Spring 4-20-2021

Factors in Disaster Response in Mexico, Central America, and the Caribbean

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FACTORS IN DISASTER RESPONSE IN MEXICO, CENTRAL AMERICA, AND THE CARIBBEAN

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A thesis presented in partial fulfillment of the requirements for completion of the Bachelor of Arts degree in International Studies Croft Institute for International Studies Sally McDonnell Barksdale Honors College The University of Mississippi

University, Mississippi
April 2021

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ACKNOWLEDGEMENTS

Firstly, I would like to acknowledge and thank Dr. Shaio Zerba, my thesis advisor, whose wisdom and experience has shown through during our conversations and meetings. I greatly appreciated her guidance and counsel on this, at times, greatly difficult project. Additionally, I would also like to thank Dr. Marcos Mendoza and Dr. William Schenck who served as my second and third readers. Their comments and insights greatly helped steer my research and better punctuate the points I strove to make. I will forever be grateful to all of the faculty who assisted me on this project and am additionally thankful for the love and support from my family as well. It has been a joy to have studied at the University of Mississippi and the Croft Institute. I want to thank all the teachers who have given me support and guidance throughout my four years here. Finally, I am especially thankful to my parents who have given me all the tools I need to succeed throughout my undergraduate career.

ABSTRACT

This research examines the impacts that existing factors can have on the outcome of natural disasters. In order to study this question more thoroughly than previous research, this paper conducts a small n study on the Middle America region through case studies in Mexico, El Salvador, and Haiti. Each of these case studies are evaluated by their outcomes of severe earthquakes and the conditions in which these earthquakes occurred. These conditions being: their economies, governances, and pre-existing natural disaster plans. The analysis of these indicators attempts to understand why certain countries perform better in natural disasters compared to others. In a region like Middle America, where natural disasters are extremely common, what can countries do to reduce their losses in fatalities and monetary damages?

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CHAPTER ONE: INTRODUCTION

Research Question

The Latin American and the Caribbean region is the second most prone region in the world for natural disasters[1]. While there is an abundance of research that examines this phenomena ecologically.[2,3] There is little research into the man-made aspects that can work in tandem with natural forces to create catastrophes. Specifically, these main aspects are the economic, political, and disaster planning elements that can determine the severity of a natural disaster. Latin American countries seem to have many similarities in these elements, especially in comparison to other regions. However, some countries in this region have suffered much greater impacts from natural disasters than other countries in the region. This poses the question of why some countries that seem to share similarities in these relevant areas are impacted less by natural disasters of similar caliber than others.

This research investigates the effects that governments, the economy, and pre-disaster preparedness and prevention have on the impact of natural disasters using three case studies: the Mexico City, Mexico 1985 earthquake, the San Salvador, El Salvador 1986 earthquake, and the 2010 Port-au-Prince, Haiti earthquake. It seeks to learn from some of the most devastating natural disasters in Mexico, Central America, and the Caribbean, or the "Middle America" region that struggles with a high susceptibility to many kinds of natural disasters, lack of

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[1] Gencer, "Overview of Urban Vulnerability", 2
[2] Hardoy and Pandiella, "Urban Poverty and Vulnerability."
[3] Reguero et al., "Climate Change on Exposure to Coastal Flooding"

economic growth, and poor governance. When deciding what specific natural disaster would be the focal point of the study, earthquakes were chosen because of their high mortality rates and costly economic impact. Therefore, in-depth research into case studies of earthquakes in this region in addition to the existing natural disaster research could provide answers for other kinds of natural disasters that have less devastating effects.

This research chooses three case studies rather than a wide study of the region because natural disaster recoveries are very complex. Including the use of case study analysis allows for a deeper examination into the qualitative drivers behind the quantitative data presented and allows a story to emerge that results in a more complete study of the selected country both pre and post disaster. Additionally, including this qualitative commentary offers insight into the disaster preparedness or plan of each country and how well that plan was instituted following the earthquake.

This research has the hopes to provide more insight into the elements that can impact the level of devastation of earthquakes, and more broadly all natural disasters, in the Central American and Caribbean region. This region, which receives large amounts of aid from external organizations, could be assisted more effectively if there was more insight into how these countries could better mitigate and respond to natural disasters.[4]

[4] Foreign Assistance to Latin America and the Caribbean, 21

Literature Review

Several reports from the Multidisciplinary Center for Earthquake Engineering Research (MCEER) point to poor construction and lack of earthquake resistance building codes as reasons that the impacts of many earthquakes were exacerbated.[5] Some of these preventable measures include implementing construction regulations, regulating construction near fault zones, and licensing for contractors, engineers and architects. Whereas, other cases did not lack regulation, they lacked incentives to abide by these regulations, especially in lowly populated and poorer areas. So what prevented these countries from creating or implementing disaster prevention methods?

Anbarci et al. says that the lack of collective action is the obstacle in enacting disaster prevention and planning.[6] The creation of disaster prevention methods and the action of the people implementing the precautionary regulation that MCEER discusses is what Anbarci et al. describes as collective action in natural disaster preparedness. Their research shows that richer countries and countries with lower levels of inequality have less fatalities in earthquakes than poorer countries which they attribute to a positive correlation between collective action and GDP.[7] According to their theory, "The ability of a country to pursue such collective action is, however, limited by its income and the ability of the population to arrive at an agreeable distribution of the economic burden of the actions".[8] Their research found that there were 85% and 167% more fatalities in

[5] MCEER
[6] Anbarci, Escaleras, and Register, "Earthquake Fatalities", 1908
[7] Anbarci, 1910
[8] Anbarci, 1909

poorer and unequal countries respectively than wealthier and more equal countries in instances where they were both hit by earthquakes of nearly identical magnitudes.[9] Although one can infer from the results of the empirical model that GDP per capita and inequality are correlated with earthquake preparedness, Anabarci et al. does not have the data to confirm their theoretical model that income and equality work together to determine a country's level of collective action in the form of earthquake preparedness.

Other research has supported Anbarci et al.'s argument that poorer countries experience a disproportionate amount of fatalities due to natural disasters compared to wealthier countries. Kahn dismisses the argument that this is because poorer countries experience an unequal amount of natural disasters compared to richer countries.[10] His research finds that poor nations suffer the same quantity and quality of natural disasters, but that on average poorer countries experience an increase of 5.3% in earthquake fatality rates for every ten percent decrease in GDP.[11] Kahn hypothesizes that this can be attributed to better construction and natural disaster planning in rich countries. However, without a deeper study into the specific construction practices and natural disaster plans of the countries used in his study, Kahn still cannot have concrete evidence to explain why higher GDPs result in less devastation in the instance of natural disasters.[12] So what are these richer countries doing to minimize fatalities caused

[9] Anbarci, 1922
[10] Kahn, "Role of Income, Geography, and Institutions", 271
[11] Kahn, 278
[12] Kahn, 283

by natural disasters? What kinds of resources are they able to afford that poorer countries cannot?

There is limited research into why some natural disaster prevention and mitigation plans are successful and others are not. This is why it is difficult for researchers like Kahn and Anbarci et al. to prove their theories. It is mostly unknown what wealthy countries devote resources to in order to become more successful at preventing and mitigating disaster. In his article, *Agility and Discipline: Critical Success Factors for Disaster Response*, Harrald is one of the few to discuss the necessary elements for creating a disaster response plan as well as the post-disaster implementation of disaster plans. Previous literature claims that there is a trade-off between command and control elements in mobilizing and managing a large organization in order to ensure broad coordination and communication. However, Harrald disagrees that these trade-offs are a definite reality of disaster recovery. He argues that disaster response plans should be designed in order to handle adaptative situations, while also maintaining a strong structure within the organizational systems.[13] The main goal, according to Harrald, of disaster response planning is to formulate a plan to "prepare for, respond to, and recover from extreme events in ways that minimize the disruption to and maximize the resiliency of our social and economic systems".[14] Using Harrald's factors to success for natural disaster response, countries in the Middle America region might be able to partner with multilateral aid organizations and development banks to invest in preparedness for natural disasters.

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[13] Harrald, "Critical Success Factors", 257
[14] Harrald, 257

The research previously mentioned suggests that poorer countries suffer higher rates of mortalities because they do not view allocating resources towards disaster response preparedness as the highest priority. This is due to the fact that resources are few and the payoffs of preparedness mechanisms are sometimes never seen. However, if poorer countries can implement disaster preparedness that is effective without putting financial pressures on their population, they are able to reduce the lack of collection action that Anbarci et al. describes as an obstacle to effective disaster response.[15] However, unless governments, especially in poorer countries, have guidance on what mechanisms are effective, they are not going to risk wasting their resources.

[15] Anbarci, 1907

CHAPTER TWO: THEORETICAL ARGUMENT

Methodology

Noting that Latin America, especially Central America and the Caribbean has struggled economically and politically in the past, this research began by investigating how these countries dealt with the impact of natural disasters. Did the previous research hold true for this region as well; did wealthier Central American and Caribbean countries have lower mortality rates for natural disasters? As previous literature briefly mentions[16,17], it could be suspected that political elements have a role in natural disaster responses. This research chose to also investigate the role governance plays in natural disaster responses along with economic factors due to the lack of previous literature surrounding it. Three case studies were chosen in order to be able to provide significant quantitative research on each. This quantitative evidence serves to support the qualitative data in this study, along with that in previous research, and provide a more clear link between the data and the theories behind it. The three case studies from Mexico, El Salvador, and Haiti were chosen because although they have shared some of the same general political and financial struggles, they have very different histories regarding their governments and economies. These specific instances of earthquakes in 1985 in Mexico, 1986 in El Salvador, and 2010 in Haiti were selected because each of these earthquakes registered as 6+ magnitude on the Ritcher scale which qualifies them as severe earthquakes. As previous research has suggested, although it could be inferred through their results, they lacked the

[16] Anbarci, 1918
[17] Kahn, 280-283

specifics of each country's natural disaster preparedness. This is because investigating every country's natural preparedness plan involved in their studies would have proved an almost impossible task. Therefore, they had no way to confirm that collective action is the causal mechanism that explains how wealthier and more equal countries have fewer fatalities from earthquakes. In order to continue the study of these specific causal mechanisms, this research conducts a small n study on three countries that were affected by earthquakes of similar magnitude. Only a few case studies were chosen in order to be able to allow for more detailed evidence to support this theoretical model that economic variables impact the severity of a natural disaster because they are linked to the likelihood of collective action through natural disaster preparedness. This research incorporates two other variables, governance and disaster planning to further support these theories.

Due to the lack of natural disaster literature that combines both quantitative and qualitative data, it was crucial that this research would use a combination of both in order to fill this gap in the literature. Additionally, this research studies the element of governance with regard to natural disaster response in these three case studies. This variable was added in order to improve the hypothesis that collective action needed for natural disaster planning is motivated only through economics. However, this research investigated the idea that governments can influence the effectiveness of disaster response plans and ultimately mortality rates, number of people affected, and monetary damages in addition to economies. They are able to have this influence through their

allocation of resources and whether they choose to enforce disaster response mechanisms. This research also expands on previous research by including monetary damage and affected population data in addition to fatalities. However, it is important to control for both the population size of the affected area when analyzing fatalities as well as the country's GDP when analyzing monetary damages.

Death Toll, Affected Population, and Monetary Damages Variables

The number of fatalities is the common variable used to measure the impact of a natural disaster. While this variable alone can provide decent insight into the severity of the impact of a natural disaster, it cannot illustrate the situation entirely. The death toll can provide insight into the devastation in the immediate wake of a natural disaster, but the number of affected people and the damages that are done to their surroundings can be indicative of the struggles that the country will suffer in the long term. Therefore, this study sought a more detailed approach than previous studies with the addition of affected population and monetary damages variables. In this study, affected people are categorized as "those that required immediate assistance during a period of emergency i.e. requiring basic survival needs such as food, water, shelter, sanitation and immediate medical assistance." In some cases, the affected population becomes displaced for an extended period of time. This is why it is important that countries not only try to prevent fatalities, but also try to mitigate the number of affected people and monetary damages in order to avoid long lasting effects.

The data for the death tolls, affected population, and monetary damages was gathered from the EM-DAT database. This database is compiled by the Centre for Research on the Epidemiology of Disasters using various sources, including UN agencies, non-governmental organizations, insurance companies, research institutes and press agencies.[18] Although measuring death tolls and monetary damages is not a holistic way of measuring the severity of the disaster, this research provides in-depth qualitative evidence to support it. In this research, the percentage of the population in the affected areas and GDP are also taken into consideration when comparing the death tolls and monetary damages. Although the death toll or monetary damages in one country may look less severe than another, when measured to the population and GDP, it is easy to see the impact of the disaster relatively. Poorer countries suffer worse effects, especially monetarily, even when statistics seem to show them as being impacted less than developed countries. This is due to higher levels of the population of poorer countries living closer to subsistence level and their infrastructure being less developed, and therefore, less expensive. This research attempts to supplement the quantitative data of each case study with qualitative data about the overall situation in the country, which may have had an effect on how the natural disaster impacted the country.

Governance

Previous studies have investigated very little into the role that governments play in natural disasters. The existing studies have mostly focused

[18] Centre for Research

on the role of equality as it pertains to natural disasters[19, 20]. However, this research seeks to investigate deeper into the specific governmental institutions that existed in these three countries at the time of the earthquakes. This research seeks to explore the role that good governance can have in facilitating effective response plans pre and post-disaster. On the other hand, it also investigates the role that bad governance, whether it be in the form of corruption, conflict, etc., has on natural disaster response. This variable will rely solely on qualitative research since there is no data available for governance indicators that is consistent for all three countries.

Economic Variable

Although theoretical models that link economic variables with natural disaster death tolls exist, they lack the qualitative research to confirm their argument. This research provides the background on each country's economy at the time of the earthquake for a more complex understanding of the context behind the data. There is a limited amount of economincal quantitative data that is available for all the three countries studied in this research. This is mostly hindered by the lack of data on the two older case studies, Mexico in 1985 and El Salvador in 1986. Without equal data to use to compare these three case studies economically, the analysis on available data would be skewed. However, GDP is a reliable variable that can be used to give a base comparison of the data. Although GDP is a widely used and understood variable, it does not encompass

[19] Anbarci
[20] Kahn

all of the elements that are important to this research. Therefore, I will supplement the GDP variable with qualitative data from the unique case studies. By combining GDP with qualitative data, this research aims at illustrating a robust argument about the effects that an existing economy can have on the ability of a nation to recover from a natural disaster quickly and effectively in a way that minimizes deaths and damages.

Disaster Planning Variable

Although some might assume that countries with a higher frequency of natural disasters would know how to mitigate the impact of a disaster better than those with low frequencies, previous research has found that the frequency of earthquakes did not have a significant relationship to the number of fatalities in an earthquake.[21] Research has also found that poorer countries did not experience more natural disasters compared to richer countries.[22] Therefore, a successful mitigation of the impact of an earthquake and an effective initial response is directly related to prior intentional planning and not to learned strategies due to high frequencies of a natural disaster. Also, richer countries do not have lower mortality rates because they have lower frequencies of natural disasters, but rather because they plan more effectively.

This paper focuses on the effects that are the result of what Harrald would categorize as the Preparedness and Prevention and Initial Reaction and Mobilization phases. This paper does not focus on the phases past the Initial Reaction and Mobilization phase because the next phase, Organizational

[21] Anbarci, 1926
[22] Kahn, 275

Integration, is where external actors, which were not coordinated pre-disaster, are brought into the response efforts. This paper chooses to focus on the response from the country itself and the effectiveness of its predetermined response efforts, rather than the role that external organizations that step up post-disaster play. However, this does not include external organizations that have a premeditated role in a country's natural disaster plan.

Preparedness & Prevention	- Domain awareness & detection capability - Mobilization & response plans - Mobilization capacity & capability - Adequate resources - Interorganizational coordination
Initial Reaction & Mobilization	- Situational awareness - Resources in place - Resource mobilization

Figure 1[23]

In this research, the Preparedness and Prevention and Initial Reaction and Mobilization phases of each case study will be evaluated on the criteria shown in Figure 1. This study argues that if Middle American and Caribbean countries know how to more effectively mitigate damages from natural disasters, they would be more likely to invest in emergency management. Therefore, this research investigates if any of these factors could prove to be effective for future disaster response efforts through the study of Mexico, El Salvador, and Haiti.

[23] Harrald, 262

CHAPTER THREE: FINDINGS

Mexico City, Mexico Earthquake 1985

Background

The 8.1 earthquake that occurred in Mexico on September 19, 1985 affected Mexico's most populated city.[24] At the time, its population was estimated to be 18 million people.[25] Mexico City is not only the capital city but also the hub to Mexico's educational and financial institutions, mass media outlets, and industrial and commercial establishments[26]. For these reasons, Mexico City was differentiated from all other Mexican municipalities through the creation of The Department of the Federal District (DDF).[27] Therefore, Mexico City relied heavily on federal authority to govern their district including the emergency response plans that were prepared for the city.[28] The federal government's emergency response plan at the time of the earthquake was titled DN-3.[29] Immediately after the earthquake hit, the President gave instruction that emergency measures be taken and response efforts detailed in DN-3 begin.[30] However, it is speculated that the civilian government was wary about relinquishing control to the military, due to Mexico's former oppressive military regimes.[31] Starting in the 1980s until only a few years before the earthquake in 1982, the government in conjunction with the military carried out a vicious

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[24] National Geophysical Data Center, The Earthquake in Mexico City, 1
[25] National Geophysical Data Center, 1
[26] Dynes, "Response to the 1985 Earthquake", 20
[27] Dynes 20
[28] Dynes, 21
[29] Dynes, 21
[30] Dynes, 30
[31] Robinson, et al. "The Mexico City earthquake", 113

counterinsurgency campaign against government opponents.[32] This confusion over control caused a lack of interorganizational communication between municipal civilian officials and federal officials over who had the control over certain responsibilities in the response efforts.[33] Later, control was given to impromptu emergency response coordinating committees that were created by the President in the two days following the earthquake.[34]

Governance

At the time of the earthquake, Miguel de la Madrid was president[35]. He was part of the Institutional Revolutionary Party (PRI) party and had never held elective office before.[36] While he was inexperienced, he benefited by running a campaign that stuck to liberal values such as mass equality and representation for Mexico's middle and lower classes.[37] By utilizing this strategy, he was wildly popular with his constituency which led to one of the largest voter turnouts the country had seen up to that point.[38] A string of PRI party presidents that were popular with the working class, the peasantry, and government workers pushed the country towards industrialization and economic reform which caused a period of roughly forty years that were of largely peaceful and productive years for the country when compared to their Central American neighbors.[39]

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[32] Forero, "Mexico's Dirty Wars"
[33] Dynes, 29
[34] Dynes, 31
[35] Zarate, "Miguel de la Madrid Hurtado"
[36] Zarate
[37] Zarate
[38] Zarate
[39] Storrs, "Mexico's Political History", 2

Economy

Three years before the earthquake in 1982, Mexico had a debt crisis.[40] Mexico's economy had become dependent on foreign exchange and fiscal abundance due to high oil prices during the 1970-1980s; however, in 1981, oil prices started to fall and Mexico's financial deficit reached 14.1% of the GDP, nearly double from 1980.[41] The country also had a large amount of foreign debt which was not seen as problematic when the interest rates were low but became detrimental to the economy once these rates started to rise.[42] However, according to Moreno-Brid et al. "The size and speed of Mexico's external adjustment to the debt crisis was outstanding in the Latin American context".[43] Mexico addressed its trade balance within a year, turning its US$3.8 billion trade deficit into a US$7.1 billion surplus.[44] This surplus increased in 1983, reaching US$14.1 billion.[45] In order to pay its foreign debt, Mexico knew that it was unrealistic to expect nonoil export industries to generate this revenue.[46] Therefore, Mexico successfully cut its imports drastically and reduced its domestic spending in order to pay the debt it had accrued.[47] This was successful because intermediate and capital good imports had contributed more than 70% to the nonoil trade balance

[40] Buffie and Krause, "Stabilizing Development to the Debt Crisis", 148
[41] Buffie and Krause, 148
[42] Moreno-Brid and Ros, "Mexican Economy: A Historical Perspective", 145
[43] Moreno-Brid and Ros, 147
[44] Moreno-Brid and Ros, 145
[45] Moreno-Brid and Ros, 147
[46] Moreno-Brid and Ros, 146
[47] Moreno-Brid and Ros, 146

which was a contributing factor to the debt crises.[48] In the years leading up to the earthquake, Mexico's economy was rebounding from the 1983 debt crisis.

Disaster Planning

As previously discussed, the Mexican federal government had a plan for natural disasters called DN-3 (or SME-3 by the Navy).[49] This delegated the responsibility of disaster response to the Mexican army.[50] The plan was to be enacted after the president declared a state of emergency.[51] Although certain U.S. organizations such as the National Association of Search and Rescue offered their assistance upon hearing the news, President de la Madrid initially made the statement that the country would be able to manage the disaster relying only on internal resources.[52] The Mexican military's control of human and material resources was a crucial factor in the federal response to earlier disasters outside of the capital city.[53] Their response to earlier disaster shows that the Mexican response plan had access to adequate resources that could be available for initial response in high threat areas.[54] Due to their prior experience with this plan outside of Mexico City, the military had a basis for how to respond to natural disasters based on realistic scenarios, although the Mexico City earthquake was much more of a devastating disaster than the Mexican military had previously seen.[55] However, where communication and coordination was disrupted was the interorganizational

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[48] Moreno-Brid and Ross, 149
[49] Dynes, 21
[50] Dynes, 21
[51] Dynes, 23
[52] Comfort, "International Disaster Assistance", 23
[53] Dynes, 21
[54] Dynes, 21
[55] Dynes, 21

preplanning between the federal district of Mexico City and the Mexican federal government.[56] Prior to the 1985 earthquake the situation in Mexico City could be described as one of extreme organizational complexity and a relatively decentralized metropolitan government that had a limited response plan at the metropolitan level.[57] However, this was alongside a massive pool of human and material resources at the federal level that could be potentially employed or used in mass emergencies.[58] Although the military had never encountered a disaster of the same magnitude as they did in 1985 in Mexico City, they had previous training that prepared them for a similar scenario.[59] President de la Madrid took further action after the earthquake after implementing DN-3. He was able to have situational awareness of the destruction and affected areas through multiple helicopter and bus tours around the city after the impact.[60] The blueprint for immediate reaction accompanied by the situational awareness was crucial to this initial effort.

San Salvador, El Salvador 1986

Background

On October 10th 1986 a 6.2 earthquake hit the capital of El Salvador, San Salvador, at 11:49 am local time.[61] During this time, the nation of El Salvador was in the midst of a civil war.[62] In addition to this, the country was experiencing

[56] Dynes, 32
[57] Dynes, 21
[58] Dynes, 22
[59] Dynes, 21
[60] Dynes, 30
[61] Bommer and Ledbetter, “The San Salvador Earthquake”, 85
[62] Dobbins, "Overcoming Obstacles to Peace", 67

crop failures due to drought and rising inflation.[63] Due to a limited economy and lack of governmental resources, El Salvador was unable to implement or enforce the most modern building codes.[64] An estimated half of lower income housing in El Salvador at this time was constructed without the approval of any government official or inspected for regulation violations.[65] The population of San Salvador was 1,500,000 at the time of the earthquake.[66] In response to the earthquake, the government established the National Emergency Committee (COEN) headed by President Jose Napoleon Duarte.[67] The President did not allow aid to be accepted from certain countries, due to political reasons.[68] The poor, who mostly live in shantytowns, in San Salvador were the most greatly affected.[69] Due to the unorganized response efforts, aid was not handed out in an even fashion.[70] Aid trucks would arrive at the shantytowns unannounced to distribute relief on a first-come first-serve basis, which meant that those who lived higher on the slopes of the shantytowns and further away from the roads did not receive aid.[71] During the earthquake, water lines, electric supply systems, and telecommunication systems were severely damaged.[72] Additionally, while tankers were able to deliver potable water, the damaged water lines left people without running water and disrupted

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[63] Bommer and Ledbetter, 88
[64] Bommer and Ledbetter, 85, 95
[65] Warren Hoge, "War Saps Salvador Economy"
[66] Bommer and Ledbetter, 92
[67] Bommer and Ledbetter, 94
[68] Tyroler, “Salvadoran Government Prohibiting Landing Of Planes”, 1
[69] “San Salvador Earthquake”, 47
[70] “San Salvador Earthquake”, 51
[71] “San Salvador Earthquake”, 51
[72] “San Salvador Earthquake”, 53

sewerage systems.[73] This, and the disruption of hospitals, resulted in an increase of diseases, particularly cholera. [74]

Governance

As mentioned before, El Salvador was in the midst of a civil war that ravaged the country as both the military led junta and the Farabundo Marti National Liberation Front (FMLN) battled for control of the country's future.[75] The inequality in El Salvador, when combined with the inhumane treatment of protesters, common election fraud, and the rise of death squads spurred a resistance which eventually led to the formation of the FMLN.[76] This time period also marked the start of various crimes against humanity from the military led junta and the government as thousands of people from suspected communists to Catholic priests were killed for speaking out against the government.[77] Due to the civil war, the country, while it had resources in place that were ready for mobilization, was very unorganized in the distribution of those resources leading to some citizens benefitting more than others in the aftermath of the earthquake.[78] The ongoing conflict was in its seventh year by the time of the 1986 earthquake, and it only served to complicate getting aid out to Salvadoran citizens who needed it the most.[79] President Duarte and the Salvadoran government declared a state of emergency that briefly interrupted fighting as the government attempted to help

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[73] "San Salvador Earthquake", 45
[74] Bommer and Ledbetter, 94
[75] Dobbins, "Overcoming Obstacles to Peace", 67
[76] Brockett, "The Twelve-Year War in El Salvador", 11
[77] Brockett, 3
[78] "San Salvador Earthquake", 51
[79] Bommer and Ledbetter, 88

those who had been injured and assessed the property damage that had taken place.[80]

Economy

Although El Salvador's economy had grown during the 1960s and 1970s, the civil war, which started in 1980 and wasn't resolved until a peace agreement in 1992, damaged the economy more than it had grown during these decades.[81] During the 1980s, El Salvador's economy slowed to an average of 1.3 percent in growth each year.[82] During this decade, there was capital flight, a reluctance to invest, reduced production, lack of credit, inflated prices of imports, and depressed prices of principal exports such as coffee, sugar, and cotton.[83] Other contributing factors were the decline in Salvadoran exports caused by a disadvantageous global economy and an overvaluation of the national currency. El Salvador also had to deal with the impacts of the civil war, which caused a loss of confidence, political uncertainty, and destruction.[84] One of the tactics from the Farabundo Martí National Liberation Front in the civil war was to sabotage the economy through the destruction of workplaces. Some of El Salvador's primary exports including cotton, sugar, and coffee had decreased by fifty, thirty, and twenty-three percent respectively by 1982. United States Ambassador, Deane R. Hinton estimated that US$740 million had left El Salvador from 1979 to 1982 and El Salvador's Planning Minister, Atilio Vieytez, said he believed this amount to

[80] Brockett, 30
[81] Dobbins, 67, 72
[82] Dobbins, 72
[83] Hoge, A17
[84] Hoge, A1

be twice as large.[85] During the war, the only increases that El Salvador saw to its economy came from U.S. economic aid and remittances from expatriates that had fled the country.[86] In order to maintain El Salvador's economy at zero growth, the U.S., in the form of grants and long-term loans, and international lending institutions gave El Salvador a combined US$392.5 million.[87] When asked about this economic aid in an interview, President of the Central Bank, Alberto Benitez Bonilla, said, "If we didn't have this aid almost all our industries would stop, and we would have at least 20 percent negative growth".[88] The U.S. also tried to provide economic assistance in the form of encouragement of economic reforms.[89] However, steps had to be taken to prevent this economic aid from being distributed based on personal connections, rather than credit-worthiness or a genuine need for financing which was common in Salvadoran banking practices.[90] El Salvador's ongoing civil war and the overall unfavorable global and regional economic environment left almost no chance for El Salvador to grow its economy during this period.

Disaster Planning

Although El Salvador is prone to disasters, it did not have an official institution to deal with natural disasters.[91] This created problems during the 1986 earthquake with communication and mobilization. In regard to the country's

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[85] Hoge, A1
[86] Dobbins, 72
[87] Hoge, A1
[88] Hoge, A1
[89] Dobbins, 71
[90] Hoge, A1
[91] Bommer, 94

response to the earthquake one diplomat said, "They are still fighting a war. When the earthquake first hit, they still felt a need to protect the country from guerillas."[92] As part of their prior disaster response plan, the Salvadoran government had developed relationships with external organizations that assumed specific roles within the nation's disaster efforts. The most prominent groups were the Church Emergency Committee (CIE) and the Union Nacional Trabajadores (UNTS), a trade union confederation.[93] The aid that was sent to El Salvador was actually not addressed to the Salvadoran government, but rather to these two organizations.[94] However, the government did have a say in what aid entered the country.[95] This complicated the inflow of aid from international actors because the Salvadoran government refused to accept aid from certain countries due to political reasons.[96] For example, fifteen planes carrying emergency aid from U.S. organizations and that were intended for the CIE were denied from landing by the Salvadoran government.[97] Some aid, in the form of medical supplies, from Cuba was accepted.[98] However, a Cuban team of forty medical specialists that were sent with the supplies were denied from entering El Salvador by the government.[99] A spokesperson from the Salvadoran government explained this by saying that the government did not want to acquire an oversupply of unnecessary medicines, and

[92] Williams, "More than 400 Dead"
[93] Bommer, 94
[94] Bommer, 94
[95] Bommer, 94
[96] Bommer, 94
[97] Tyroler, 1
[98] Bommer, 94
[99] Bommer, 94

that the government wanted to be able to supervise the use of medical supplies.[100] This illustrated that although there was coordination between the government and external organizations, power was not totally given to these institutions to make executive decisions about the recovery process. This created a power struggle and slowed down the initial disaster response. Although these external organizations were given the task of managing the incoming aid, they were not authorized to distribute the aid at first.[101] However, after there were complaints that the government was limiting the amount of assistance that the external organizations could provide, the Salvadoran government granted the National Emergency Committee (COEN), which was in charge of these external organizations, the ability to distribute the aid they had received.[102]

Haiti 2010

Background

The 2010 Haitian earthquake of 7.0 magnitude occurred at 4:53 pm local time on November 12th.[103] In 2010, Haiti was the poorest country in the Western hemisphere.[104] Only a small portion of the population had access to potable water before the earthquake and only about a third of the population had intermittent access to electricity.[105] These factors indicate that Haiti was already not in a stable place where it could effectively deal with a devastating natural disaster. Additionally, Haiti's only natural disaster plan was concentrated on hurricanes,

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[100] Tyroler, 1
[101] Bommer, 94
[102] Bommer, 94
[103] Hou and Shi, "Haiti 2010 earthquake", 25
[104] DesRoches et al., S3
[105] DesRoches et al., S3

not earthquakes.[106] In 2010, Haiti had not experienced a major earthquake in many decades and its hurricane preparation actually worsened the impact of the 2010 earthquake. Haiti's main attempt at hurricane preparation was to build concrete buildings.[107] However, the heaviness of these structures was eventually harmful to those that became trapped in buildings after the earthquake and could not escape the heavy rubble.[108] The government and The United Nations Stabilization Mission in Haiti (MINUSTAH), which was a main actor involved with disaster response planning prior to the earthquake, were heavily affected by the earthquake because their buildings were destroyed.[109] The presidential palace and MINUSTAH's headquarters suffered great damages and key staff died.[110] This made it even more difficult for the Haitian government and MINUSTAH to provide effective response efforts to affected areas after the earthquake.[111] The US government eventually became a primary actor in the post-disaster recovery but was unable to coordinate assistance until eight days after the initial earthquake.[112] Although the damages and casualties suffered within the Haitian government made it even harder for it to respond to this disaster, the Haitian government's lack of creation of a disaster response institution prior to the earthquake was a major factor that contributed to its inefficiencies in its disaster recovery.[113] Haiti

[106] Hou and Shi, 26
[107] Hou and Shi, 26
[108] Hou and Shi, 26
[109] Hou and Shi, 31
[110] Hou and Shi, 31
[111] Hou and Shi, 31
[112] Cecchine, "The U.S. Military Response", 21
[113] Hou and Shi, 29

also had a lack of disaster recovery participation from the Haitian population.[114] This could be attributed to the fact that most people were affected by the disaster and were therefore tending to their own needs.[115] However, the surrounding communities outside Port au Prince did not offer much assistance. According to Hou and Shi, this was due to the areas outside Port au Prince being poorer than the capital and not being able to offer much help.[116] The economic losses that were caused by this earthquake were particularly devastating for Haiti because the damage mostly impacted the population's ability to acquire basic necessities; and therefore, the disaster had a significant impact on the survival of the Haitian people for years after.[117, 118] To this day, many of the survivors of the 2010 earthquake still live in refugee camps outside of Port-au-Prince and don't have access to clean water, sanitation, or food.[119]

Governance

For years Haiti has struggled with maintaining peace and order through governance.[120] Ongoing corruption had resulted in an election boycott in 2000.[121] In recent years at the time of the earthquake, there had been multiple coups to overthrow the Haitian president.[122] Every election has accusations of election fraud, and there have been strong tensions between political parties that

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[114] Hou and Shi, 31
[115] Hou and Shi, 31
[116] Hou and Shi, 31
[117] Hou and Shi, 26
[118] Biquet, "Haiti, Between Emergency and Reconstruction", 131
[119] Lemaire, "Haiti Quake Survivors Still Struggling", 1
[120] Lundahl, "Political Economy of Reform Failure", 272-277
[121] Lundahl, "Political Economy of Reform Failure", 273
[122] Lundahl, "Political Economy of Reform Failure", 272, 274, 279

sometimes result in violence. In December 2001, the National Palace was attacked by thirty heavily armed commandos.[123] Although unsuccessful, this increased tensions between the president and opposition.[124] Supporters of President Aristide burned the opposition's headquarters and the homes of opposition leaders.[125] Then, the pro-government supporters began an attack on supporters of the opposition, specifically targeting journalists.[126] Eventually, private news and radio stations closed due to threats.[127] This time was marked by demonstrations, marches, fighting and killing.[128] The effects of these were worsened due to the shortage of police.[129] Even worse, many of the police were appointed because of their political connections and were not trained.[130] This made the police force corrupt and uninterested in quelling the violence of the frequent uprisings.[131] In December 2003, the President sent gang members into the University of Haiti and severely injured students and staff.[132] This incited student demonstrations of up to 10,000 people.[133] These demonstrations and violence continued, and by the end of 2003, Aristide's political party started to fall apart. Things started to change in February 2003, when the opposition began their rebellion that eventually forced out Aristide by the end of that month.[134] This

[123] Lundahl, "Political Economy of Reform Failure", 274
[124] Lundahl, "Political Economy of Reform Failure", 275
[125] Lundahl, "Political Economy of Reform Failure", 274
[126] Lundahl, "Political Economy of Reform Failure", 275
[127] Lundahl, "Political Economy of Reform Failure", 296
[128] Lundahl, "Political Economy of Reform Failure", 276
[129] Lundahl, "Political Economy of Reform Failure", 276
[130] Lundahl, "Political Economy of Reform Failure", 276
[131] Lundahl, "Political Economy of Reform Failure", 276
[132] Luzincourt and Gulbrandson, 9
[133] Lundahl, "Political Economy of Reform Failure", 276
[134] Lundahl, "Political Economy of Reform Failure", 276

marked the beginning of a changing period in Haitian politics, and in February of 2006 Haitians went to the polls and elected Rene Preval to the presidency.[135] Preval represented a new government that would work to better the lives of the Haitian working class and the popular sectors through liberal reforms to help the average Haitian and bring the country out of poverty.[136]

Economy

After Aristide was forced out of office, a military regime took his place that had severe consequences on the Haitian economy.[137] During the reign of the military regime headed by Raoul Cedras, real income per capita decreased by an estimated thirty percent, Haiti's crucial assembly industry was reduced by eighty-five percent, and prices of essential goods, oil, and gas prices skyrocketed.[138] During this period, unemployment rose and Haiti's signature coffee exports fell by one-third.[139] This resulted in Haiti defaulting on public debt payments which caused a flight in capital, a deficit, and depreciation of the local currency.[140] Before the 2010 earthquake, Haiti already relied heavily on international assistance as it had for many years.[141] Sixty-five percent of the country's national budget relied on assistance from external donors including non-governmental organizations and bilateral and multilateral donors.[142] For these reasons, Haiti's economic development strategy was heavily influenced by the economic ideology

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[135] Dupuy, "Haiti Election 2006", 132
[136] Dupuy, 138
[137] Lundahl, "Political Economy of Reform Failure", 277
[138] Lundahl, "Political Economy of Reform Failure", 281
[139] Lundahl, "Political Economy of Reform Failure", 282
[140] Lundahl, "Political Economy of Reform Failure", 282
[141] Lundahl, "Political Economy of Reform Failure", 272
[142] Shamsie, "Purported Glimmer in Haiti's Development Murk", 652

and needs of their donors, which entailed economic liberalism and an export-driven economy.[143] The objectives of Haiti's foreign investors mostly centered around Haitian exports.[144] However, Haiti's economic dependence on these export markets made it vulnerable to the fluctuations of demand for these commodities, natural and human obstacles to producing food, and international sanctions against Haiti.[145] Unfortunately, the demand for Haiti's traditional exports have severely declined or has disappeared altogether.[146] The military regime from 1991-1994 also contributed to the decline of this industry. The assembly export industry that was popular before this regime, severely decreased after their time in office and by 2005 it only employed about 20,000-30,000 people.[147] The other sectors of Haiti's economy have also decreased.[148] Poor agricultural practices have shrunk the profits and production possibilities in the agricultural sector of Haiti's economy.[149] This created a very grave situation in Haiti which not only limited their economic capabilities but also added to the severity of the shortages and price inflation of food which peaked in 2008.[150] This made Haiti's poor vulnerable in many ways.

Disaster Planning

Some may assume that Haiti's infrequent occurrences of earthquakes contributed to the massive losses that it suffered. However, the lack of

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[143] Shamsie, 663
[144] Shamsie, 650
[145] Lundahl, "The Political Economy of Disaster" 30
[146] Lundahl, "Political Economy of Reform Failure", 281
[147] Shamsie, 659
[148] Lundahl, "Political Economy of Reform Failure", 278
[149] Lundahl, "Political Economy of Reform Failure", 279
[150] Al Jazeera

relationship between the frequency of earthquakes to the number of fatalities mentioned above disproves this argument.[151] Therefore, other countries that had a higher frequency of earthquakes did not have an advantage over Haiti, whose last devastating earthquake before the instance in 2010 was in 1946. Haiti also had very limited data collection and monitoring capabilities at the time of the 2010 earthquake. They did not have any structured national early warning system for natural disasters.[152] At the local level, Haiti's risk assessment had greatly improved in the years leading up to the 2010 earthquake.[153] However, this only resulted in rudimentary risk maps based on limited available data.[154] Although several data collection and monitoring systems were operational, they did not provide the necessary coverage for natural disaster early warning systems.[155] Haiti's National Meteorological Center relied on two weather-monitoring stations and a network of volunteer observers from around the country.[156] However, this was not directly related to Haiti's weather monitoring needs, but rather to provide data to the United States' National Oceanic and Atmospheric Administration's National Weather Service.[157] To analyze the mobilization capacity and capabilities, there needs to be a closer look at the structure of Haiti's National Disaster Risk Management Plan (NDRMP). This plan is structured to be decentralized from the national government and focuses on disaster management

[151] Anbarci, 1926
[152] "Disaster Risk Management", 11
[153] "Disaster Risk Management", 10
[154] "Disaster Risk Management", 10
[155] Lundahl, "The Political Economy of Disaster", 188
[156] "Disaster Risk Management", 11
[157] "Disaster Risk Management", 11

plans at a local level. Strengthening local communities individually, rather than bolstering a large national organization was the strategy of Haiti's natural disaster plan.[158] In order to enact this plan within each community, the NDRMS created an extensive network of Disaster Risk Management (DMR) committees (CDRM) at all ten departmental levels and in most of the 165 municipalities.[159] Although this could be an effective plan in theory, the network of DMR committees was limited by the lack of legal decentralization of disaster recovery from the national government.[160] Although the majority of countries use their military as a mechanism for security and resource mobilization after a natural disaster, Haiti's only security force has been the police since the military disbandment in 1994.[161] However, the police did not mobilize after the earthquake, possibly because they were part of the severely impacted population or because they did not know their specific role within the NDRMS.[162] According to Hou and Shi, "Two weeks after the earthquake, only 3,433 policemen from the 6,000 from the area of Port-au-Prince had responded to the government's call".[163] Referring to Haiti's response plan the World Bank said, "most line ministries do not have the legal mandate, strategic framework or technical capacity to effectively fulfill their DRR (Disaster Risk Reduction) role and responsibilities as defined within the NDRMP."[164] Although ten ministries and the Haitian Red Cross signed the NDRMP, the

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[158] "CELP Profile: Haiti."
[159] "Disaster Risk Management", 9
[160] "Disaster Risk Management", 8
[161] Lundahl, "The Political Economy of Disaster", 62
[162] Hou and Shi, 31
[163] Hou and Shi, 29
[164] "Disaster Risk Management", 9

Ministère de l'Intérieur et des Collectivités Territoriales (MICT), which is part of the executive body of the Haitian government, is the only entity that has a clear mandate from DRR.[165] Due to the lack of clarity in the organization of the official disaster response, The World Bank claims that it, "makes it difficult to allocate financial resources and limits the involvement of the signatory ministries at the institutional level."[166] Due to this, the NDRMS started to rely more on the local committees to coordinate plans within their own jurisdictions without much support from the NDRMS itself or the institutional support at the national level.[167] However, this limits the capacity and capability of the disaster response systems because local committees have less access to resources and this also severely limits the human capital needed in the initial response period.[168] If the immediate response teams are all local they are less capable of mobilizing since they are likely part of the affected population. Additionally, the lack of funding limits the capacity and capability of the local committees. As mentioned before, Haiti's disaster response plan is limited by the amount of human capital.[169] This also applies to the amount of trained personnel that is available in the country. There is a limited number of people with strategic and technical expertise in disaster management.[170] The lack of trained personnel is a severe limitation to the number of adequate resources that would be available to high threat areas. Additionally, Haiti has many high threat areas. Due to deforestation and lack of adequate

[165] "Disaster Risk Management", 9
[166] "Disaster Risk Management", 9
[167] "Disaster Risk Management", 9
[168] "Disaster Risk Management", 9, 12
[169] "Disaster Risk Management", 12
[170] "Disaster Risk Management", 12

construction, around 96% of the Haitian population is at risk in the event of a natural disaster.[171]

[171] "Disaster Risk Management", 9

CHAPTER FOUR: ANALYSIS AND IMPLICATIONS

Analysis

Details of the specific case studies are helpful in understanding the data of the three case studies. While Anbarci and Kahn's research used data to explain theoretical models, this research aims at providing qualitative evidence to provide further evidence that wealthier countries have lower natural disaster mortality rates. This research also aims to explain the discrepancies in data that may be misleading. This chapter provides comparisons of the three case studies and their governance, economic, and disaster planning variables. The comparisons of the qualitative data is supplemented by the quantitative data of these three disasters. Using quantitative and qualitative data these comparisons aim to solve the existing questions about why some natural disasters are less devastating than others and why certain variables seem to have effects on a country's ability to mitigate natural disasters.

First, it is crucial that the quantitative data is understood within the context of each country. While a specific instance of an earthquake may look less severe than another, in the context of the country as a whole, this data is seen differently. Figure 2 below provides the raw data for the death toll, affected population, and monetary damages. Objectively, it seems that El Salvador had the least devastating earthquake as it suffered the least amount of devastation in all three categories. However, Figure 2 provides a broader perspective on this data.

Figure 2:[172]

[172] Centre for Research on the Epidemiology of Disasters

	Year	Magnitude	Death Toll	Monetary Damages
Mexico City, Mexico	1985	8 Richter	9,500	4.1B US $
San Salvador, El Salvador	1986	8 Richter	1,100	1.5B US $
Port-au-Prince, Haiti	2010	7 Richter	222,570	8.0B US $

Figure 3:[173, 174, 175, 176]

	Death Toll / Metropolitan Population	Affected Population / Metropolitan Population	Monetary Damages / GDP
Mexico City, Mexico	0.052%	11.8%	2%
San Salvador, El Salvador	0.073%	51.0%	41%
Port-au-Prince, Haiti	7.4%	123.0%	68%

Figure 3 provides these variables in the context of the population sizes of the affected area and the GDP of the countries during years of each earthquake. This is important because countries that have smaller populations and GDPs are going to have more difficulties bearing even relatively small devastations. While the data on Haiti is astounding both in terms of raw data and comparatively, the comparisons between the Mexico City and San Salvador earthquakes are much clearer when seen in the context of population sizes and GDP. The information provided by Figure 3 shows that Mexico and El Salvador's death tolls were a lot closer proportionally than Figure 2 suggests with Mexico's death toll in regard to population being lower than El Salvador's. Additionally, there were a lot more people significantly impacted by the earthquake in San Salvador compared to Mexico City. Finally, the monetary damages were significantly more devastating for El Salvador in comparison to their GDP than Mexico's monetary damages.

[173] Centre for Research on the Epidemiology of Disasters
[174] GDP (current US$) - Mexico
[175] GDP (current US$) - El Salvador
[176] GDP (current US$) - Haiti

Although Mexico and El Salvador's death tolls were relatively similar in comparison to the population of the affected areas, the percentage of affected people and monetary damages are important. As mentioned earlier, these devastations are much more impactful on poorer countries because their population lives closer to subsistence level and affected people are more likely to remain displaced for a longer period of time. This can be seen in Haiti which has the highest affected population compared to the population size of Port-au-Prince and even affected some outside of the city. Even today, Haiti has a large number of displaced people who live in temporary tent cities around Port-au-Prince.[177]

So what made Mexico able to prevent higher percentages of affected people and monetary damages better than El Salvador? And why was Haiti so dramatically affected by an earthquake of similar magnitude to the Mexico City and San Salvador earthquakes? The following indicators hope to provide evidence to answer these questions.

Governance

While Mexico has had a complex political history, leading up to the earthquake, Mexico was relatively peaceful and a large majority of the population was content with their leadership albeit weary due to the recent economic crisis.[178] On the other hand, El Salvador was in the midst of a civil war, and Haiti was only a few years into Preval's presidency after years of civil unrest. A superficial evaluation of Haiti's government would assume that it did not play a

[177] Biquet, "Haiti, Between Emergency and Reconstruction", 131
[178] The New York Times, 16

role in how devastated Port-au-Prince was. However, the effects of bad government have a lasting impact.

It could be assumed that at the time of the earthquakes, the governments of Haiti and El Salvador would have been more preoccupied with resolving their current issues at hand rather than focusing on natural disaster preparedness which was not viewed as critical at the time. Often natural disaster preparedness is dealt with after most crucial issues are resolved. Therefore, if a country is in a state of chaos or rebuilding, their focus is primarily on the conflict at hand or restoring the essential elements to maintain peace and order. While natural disaster planning should not be considered a nonessential element to government institutions, the reality is that countries that struggle with everyday problems are probably less likely to allocate their resources towards a crisis that seems distant.

Even though in countries like Haiti it may seem like their government is improving, a closer look at their history of governance shows major institutional damage that forced subsequent leaders to attend to more pressing issues.[179] This is why strictly quantitative data is not always indicative of reality. The government of Haiti had made great strides with the election of Preval in 2006.[180] Haiti seemed to be making great improvements when Preval became the first president to cede the presidency peacefully. However, Preval had the responsibility of undoing the damage that all the presidents who had not peacefully ceded power had done.[181]

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[179] Lundahl, "Political Economy of Reform Failure", 1-101
[180] Dupuy, 132
[181] Dupuy, 132, 133

Examples like Mexico in 1985 provide evidence that once a government is able to maintain order for an extended period of time, they are able to choose to extend their efforts towards areas of prevention to maintain this order. Because the economy was rebounding from the debt crisis and there was no ongoing crisis, policies did not have to be based around issues that would show immediate results. Natural disaster planning, while valuable in the time of need, does not show immediate results. This can discourage policymakers from allocating time and resources towards disaster planning especially if they are concerned about trying to maintain power and favorability.

Ultimately, governments seem to play a role in their countries' ability to handle an earthquake. In the evaluation of these case studies, what can be inferred is that the longer that a government remains stable as well as the favorability of the current regime play a role in the government's likelihood in allocating time and resources into natural disaster planning.

Economy

The impact of economic factors on a country to mitigate a natural disaster is the most previously studied variable out of the variables included in this research. However, this research provides a more in-depth analysis on this variable beyond GDP. Quantitatively, Mexico had the healthiest economy with a GDP of 195.22 billion, with El Salvador following with a GDP of 9.58 billion, and lastly, Haiti with a GDP of 6.62 billion during the year of each of their

earthquakes.[182, 183, 184] A more qualitative study of these countries' economies during these periods supported the quantitative evidence. However, qualitative research allows for more questions to be answered about the link between economies and natural disasters.

Mexico's ability to come back from its debt crisis was unprecedented for the region.[185] A few years after the crisis, whenever the earthquake struck, the Mexican economy was rebounding from the 1983 debt crisis. The country did this through more independent economic policies that cut imports.[186] It could be assumed that the lack of reliance on foreign assistance gave Mexico the freedom to allocate resources where needed. While both the El Salvadoran and Haitian economies depended on external aid, no industries in the Haitian economy have been extremely successful, much less stable.[187] Although El Salvador experienced an earthquake in the middle of a civil war, its economy was prevented from experiencing any negative growth during this war which began in 1980 through the assistance of external aid.[188] Unlike Haiti, this aid was used properly, and therefore, it was able to keep the Salvadoran economy afloat. Although the Haitian economy experienced growth during the years leading up to the earthquake, other research on Haitian economics has concluded that this result was more a factor of tightened expenditure policies and an increased revenue in

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[182] GDP (current US$) - Mexico
[183] GDP (current US$) - El Salvador
[184] GDP (current US$) - Haiti
[185] Moreno-Brid and Ros, 147
[186] Moreno-Brid and Ros, 146
[187] Lundahl, "Political Economy of Reform Failure", 281
[188] Hoge, A1

the short run than of an increase in the quality of the lives of Haitian citizens.[189] Further, Haiti was also plagued by lower employment rates, increasing inflation, poor governance, and less purchasing power which pushed more Haitians into poverty.[190]

One of the key differences when comparing the Mexican economy to the Salvadoran and Hai tian economies was Mexico's trade surplus which made it less dependent on imports from other countries. After the debt crisis, Mexico turned its trade deficit into a surplus as part of its economic recovery.[191] Further, the difference between El Salvador and Haiti's economies was the historical dependence on foreign debt. While El Salvador depended on foreign assistance during its civil war, the country did not have a historical dependence on external aid and was able to keep its economy from shrinking during the civil war time.

It could be assumed that economies had a role in these countries' ability to mitigate natural disasters. The freedom that Mexico had with its economy allowed it to allocate resources freely. El Salvador and Haiti's dependence on foreign aid had disadvantages, such as the requirement that this aid be used in a way that was satisfactory to the foreign lenders.[192] This usually meant that the assistance had to be allocated towards their economy or their exports.[193] This might have prevented the Salvadoran and Haitian governments from being able to invest into natural disaster planning. This could be especially true for Haiti which has depended on

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[189] Lundahl, "The Political Economy of Disaster", 107
[190] Lundahl, "The Political Economy of Disaster", 108
[191] Moreno-Brid and Ros, 145
[192] Shamsie, 650
[193] Shamsie, 650

foreign investment for many years.[194] However, El Salvador experienced growth in the couple of decades leading up to the earthquake suggesting that its economy was on a healthy path until the disruption of the civil war.[195] In contrast, Haiti's inability to find profitable industries and sustain them in order to grow economically could have an effect on their willingness to allocate funding towards resources that they considered nonessential.[196]

Disaster Planning

In comparison to the two other case studies, Mexico was the only country that had a detailed disaster response plan.[197] While El Salvador had the capacity and capability to mobilize through their military, they were still preoccupied with fighting the guerillas even after the shock hit San Salvador.[198] El Salvador's lack of an emergency plan coupled with the military's distraction from guerilla forces made it hard to coordinate a response. However, once the Salvadoran military were able to mobilize, they had the capability to provide aid using military grade equipment and technology.

However, Haiti was the only country without a military. The initial response time in Port-au-Prince was vastly longer than that of the other two case studies.[199] It could be assumed that the lack of capacity and capability that is usually provided by the military could have been a cause for this lag in response. Additionally, as previously mentioned, the police were not a trained and reliable

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[194] Lundahl, "Political Economy of Reform Failure", 272
[195] Dobbins, 67, 72
[196] Lundahl, "Political Economy of Reform Failure", 279
[197] Dynes, 21
[198] Williams, "More than 400 Dead"
[199] Hou and Shi, 29

source.[200] This was very apparent by their lack of mobilization even days after the shock.[201] Military personnel are usually trained on how to mobilize even in the face of destruction and disaster. However, the Haitian police were not given this kind of training. Additionally, the Haitian police were concentrated in one area unlike a military which usually has the ability to mobilize from other areas of the country to assist in times of duress. This impacted the police's ability to respond because everyone in Port-au-Prince was affected.

Through the examination of these case studies, it can be assumed that mobilization capacity and capability, which usually is performed through the military, is an important factor in disaster response. If even local response teams are not able to mobilize, when foreign response teams arrive, the response effort will become very disorganized. Help from external organizations is useful, but is it much more efficient and effective whenever it supports local efforts rather than crafting its own. Additionally, it is important to establish a disaster response plan. Although the Mexico City and San Salvador earthquakes are close in death tolls in respect to the cities' population sizes, Mexico City suffered much less in terms of affected people and monetary damages. This could be attributed to their prior disaster response efforts. No disaster plan can be created perfectly. Although they had complications with organization, the establishment of a plan gave the local response team a blueprint for the initial plan of action.

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[200] Lundahl, "Political Economy of Reform Failure", 276
[201] Hou and Shi, 31

Implications for the International Community

While some of these issues are complex to resolve, some of them could be more effectively developed with the help of the international community. Although external organizations and foreign actors have tried to assist the Central American and Caribbean region in the past in regard to natural disaster devastation, there are lessons that can be learned in order to help the region more effectively.

Firstly, international organizations need to begin their disaster response aid to these Central American and Caribbean countries before disaster even strikes. The best way to assist these countries and avoid devastation is to assist them in implementing the necessary measures to reduce risk. All of the factors listed above require necessary action before a natural disaster strikes. Keeping this in mind, if international organizations provide aid to a country, there needs to be more freedom to allocate these funds towards prevention measures like emergency management. If countries are unable to pay off their foreign debt, they are usually bound by certain restrictions. This usually means that this assistance has to be spent fixing immediate problems. However, natural disasters can exacerbate any existing problems in the country, as illustrated by the Haiti example. Additionally, since this region is so prone to natural disasters, while emergency management may seem like a nonessential expense, it is necessary in order to not cause further devastation to a region that already struggles economically. Therefore, foreign organizations and nations that lend money to

these countries should be lenient towards allowing for more natural disaster response expenses.

Lastly, the international community should help Central American and Caribbean countries expand their capacity in emergency management and encourage countries to develop natural disaster response plans. As mentioned earlier, many of these countries struggle economically and do not view emergency management as essential in comparison to other demands. Therefore, they are less likely to allocate resources towards it, especially if they are not confident that the measures they are taking will be effective. This provides opportunity for external organizations and other nations to educate these countries about proper emergency management measures. If the international community is able to provide the Central America and Caribbean region with more education about emergency management, funds for natural disaster planning, and more freedom to allocate towards measures they believe will reduce devastation, the negative impact of natural disasters in this area of the world could be decreased.

CHAPTER FIVE: SUMMARY

Summary of Findings

Having examined the findings from all three case studies, it could be inferred that a country is more likely to be able mitigate a natural disaster well if it has a history of stability within its government, the people favor the government in power, it is more independent economically, it has a military, and finally, that it has a prior disaster response plan. While previous studies have examined the relationship that economies and governance have with natural disaster deaths, the study of specific elements of disaster response and emergency management is a topic with very little research or empirical studies.

The figures below evaluate the disaster response according to the criteria given in Harrald's Preparedness and Prevention phase and Initial Reaction and Mobilization phase of his criteria for successful disaster response.

Figure 4:

Preparedness and Prevention

	Domain Awareness and Detection Capability	Mobilization and Response Plans	Mobilization Capacity and Capability	Adequate Resources	Interorganizational Coordination
Mexico City, Mexico		X	X	X	
San Salvador, El Salvador			X		X
Port-au-Prince, Haiti		X			

Figure 5:

Initial Reaction and Mobilization

	Situational Awareness	Resources in Place	Resource Mobilization
Mexico City, Mexico	X	X	X
San Salvador, El Salvador			X
Port-au-Prince, Haiti			

As illustrated in Figure 4, Mexico demonstrated more crucial elements of the Preparedness and Prevention stage than the other two case studies. Mexico's DN-

3 was its Mobilization and Response Plan.[202] Mexico's disaster plan also demonstrated its Mobilization Capacity and Capability and its ability to obtain Adequate Resources in natural disaster events prior to the 1986 earthquake. However, many of Mexico's losses can be attributed to the lack of Interorganizational Communication due to the lack of coordination between the municipality of Mexico City and the federal government. El Salvador had a much less developed Preparedness and Prevention plan for natural disaster than Mexico. The only elements that El Salvador demonstrated were Interorganizational Communication and Mobilization Capacity and Capability. El Salvador had the Interorganizational Communication factor because external organizations, such as the CIE and UNT, were part of the plan developed by the government before the disaster occured.[203] El Salvador also had the Mobilization Capacity and Capability through their military. Although the military was slightly delayed in their response, they were able to provide assistance to the local and foreign effort. Lastly, Haiti's only element in the Preparedness and Prevention stage was their Mobilization and Response Plan. However, the existence of this plan was overshadowed by the lack of interorganizational coordination. While there were external organizations, such as the Haitian Red Cross, that would have assisted Haiti in a disaster response effort, the lack of clarity made it difficult for these organizations to provide financial much less physical assistance.

Figure 5 compares elements of each country's initial response and evaluates them according to Harrald's criteria. Mexico had all of Harrald's crucial

[202] Dynes, 21
[203] Bommer, 94

elements. The country was able to accomplish this through helicopter and bus tours around the city that allowed response teams to survey the damage.[204] The large amount of human and material resources that the military could employ meant that Mexico had Resources in Place prior to the earthquake. Finally, Mexico military's response to previous natural disasters allowed it to take these resources and have a realistic approach to Resource Mobilization. These comparisons can be used to gain more insight into the important factors that constitute an effective natural disaster plan, specifically in the Central American and Caribbean context.

Conclusions

By using both quantitative and qualitative data, this research was able to gain a better insight into the factors that affect natural disasters in the Central American and Caribbean region. There are lessons that can be learned from this research that can be applied to this region which needs to increase its efforts in emergency management. Central America and the Caribbean have struggled with poor economies and unstable governments for decades, so although maintaining the economy in preparation for a natural disaster is unlikely, the impact that disaster response plans have on the death toll and monetary damages is hopeful.

These plans do not have to be very complex, but rather based on informed decisions with high importance placed on communication and coordination within the response teams. Two of Harrald's preparedness and prevention factors, Domain Awareness and Detection Capability that are created and maintained as

[204] Dynes, 30

well as Mobilization and Response Plans cannot be effective unless they are based on realistic scenarios, focusing on the need to be informed. While investment may need to be placed into detection capabilities, domain awareness could be done without technology and instead through implementing a plan for prompt communication from affected and surrounding areas. The mobilization and response plans based on realistic scenarios requires an informed disaster response planning team prior to the occurrence of the disaster. This information could come from previous disasters, but should also take into consideration the possible occurrence of an infrequent kind of disaster, based on the country's geographical positioning.

The need for mobilization capacity and capability that can adequately meet the needs of people in affected areas is an important factor but could be a barrier to successful disaster preparedness and prevention in poor Central American countries due to the lack of investment. However, many of these countries already rely on external organizations for assistance in their disaster relief efforts. Therefore, if external organizations in the country have the adequate capacity and capability to deliver large amounts of resources post-disaster, there should be coordination pre-disaster with these groups and also pre-planned communication between all external groups and the local government. Adequate resources for high threat areas during the initial response is also a factor that requires investment, but it should not be discounted as out of the capability of these Latin American countries. Many international organizations are eager to send resources, such as medical and disaster recovery supplies. The mobilization

of international resources in the form of doctors or other non-material resources may be slower and less optimal than using native resources, but if a plan is already implemented this process could be more efficiently optimized. With the United States being so close to Central America and the Caribbean, if prior plans were made before disaster struck, many aid organizations within the U.S., and possibly the U.S. government, would be willing to assist in the disaster recovery and could be in the affected countries relatively quickly when needed. This is connected to Harrald's last factor for success in disaster preparedness and prevention: interorganizational coordination that is preplanned. Coordination is such a key factor in disaster response. Although many Central American and Caribbean countries do not have the available investment to gain resources needed for disaster recovery, there are many other organizations that are willing to help. If these organizations are utilized wisely and preemptively put into the disaster response plans, with the use of coordination between the country's available resources and external resources, an effective disaster response is achievable.

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