

GIVING VOICES TO YOUTH IN COMMUNITY DISASTER MITIGATION: TEXAS
CASE STUDY

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DEDICATION

I dedicate this honor thesis to my parents who have not only witnessed my downfalls in life but have seen me get up and grow into the strong and independent person I am today.

ABSTRACT

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There is a paucity of research on the inclusion of children and youth in disaster risk reduction or participating in using mitigation strategies to lessen the impact of disasters likely to occur in their communities. However, in recent years, there has been a gradual increase of research documenting that children and youth play a role in emergency management in taking leadership roles to educate and influence their community on disaster risk reduction (DRR) and mitigation. This thesis will focus on a group of individuals who have been ignored in voicing their thoughts on creating safer communities against natural disasters, such as flooding. This study will focus on the impact of Tropical Storm Imelda in the Kingwood, Texas area, and how children and youth can engage in DRR and mitigation in their community. Thesis reviews existing literature on children and youth population, and their inclusion in DRR and mitigation. Thesis results is an educational module formed to help engage and educate children and youth in the Kingwood community on their role in DRR and assist in forming mitigation strategies to prevent future impact caused by natural disasters.

KEY WORDS: Disaster risk reduction, children and youth inclusion, mitigation, emergency management, Texas, floods, mitigation polices

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I would like to take a moment to acknowledge those who have aided me in this yearlong project; my last major work accomplished as an undergraduate student. First, I would like to thank Dr. Magdalena Denham for the immense support, encouragement, and patience she has offered me since the first day I came into her office to sign up for the Poland study abroad program. She always welcomed me with a warm smile and thought positively, which I appreciate very much. Without Dr. Denham as my advisor, the path from the start to the finish line would have not gone well and would have not even thought of writing an honors thesis. Dr. Denham has been one of the best professors at Sam Houston State University that I have had the honor to get know through taking her emergency management course, but above all having her as my advisor.

Without the loving support of my parents, who have given everything to help me get through college, I would not be where I am today. I want to apologize for all the childish tantrums I have put them through over the years, but also thank them for never giving up on me. Even though most of the time when I spoke of projects, honor contracts, and thesis, my parents seemed confused and probably not interested, I thank them listening. My parents might not understand the importance to me of graduating with not only honors but with the highest honors, but I do and it is for them that I signed up for endless nights of researching, reading, and writing.

Just as my parents gave everything for their daughters, I must also give everything to make them proud. Thank you from the bottom of my heart mom, dad, sister, Dr. MD, friends and family for your humble support.

PREFACE

I have chosen to work with Dr. Magdalena Denham in her “Child-Centered Risk Reduction: Youth Inclusion in Local Community Hazard Mitigation Planning ” research project because she introduced me to it when I decided to complete the honors thesis. I was been engaged in a Teen Community Emergency Response Team (CERT) program in high school and learned strategies to help educate my school community in preparedness and response towards unexpected disasters. I believed that this research project was something that could further enhance the skills I gained in the Texas Youth Preparedness Camp as well as academic competencies such as organizing and analytical thinking and writing. I believe that this project would push me to another level in going above and beyond as an Honor student. It was an opportunity to test the waters in conducting research, which is what I will, later, acquire fully in graduate school.

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CHAPTER I

Introduction

Emergency management can be simply defined as “a discipline that deals with risk and risk avoidance” (Haddow et al., 2017, p. 2). Risk can refer to the possibility of something being lost, per se loss of lives, property, or damage to the environment. The combination of something occurring and the consequences of the impact calculates the risk of exposure, thus $\text{Risk} = \text{Probability} \times \text{Vulnerability} \times \text{Impact}$ (Federal Emergency Agency [FEMA], 2020c). There are two factors of risk, which is determining hazards and vulnerability. Risk is something that can be calculated but hazards cannot but can be assessed based on past events and future potential of occurring. Hazards represent an inherent source of risk that when activated can cause damage; there are several types of hazards, which include those of the natural variety like floods (Haddow et al., 2017, p. 32). Disasters can be caused by hazards when human activities, property, and human life are affected (Ababa, 1998, p. 3). Identifying hazards is the result of all emergency and risk management activities (Haddow et al., 2017, p. 31). Risk is known once the current hazard is present; this guides the process for phases of emergency management such as preparedness, response, recovery, and mitigation. Since prior the 1900s to present, the U.S. government has provided aid for flood disasters and shown to play a key role in relief efforts of response and recovery. Emergency management plays an important role in government, and especially when dealing with natural hazards such as floods.

Focusing Flood Events Overview

Floods are a type of natural disaster that has the capability of reaching the level of destructiveness in the loss of human lives and property in the United States (Branch,

2019, p. 3). A flood is defined as an abundance of water that swamps land and other property that is usually dry (Haddow et al., 2017, p. 32). This type of natural disaster is the most frequent and widespread disaster in the United States, due to the tendency of carrying out human development in floodplains (Haddow et al., 2017, p. 33). It is documented that since 1950, presidents have made more disaster declarations for floods than any other natural disaster event (Rubin, 2012, p. 155). Floods are intensifying and increasing and are expected to continue increasing due to climate change (World Health Organization, 2019). Prior to the 1900s, the United States has encountered natural disasters, and in particular floods, such as the disaster of 1889.

On the afternoon of May 31st of 1889 in Johnstown, Pennsylvania, a great amount of rainfall was recorded (Stayer, 2007). Johnstown stood below a valley, and a poor man-made dam collapsed. The disastrous flood killed over two thousand individuals, which did not include the number of missing individuals (Stayer, 2007). The Johnstown flood is known to be a great disaster in the list of natural disasters that have killed a large number of individuals in the United States (Kaktins, Todd, Wojno, & Coleman, 2013, p. 335). Approximately 2,209 individuals died, 1,600 homes were destroyed, and \$17 million in property damage was recorded (Johnstown Area Heritage Association [JAHA], 2019a).

During the existence of the dam, very little maintenance was performed, and this remained the trend as the dam and reservoir was passed on through several owners until the South Fork Fishing & Hunting Club bought it in 1879 (JAHA, 2020a). The club would carry out the maintenance of the dam, but their modifications only led to capturing debris and impeding the spillway from draining the overflow (JAHA, 2020a). Not only

was the dam poorly maintained, but also the construction of it was unsound when it was first built. The plans of the dam specified initially for the spillway to be 150 feet wide, but instead it only spanned about 70 feet. Thus, the dam first collapsed in 1862, and then was poorly repaired and maintained, until it collapsed again in 1889 (Association of Dam Officials, 2020).

Johnstown flooding was at the time the most catastrophic event causing the loss of so many lives. This disaster received the largest media coverage since the assassination of President Lincoln in 1865, compared to other natural disasters prior to the 1900s (JAHA, 2013). It was the first disaster described fully by the media and it raised awareness, thus influencing the government to start considering the “ad hoc approach to disaster response” (Rubin, 2012, p. 15). Not only was it the first to receive a lot of coverage, but it is also recognized as the first natural disaster where the American Red Cross gave relief effort (Rubin, 2012, p. 16). The great amount of news coverage coupled with the relief effort on behalf of the Red Cross helped establish the American Red Cross “as a major disaster relief agency” in the United States (JAHA, 2020b).

On behalf of the federal government, not much action was carried out. President Harrison had no duty to provide relief efforts, though he directed the U.S. Army Corps of Engineers (USACE) to repair, replace, or build new bridges that were damaged (Kapucu, 2011, p. 1). Along with the aid from the American Red Cross, the largest cities also organized themselves to travel out to Pennsylvania. The initial effort was led by the residents of Johnstown who survived the disaster and were in physical condition to perform rescues. Several volunteers from Pittsburg came, prisoners from Cincinnati were sent, and thousands of goods were sent to feed the homeless survivors (JAHA, 2019b). It

is recorded that approximately \$3,742,818.78 was collected in charity for the relief effort, coming from help within the U. S. and twelve foreign countries (JAHA, 2019b).

After Johnstown flood, another major flooding disaster that occurred in the 1900 was the Great Stormin Galveston. On September 8, 1900, people on the island ““went about their usual tasks until about 11 a.m.,”” and no one imagined the deadly disaster heading towards them (Burnett, 2017). After 3 pm the waters were rising and moving slowly into the city of Galveston (Burnett, 2017). To this day, the Galveston Hurricane of 1900 has remained the deadliest disaster to have occurred in the United States (Rubin, 2012, p. 17). Thousands of people died during this disaster, though it was difficult to record the exact number of lives lost. They estimate at least between 6,000 up to 12,000 people died, which translates to roughly about one of every six Galveston citizens having perished (Rubin, 2012, p. 17). There were warning signs sent from the U.S. Weather Bureau from Washington D.C. as early as September 4th. It is said that a hurricane like this should have been expected, due to previous hurricanes that hit the Gulf coast in the 19th century (Rubin, 2012, p. 19).

The initial response right after the Galveston Hurricane hit, was the community response, thus surviving victims helping among each other. Among each other they provided food, clothing, shelter, medical care, performing search and rescue, and even locating and burying the bodies (Rubin, 2012 p. 19). Apart from the American Red Cross providing relief help in form of food and clothing, the U.S. Army sent soldiers, tents, and food to the survivors. The operations for recovery, such as recovering bodies, took several weeks (Rubin, 2012, p. 19). Galveston was not prepared for a hurricane at this level.

There had been previous suggestions to build a seawall, but no action was carried out until after the hurricane because Galveston officials finally realized the importance to construct a seawall (Rubin, 2012, p. 20). Not only was it important to build a seawall, but it was necessary to physically elevate the city to provide protection for future flood disasters. The city was raised 17 feet high and a bit more than 2,100 buildings were raised as well in the process (Rubin, 2012, p. 20). In 2008, an article published by the FEMA claimed that the Galveston's St. Patrick church survived being surged with flooding from Hurricane Ike, due to the action of elevating the church after the 1900 hurricane disaster. Elevating buildings served as a practice of mitigation in preventing flooding from occurring (Patton, 2008).

Following Galveston Hurricane, a few decades later another flooding disaster occurred in 1927. The Mississippi flood of 1927 is called to be the “greatest natural disaster to befall” the nation regarding the amount of human suffering and misery the people endured (Rubin, 2012, p. 53). It is said that it was not the first time the Mississippi River overflowed, and this is similar to how the Island of Galveston had previously encountered hurricanes before the 1900 Big Storm (Kosar, 2005, p. 2). On April 16, 1927, the Mississippi river flooded 175,000 acres. A 1,200-foot section of a levee collapsed, about “thirty miles south of the confluence of the Ohio and Mississippi Rivers” (Rubin, 2012, p. 52,). The collapse of the levee, which was to prevent the city from the rising river, affected areas such as Arkansas, Illinois, Louisiana, Missouri, Kentucky, Tennessee, and of course Mississippi. The number of deaths was difficult to record, but the American Red Cross reported about 246, though it is said that it was probably several times more in deaths (Rubin, 2012, p. 53).

Thousands of victims were homeless and had to stay in American Red Cross camps for months due to their homes being destroyed. About 200,000 buildings were either destroyed or damaged, and thousands of square miles of land were flooded (Rubin, 2012, p. 53). Just one year before this disaster, the USACE had declared the levee system efficient to prevent future floods in the Mississippi River, although this claim was shortly contradicted (Rubin, 2012, p. 53). The American Red Cross took care of the lion share of the financial recovery from the flood. Apart from this aid, there was finally some mixture of federal governance contributions, known as the “biggest disaster relief effort in U.S. history” (Rubin, 2012, p. 55). The response to this disaster consisted of state, local, federal, and private resources. Although there was federal aid, this event showed that the federal government needed to take the responsibility of forming a flood control program to address the issue of flooding and protect the people (Rubin, 2012, p. 55). Thus, this event also shows the lack of capability of locals to deal financially with flood control measures.

The effect of this disaster helped promote more federal floodplain management (Rubin, 2012, p. 56-57). A few years after a major legislation was passed to help prevent flooding disasters, the Flood Control Act of 1936 was established. This legislation gave USACE the authority to design and build projects regarding flood-control. This act of emergency management was costly, due to being shortsighted and sustained for several years (Haddow et al., 2017, p. 3). Although it was not the perfect solution to resolve flooding issues, it served for people to acknowledge that there is a way to eliminate flooding hazards. After the Mississippi flood, another flood disaster more locally in Texas was Tropical Storm Allison which hit the United States in 2001.

Known as one of the top ten U.S flood disasters between 1900-2013 lies Tropical Storm Allison in June 2001 (Haddow et al., 2017, p. 34). Table 1 represents the Top Ten US Flood Disasters and Losses Paid. Tropical Storm Allison left more than five billion in property damage. There were 22 deaths, 30,000 residents staying in shelters, 95,000 damaged vehicles, and approximately 73,000 damaged residences (Harris County Flood Control District, 2002, p. 1). On June 5, 2001, the storm made landfall for the first time in Galveston and moved into the Houston region, where it resulted in flooding of 1,000 residences. Between June 5 to 9, there was about a total of 40 inches of rainfall collected in several regions of Houston such as downtown. During the second landfall of Allison in Houston, within a 12-hour period, northeast of downtown Houston received 28 inches of rainfall (Harris County Flood Control District [HCFCD], 2002, p. 1). One of the areas that was impacted the most was the Texas Medical Center; the level of damage done varied, and the preparedness of the facilities failed because the high levels of flooding were unpredicted and the electronics failed from extensive water damage (Crowley, 2005, p. 677).

Table 1

Top Ten U.S. Flood Disasters, 1900-2013 (by Total Cost of National Flood Insurance Program Losses Paid)

Event	Date	Number of Paid losses	Amount of Paid Losses
Hurricane Katrina	August 2005	167,699	\$16,266,477,732
Hurricane Sandy	October 2012	115,000	\$9,700,000,000
Hurricane Ike	September 2008	46,418	\$2,663,589,174
Hurricane Ivan	September 2004	27,658	\$1,590,436,206
Hurricane Irene	August 2011	43,844	\$1,301,682,155
Tropical Storm Allison	June 2001	30,663	\$1,103,877,235
Louisiana Flood	May 1995	31,343	\$585,071,593
Hurricane Isabel	September 2003	19,869	\$493,433,448
Hurricane Rita	September 2005	9,518	\$472,885,523
Hurricane Floyd	September 1999	20,437	\$462,252,753

Adopted from Haddow et al., 2017

On Saturday, June 9th, several units of the Coast Guard, local emergency agencies, and the National Guard helped rescue about 7,000 individuals. Also, apart from the rescues being carried out by these agencies, citizens were also helping others in rescuing thousands of flood victims. A few days after the storm passed, about 30,000 Houston residents were sheltering in 51 shelters in the county. More than \$53 million was spent to help repair city facilities, which is estimated to have a total damage cost of \$80 million (HCFCD, 2002, p. 4).

Another natural disaster that hit severely in the United States was Hurricane Katrina in 2005. Hurricane Katrina is another top ten U.S. flood disasters and had a total cost of National Flood Insurance Program losses paid of \$16,266,477,732 (Haddow et al., 2017, p. 34). Hurricane Katrina first passed through Florida on August 25, 2005, as a category 1. Then on August 29, 2005, it made landfall as a category 3 hurricane in Louisiana. In New Orleans, the levee system failed, thus submerging the city underwater.

The communities that were the hardest hit were in Louisiana, Alabama and Mississippi. All the infrastructures and lifelines were lost in many communities in those states, such as electricity, communication systems, water and sewer, and even governmental operations which included law enforcement. Several of the local first responders in these communities were surviving victims (United States Department of Homeland Security, Office of Inspector General [US DHS, OIG, 2006, p.4). This storm is listed as the third deadliest hurricane in the US history, and it resulted in approximately 1,867 deaths (Rubin, 2012, p. 194).

Due to all infrastructure being lost, it severely impacted the ability of emergency responders to get/stay organized to help the surviving victims that were stranded. It took several days for responders and other relief efforts to get a clear picture of the damage that Hurricane Katrina caused (US DHS, OIG 2006, p. 6-7). Within one week after the hurricane, the U.S. Coast Guard performed over 30,000 rescues, which were more rescues than the total amount performed throughout 2004. Apart from the efforts done by the U.S. Coast Guard troops, state and local first responders and active-duty federal troops also helped in search and rescue. There were an estimated 50,000 victims rescued. Responding and recovering from this disaster might have gone smoothly if FEMA's logistic system had a more accurate visibility program. There was a lot of confusion and frustration from FEMA personnel and responders in not knowing what resources were being delivered to them nor when their arrival was (US DHS, OIG, 2006, p. 7). These flaws in the system lead to Post-Katrina Emergency Management Reform Act (PKEMRA) established in 2006. This act implemented the responsibility of the Federal

government to reorganize FEMA, in order to assist local and state governments when declaring emergency disaster (Haddow et al., 2017, p. 2).

A more recent natural disaster that impacted greatly thousands of Houston residents was Hurricane Harvey, flooding thousands of homes and causing damage to water systems. It is known to have most direct deaths from a tropical cyclone within a state since 1919; there were 68 deaths in Texas. This hurricane made a significant large amount of rainfall that caused a catastrophic flooding in Galveston and Harris counties and beyond, as shown in figure 1 (Blake & Zelinsky, 2018, p. 6). During Harvey, Nederland, Texas set a record for being “a single storm in the continental United States” to have nearly 60.5 inches of rainfall (Amadeo, 2019, p. 3). Due to the rainfall reaching record levels in cities like Houston and Nederland, thousands of people were evacuated and rescued from their homes and even some from the highways. There were 37,000 people in shelters in the state of Texas and 2,000 in Louisiana (Amadeo, 2019, p. 2). This hurricane brought challenges in dealing with submerged filtrations pumps, leaving many areas without access for water for several days, due to the tremendous amount of rainfall causing severe flooding (Mann & Williams, 2020, p. 1). It was said that the flooding in southwest Texas was the size of the state of New Jersey (Amadeo, 2019, p. 3-4).



Figure 1. Water Rescues During Hurricane Harvey 2017. Source: Blake & Zelinsky, 2018.

Ten months after Hurricane Harvey happened, the Federal government approved a \$5 billion grant plan for disaster relief. It is a plan that designated \$2.3 billion for Houston and Harris County disaster areas, and \$2.7 billion for other disaster areas. Programs such as local, regional, and state planning will allow the Texas General Land Office (TGLO) to study planning on disaster mitigation in areas impacted, to obtain a smooth long-term recovery (Cobler, 2018). In 2019, another group of bills were passed by the Texas Senate to aid in the recovery of Hurricane Harvey, but they also included plans to protect against future storms. These bills implement measures that will allow for mitigation strategies to resolve the lack of flood control, thus lessening the impact of future flood disasters. Senate Bill 6, 7, and 8 included key points such as creating guides for local officials on both disaster response and recovery, payments for projects regarding flood control, as well creating an official statewide flood plan (Collier, 2019).

Flooding is not only a type of natural disaster that occurs within the United States; indeed, many countries around the world are severely impacted by flooding events as well. Floods are said to be responsible for “44 % of the deaths caused by natural hazards world-wide” (Prama et al., 2020, p. 4). Flood events such as the French Riviera in 2015, winter floods in 2015 and 2016 in England, and the floods in spring 2016 within the European continent have clearly shown that devastation from flooding can be loss of life, economic losses, and disruption (Gilissen et al., 2016, p. 2). Just like the United States, the Netherlands can attest to experiencing an amount of flooding. Just one major flood event in the Netherlands that occurred in 1953 cost \$1.5 billion in damages (Branch, 2019, p. 3). Due to its geography, such as half of the country being below sea level, the Netherlands is in high risk of flooding (Branch, 2019, p. 18). Flooding is prone to happen in the Netherlands, just like several U.S. states such as Texas being near the Gulf Coast prone to hurricanes and tropical storms. It is a type of natural disaster accepted in perceptions of many Dutch communities to occur (Branch, 2019, p. 17).

Meanwhile, in India’s 2019 monsoon season, floods have displaced or injured about 2.5 million people within 22 states and have killed thousands (Patel, 2019). Further, flooding events in Saudi Arabia have taken over more than 113 lives and destroyed 10,000 homes within the last 5 years (Prama et al., 2020, p. 2). City of Dahab, in its last catastrophic flood recorded 26 deaths, 72 injured, and about 6,500 families affected (Prama et al., 2020, p. 4). Countries in Europe and Asia are just some of the areas that are impacted severely by flood disasters, just as the United States is impacted cyclically every year.

In tandem with natural disasters becoming ubiquitous around the world, emergency management has in the United States and in another parts of world to address increasing challenges and complexity of natural weather events' management. Agencies like FEMA perform trainings in preparation for future disasters, and non-governmental organizations (NGOs) like the American Red Cross recruit volunteers to help during disaster events.

Children in Disasters

About 175 million children are estimated to be have been affected by disasters each year between 2010 to 2020, stated by the Save the Children organization (Fothergill & Peek, 2015, p. 21). Children experience disaster events first-handby being evacuated from their flooded home and displaced; to many those can trigger traumatic experiences. They can experience a range of vulnerabilities such as physical, psychological, and educational, which can be interconnected (Fothergill & Peek, 2015, p. 21). However, instead of viewing children as victims of disasters, they can also be examined based on the role they play a role in disaster preparedness, response, and mitigation (Pfefferbaum, B., Pfefferbaum, R. L., & Van Horn, R. L., 2018, p. 2). Children can become active agents as in their communities as communicators of disaster risks and serve as a mitigation strategy to reduce the level of impact that disasters have in their area (Winangsih & Kurniati, 2020, p. 298). The small amount of literature and research on youth mitigation necessitates further inquiry into the youth involvement in emergency management and in DRR in particular.

The topic about emergency management and the inclusion of youth and their role in disasters originated from the research study proposed by Dr. Magdalena Denham in

her “Child-Centered Risk Reduction: Youth Inclusion in Local Community Hazard Mitigation Planning.” EUREKA FAST. The study content will include the Tropical Storm Imelda, and location will be Kingwood, Texas. This study will focus on youth and their importance in serving as a mitigation strategy to help reduce the disaster risk that exists in their communities. This thesis played a part in the research project by providing the literature review and educational module that will be used to educate on mitigation and the importance of their role in disaster risk reduction (DRR) in their community, and to identify mitigation strategies that will help provide a safer community in future natural disasters such as flooding. Here I would list the steps of the project that were proposed and indicate that the study is ongoing, and your piece is fundamental to it.

CHAPTER II

Disaster Risk Reduction

Disaster risk reduction (DRR) is a term broad enough to define in several forms. According to the United States Agency for International Development (USAID), DRR involves preventing damage that is caused by natural hazards such as floods, storms, droughts, and earthquakes. USAID also states that DRR does not only help save lives after a disaster hits but also as the disaster strikes (United States Agency for International Development [US AID], 2019). The United Nations of International Strategy for Disaster Reduction states that DRR is reducing exposure to hazards, decreasing the vulnerability of people and property, and improving preparedness for adverse events (“What Is DRR?”, n.d.). “Disaster risk reduction requires an all-of-society engagement... youth leadership should be promoted,” stated as one of the guiding principles of the purpose of DRR (“Sendai Framework,” 2015, p. 13). DRR plays a factor in emergency management, and youth can implement practices in their communities to create safety in future natural disasters.

In the emergency management cycle, there are four phases: preparedness, response, recovery, and mitigation, as shown in Figure 2. DRR is associated with two of the four phases of the emergency management cycle, which are preparedness and mitigation. Preparedness and mitigation are two stages that involve preparing for crises and preventing the severity of their impact, which is what DRR is and is a similarity between the stages (Strom, 2020). Both stages take part in an important role in emergency management, and the main difference is the moment in which they take part in disasters. It is important to review the other two of the four phases of the emergency

management cycle before going into depth with the two associated with DRR: response and recovery.



Figure 2. Emergency Management Cycle. Source: Conservation Center for Art & and Historic Artifacts, n.d.

Responding was the traditional approach carried out in many disasters prior to the 1990s in the United States. The response phase in the emergency management cycle takes place once an emergency event has occurred. This phase is all the activities that are carried out in an effort to begin to restore order (Haddow et al., 2017, p. 175). First responders are not precisely always in natural disasters government officials, especially if per se a hurricane caused major damage in areas that are severely flooded, thus local police are unable to reach residents and evacuate them. Most responders are volunteers, even neighbors can help each other rescue to keep away from the harm that is posed by the disaster. This phase takes action in tackling immediate threats that are imposed by the disaster (“Phases of Disaster”, 2020). Some activities carried out in response to Hurricane Katrina were restoring infrastructure, providing emergency assistance to victims, sheltering people, and providing food. Since the response to Hurricane Katrina was not efficient as it should, FEMA and DHS created the National Response Framework (NRF)

and embraced the National Incident Management System (NIMS). The NRF will allow for efficient response to disasters in general, and the NIMS will allow better coordination response to disasters by local, state, and federal government; private sectors; and voluntary and nongovernmental organizations (Haddow et al., 2017, p. 179).

The recovery phase comes right after the response phase in the emergency management cycle. FEMA defines recovery as providing what is necessary to assist communities impacted, in order to recover efficiently (U.S. DHS, 2016, p. 1). Recovery involves activities related to restoring business, rebuilding homes, replacing property, and rebuilding infrastructure. This phase also prioritizes what is needed at the moment to normalize the community affected but keep the long-term goal in mind to reduce future vulnerability (Haddow et al., 2017, p. 229). Due to the recovery required to have a long-term goal besides just giving aid to the community, it is important several parties play their role, in order to have an efficient recovery. Just like there is a National Response Framework, there is a National Disaster Recovery Framework (NDRF), and it claims that a successful recovery requires the effort of the whole community (U.S. DHS, 2016, p. 10). Thus, the numerous participants include all levels of government, political leadership, community businesses and activists, and individuals. All players in recovery need to unite to help finance, plan, and establish a recovery strategy that will not only help rebuild the disaster-affected areas but as well make it safer and secure as quickly as possible (Haddow et al., 2017, p. 229-230). Although in the cycle, it shows recovery coming after the response phase, there is some debate about whether some actions carried out in the response phase might also be part of recovery. Some recovery actions carried out maybe “concurrent with response efforts,” and some of the long-term projects set in

motion may be mitigation measures as well (FEMA, 2020a, p. 3). The recovery phase can take place a few hours and days after a disaster hits an area and can continue for months, even years, it just depends on the level of severity and destruction that was caused (Haddow et al., 2017, p. 229).

According to the DHS and FEMA, preparedness is defined as a “continuous cycle” that involves planning, equipping, and taking action to ensure efficient coordination when responding to an incident (“Plan and Prepare for Disasters”, 2012, p. 1). In the preparedness stage, one plans out strategic ways to respond in anticipation of a specific event and allocate its resources before the incident occurs. Planning is a factor in preparedness and most often deals with the process of assessing hazard risks. By identifying vulnerability in a region, planners can then organize themselves and determine the resources they must allocate, provide any training, and exercise their plan of preparation for possible disasters (Haddow et al., 2017, p. 104-105). This stage can be specific to a disaster, such as a person stockpiling on food supplies or cities and counties declaring mandatory evacuations before a hurricane hits in an area (Twiggs, 2004, p. 13). Not only is this phase proactively anticipating the response to a particular disaster but implies the potential risks that exist. Such actions might be knowing the danger of a category 5 hurricane landing in Galveston, Texas, and mandatory evacuation implemented in the area to avoid the loss of lives. The preparedness phase views the hazards, risks, and vulnerabilities that have been noted in a region (“Emergency Management Cycle,” n.d.). Therefore, specific measures are carried out such as planning evacuation routes, stocking up on resources, and setting up shelters. Preparedness, such as planning for evacuation routes in an area vulnerable to landslides or flooding as the

people of Johnstown, thus establishing a warning system to evacuate before the dam collapse, could have decreased the number of deaths recorded in 1889.

FEMA defines mitigation as a form of action to reduce or eliminate risk to people and property from hazards and their impact (“Local Mitigation”, 2013, p. 1). Mitigation strategies such as building codes, public education, and warning systems have declined the number of deaths from natural disasters in the last century (Haddow et al., 2017, p. 73). Some of the most common mitigation tools include land use planning, hazard identification, and mapping, structural controls, insurance, and building codes and enforcement (Rubin, 2012, p. 202). Overall, mitigation can reduce costs in responding and recovering from a natural disaster (FEMA, 2020a, p. 1). Instead of rebuilding flooded homes every year in a floodplain area, replacing the homes in an area with minimum to no risk of flooding can serve as a mitigation strategy.

Mitigation and preparedness mainly focus on the anticipation of a disaster, by previous exposure to past disasters (Mann & Williams, 2020, p. 2). Also, unlike the preparedness phase, mitigation not only strives to anticipate the response to a disaster but prevent the consequences of a disaster or lessen its impact (Strom, 2020). “Mitigation represents a sound financial investment” (National Institute of Building Sciences Multi-hazard Mitigation Council, 2017, p. 1). In a study, results showed that society saves about \$6 for every \$1 that is spent on federal mitigation grants (National Institute of Building Sciences Multi-hazard Mitigation Council, 2017, p. 1). At times it is difficult to handle the impact of a natural disaster by just preparing for it and hoping for the best. Thus, mitigation strategies can be the key to DRR and help evolve emergency management.

DRR strategy alone carried out by communities is a step to ensure the health, security, and safety of the population at risk. Since communities are developing DRR strategies, then it is a great moment to develop legislation to ensure that in future natural disasters DRR is carried out accurately (Rose, C., Debling, Fl., Safaie, S., & Ruud, H., 2020, p. 29). Not only policymaking but as the Sendai Framework for DRR suggests the inclusion of children and youth is part of the key factor to produce effective DRR. Around the world, this young generation is already practicing DRR to help make their homes, schools, and communities safer (United Nations Office for Disaster Risk Reduction, 2020, p. 18). Efficient DRR needs the inclusion of youth and effective policies, specifically mitigation policies. This concept has become known internationally as Child Centered DRR (CC DRR).

CHAPTER III

Mitigation Phase Characteristics and Processes

Stocking up on non-perishable food items, cases of water, batteries, and determining where to head in case of evacuation is a form of preparedness, and communities prone to disaster risks should take this precaution in future events. However, dreading hurricane season due to having to remodel the house every year for the past few years due to flood damage, is costly and not a long-term solution. Every year the rise of costs due to natural disasters increases, and the people and government must find ways to reduce the risk of hazards they encounter, such as in wildfire and hurricane seasons (City of Los Angeles Emergency Management, 2020). Preparing and then responding to the impact of a disaster is viewed as a routine. Mitigation can help break the repetitive cycle of damage being caused by natural disasters, especially in prone areas. The practice of mitigation is essential in carrying out emergency management efficiently and serves as DRR.

Since 2000, it has cost the United States more than \$845 billion in flood-related disasters. The range of damage varied from impacting businesses, homes, and critical infrastructures (The Pew Charitable Trusts, 2019, p. 1). There are various forms to begin mitigating when it comes to natural disasters. Developing policies is an important factor in helping communities reduce disaster risks they face. Mitigation is important and there is slowly an increase in case studies that state community investment in mitigation “pays direct dividends when a disaster occurs” (National Research Council et al., 1991, p. 21). Both the people and the government benefit from mitigation policies, such as people

avoiding losing everything and the government continuing to spend more each year in recovering from a disaster.

There has been a variety of mitigation policy strategies since the 1900s that have been implemented to serve DRR. There are two types of categories regarding mitigation strategies implemented: structural and nonstructural. Structural measures are known as the first type of traditional approach made in the United States (Highfield, Brody & Blessing, 2014, p. 688). They are measures where physical structures are constructed or modified, to reduce the impact of flood disasters (“Structural and Non-Structural Flood Mitigation Measures,” 2020). In response to the Mississippi Flood in 1927, the Flood Control Act of 1930 was established, and directed federal funds to be used to build flood control works such as floodwalls and levees (Highfield et al., 2014, pp. 688-689). After the 1900 Galveston Hurricane, structural measures were carried out such as building the seawall and elevating parts of the city, thus elevating buildings, to be less prone to flood risk (Rubin, 2012, p. 20). The structural approach has shown positive results in DRR, but the costs are extremely high in some cases. Since the 1930s there has been an estimate of \$706 billion dollars in damage prevented by structural control projects but at a high cost of about \$120 billion spent in these projects. Also, apart from this type of measure being costly, flood control projects can also “exacerbate the adverse” level of impact caused by flooding (Highfield et al., 2014, p. 689). Thus, instead of the flood control projects performing DRR, they can potentially produce higher flood damage.

Non-structural mitigation measures like structural measures can also prevent flood damage. They consist of implementing both incentive-based and regulatory policies that can over the long term establish flood-resilient development patterns (Highfield et

al., 2014, p. 689). Some examples of non-structural measures can be implemented early are warning systems, developing a household emergency plan, land use planning controls, public education, training, and promoting awareness programs (“Structural and Non-Structural Flood Mitigation Measures,” 2020). Land use planning is known as one of the first approaches to promote mitigation and being a non-structural measure. In 1968, the National Flood Insurance Act was established by Congress to require local governments to carry out floodplain management, in order to provide low-cost flood insurance to communities. It was known as the largest federal mapping approach and helped communities to avoid development in floodplains (Haddow et al., 2017, p. 77). In 2000, the Disaster Mitigation Act was passed by Congress, in an effort to encourage local and state levels in mitigation planning. This act required that states obtain a mitigation plan in order to apply for federal mitigation funds and disaster assistance programs (Haddow et al., 2017, p. 88). Another non-structural measure taken at the federal level was Congress approving in 2009 FEMA’s Risk Mapping, Assessment, and Planning (Risk MAP). The purpose of this is to reduce losses of life and property, using effective local mitigation efforts. Consists of performing a risk assessment, obtaining flood hazard data, and mitigation planning in the areas prone to flood risk (Haddow et al., 2017, p. 75).

Not only are there non-structural policy measures taken at a federal level, but there are also policies that implement mitigation at a local level. In Napa, California over the span of 36 years (1961-1997) there was over \$542 million in residential property damage, caused by 19 floods. After a flood in 1986, causing the death of three individuals, evacuation of 5,000 residents, damage to 2,500 homes, and destruction of

250 homes, encouraged the city to implement flood mitigation. In 1998 the Napa Creek Flood Protection Project was approved by the county. Involved watershed management projects, drainage improvements, dam safety, and have a fund flood protection for all communities in the county. The project was ongoing in 2006, but in 2005 these new mitigation measures were tested. A 10-inch rainfall occurred and within 4 days the flood in the city was able to be repaired and normalized. Thus, a significant amount of economic losses was avoided with the implementation of mitigating strategies brought by the project (Haddow et al., 2017, p. 80-81).

Similar success was seen in Riverton, Illinois, where the Acquisition Project was started in 2002. This project implemented mitigation efforts to reduce and prevent damage caused by flooding and other hazards. Also, there were buyouts of homes located in flood-prone areas near the Sangamon River. This river ran in the middle of the town and when heavy rainfall occurred, it caused flooding. Six homes were demolished and allowed the floodplain where the homes were located to have open space. In 2008, mitigating measures were tested, due to flooding that occurred in the month of June. The area where the homes were removed would have been flooded with 2 to 3ft of water. Thus, the initiative saved not only residents' money but inflicted overall less economic losses for the city (Haddow et al., 2017, p. 78-79).

Mitigation efforts are proven to play an important role in emergency management. Policies implementing mitigation can make a difference in DRR. There is a need to implement more non-structural mitigation measures to prevent flood damage and save the economy money being spent on flood damages in the long run. Besides implementing mitigation policies on a federal, state, and local level, communities need practicing and

promoting mitigating factors. Mitigation is a form of DRR, and the inclusion of children and youth mitigating in their communities can result in a safer community.

CHAPTER IV

Children and Youth Involvement in Emergency Management

It is important to note that children and youth are not simply passive victims of natural disasters in their communities. There is this mentality that children are fragile and incapable of acting when facing disaster. These misconceptions of children and youth role-playing in emergency management can stray adults away from including this population. It is thought that the way children behave when not supervised by parents, teachers, or healthcare providers may differ (Fothergill & Peek, 2015, p. 4). Thus, if children are given the opportunity to take leadership in their communities and engage in mitigation strategies, they can possibly produce positive results. These misconceptions can explain why there is not a great amount of research executed on youth inclusion in DRR, and even fewer studies on youth mitigation with virtually almost none in the United States.

With climate change leading to more frequent severe weather, every year children and youth are being exposed to natural disasters, such as flooding. Children and youth are said to make up about half of those severely impacted by disasters worldwide (Fletcher, Cox, Scannell, Heykoop, Tobin-Gurley & Peek, 2016, p. 149). About 66 million children every year are affected by disasters such as floods, droughts, and earthquakes. One would think that children and youth's vulnerabilities are prioritized and considered, since they make up the largest population affected by disasters. Regrettably, this is not the case, and they are instead the least listened to in society and not given the opportunity to give voice. Thus, my study aims to fill the gap in little research and supply evidence of children and youth capabilities during disasters, especially in developing countries

(Muzenda-Mudavanhu, 2016, p. 1). Children and youth experiencing their home being flooded, evacuating, and facing the struggles that their families face after the disaster, give them the potential to drive solutions. They have experienced it all just like all adults, and many go through long-term effects caused by disasters that lead them to come up with ways to adapt and respond (Fletcher et al., 2016, p. 158). Thus, children and youth can be fully capable to help out in their communities as well as to adapt and respond using DRR strategies.

There are not a great number of studies that discuss the inclusion of children and youth in DRR, or CC DRR studies, but there are a few, such as case studies that were conducted in El Salvador and New Orleans. El Salvador is one of the disaster hotspot countries that is exposed to natural disasters such as floods and landslides (Mitchell, Haynes, Hall, Choong & Oven, 2008, p. 260). In 2007, study was conducted in Petapa in El Carrizal Municipality in El Salvador, focused on CC DRR. The group of children that participated, referred to themselves as the Children's Emergency Committee. Some of the participatory approaches used in evaluating CC DRR strategies were community mapping, transect walks, risk identification, and risk ranking and visioning exercises to identify the risks prone to appear in the community. There were 22 children used, which included 6 males and 16 females, between the ages of 11 and 18 years. Also, there were 7 adults in total that participated, which included 6 females and 1 male, between the ages of 30 and 50 years. There were sessions conducted with children and with the children and adults combined. This allowed researchers to view the difference in the risks perceived between adults and youth and gain an understanding of forms of communication between children and others. The sessions were recorded using a voice recorder, video,

photographed, and notes were taken. There were also focused group discussions, in-depth interviews, and visioning exercises conducted. In the discussions, there was a set of questions that included causes of disasters in general, past disasters and the consequences they faced, and their response to these tragic events. The risk mapping exercise showed that children can understand and respond in a constructive way, communicate effectively about risks they identify (Mitchell et al., 2008, p. 262). This study showed that children have a clear understanding of the risks they viewed in their communities (Mitchell et al., 2008, p. 263). The group of children in this CC DRR study also recognized that dumping litter can potentially blocking waterways can cause greater flood damages (Mitchell et al., 2008, p. 264).

The only case study in CC DRR performed in the United States was the research in New Orleans that took place in 2006. It focused on the Vietnamese community, which was severely impacted by Hurricane Katrina in August 2005 (Mitchell et al., 2008, p. 265). The group that was observed in the fieldwork was the Vietnamese American Young Leaders Association (VAYLA-NO). The purpose of the research was to understand what makes the Vietnamese community resilient and the role that youth play in the process. Weekly youth meetings and social gatherings carried out by the VAYLA-NO, encouraged youth, residents, and other community members to participate in activities carried out in the community. The researchers of the study would take the opportunity to collect personal accounts from the discussions they would have in conversations and interviews with several residents, youth, and even community development officers. The researchers interviewed 30 individuals, mostly youth between the ages of 16 and 26 years. Most of the questions asked during interviews and informal discussions were

seeking responses about the impact participants faced after Hurricane Katrina. Also, the questions focused on the process of long-term recovery, assistance received within their community and outside, and the role of youth in CC DRR. During the fieldwork, the VAYLA-NO carried out several activities in which they encourage community members participation. Activities included organizing youth social gatherings to improve the morale of children and youth in the communities in which they live (Mitchell et al., 2008, p. 262). Also, the fieldwork showed that the voice of youth was considered in the Vietnamese community. These young folks were bilingual, and in non-English speaking communities, they were a link between their community and the outside. Youth in Vietnamese communities can maintain a role in providing communication in crucial events, such as going through recovery after a disaster. In migrant communities, youth, and their ability to be bilingual allows for them to form a formal trust, also their cultural understanding plays a factor in gaining trust as well (Mitchell et al., 2008, p. 268). Moreover, since most of the gatherings and activities took place in the space provided by a church, the study illustrated children and youth can deliver their message on the importance of CC DRR in their communities, through “vehicles trusted by the adult community” (Mitchell et al., 2008, p. 271). Youth playing a role in communicating CC DRR in their community specifically has shown effectiveness, but above all shows the necessity of their further inclusion in research. Youth playing a role in migrant communities can help the community be well informed and to catalyze the community towards safety efforts. This study documented the capabilities that the youth had in conducting CC DRR in their communities, especially when recovering from a disaster.

Another case study that discusses the participation of youth in DRR, using science clubs, was undertaken in the Philippines. The Philippines is known as one of the world's most disaster-prone countries. Due to its geographic location along the typhoon belt and the Pacific Ring of Fire, the Philippines is vulnerable to all types of natural hazards (Fernandez & Shaw, 2014, p. 279). The purpose of the study was to view how youth could become active in DRR through school organizations, such as science clubs. Science club activities allow for children and youth to be able to connect the concepts learned in the classroom to real-life events (Fernandez & Shaw, 2014, p. 284). The youth age range in the study was between 14 and 17 (Fernandez & Shaw, 2014, p. 280). There was a total of 850 participants surveyed. There were three periods of fieldwork between April 2010 and October 2011. A questionnaire survey was used as the main tool to collect quantitative and qualitative data from the members of the club and their advisor. The information collected in the survey included (a) the perception of the severity of the disaster, (b) level of knowledge of DRR, (c) disaster preparedness activities carried out, (d) their source of disaster information, (e) resources available for youth regarding their involvement in DRR, and (f) their preference of DRR activities. The questionnaire included 27 multiple-choice questions. The participants in the study would then respond by assigning a weight to indicators and parameters in the order of importance and relevance to the situation. A Weighted Mean Index and Aggregate Weighted Mean Index were used to help compute the data collected from the questionnaire (Fernandez & Shaw, 2014, p. 285). One of the findings in the study stated that through the engagement of students in science clubs, youth reported gains in self-esteem, confidence, and even gains in skills such as decision making, teamwork, conflict management, and capability to

work in different environments (Fernandez & Shaw, 2014, p. 289). Some of the weaknesses shown by science clubs were that there needed to be an active advisor helping the club lead in the right direction, as well as having enough funds and time underscoring the importance of mentorship in CC DRR (Fernandez & Shaw, 2014, p. 290). Science clubs engaging in CC DRR are important because they know their school and community, and youth can provide knowledge about the resources needed to sustain a community based DRR (Fernandez & Shaw, 2014, p. 292). This study showed the flaws that existed in having science clubs performing DRR in their communities, but provided recommendations that would help the clubs succeed, such as having an active advisor to guide the clubs. Some of the flaws mentioned were the lack of an active advisor, inefficient scheduling to assure attendance of participants, and lack of training given to use DRR material effectively. Apart from the few flaws found in science clubs that can be easily solved, this study supplied encouraging evidence that this type of approach in using science clubs can be a vehicle for successful youth inclusion in DRR (Fernandez & Shaw, 2014, p. 291).

One other case that includes youth and DRR, specifically in earthquake mitigation, focuses on the effectiveness of disaster prevention and mitigation training, in areas prone to disaster, for students. The research was conducted in an elementary school in Makassar City, South Sulawesi. The study design used is a quasi-experiment design that consisted of nonequivalent control group. The sample was made up of 75 students from the elementary school. The students' ages were between 8 to 12 years old. There were three groups: training, educational video screening, and control. Data were collected by using a test technique that was first tested out by the test results taken from the series

of questions asked of the participants. The questions were asked before and after the activity took place. The questions were specific according to the type of method being tested for each group; thus, each group was asked a specific set of questions. The interviewer with a structured interview technique was used to ask the questions (Mubarak, Amiruddin & Gaus, 2019, p. 2). When asking the questions, it was considered that these students were in elementary and had not probably known much in earthquake disaster mitigation training (Mubarak et al., 2019, p. 1-2). When processing the data, the McNemar test and Post Hoc test were done to find a relationship between the variables being used, and see the effectiveness of training, educational video screening, and control group in CC DRR and mitigation skills (Mubarak et al., 2019, p. 3). The results showed that the training method was much affected compared to the educational video screening, in increasing the student's DRR and mitigation capability (Mubarak et al., 2019, p. 4). The training method was effective because it allowed the trainees to be attentive to follow the material that was new and interesting to them. Also, children between the ages of 8 to 12 seem to have more memory ability and can understand and process disaster mitigation and its importance. One key factor in the training method being efficient is that the training modules must be delivered through practices and materials or simulations, in order to facilitate the training and make it easier on the students (Mubarak et al., 2019, p. 5). This case study illustrated that children and youth have the capacity to be trained to conduct DRR in their communities, but more importantly to engage in mitigation strategies, a perfect example of successful CC DRR.

These are just a few studies that suggest the importance to incorporate children and youth in CC DRR. Through various methods, children and youth can be guided to

become active leaders in their communities, and overall help create a safer environment. Whether it is asking students to do a risk mapping exercise, assess the resources that their communities lack to conduct DRR, and receive effective CC DRR training, they have the capability to fully understand what issues are relevant and how. Children and youth are individuals that have experienced a disaster and can create ways to network and communicate in their communities effectively. More studies need to be conducted in children and youth inclusion to help communities, in disaster-prone areas, not be severely impacted in future events, as they have experienced in the past years. This is particularly important for youth in the United States as those studies are rare.

CHAPTER V

Texas Case Study

Flooding can rise to the level of destructiveness, such as causing the loss of lives, and damage to property and the environment. Southeast Texas is no stranger to natural disasters, and meteorologists are always watching closely during hurricane season. Hurricane season starts June 1st and ends on November 30th. The peak threat for the Texas coast is from August through September (National Weather Service [NWS], 2020, p. 3). In the past few years, there have been natural disasters impacting Southeast Texas along the Gulf coast each year. Two major recent disasters that hit Houston, Texas, and surrounding areas were Hurricane Harvey in 2017 and Tropical Storm Imelda in 2019. In both the disasters there was severe flood damage.

Hurricane Harvey occurred in August of 2017 caused about \$125 billion in damages and became known as one of the wettest rainfalls in the history of the United States. There was an estimate of 36 to 48 inches recorded in Houston and surrounding areas, which led to severe flooding (Gebremichael, Molthan, Bell, Schultz & Hain, 2020, p. 2). Tropical Storm Imelda also created a great amount of flood damage, especially in Kingwood, Texas, in September of 2019. It was estimated that about 30 inches of rainfall were recorded in areas such as Kingwood, Humble, and Atascocita (Mehrtens, 2019). Even though the severity of the flooding was not as intense as Hurricane Harvey to many residents of Kingwood, Texas it was a severe flood disaster that hit them while they still were recovering from the damage caused by Hurricane Harvey two years prior. Markedly, Imelda compared to Harvey was categorized as a tropical storm, which brings

attention that as years go by, natural disasters will become a greater danger, thus changes are needed in mitigation approaches to them.

“Child-Centered Risk Reduction: Youth Inclusion in Local Community Hazard Mitigation Planning ” is a research study that will focus on Kingwood, Texas. The study will focus on the impact of Tropical Storm Imelda on the children and youth population. The purpose is to help the youth population give voice in participating in DRR through CC DRR approach. A population that has been ignored in research, specifically in youth inclusion in disaster mitigation in the United States is thus part of that research. This thesis forms part of the research project in providing a literature view on children and youth inclusion in CC DRR and in constructing an educational module that will be used in the study. This module will motivate the participants in the study to understand what mitigation is, identify disaster risks inherent to their community, explain their role in DRR at a community level, and develop mitigation strategies in their communities. To that end, the EUREKA FAST grant was designed as follows:

Phase I will include about two to three focus groups of young kids who experienced Imelda in the Kingwood area as volunteers and will gauge their opinions on youth taking part in disaster response; this part will be grounded in their personal experiences after Imelda. Each focus group (FG) will have 4 to 6 individuals. FG data will be recorded, transcribed, and analyzed by student researchers using qualitative software QDA Miner. Resulting themes will facilitate design of specific educational components for the Phase II of our project. These focus groups will allow us as researchers to gain access to their experiences of post-natural disaster events. We will then analyze all the data recorded. After this, it will be easier to come up with specific topics that will guide

us to create educative techniques for the next part of the project. All sessions and activities conducted with participants will be virtually to follow COVID-19 social distancing guidelines and overall keep everyone safe.

Phase II will consist of designing and directing a virtual module with youth. The module will focus on encouraging disaster risk reduction (DRR) techniques and educate on the characteristics of flood-hazards. The reason to conduct this module is to get the young folks' mindset into mitigation planning. It is important for the youth to acknowledge the importance of their role in the community, in improving the DRR, and what strategies of mitigation are adequate for the area they live in. Thesis results will provide the risk awareness and mitigation education module.

Phase III consists of reconvening focus groups to conduct a further examination of the knowledge gained about mitigation planning, compared to what they knew before participating in the project. We will also get an idea of how the participants view themselves in the role of CC DRR, how they have put into practice the various strategies taught, and overall reflection of the project. We will get an insight, based on their opinion and suggestions on how to improve on discussing DRR to young folks and get more engaged. Once data collected in this phase will be analyzed, the most hit topics will allow us to create a survey, which will be used as the final step in the project.

Phase IV, final phase, will consist of conducting a survey that will be given to EM professionals to get their opinion on the importance of youth involvement in mitigation planning. The survey will contain some suggestions, strategies, and solutions that were picked up from the data recorded and analyzed in phase three, from the focus group participants. Also, apart from the survey that will be given to EM professionals, the

young participants will get the chance to share their overall thoughts and results they gathered from the Kingwood community emergency planning meeting. Focusing on the young folks is a way to guide them to feel confident in having a voice in decisions such as DRR, which is something that youth has been excluded from participating. Also, it is important to include EM professionals because they may also offer some ideas that us as researchers could have forgotten to mention or focus on.

Educational Module

First Virtual Group Discussion

- Ice Breaker: Each participant will present themselves saying their name, what is their favorite subject in school, and list a word that starts with the first letter in their name that describes their personality.
 - This will allow participants to get comfortable and be creative at the same time.
- Ask participants to share their thoughts on attending school and any issues they face or their parents during COVID-19 period. Each participant will share what their usual day in school looks like. They will also discuss what issues they have with attending school nowadays.
 - This will allow participants to get a jump start in sharing their experience in general with the group and identifying issues. Thus, when it comes to any issues, they see in their community that may cause flood risks, they have an idea of what is being asked.

- Question participants if they remember something major that occurred in 2019, thus questioning their ability to remember the impact of Tropical Storm Imelda that hit in September.
 - Possible Questions:
 - Ask participants if flooding, as seen during Imelda, has occurred in previous events or if more flooding incidents have been seen afterward?
 - This again asks participants to recall and test their memory skills.
 - This will test what was found in the study done in Makassar City in Indonesia, which stated that children and youth between the ages of 8 to 12 have more memory ability and can understand what is going on (Mubarak et al., 2019, p. 5). Thus, the study population between the ages of 11 and under 18, should be fine in retaining memory, especially disasters they and their families have faced.
- Ask questions such as what they felt after Imelda hit, and how they and their parents responded?
 - Possible Questions:
 - Did they engage in helping their parents clean up afterward?
 - Such as picking up branches or taking items from their homes and placing them in the trash because they got damaged.

- Was there something that they lost or their parents that had great value to them?
- Was there anything that you could have done to avoid flood damaging their home?
- Lastly, ask if their families prepared for the storm?
 - What were some things their parents had in preparation for the storm, such as food, water, gasoline tank, emergency kit, etc?

Risk Awareness and Mitigation Education Module

- Community mapping activity
 - Draw a map of what their neighborhood looked like after the storm.
 - In this map layout, the participant will show where their home is located in their community, and what roads were closed off due to flooding.
 - Participants will identify, if any, sections in the neighborhood where they saw higher levels of water compared to others.
 - Identify any building structures or open areas surrounding the areas of high and low flooding levels.
 - Participants will get the chance to share their drawing and explain it.
 - This activity will allow participants to think further and remember what areas of their community were severely impacted by

flooding. This is an activity that took part in the case study in El Salvador, to determine risks in their communities (Mitchell et al., 2008, p. 262).

- Identifying flooding risks in their community
 - Explain risks in general and what disaster risks are.
 - Give participants then a chance to identify a risk they saw in their community during Imelda.
 - When explaining, refer to the things the participants mentioned they lost in the storm. This will allow participants to not get lost or confused when explaining these terms and comprehend better. This was a recommendation given in the Makassar City study, in order to allow the trainees to follow through with the training modules. The study stated that practices or simulations can deliver the training modules to the trainees in a facilitated way (Mubarak et al., 2019, p. 5).
- Explaining mitigation and its importance
 - Explain mitigation using a scenario.
 - Talk about the comparison of two houses on the Galveston coast. Explain how one is elevated several feet from the ground and the other one is only one foot elevated. When explaining the scenario engage the participants at the same time in predicting what would happen if certain natural

disasters occurred, such as hurricanes, storms, and earthquakes.

- Explain the importance of identifying risks to carry out mitigation
 - Discussion
 - Ask participants why is it important to know what is causing harm in their community?
 - If there were ways to keep their communities safe would they take action to prevent future damage caused by natural disasters?
 - Allows researchers in the study to see if children are interested in carrying out DRR in their community.
 - Explain to participants that if there are no forms to stop perse flooding in an area that tends to always flood during a natural disaster, then it is important to mitigate by using strategies to lessen the impact of flooding.
- Brainstorming mitigation strategies
 - Make a matching card game that will allow participants to match mitigation strategies to different scenarios.
 - There will be cards that have a scenario and other cards that are examples of mitigation strategies.

- A copy of the card game will be provided for each participant, so the activity can be easy to follow when zooming virtually.
 - Participants will tell the researcher where they believe the strategies below according to the scenario on the card.
 - Then afterward the researcher will go over the scenarios and explain why certain cards belong with certain scenarios.
- Discussion
 - Ask participants what mitigation strategies used in the game can be useful in their communities for DRR?

The educational module is set up to be conducted virtually, assuring that the research is complying with all safety measures required by the institutional review board (IRB). The structure of the module is to allow participants to fully understand what CC DRR is and how implementing mitigation strategies can help out their communities be safe in future flood disasters. Children need to be engaged in order to teach them about these topics such as natural hazards and DRR. Thus, the implementation of the ice breaker, drawing a map of their community, and playing a card game is to get participants excited in learning and coming up with mitigation strategies for their particular community, being Kingwood, Texas, which is prone to flood hazards.

Research Issues Encountered

Due to this being a research study that involves working with participants, such as minors in this case, the IRB process was taken place. The IRB application needed to be approved before any planning on recruiting could begin nor access funds from the SHSU grant that was approved when the research study proposal was proposed to obtain funds. It is a process that ensures that all methods and activities carried out in the study are ethical. All researchers in the study needed to complete IRB training apart of submitting the research project IRB application. The IRB process took longer than expected due to the unexpected arrival of COVID-19. The entire application that had been previously submitted was no longer useful, because it did not include the social distancing and virtual measures that are included in the recent approved IRB application, submitted by Dr. Magdalena Denham, head of the research study.

“Child-Centered Risk Reduction: Youth Inclusion in Local Community Hazard Mitigation Planning ” research project was planned to take off in Summer 2020. Due to COVID-19, plans were pushed to Fall 2020. The IRB had to develop ways in which research that needed to be carried out provide safety for all participants of studies as well keep researchers safe. It took a while for the IRB to meet and rearrange all types of restrictions and factors in carrying out a research study during the pandemic. After the IRB finally approved our research project, we faced difficulties in being able to carry out the recruitment via virtual platforms. We thus had to adapt and devise new recruitment strategies; this prevented full recruitment in the Fall of 2020 to be completed fully and the project is ongoing into Spring and Summer 2021. Even though the project was unable to be carried out in the timeframe that was planned, my portion of the research project

was successfully completed. The literature review and educational module is the foundation for the research to go further.

CHAPTER VI

Conclusion

Emergency management has evolved throughout the past decades in the United States, although there are still some flaws in the system. There is more that needs to be carried out to continue to eliminate or prevent the disaster risks from impacting communities prone to natural hazards such as flooding. Flooding can cause great destructiveness to the point that there are lives lost, besides damage done to property and the environment. There have been several flooding events in the United States before the 1900s that have caused billions of dollars in damage, but beside the fact that there have been losses in people there have been less and less since then. In emergency management, mitigation is a key factor of DRR. There is evidence that has shown that mitigating strategies can lessen or eliminate the impact disasters have on a community. Many of the mitigation policies that have been established at the federal, state, and local level have lessened the impact of natural disasters over the years. Although structural mitigation measures are effective, they are costly, thus more nonstructural mitigation strategies should be implemented. Restrictions on land use can save the economy money wasted rebuilding structures developed in a floodplain zone. Education and particularly education of children and youth participating in emergency management about their potential roles in mitigation in their communities can promote overall greater awareness and also influence the use of mitigation measures. Not a lot of studies, especially in the United States, focus on the positive outcome that exists when children and youth participate in DRR. The few studies that discuss this population performing CC DRR strategies in their communities demonstrate their capability to act as active agents in their

communities. Children and youth are not simply passive victims, and their experience in facing disasters allows them to come up with innovative mitigating measures to create a safe environment for the community.

The "Child-Centered Risk Reduction: Youth Inclusion in Local Community Hazard Mitigation Planning " research study will be useful in understanding further how children and youth can mitigate in their communities. This study will bring focus on a population that has been ignored and excluded from research conducted on CC DRR and mitigation. The educational module will serve as a method to engage children and youth in knowing the importance of mitigation and how they can act in their communities. Giving voice to youth in community disaster mitigation can be a true force multiplier in the Whole Community DRR efforts.

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EDUCATION

Sam Houston State University, Huntsville, TX

- Bachelor of Science in Criminal Justice, minor in Homeland Security
 - Expected to graduate with Highest Honors, Honors College upon completion of Honors Thesis
- Expected Graduation Date: December 2020
- Honors College Member with cumulative GPA of 3.88

EXPERIENCE

Summer 2016 and Summer 2017: Bookkeeper/Receptionist Assistant

- Our Lady of Fatima Catholic Church Office, Galena Park, Texas
 - Organized and filed parish documents and records
 - Communicated and attended customers
 - Answered phone calls
 - Verified and recorded financial transactions

Summer 2016: Certified Community Emergency Response Team

- Texas Youth Preparedness Camp, San Marcos, Texas
 - Completed a twenty-hour course in Basic FEMA G-317
 - Learned leadership skills that can enhance my capacity to assist my local community to help educate and prepare others
 - Worked in a group of students from my school to create an action plan for our school
 - Developed a plan to educate and prepare the students and faculty during an unexpected disaster

HONORS/AWARDS RECEIVED & ACTIVITIES

- President's List: Fall 2018, Fall and Spring 2019, & Spring 2020
- College of Criminal Justice Dean's List: Fall and Spring 2018, Fall and Spring 2019 & Spring 2020
- Highlands Rotary Scholarship: 2017, 2018, 2019 & 2020
- Outstanding Students Award: Spring 2018
- Crime Victim Services Alliance: Vice President
 - Fall and Spring 2019 & Fall and Spring 2020
- Honors College: Member
 - Fall 2018 - Present
- Mexican Student Association: Member
 - Fall 2019 & Fall and Spring 2020
- Our Lady of Fatima Church: Volunteer

- Summer 2018 & Summer 2019

SKILLS

- Organizing/ Scheduling
- Teamwork
- Spanish (Spoken and Written)
- Communication