-689. https://bit.ly/41uojtM

Yee, D. K. P. (2019). Post-political planning and insurgent mobilisation in the post-disaster city. In *Post-Politics and Civil Society in Asian Cities*. Routledge. https://bit.ly/3IW2HiW

Yeo, J., C. C. Knox, & Q. Hu. (2020). Disaster Recovery Communication in the Digital Era: Social Media and the 2016 Southern Louisiana Flood. *RIsk Analysis, 42*(8), 1670-1685. https://bit.ly/3EGcZBh

Yin, R. (2003). *Case Study Research: Design and Methods*. Sage Publications.

Yoon, D. (2012). Assessment of social vulnerability to natural disasters: a comparative study. *Natural Hazards*, *63*, 823-843. https://bit.ly/3ZsvHE7

Yu, D., J. Yin, R. Wilby, S. Lane, J. Aerts, N. Lin, M. Liu, H. Yuan, J. Chen, C. Prudhomme, M. Guan, & A. Baruch. (2020). Disruption of emergency response to vulnerable populations during floods. *Nature Sustainability*, *3*, 728-736. https://go.nature.com/3KF9nmC

Yuldashev, F. (2018). *Natural Disasters and Governance Systems: The Sociotechnical Foundations of Post-Disaster Governance Reforms in Nepal* (Publication Number 13819949) University of Pittsburgh]. University of Pittsburgh. https://bit.ly/3EJ3Esm

Yusuf, J.-E., S. Hill, E. Landaeta, J. Whytlaw, & T. Richardson. (2020). The Compound Threat of COVID-19 and Hazards: Public Management and Policy Issues from a Stakeholder Perspective. *International Journal of Policy Studies, 11*(2), 149-181. https://bit.ly/41z3ugP

Zhang, W., S. Zhang, M. Cai, & J. Huang. (2011). A new manufacturing resource allocation method for supply chain optimization using extended genetic algorithm. *The International Journal of Advanced Manufacturing Technology*, *53*, 1247-1260. https://bit.ly/41yiNGA

Zucker, D. (2009). *How to do Case Study Research*. University of Massachusetts - Amherst.

Zurita, M. d. L. M., B. Cook, L. Harms, & A. March. (2015). Towards New Disaster Governance: Subsidiarity as a Critical Tool. *Environmental Policy and Governance*, *25*(6), 383-398. https://bit.ly/3KCuB4J

APPENDICES

APPENDIX A – LETTER FROM HUMAN SUBJECTS REVIEW COMMITTEE

Please note that Old Dominion University Arts & Letters Human Subjects Review Committee has taken the following action on IRBNet:

Project Title: [1866153-1] Eliciting information for a post-disaster housing recovery project

Principal Investigator: Eduardo Landaeta

Submission Type: New Project

Date Submitted: January 27, 2022

Action: EXEMPT

Effective Date: February 22, 2022

Review Type: Exempt Review

Should you have any questions you may contact Randy Gainey at rgainey@odu.edu

Thank you,

The IRBNet Support Team

APPENDIX B – AN INTRODUCTORY LETTER TO LTRG MEMBERS

Dear “LTRG member”

I hope this letter finds you well.

I would like to know if it's possible to interview with you to get information and insights regarding your experience in the post-disaster housing recovery process on past declared disasters that happened during your leadership role. I got your contact information from the “state/city” LTRG website.

I am a doctoral student in International Studies at Old Dominion University in Norfolk, VA. My dissertation research is focused on the process of the post-disaster housing recovery. An important part of it is collecting data from experts like you to understand lessons learned from previous disaster recoveries to plan policies, coordination, resources, and labor. Your participation in this data collection - that it is only for a few members of past LTRGs- will make a difference in providing a better understanding of the roles of LTRGs to improve recoveries and, therefore, increase the nation’s efforts to build resilience and better serve populations.

I have been doing theoretical research on post-disaster housing recovery over the last three years and I know the important value of the Long-Term Recovery Groups (LTRGs) for the effectiveness of the process. It would be my honor if you can share some information with me to assist me in my research.

The information which you provide me will be used in the strictest confidence to only analyze previous housing recovery. Your name and contact information will not be shared, nor will I keep this information in our database with the interview. I will also share with you and other participants the final results of my research, which I hope will be valuable to you.

Is it ok if we can connect soon -phone or zoom? Perhaps “date and hour” works for you?

I look forward to hearing from you.

Thank you in advance,

Sincerely,

Eduardo Landaeta

APPENDIX C – SET OF QUESTIONS FOR LTRG MEMBERS

This research is a general exploration of the role of LTRGs in post-disaster recoveries. This research examines questions surrounding the speed of recovery in which LTRGs were present. From the perspective of individuals and organizations taking part as members of these LTRGs:

1. How the LTRG was initially established. Who took the lead? Was the energy to set up the LTRG from the business sector, government sector, nonprofit sector? Are there standard pathways to set up LTRGs?
2. Were there multiple LTRGs operating for the same disaster? If so, what were the boundaries for the several LTRGs? Did these LTRGs interface regularly?
3. What factors were experienced that frustrated the speed of recovery? Were due to material availability, general materials vs specialized material? Were due to labor availability, general labor vs specialized labor? Were due to process roadblocks, such as permitting, inspections, and financing? Were due to special zones such as historic districts that require an additional layer of oversight/approval prior to repairs being made?
4. What are the differences across the median income of those impacted, and other household characteristics?
5. Did the locality have a Build Back Better philosophy that is reflected in a recovery plan?
6. What type of government was during the disaster? (i.e., city manager)
7. Plan to do differently next time? What are the lessons learned?
8. Any other comment or suggestion you feel it’s important to add?

VITA

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Landaeta holds a bachelor's degree in interdisciplinary studies with concentrations in International Politics and Communications from the University of Houston-Downtown in Houston, Texas. A Specialization in International Business from Universidade Presbiteriana Mackenzie in São Paulo-Brazil. And a doctoral degree in International Studies with concentrations in Modeling and Simulation, and International Political Economy from Old Dominion University in Norfolk, Virginia.

He is interested in global environmental issues and has been doing research over the past years on post disaster housing recovery and COVID-19 for vulnerable populations, including some as a research assistant at the Virginia Modeling Analysis and Simulation Center (VMASC). Eduardo has co-authored three peer-review publications, and two workshop reports – all related to natural hazards and COVID-19.

He has been awarded with the Bruce and Lily Bradley Distinguished Coastal Resilience Fellowship. He is also part of the Pi Sigma Alpha National Political Science Honor Society, the Omicron Delta Kappa National Leadership Honor Society, and part of the ODU Comprehensive Leadership Program – Monarchs LEAD (Leadership Exploration and Development).

He has a strong background in International Relations, Leadership, and Negotiation, where he has been part of leadership positions over the past years. He is fluent in Spanish, Portuguese, and English.