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Compounding Disasters, Disaster Vulnerability and Disaster Management: A Case Study of Breast Cancer Patients in Puerto Rico

Incorporating the Social Determinants of Health to Build Resilient Communities

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II. KEY INFORMATION

Abstract

BACKGROUND: Puerto Rico (P.R.) faces particular and exacerbated vulnerabilities from climate change-induced disasters. These types of disasters are increasing, becoming stronger and more destructive due to unnatural human activities. The increase in exposures, vulnerabilities, and health risks, leads to increased stress on health systems worldwide but disproportionately affects countries where health inequities exist. Most recently, Hurricane *Maria*, the earthquake sequence, and the COVID-19 pandemic have led to the collapse of the healthcare system and the exacerbation of health inequities in P.R. Research shows that disaster management (DM) can help communities, families, and individuals prepare for disasters. However, current DM strategies are mainly focused on short-term health risks (such as immediate injuries and trauma, and acute infections), whereas the long-term impacts (e.g., risk of complications of specialized care and interruption of cancer treatment) remain overlooked. Disasters can significantly interrupt health services and lead to increased psychological distress, particularly in medically fragile populations. Women have been identified as more vulnerable to disasters; therefore, breast cancer patients face a “double jeopardy” to disaster risk due to their gender and illness. Therefore, this research will investigate DM from the Social Determinants of Health (SDH) perspective, two concepts often studied separately, giving a more comprehensive picture of the needs of vulnerable populations after disasters.

METHODS: A qualitative approach through media analysis, stakeholder interviews, and a case study focus group discussion was conducted to understand the relationship between health inequities and DM. It explored how current DM strategies in P.R. can create, and reinforce existing inequities, specifically for breast care patients after disasters.

RESULTS: The myopic and traditional perspective of DM is insufficient when health inequities exist, and therefore, there is an urgent need to broaden DM to incorporate the SDH perspective to mitigate health inequities. The results show that key barriers to DM implementation are (1) lack of preparedness, (2) top-down implementation, and (3) lack of data and transparency. Specifically for vulnerable populations, such as breast cancer patients, this results in inadequate access to healthcare, loss of electricity, and heightened psychological stress. Ultimately leading to lower survival rates and long-term adverse health outcomes.

CONCLUSION: The disasters exposed how current DM strategies are inadequate for mitigating long-term health outcomes. Therefore, a broader (bottom-up, inclusive, and community-level) perspective of DM prioritizing vulnerable populations and existing health inequities is imperative. Further research should be conducted to determine specific actions and recommendations for P.R. to facilitate this integration.

Key Concepts

Disaster Vulnerability • Puerto Rico (P.R.) • Social Determinants of Health (SDH) • Disaster Management (DM) • Specialized Cancer Care • Health Inequity

Abbreviations

BRACE	Building Resilience Against Climate Effects (BRACE) Framework
CDC	Centers for Disease Control and Prevention
CDP	Center for Disaster Philanthropy
COVID-19	Coronavirus 2019 Pandemic
CMS	Center of Medicaid and Medicare Services
CSDH	Commission on the Social Determinants of Health
DRR	Disaster Risk Reduction
DM	Disaster Management
DRM	Disaster Risk Management
ESF	Emergency Support Functions
FEMA	Federal Emergency Management Agency
FGD	Focus Group Discussion
GPR	Government of Puerto Rico
JEDI	Justice, Equity, Diversity, and Inclusion in Climate Adaptation Planning
P.R.	Commonwealth of Puerto Rico
NGOs	Non-Governmental Organizations
NRF	National Response Framework
UPR RLC	University of Puerto Rico: Resiliency Law Center
UN	United Nations
UNDP	United Nations Development Programme
UNDRR	United Nations Office for Disaster Risk Reduction
U.S.	United States
SIDS	Small Island Developing States
SDH	Social Determinants of Health
SDGs	Sustainable Development Goals
SRQ	Sub Research Questions
RQ	Research Question
WCDRR	World Conference on Disaster Risk Reduction
WHO	World Health Organization

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1. INTRODUCTION

1.1. Introduction

The Commonwealth of Puerto Rico (hereafter referred to as P.R.) is classified as a Small Island Developing State (SIDS), which faces particular and exacerbated vulnerabilities from climate change-induced disasters (United Nations, 2022b; Berardelli, 2021; *Appendix I*). These types of disasters are increasing, becoming stronger and more destructive due to unnatural human activities (Berardelli, 2021). The increase in exposures, vulnerabilities, and health risks, leads to increased stress on health systems worldwide but disproportionately affects countries where health inequities exist. Most recently, Hurricane *Maria* (hereafter *Maria*) in 2017, the earthquake sequence in 2019-2020, and the COVID-19 pandemic (hereafter COVID-19) have led to the collapse of the healthcare system and exacerbation of health inequities in P.R. (Roman, 2015; Bonilla, 2020). Why did these disasters exacerbate health inequities? The current discourse is emerging on *planetary health*, in which researchers connect human health to climate change impacts by recognizing the “interconnection of health and environmental problems, socioeconomic dynamics, and how they impact groups differently” (Giulio et al., 2021, p. 4374). The planetary health perspective aims to understand how human activities have affected natural systems and, in turn, how these human systems affect the response to crises (Mair, 2020). However, it measures health outcomes through population averages (for example, overall increase in life expectancy, decrease in poverty, or child mortality), indicating that health outcomes are generally improving. By taking population averages, it hides inequities and overlooks vulnerable populations. Therefore, this research will take a more nuanced perspective explicitly focused on health inequity that is complementary to planetary health: the *Social Determinants of Health* (SDH) perspective. The World Health Organization (WHO) defines the SDH as the “circumstances in which people are born, grow up, live, work and age, and the systems put in place to deal with illness” (WHO, 2013). SDH postulates that health outcomes do not only relate to healthy habits (such as exercising, resistance to alcohol and tobacco, and more) but also is affected by larger systematic social and economic factors (Veenema et al., 2019; Asare et al., 2017). Like the WHO definition of the SDH, the Hyogo Framework for Action, a global United Nations (UN) initiative for disaster risk reduction (DRR), defines *disaster vulnerability* as the conditions determined by the “physical, social, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards,” (UNDRR, 2007). In other words, while everyone is affected when a disaster occurs to some degree, some people are more vulnerable to the risks of a disaster due to their circumstances (Gray, 2017). The increasing climatic variability and socioeconomic situation make P.R. one of the most vulnerable countries to disasters.

In March 2015, at the Third UN World Conference on Disaster Risk Reduction (WCARR), the Sendai Framework for Disaster Risk Reduction 2015-2030 was adopted (see *Appendix II* for

more information on the objectives, priorities, and principles of the framework). It is the first major agreement to reduce disaster losses by 2030 and provides member states with practical recommendations. In short, the Sendai Framework aims to advance “the substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries” (United Nations Office for Disaster Risk Reduction [UNDRR], 2021, p. 12). For the first time in DRR discourse, the Sendai framework brings health to the forefront of DRR strategies with more than 30 explicit references to health (Chan & Murray, 2017). In addition, other global efforts, such as the Sustainable Development Goals (SDGs), align with the Sendai framework to reduce disaster losses (such as SDG #13: climate action and #10: reduced inequality) (see *Appendix III*). One of the key strategies to reduce disaster losses is *disaster management* (DM). Research shows that DM strategies have the potential to help communities, families, and individuals to prepare for and respond to risk events (Sem, 2007). When a health risk (such as a hurricane, earthquake, or pandemic) arises, the State plays a pivotal role in communicating with communities on how to deal with these threats, providing support, and strategizing emergency plans. In the case of P.R., the State refers to both the federal government and the local Government of Puerto Rico (GPR). However, if DM strategies do not reflect the reality of the socioeconomic and political context, health inequities are exacerbated and perpetuated. Therefore, this research aims to understand how the SDH in P.R. has impacted the effectiveness of the DM strategies in place and exacerbated health inequities, especially for vulnerable populations such as breast cancer patients.

1.2. Problem Definition and Knowledge Gap

1.2.1. *The SDH in Relation to Breast Cancer*

There are significant health inequities in P.R. due to its geographic location, historical background, and current public health crisis. Looking at the epidemiological profile of P.R., in comparison to the United States (U.S.), it has higher rates of pre-term births, asthma, diabetes, cardiovascular disease, HIV/AIDs, chronic illnesses, gender-based violence, food insecurity, and more (Ramos et al., 2022). One of the most predominant health challenges in P.R. is cancer. Cancer is the leading cause of death among adults, and its detection rate is increasing at a rate of 0.3% per year (Rodriguez-Rabassa et al., 2020; Castro et al., 2017). Specifically, breast cancer is one of the most common types of cancer detected in women accounting for 18% of all cancer deaths between 2011-2015 (see *Figure 1* below; Torres-Cintron et al., 2010; Castro et al., 2017; Ayala-Marín et al., 2021; Miller et al., 2018). Breast cancer has historically been the highest cause of death for women in both developed and developing countries (Bray et al., 2013). Although, over the course of the last thirty years, breast cancer survival for advanced-stage diagnosis has improved significantly (Monfared et al., 2017). However, this increase in survival rate has not occurred for all women. For example, breast cancer rates are decreasing overall in the U.S. but continue to increase in P.R., although P.R. is an unincorporated territory of the U.S. (Rosario-Rosado et al., 2020). Research shows that the differences in survival rate can partially be attributed to the SDH

(Monfared et al., 2017; Yu et al., 2009). Regardless of technological advances in diagnostic and therapeutic interventions, the “[SDH] are among the key factors affecting the pathogenesis of diseases” (Monfared et al., 2017, p. 1121).

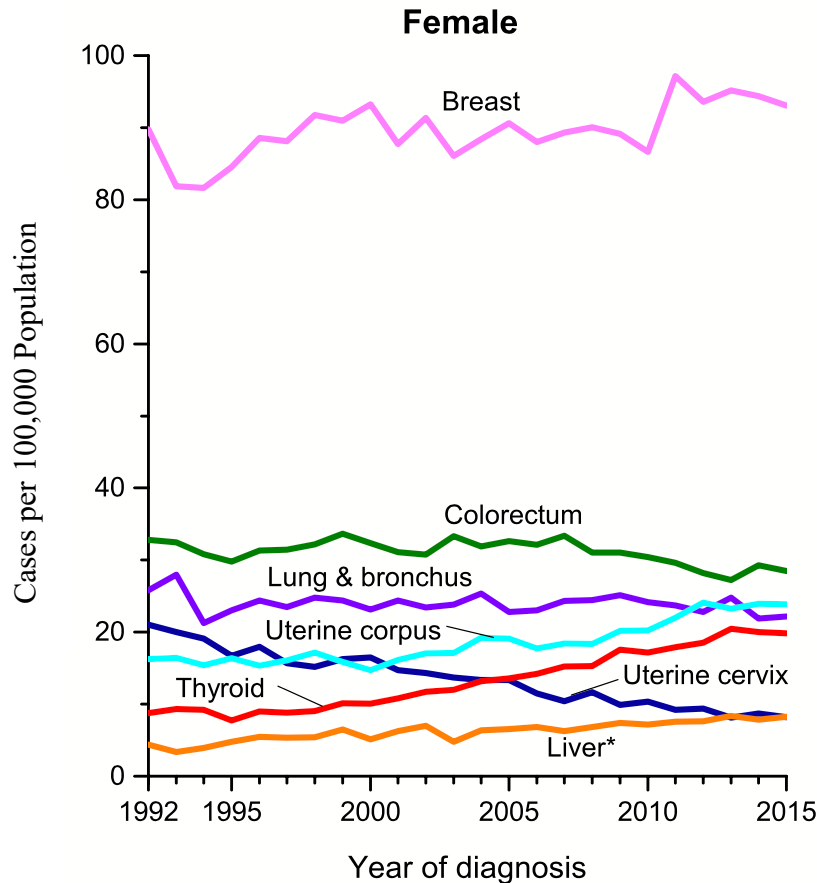


Figure 1. Trends in Cancer Incidence Rates Among Hispanics, 1992 to 2015 (taken from Miller et al., 2018, p. 428)

Research on breast cancer and the SDH show that determinants such as race and ethnicity, poverty, education level, health knowledge, access to healthcare, food insecurity, and more can significantly influence breast cancer incidence and survival. For example, P.R.’s race and ethnic demographic makeup is almost 99% Hispanic (U.S. Census Bureau, 2021). Existing research shows there are specific cancer inequities for Hispanic women (in comparison to White, Black, Asian/Pacific Islander, and American Indian/Alaska Native women) due to higher rates of poverty, unequal access to healthcare, later diagnosis, and underutilization of mammograms and more (Miller et al., 2018). Other studies have shown that Hispanic women are at higher socioeconomic risk for poorer cancer outcomes and Hispanic women have the lowest survival rate, even when adjusted for stages (Gany et al., 2011; Hernández-Ramirez, 2018). Further, according to research on the SDH of breast cancer, poverty is positively associated with breast cancer incidence due to late-stage diagnosis, poorer prognosis, inadequate health insurance, and lack of access to healthcare (Coughlin, 2019; Bouchardy et al., 2006; Dalton et al., 2007; Monfared et al., 2017). In

addition, women with lower levels of education often have lower survival rates, and the mortality rate is 1.39 times higher for women with an education level lower than high school compared to women with a university degree (Monfared et al., 2017). Likewise, health education and knowledge are imperative for any person to make informed health decisions. Unfortunately, there is limited research on the influence of SDH in P.R. specifically. However, a national study from 2001 revealed that of 500 Puerto Rican women, “only 51.5% had received an explanation about mammograms from their gynecologist; 88% believed that hitting or bruising the breast can cause cancer; 71% had never received an explanation on how to detect [breast cancer]; and 39.4% had never had a mammogram (Hernández-Ramirez, 2018, pp. 4-5). These results indicate that health knowledge, which is essential for making informed decisions, of breast cancer remains low, although breast cancer is one of the leading causes of death in P.R. Research by Coughlin (2019) revealed that food insecurity is an important SDH for breast cancer patients. Patients who experience it are more subjected to a nutrient-poor diet, postpone medical care, and have higher rates of psychological distress can increase their vulnerability to breast cancer. However, despite the known high burden of breast cancer and the increasing severity and intensity of disasters in P.R., little is known about the intersection between breast cancer, the SDH, and disaster vulnerability in P.R.

1.2.2. Impact of Disasters on Breast Cancer Care

Disasters can significantly interrupt health services and lead to increased physical and psychological distress, particularly in medically fragile populations such as cancer patients (Rodriguez-Rabassa et al., 2020). Research shows that “patients with cancer are among the most vulnerable populations in the aftermath of a disaster as disruptions of care can negatively affect their cancer outcomes” (Ortiz et al., 2020, p. 1290). Disasters can interrupt treatment in various ways, such as the loss of transportation, damage to infrastructure, loss of social support, unemployment, and more (Ortiz et al., 2020). Specifically for breast cancer, disasters can interfere with access to specialized treatments, specialized cancer professionals, and specialty medications (Sahar et al., 2020). It is worth mentioning that women are already identified as more vulnerable to disasters; therefore, breast cancer patients face a “double jeopardy” to disaster risk due to their gender and illness (Gray, 2017). Further, without proper treatment options, women experience dramatically increased negative physical and psychological stress (Rodriguez-Rabassa et al., 2020). This reflects the *stress-vulnerability theory*, which states that vulnerable populations, such as cancer patients, are the most at risk for experiencing extreme stress from events such as disasters which increase long-term adverse health impacts (Cange & McGaw-Césaire, 2020). It is important to note that increased psychological stress is a gendered experience, as women report having two times more stress than men (Castro et al., 2017). Stressors activate biological responses, most importantly the release of cortisol, which “has protective/adaptive effects on the organism: it regulates immune function and prepares the organism to meet the physical demands of a fight-or-flight response” (Borgi et al., 2020, p. 408). However, the prolonged conditioning to stress, which can be stimulated by stressful life events such as cancer diagnosis and further intensified through

high-impact disasters, can lead to more severe negative health outcomes (i.e., immune dysfunction, depression, lower survival rates, and more) (Borgi et al., 2020; Cange & McGaw-Césaire, 2020). Additionally, research shows that cancer patients exposed to disasters have a decreased long-term survival rate. A patient that experiences a delay of more than three months has a more than 10% lower five-year survival rate (Richards et al., 1999). Therefore, the long-term health impacts of disasters, especially for vulnerable populations, should not be overlooked. Thus, illustrating an urgent need to prioritize specialized cancer care and long-term health outcomes in DM strategies.

1.2.3. Disaster Management (DM) Strategies in P.R.

DM strategies are essential for mitigating and alleviating the damage from disasters. As depicted in **Figure 2**, Disaster Risk Management (DRM) is comprised of preventive and recovery strategies, thus, assisting communities before, during, and after a disaster takes place. This research will focus on DM policies, including preparedness, relief, and recovery strategies. In short, preparedness includes planning, training, and educational activities for events that cannot be mitigated (FEMA, 2022c). It helps understand what to do, where to go, or whom to call for help in a disaster. Specifically, to health care services: how to deal with power outages, interrupt to specialized care services, loss of transportation, and more. The second phase, relief, refers to the immediate response after a disaster, such as implementing disaster response plans and individual actions to protect themselves in the aftermath of a disaster. The final phase, recovery, refers to efforts to restore regular operations and activities, such as long-term disaster recovery plans and funding (FEMA, 2022c).

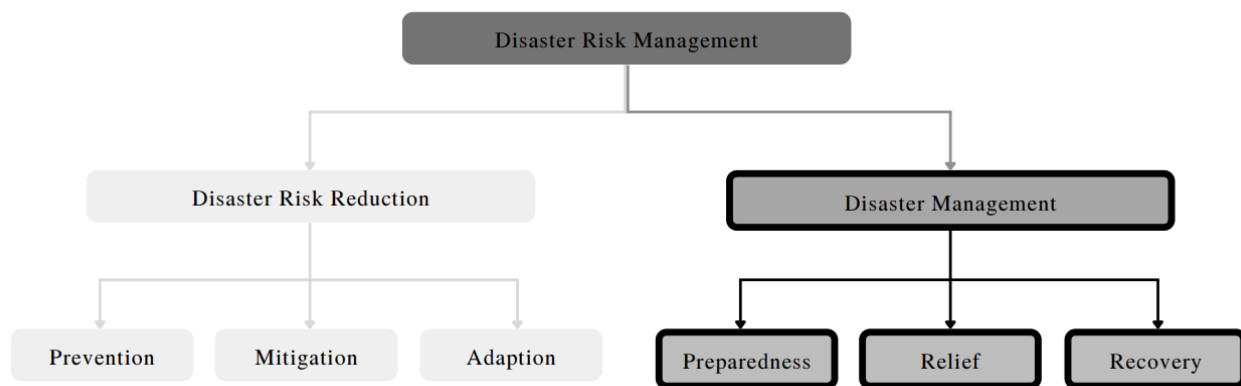


Figure 2. Disaster Risk Management and its Components (adapted from UNISDR, 2012)

In addition to the Sendai Framework, P.R., like many U.S. states and territories, has adopted the Federal Emergency Management Agency (FEMA) doctrines and principles (Ortiz et al., 2020). Under the administration of President Jimmy Carter in 1979, FEMA was officially created with the dual purpose of emergency management and civil defense (FEMA, 2022a). According to the law, U.S. Code 313(b), the purpose of FEMA is:

to reduce the loss of life and property and protect the Nation from all hazards, including natural disasters, acts of terrorism, and other man-made disasters, by leading and supporting the Nation in a risk-based, comprehensive emergency management system of preparedness, protection, response, recovery, and mitigation. (United States Code, 2006)

Every four years, FEMA publishes a revised strategic plan outlining the objectives and priorities of DM. During *Maria*, the FEMA strategic plan 2014-2018 (*Appendix IV*) was the action plan in place, and it emphasized the strategic imperative of a “whole community approach to disaster management” (FEMA, 2014). In other words, the necessity for DM strategies to engage all levels of a community (i.e., individuals, families, communities, faith-based organizations, non-profit organizations, private sector, and more). Its guiding principles include: “plan *with* rather *for* communities; engage and empower all parts of the community; better understand and help meet the needs of the community; strengthen what works well in communities on a daily basis” (FEMA, 2014, p. 6). This strategic plan does not mention health or long-term health impacts of disasters. During the earthquake sequence and COVID-19, the strategic plan 2018-2022 (*Appendix V*) was the action plan in place. In this strategic plan, the three strategic goals include: (1) building a culture of preparedness, (2) ready the Nation for catastrophic disasters, and (3) reducing the complexity of FEMA (FEMA, 2018). Again, this strategic plan does not mention health or long-term health impacts of disasters.

Additionally relevant is the National Response Framework (NRF), which outlines how to prepare and respond to different disasters and which Emergency Support Functions (ESF) are responsible for coordination. ESF #8, the Public Health and Medical Services, is primarily responsible for connecting DM practices to public health (FEMA, 2016; FEMA, 2021a). Although historically, public health has not been considered in DM practices, it is increasingly becoming a focal point in disaster preparedness, relief, and recovery (FEMA, 2022b). The purpose of ESF #8 is to “mitigate the effects of acute and longer-term threats to the health of the population” (FEMA, 2016, p. 1). However, most current disaster planning focuses on short-term health risks (such as immediate injuries and trauma, and acute infections), whereas the long-term impacts (e.g., risk of complications of specialized care and interruption of cancer treatment) remain overlooked (Verna et al., 2019; Veenema et al., 2019). Effective DM strategies should be able to sustain the needs of specialized cancer (De Guzman & Malik, 2019). However, there are still no validated and recognized strategies to incorporate specialized cancer needs in DM strategies. The SDGs emphasize the guiding principle of “leave no one behind” (United Nations, 2022a). Historically, the most vulnerable populations have been left behind in DM; however, among them, one of the more invisible groups is breast cancer patients. Therefore, understanding the intersection of SDH, disaster vulnerability, and DM strategies is imperative.

2. RESEARCH AIM AND QUESTIONS

2.1. Research Aim and Questions

As there is limited research on the intersection between SDH and DM strategies, this research explores how these two factors influence each other and can exacerbate health inequities and long-term impacts from disasters. Additionally, this research will draw upon the lived experiences of breast cancer patients after the concurrent disasters, as breast cancer is the leading cause of death in P.R. The main research question (RQ) and sub-research questions (SRQs) examined in this research are outlined in *Table 1*. As mentioned, the SDH can significantly influence health outcomes and health inequities. First, this research will examine how structural determinants (i.e., political, social, and economic systems, policies, and more) have created underlying conditions and health inequities in *SRQ1*. If existing health inequities are not accounted for in DM strategies, DM strategies have the potential to create new or maintain and exacerbate existing inequities. Therefore, *SRQ2* explores how health inequities in P.R. have impacted the effectiveness of DM strategies after the concurrent and compounding disasters. Further, DM strategies remain focused on the short-term impacts of disasters and do not prioritize vulnerable populations exposed to multiple dimensions of disaster risk. For that reason, the research will explore how the disasters (*Maria*, the earthquake sequence, and COVID-19) have influenced the availability and access to treatment and care for vulnerable populations through the case study of breast cancer patients in *SRQ3*. Ultimately the goal of this research is to look beyond the immediate impact of disasters and understand how underlying inequities and vulnerabilities create, maintain, and aggravate adverse long-term health outcomes (*RQ*). In addition, we aim to create practical recommendations on how these determinants can be incorporated into DM strategies to mitigate their influence.

Table 1. *The RQs Guiding the Research.*

<i>MAIN RQ</i>	How can disaster management be improved to mitigate disruption in specialized breast cancer treatment and negative long-term health outcomes in P.R.?
<i>SRQ1</i>	What factors have led to the creation, maintenance, and exacerbation of health inequities in P.R.?
<i>SRQ2</i>	How do the structural determinants of health impact the implementation of disaster management?
<i>SRQ3</i>	Utilizing hurricane <i>Maria</i> , the 2020 earthquakes and the COVID-19 pandemic as case studies: How do disasters affect specialized cancer care availability and access for breast cancer patients?

3. LITERATURE REVIEW

3.1. Concurrent and Cumulative Disasters

P.R. experiences particular and exacerbated social, economic, and environmental vulnerabilities from disasters (United Nations, 2022b). In addition, due to its remote geography, it is more exposed to extreme weather events such as hurricanes, earthquakes, and more (United Nations, 2022b; Rafael et al., 2021). Most recently, *Maria*, the earthquake sequence as well as, COVID-19, have exposed and further intensified these vulnerabilities in P.R., which will be introduced below.

3.1.1. *Hurricane Maria, 2017*

Each year, a new hurricane season (June-November) threatens P.R. In September 2017, the most catastrophic hurricane, *Maria*, made landfall since Hurricane *San Felipe* in 1928 (Rafael et al., 2021; Méndez-Tejeda, 2018; see **Figures 3** and **4**). *Maria* was classified as a ‘high-end’ category 4 with winds up to 155 mph, almost a category 5 hurricane, which destroyed lives and infrastructure and posed significant long-term consequences for public health and mental health (Willison et al., 2019; García et al., 2021). Officially the death toll recorded by the government was 66. However, some estimates (including direct and indirect deaths) show it to be closer to 4,645 deaths (Méndez-Tejeda, 2018; Méndez-Tejeda, 2019). The *excess deaths* after *Maria* (defined as the difference between observed and expected deaths) were mainly due to a delay in or inadequate access to healthcare services (Rios et al., 2021; Azofeifa et al., 2021). It is important to note that *Maria* resulted in more deaths than 9/11, making it the deadliest disaster on U.S. soil (Bonilla, 2020). Further, *Maria* destroyed over 500,000 homes, disrupted 95% of communications, left the island without power, and is recorded as the most expensive hurricane to hit a U.S. territory, with more than \$94 billion in economic losses (Méndez-Tejeda, 2018). Before the hurricane, the healthcare infrastructure was already dilapidated, and as a result, all 69 hospitals on the island were left with no electricity or fuel for generators for days (Zorrilla, 2017). Even 16 days after the hurricane, only “25 hospitals were working, 9.2% of people had power, 54% had water, 45% had cell phone service, and [FEMA] had distributed 433,000 food packages and 42,000 gallons of water” (Zorrilla, 2017, p. 1803).

Unlike sudden disasters, hurricanes typically allow officials and communities to prepare, evacuate, and plan emergency strategies; however, *Maria* exposed the lack of preparation and support in P.R. (Zorrilla, 2017). In addition, several studies show discrepancies between federal response in P.R. and other regions of the U.S., indicating differential governance, which will be discussed further in **Section 3.2**.

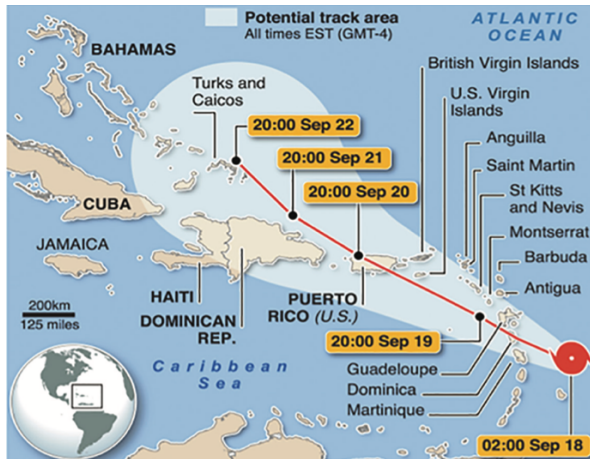


Figure 3. The Trajectory of Hurricane Maria (Méndez-Tejeda, 2018, p. 403)

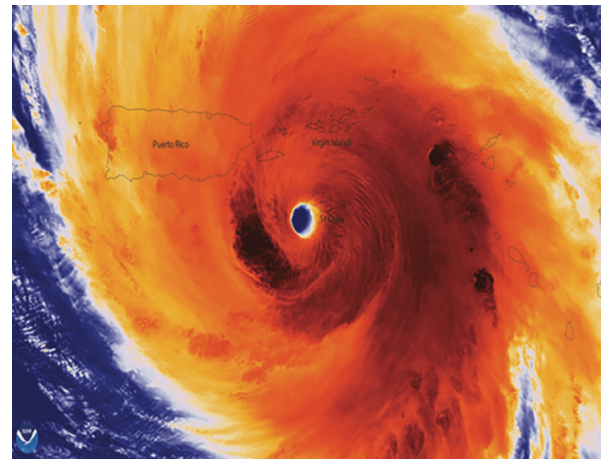


Figure 4. Eye of Hurricane Maria (National Environmental Satellite Data & Information Service, 2017; Méndez-Tejeda, 2018, p. 403)

3.1.2. Earthquake Sequence, 2019-2020

In 2019-2020, a sequence of earthquakes began in P.R., which had not yet fully recovered from the aftermath of *Maria*. P.R. is positioned and being compressed between the Caribbean and the North American tectonic plates; thus, due to its geographic location, earthquakes are a common occurrence. As shown in **Table 2** and **Figure 5**, about ten earthquakes occurred, starting with a magnitude of 5 and peaking at 6.4 (van der Elst et al., 2020). Unlike other disasters, such as hurricanes, earthquakes' aftershocks persist for weeks, years, or even decades after its occurrence (van der Elst et al., 2020). Aftershocks are earthquakes triggered by previous earthquakes (also known as mainshocks) and can be felt, with lowering intensity, daily months after the mainshock. According to the Center for Disaster Philanthropy (CDP) (2020), initial damages included \$3.1 billion in economic losses, the destruction of the island's largest power plant (responsible for one-quarter of the island's power), and over 4,000 homes that were damaged or collapsed. People were reported to have slept outside out of fear of the successive aftershocks and that their homes would collapse with them inside (CDP, 2020).

Table 2. Overview of Magnitude of Earthquake Sequence (adapted from van der Elst et al., 2020)

DATE (UTC)	TIME (UTC)	MAGNITUDE
Dec. 29th, 2019	01:06:00	5.0
Jan. 6th, 2020	10:32:18	5.8
Jan. 7 th , 2020	08:24:26	★ 6.4
Jan. 7 th , 2020	08:34:02	5.6
Jan. 7 th , 2020	08:50:45	5.0
Jan. 7 th , 2020	11:18:43	5.6
Jan. 10 th , 2020	22:26:25	5.2
Jan. 11 th , 2020	12:54:45	5.9
Jan. 11 th , 2020	12:56:22	5.2
Jan. 15th, 2020	15:36:23	5.2

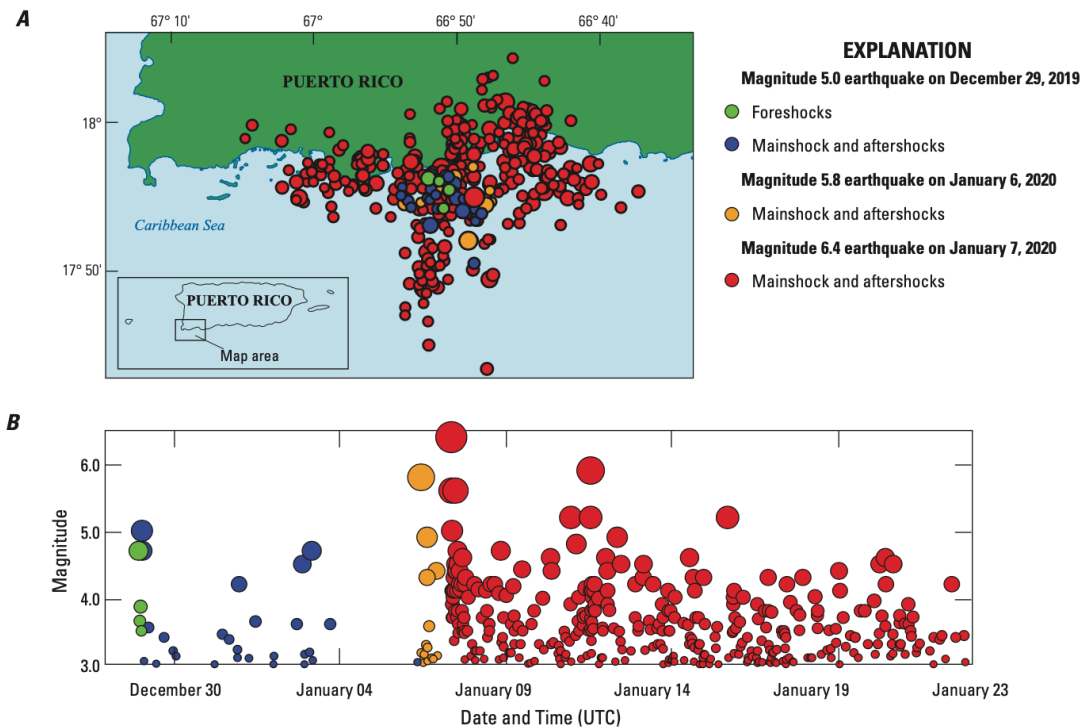


Figure 5. (A) Map & (B) Magnitude-Time Plot of the 2020 P.R. Earthquake Sequence (taken van der Elst et al., 2020, p. 2)

3.1.3. COVID-19 Pandemic, 2019-Ongoing

At the same time, P.R., like the rest of the world, was exposed to an unprecedented disaster: the COVID-19 pandemic. As aforementioned, P.R. was still recovering from the aftermath of the *Maria* and 2020 earthquake aftershocks, as well as suffering from an already crippled economy and healthcare system. At this point, relations between P.R. and the U.S. federal government were strained, which became apparent by the unequal and discriminatory response from the federal government. For example, due to the U.S. federal government's shipping restrictions placed on P.R., the island was “unable to trade with or receive aid from any country other than the USA” (Garriga-López, 2020, p. 1). P.R. was embargoed, unable to receive testing and prevention supplies from the U.S. or any other government, and as a result, P.R. had the lowest testing rate in the U.S. (Garriga-López, 2020). Due to the existing and compounding economic challenges, during COVID-19, private and public hospitals experienced mass lay-offs of staff, closure of entire hospitals, and rejection of critical COVID-19 patients due to a lack of proper protective equipment (Garriga-López, 2020). Like in other disasters, cancer patients were among the most vulnerable to COVID-19 because of their impaired immune system (from cancer itself or the treatment) (American Cancer Society, 2021). Due to the novel nature of the pandemic, P.R., like the rest of the world, was unprepared for the tremendous strain COVID-19 put on the healthcare system causing many other illnesses and treatments to be delayed or halted indefinitely (American Cancer Society, 2021). Although the extent of the impact of COVID-19 on future cancer outcomes remains unknown, **Figure 6** depicts the ways in which cancer mortality may potentially be impacted.

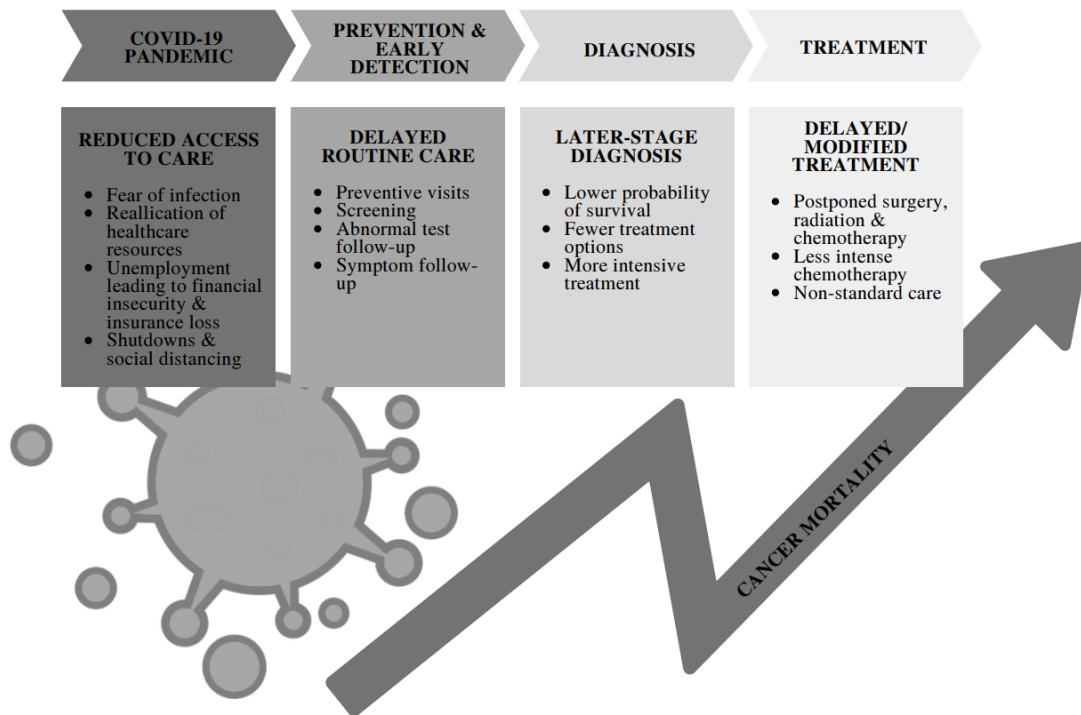


Figure 6. Potential Impact of the COVID-19 Pandemic on Future Cancer Outcomes (adapted from American Cancer Society, 2021)

Like in the aftermath of *Maria*, the “true” death toll of COVID-19 in P.R. remains disputed as challenges in monitoring, tracking, and classifying deaths have resulted in many undocumented deaths. However, research shows that the amount of COVID-19-associated deaths is likely to be two times higher than reported (Azofeifa et al., 2021). For more information on the burden of COVID-19, see *Appendix VI*.

3.2. DM Implementation During and After Concurrent Disasters

When a high-impact disaster occurs, it requires a level of DM greater than what local communities provide. In the case of P.R., DM strategies are in part the responsibility of the federal government, specifically FEMA. However, research shows that there was a discriminatory and differential application of DM strategies in P.R. compared to other U.S. states from the federal government (Bonilla, 2020). For example, after *Maria*, research comparing federal response in Texas, Florida, and P.R. reveals “responses were in fact different across critical time points, and these differences have serious consequences for acute and long-term health outcomes and recovery efforts” (Willison et al., 2019, p. 5). This disparity in response is most evident in funding allocated and distributed after the disaster. Immediately after the disasters in Texas and Florida (after Hurricanes *Harvey* and *Irma*), survivors received \$100 million FEMA dollars. In contrast, in P.R. (after *Maria*), survivors received slightly over \$6 million FEMA dollars. In October 2018, a \$4.9 billion loan was allocated for P.R., whereas Texas and Florida received grants in September. However, in January 2019, the loan was denied for P.R. because “the cash balance was deemed

too high to receive a loan” (Willison et al., 2019, p. 3). Federal funding for P.R. was slow, inadequate, and conditional compared to Texas and Florida. It directly contradicts the strategic priorities of the 2014-2018 strategic plan (*Appendix IV*), which state the importance of “maximizing the speed, efficiency, accessibility and ease of use of FEMA’s programs and services” and “to respond rapidly and to appropriately sustain incident operations,” (FEMA, 2014, p. 6). The impact of this differential and discriminatory treatment from the federal grant led to the excess mortality that occurred after *Maria*. In addition to funding, the bureaucratic processes to apply for FEMA assistance resulted in a delay in relief and response. For example, Puerto Ricans who lost their homes during *Maria* and the earthquake sequence were instructed to sign up for FEMA assistance online. This rendered impossible because they were without electricity, internet, and cell phone service. Again, this contradicts the strategic priority in the strategic plan 2018-2022 (*Appendix V*), which states that “FEMA must be flexible and adaptable to meet the needs of individuals and communities, and it must deliver assistance and support in as simple a manner as possible,” (FEMA, 2018, p. 4). As a result, almost five years after *Maria*, thousands of people (3,646 structures) are still under blue tarps provided “temporarily” by FEMA while they wait for assistance (see *Figure 7*; Willison et al., 2019; Kuilan, 2022). A similar response was apparent during COVID-19 due to the U.S. federal government's shipping restrictions placed on P.R., as explained in *Sub-Section 3.1.3*.



Figure 7. Photo of Blue Tarps on 3,646 Structures in P.R. 5 Years After Hurricane Maria (Kuilan, 2022)

In addition to the inadequate response from the federal government, the local GPR is responsible for ensuring that funds received from the federal government are distributed equitably and allocated appropriately. The literature argues that inaction and corruption from the GPR resulted in the exacerbation of disaster vulnerabilities and inequities. Research shows that “post-disaster recovery depends upon ‘the local government’s ability to prioritize needs and appropriately direct and manage funds and/or available programs’” (Rosas et al., 2021). A prime example of the inability of the local government to appropriately direct and manage disaster aid was after the earthquakes in 2020, when residents found warehouses stocked with supplies (i.e., water, expired medical supplies) that were intended for *Maria* but never left the warehouse. This requires us to ask why the federal and local governments were so ill-prepared for these disasters? Which inequities were further exacerbated by this inadequate response from the governments? To answer these questions, the intersection of the SDH, disaster vulnerabilities, and DM strategies must be examined.

3.3. Specialized Healthcare for Breast Cancer Patients

Breast cancer typically requires complex, intensive, and multiple rounds of treatment and care and can vary from patient to patient and stage of diagnosis. A cancer diagnosis affects not only the patient and their independence but also their families and loved ones. Treatment can include surgery, radiation, chemotherapy, hormone therapy, targeted drug therapy, immunotherapy, or a combination of these treatments (American Cancer Society, 2022). Additionally, it can require regular visits to the hospital or clinic, frequent consultations on the side effects, and psychological support. Treatment for breast cancer requires a specialized cancer care team involving surgical oncologists, radiation oncologists, medical oncologists, plastic surgeons, gynecologists, pathologists, hematologists, and other health professionals (American Cancer Society, 2022; Becker, 2015). Breast cancer can cause patients to experience not only physical problems but also psychological stress (i.e., anxiety, depression, loneliness, sleeplessness, and more). Research by Hernández-Ramirez (2018) on Puerto Rican women’s experience of living with breast cancer found that women struggled with disturbed body image from losing their hair and breasts and having bodily scars, sexual dysfunction, anxiety, many fears, including fear of death, pain, and disfigurement. Every human being responds to crisis and illness differently; therefore, a personalized and individualized treatment and care plan are critical for survivorship. Research shows that factors such as culture, access to healthcare, family support, and faith can influence a woman’s ability to cope and deal with their diagnosis (Hernández-Ramirez, 2018). However, current treatment and care continue to overlook the importance of the emotional needs of breast cancer patients. Further, it is important to note that research shows that timeliness of treatment is imperative for cancer care, as delays can exacerbate psychological stress and result in poorer outcomes (Layne et al., 2018). Therefore, the continuity and accessibility of breast cancer treatment after disasters can be a matter of life or death for patients.

4. CONCEPTUAL RESEARCH DESIGN

4.1. Overarching Theoretical Framework: SDH

Most research is focused on the short-term health impacts of disasters; however, it is necessary to understand the underlying inequities and differential vulnerabilities to improve long-term health outcomes. Traditionally the SDH have been overlooked as key drivers of health outcomes. However, there is increasing recognition that social, economic, and environmental factors need to be incorporated into health policies. In 2010, the WHO created the Commission on the Social Determinants of Health (CSDH) which developed a conceptual framework (Figure 8, below) to depict how the structural and social factors impact health equity (Solar & Irwin, 2010). The SDH is based on the notion that health is a social phenomenon; therefore, *health equity*, defined as the “absence of unfair and avoidable or remediable differences in health among social groups,” is a critical guiding principle (WHO, 2010, p. 4). These factors are not mutually exclusive but interrelated and can amplify one another. Although this framework is not an exhaustive list of potential determinants, it will be used as a guiding framework for this research. It is possible that other context-specific determinants will be uncovered throughout the research process. For this research, the conceptual model is inspired by this framework, and the adapted conceptual model is presented in Section 4.2. (Figure 9).

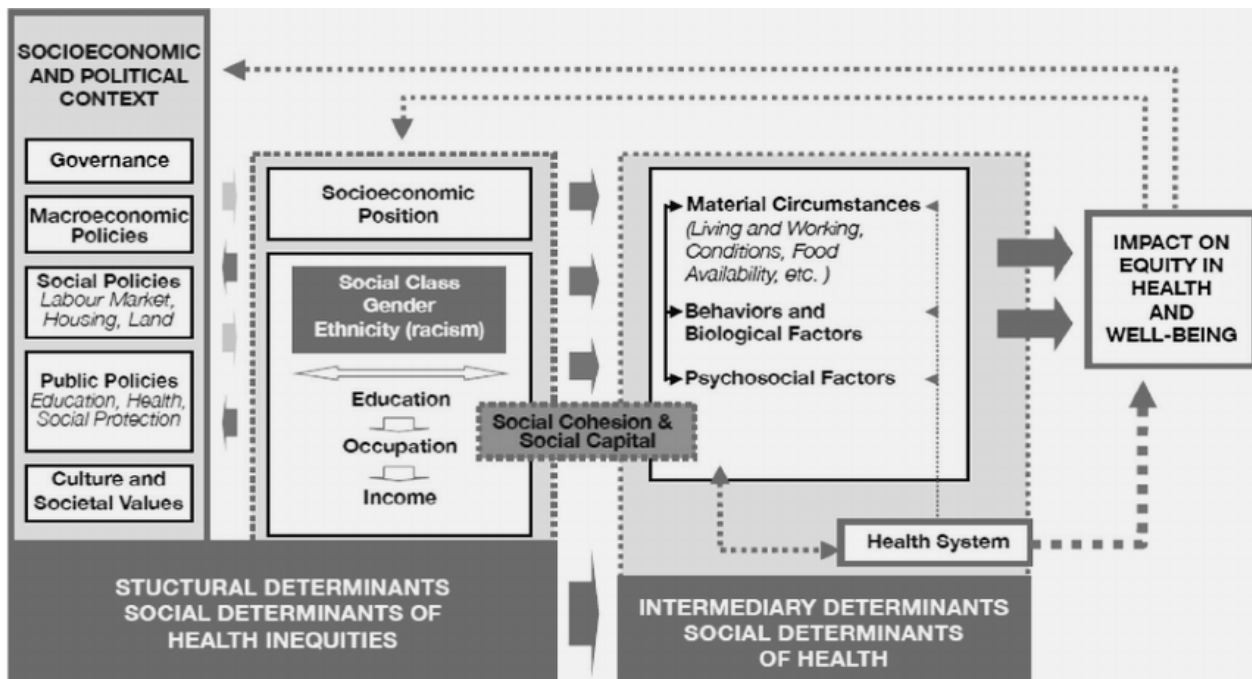


Figure 8. Social Determinants of Health Framework (taken from WHO, 2010)

It is important to clarify what the “Social Determinants of Health” means as it is an ambiguous concept that has taken on many different definitions. The CDSH framework clearly distinguishes between “the *social causes* of health and the *social factors* determining the

distribution of these causes between more and less advantaged groups” (WHO, 2010, p. 5). The concept of SDH refers to “both to the social factors promoting and undermining the health of individuals and populations and to the social processes underlying the unequal distribution of these factors between groups occupying unequal positions in society” (WHO, 2010, p. 27). This is further defined through the structural and intermediary determinants of health. The ***structural determinants*** (or the ***social determinants of health inequities***) refer “specifically to interplay between the socioeconomic-political context, structural mechanisms generating social stratification and the resulting socioeconomic position of individuals” (WHO, 2010, p. 28). Whereas the ***intermediary determinants of health*** (or the ***social processes shaping the distribution***) refer to more “downstream” and cascading determinants of health (WHO, 2010, p. 28). The terminology of “structural” and “intermediary” determinants describes the causal relationship between the factors, giving structural determinants causal priority (WHO, 2010). The structural and intermediary determinants will be further explained in ***Sub-Sections 4.1.1*** and ***4.1.2***.

4.1.1. Structural Determinants - Social Determinants of Health Inequities

The structural determinants are further delineated between two elements: the ***socioeconomic and political context*** and the ***socioeconomic position***. The latter is created and reinforced by the processes within the political, societal, and economic context, which determines how power, resources, and opportunities are distributed (Gomez-Vidal & Gomez, 2021). The first element of the CSDH framework is the socioeconomic and political context which is intentionally kept broad to encompass all the factors of a social system that influence one’s socioeconomic position and create new or reinforce existing social hierarchies. To map out the context, the CSDH recommends including the following: (1) governance, (2) macroeconomic policy, (3) social policies, (4) public policy, (5) cultural and societal values, and (6) epidemiological conditions.

Governance, according to the United Nations Development Programme (UNDP) definition, refers to “[the] system of values, policies and institutions by which society manages economic, political and social affairs through interactions within and among the state, civil society and private sector,” (WHO, 2010, p. 26). It is important to note there is no clear general definition of what governance is or what constitutes as good governance. Macroeconomic policies refer to the labor market structure (i.e., fiscal, monetary, balance of payments, and trade policies). In other words, it is the policies that influence supply (jobseekers) and demand (jobs offered). For example, if disadvantaged groups are facing difficulties entering the labor market, active policies would help facilitate that integration, whereas passive policies would aid, such as unemployment insurance. Social policies refer to the ability of the state to protect and promote the economic and social well-being of its’ citizen through factors such as labor, social welfare, land, and housing distribution. A key aspect of social policies is “income redistribution.” Like social policies, public policies refer to other relevant areas such as education, sanitation, health, and social protection. Here it refers to the ability of the state to provide “social insurance” (i.e., basic education, health services, and housing). The social and cultural context in which people live affects their decision-making and behavioral processes (Veenema et al., 2019). For example, “value placed on health and the degree

to which health is seen as a collective social concern differs greatly across regional and national contexts,” (WHO, 2010, p. 27). Major health outbreaks, such as COVID-19, have a significant impact on health systems and social structures, therefore, are also important to consider. For the context of this research, the researcher has taken the liberty to include climate change disasters as part of the epidemiological conditions.

The second element of the framework is the *socioeconomic position* which is created and maintained by the socioeconomic and political context. In every context, there is an unequal distribution of materials, resources, and opportunities. The inequality created by this unequal distribution can be understood as the social hierarchies and the creation of different socioeconomic positions in society. One’s socioeconomic position within the social hierarchy is often determined by factors such as income level, education level, occupation status, as well as social class, gender, and race/ethnicity (WHO, 2010).

Income measures the material resources component of the socioeconomic position and has a cumulative effect (i.e., higher income equates to better health opportunities and services). Some of the ways income can affect health are the ability to buy healthier food and safer shelter and access to services (i.e., health services, leisure activities, or indirectly education) (WHO, 2010). Education can impact health in various direct and indirect ways, such as it can allow for socioeconomic mobility, behavioral changes for healthier habits, and informed decisions. It is widely acknowledged that quality of education leads to increased opportunities for employment, higher incomes, and as a result, often healthier behavior (Veenema et al., 2019). Occupation can impact one’s health in various ways, such as exposure to occupational risks (i.e., toxins or physical labor), determining one’s income level, as well as may reflect one’s work stress, control, and autonomy (WHO, 2010). The latter factor relates to power dynamics between employers and employees and the impact on one’s position in the social hierarchy. One of the limitations of using occupation as a metric for one’s socioeconomic position is that it is difficult to classify people who are currently unemployed. According to the CDSH framework, social class is defined by “relations of ownership or control over productive resources (i.e., physical, financial and organizational)” (WHO, 2010, p. 33). Social class is a relational concept that does not operate according to a hierarchy but in relations of power and control. Gender, not to be confused with “sex”, refers to the socially constructed characteristics of women and men, whereas the latter refers to the biological characteristics. As gender is a socially constructed phenomenon, the characteristics differ per context and are shaped by cultural and social norms. Like gender, race and ethnicity are socially constructed categories. However, the social divisions and discriminatory practices created based on constructions of what race and ethnicity mean in a different context can have profound impacts on health outcomes.

4.1.2. Intermediary Social Factors or Social Determinants of Health

The third element of the framework is the *intermediary social factors or social determinants of health* which refers to the individual-level influences such as (1) health-related

behaviors and biological factors as well as (2) psychological factors. It also includes (3) material circumstances which refer to the physical environment (i.e., working and living conditions). The impact of the structural determinants creates disparities in the “downstream” determinants, which produce different health burdens and benefits depending on one’s socioeconomic position in the social hierarchy (WHO, 2010; Downey & Gomez, 2018).

Health-related behaviors and biological factors refer to the more common factors associated with health, such as lifestyle choices (i.e., smoking, diet, alcohol consumption, and exercise), as well as genetic factors. Lifestyle choices are also linked to socioeconomic position factors such as education, occupation, and employment. Psychological factors refer to stressors (i.e., high-impact negative life events, economic instability, lack of social support, and more) that partially explain long-term inequalities in health. As aforementioned, prolonged exposure to chronic stress can have detrimental health impacts. Material circumstances refer to the physical environment, such as housing (its location and the infrastructure itself, consumption potential (i.e., ability to buy healthy food, clothes, etc.), and the working and neighborhood environments (i.e., safety). The quality of these environments can determine different risks or benefits for one’s health. The WHO states that material circumstances may be the most important intermediary factor. The CSDH model also includes the health system as an intermediary determinant itself as it relates to factors of access and availability of health services and, in turn, differences in exposure and vulnerabilities. In other words, depending on the capacity of the health system, it can either mitigate or intensify health inequities. This research will focus on the structural determinants of health. Future research should include and expand on the intersection between the intermediary and structural determinants.

4.2. Adapted Conceptual Model

For this research, the adapted conceptual model (*Figure 9*, below) is inspired by the CSDH framework and visualizes how disasters and the SDH compound the same health inequities. Based on preliminary research, specifically influential SDH in P.R. include governance, neoliberal policies, economic instability, access to the healthcare system, basic infrastructures (i.e., housing and electrical grid), and food insecurity. Additionally, disasters can have various and similar impacts as the SDH, such as communications, out-migration and displacement, economic losses, access to healthcare, power outages, and food security. In this model, DM has the potential to function as a mediating approach to mitigate the influence of SDH and disasters for long-term health impacts and vulnerabilities.

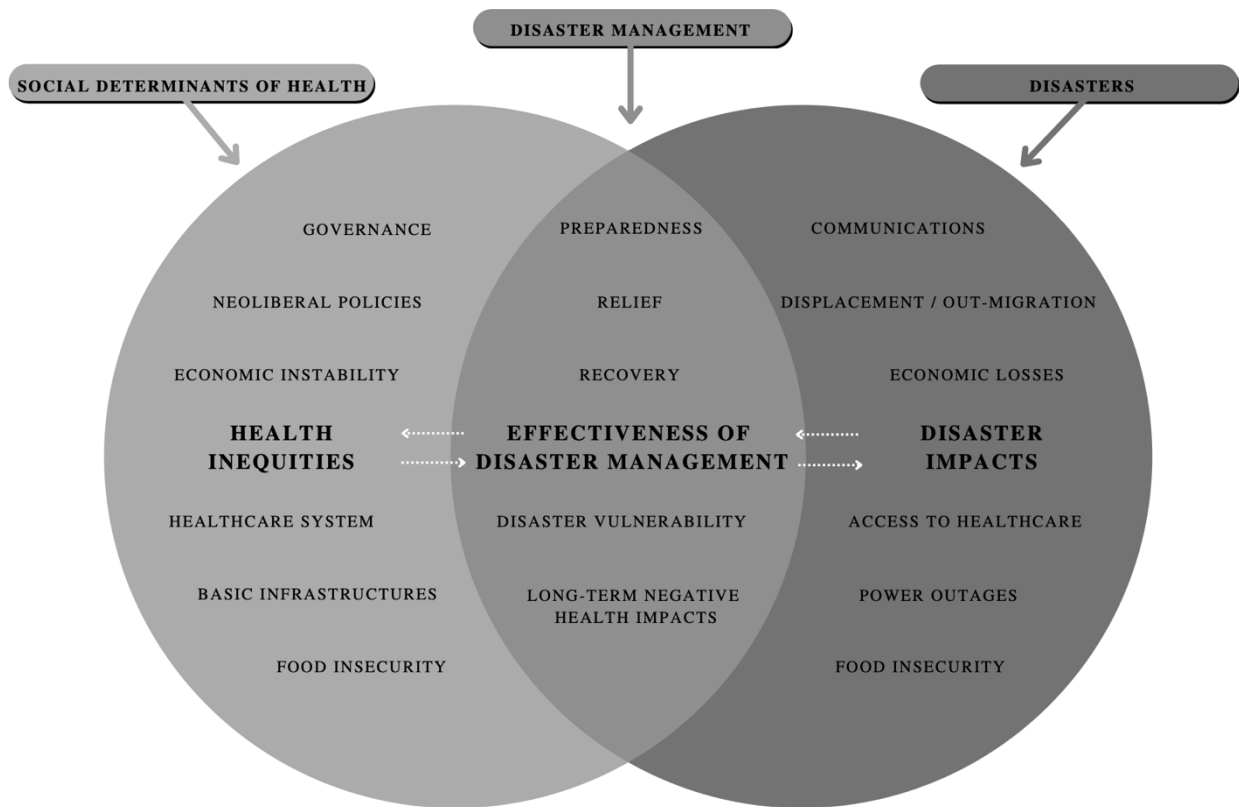


Figure 9. Adapted Conceptual Design Illustrating Relationship SDH, DM and Concurrent Disasters on Vulnerability and Long-Term Health Impacts (Author's own)

4.3. Scientific and Societal Relevance

The scientific relevance of this research will be that it will explore how current DM strategies in P.R. can create and reinforce existing socioeconomic vulnerabilities, specifically for breast cancer patients who require specialized treatment and care after disasters. DM strategies and research remain short-sighted because it is focused on the short-term health impacts after disasters and does not acknowledge the embedded socioeconomic and political inequities and vulnerabilities. Therefore, this research will bridge the field of DM with the SDH perspective. To bridge these two concepts, a clear understanding of both concepts is required. In this study, the SDH perspective is focused on how health inequities can be created, maintained, and exacerbated through structural and social determinants (such as governance, policies, socioeconomic factors, and more); see *Section 4.1.* for a more detailed description of the SDH perspective. Additionally, DM refers to the preparedness, relief, and response strategies in place to mitigate the impacts of disasters, see *Sub-Section 1.2.3.* and *Section 3.2.* for more information on current DM strategies in P.R. By merging these two concepts, a more nuanced perspective can be achieved on how context-specific inequities can influence and threaten the effectiveness of DM strategies. Additionally, this research will focus on the long-term health impacts for vulnerable populations through the case study for breast cancer patients because, historically, these populations have been

overlooked. Ultimately, this research incorporates elements often studied separately, giving a more comprehensive picture of the needs of vulnerable populations, such as cancer, after disasters.

The societal relevance of this research will be that it investigates an urgent challenge presented in current DM strategies in P.R. As mentioned, P.R., in part due to its geographic location, is particularly vulnerable to climate change disasters and is experiencing a deteriorating socioeconomic situation and impaired healthcare system. Additionally, the colonial relationship and differential treatment of the U.S. threatens P.R.'s democracy and sovereignty and ability to respond effectively to disasters and illustrates the need for a more comprehensive perspective of DM strategies. The aftermath and ongoing challenges revealed by *Maria*, the earthquake sequence, and COVID-19 present the opportunity to understand and learn how concurrent disasters can create and reinforce existing socioeconomic vulnerabilities, especially for vulnerable populations, due to myopic and short-term DM strategies. This research will help further understand the relationship between climate change disasters and health inequities through the perspective of SDH, which is complementary to planetary health. Through analyzing DM strategies from a SDH perspective, existing inequities can be adjusted for and incorporated into DM strategies to minimize their effect. To the researcher's knowledge, this is the first study linking SDH and DM in P.R. This research will also contribute to practical deliverables for the host organization, the University of Puerto Rico: Resiliency Law Center (UPR RLC), by providing concrete recommendations on how stakeholders (policymakers, healthcare providers, and more) can promote the integration of SDH in DM policies. Additionally, it takes a bottom-up and participatory approach and emphasizes the voices and lived experiences of the presumed beneficiaries of DM policies. Ultimately, the goal of this research is to improve the public health response after disasters for specialized care patients and to empower stakeholders to ask for more long-term and context-specific DM strategies.

5. RESEARCH DESIGN

This section explains the proposed methodological approach to explore the RQs by explaining the research strategy, key concepts and definitions, data collection, data analysis, and ethical considerations.

5.1. Research Strategy

5.1.1. Research Context

The archipelago of P.R. is located between the Atlantic Ocean and the Caribbean Sea, roughly 160 kilometers long and 53 kilometers wide, and home to nearly four million people (Malavet, 2004; U.S. Census Bureau, 2021). P.R. is considered an unincorporated territory of the U.S. and is neighbored by the Dominican Republic/ Haiti, Cuba, Turks and Caicos Islands, British Virgin Islands, and Monserrat (see *Figure 10*).



Figure 10. Map (A, B, C) Showing P.R. in Relation to the World and Neighboring Countries (Author's own)

It is comprised of 78 municipalities, including two municipality islands, as outlined in *Figure 11* (Rafael et al., 2021). Each municipality has its own government and an individually elected mayor and legislative body, with no intermediary bodies of government between the municipalities and the GPR (Rosas et al., 2021). Located in the North-East of the island is the capital, San Juan, the

largest and most populous city of P.R. The fieldwork was conducted between May-July 2022 in San Juan with stakeholders and patients from around the island.



Figure 11. Map of Municipalities in Puerto Rico (taken from WorldAtlas, 2021)

This research is in collaboration with the UPR RLC, which is an extension of the UPR Rio Piedras public university located in San Juan. The UPR RLC is an initiative aimed at ensuring that DM strategies in P.R. are effective, fair, and resilient. To achieve this, UPR RLC has established an advocacy center for disaster recovery and climate change awareness, where students, lawyers, and other professionals are trained in legal techniques to fight climate change. The center focuses on three major pillars: (1) capacity building, (2) advocacy center, and (3) legal services. Ultimately, the goal of the center is to ensure just and resilient aid after disasters to disenfranchised communities such as breast cancer patients. Dr. Prof. Adi Martinez (UPR RLC Director of Operations) will help familiarize the researcher with the research context and identify and contact key stakeholders and informants. Dr. Nylca Munoz (Public Health Consultant) will support this research by mentoring the researcher on the SDH framework and providing in-depth feedback throughout the research process. In addition, the researcher will work closely with a broader project conducted by a local non-profit organization, *Connecting Path's*. Connecting Paths provides humanitarian aid for rural and remote underserved communities after *Maria* focusing on empowering communities with emotional resilience (social and psychological support) and technical skills after disasters. Their project aims to understand how non-profit organizations can refine their services to help meet the psychological needs of specialized cancer patients after disasters.

This research project will focus specifically on breast cancer patients because of the high rate of the burden of breast cancer in P.R. and the gendered experience of increased psychological and physical stress after disasters. Research on the lived experiences of breast cancer patients, especially after the disasters, is limited. Hurricane *Maria*, the earthquake sequence, and COVID-19 will be used as case studies from which lessons can be learned on the implementation and effectiveness of DM strategies. As mentioned, natural disasters, such as hurricanes and earthquakes, are projected to increase in frequency and severity, especially for SIDS such as P.R. Although COVID-19 does not qualify as a natural disaster, it evokes similar DM strategies and

stakeholders that are currently engaged in these practices. Therefore, it is a relevant disaster for this analysis. **Figure 12** depicts where geographically each disaster occurred in P.R.

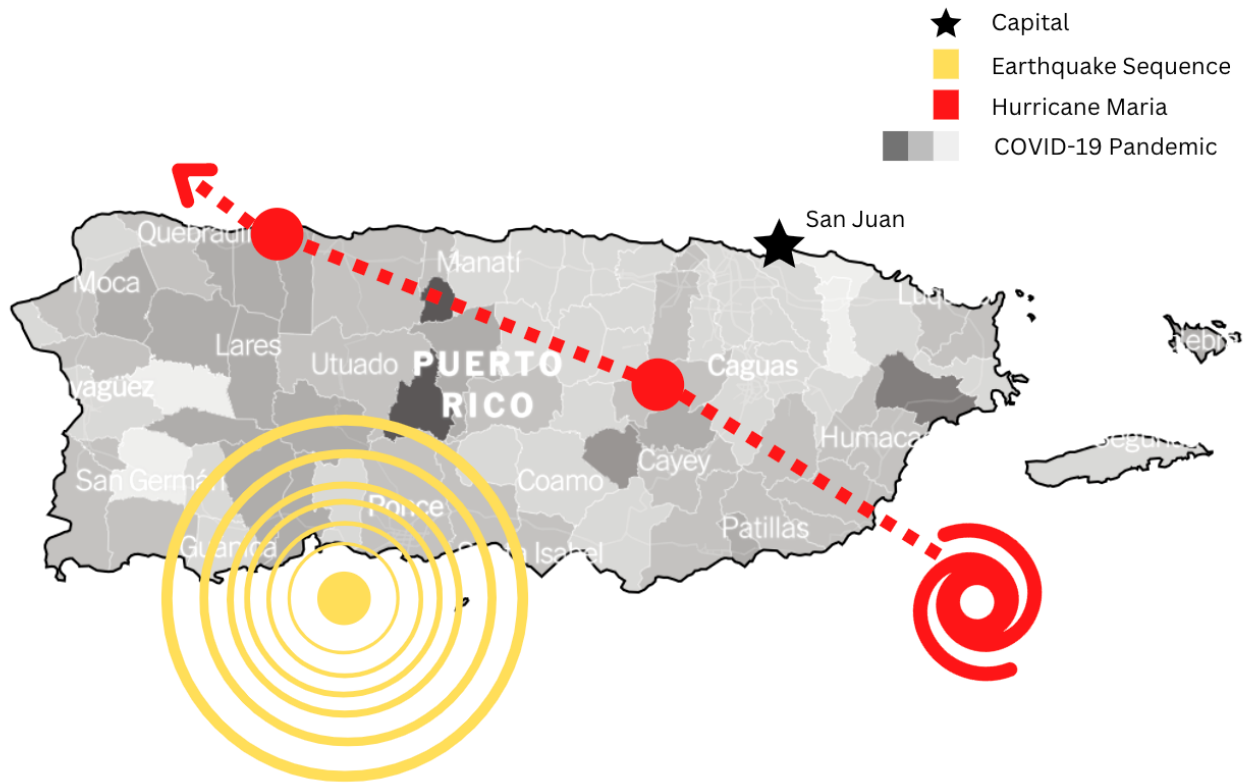


Figure 12. *Map of Concurrent and Compounding Disasters (Author's own)*

5.1.2. Research Design

The research design entails three parts: (1) media analysis and (2) in-depth semi-structured stakeholder interviews, and (3) a case study of breast cancer patients through focus group discussion (FGD). **Figure 13** depicts how each method was used to answer the SRQs, and then, the answers to the SRQs were synthesized to help answer the overarching main RQ.

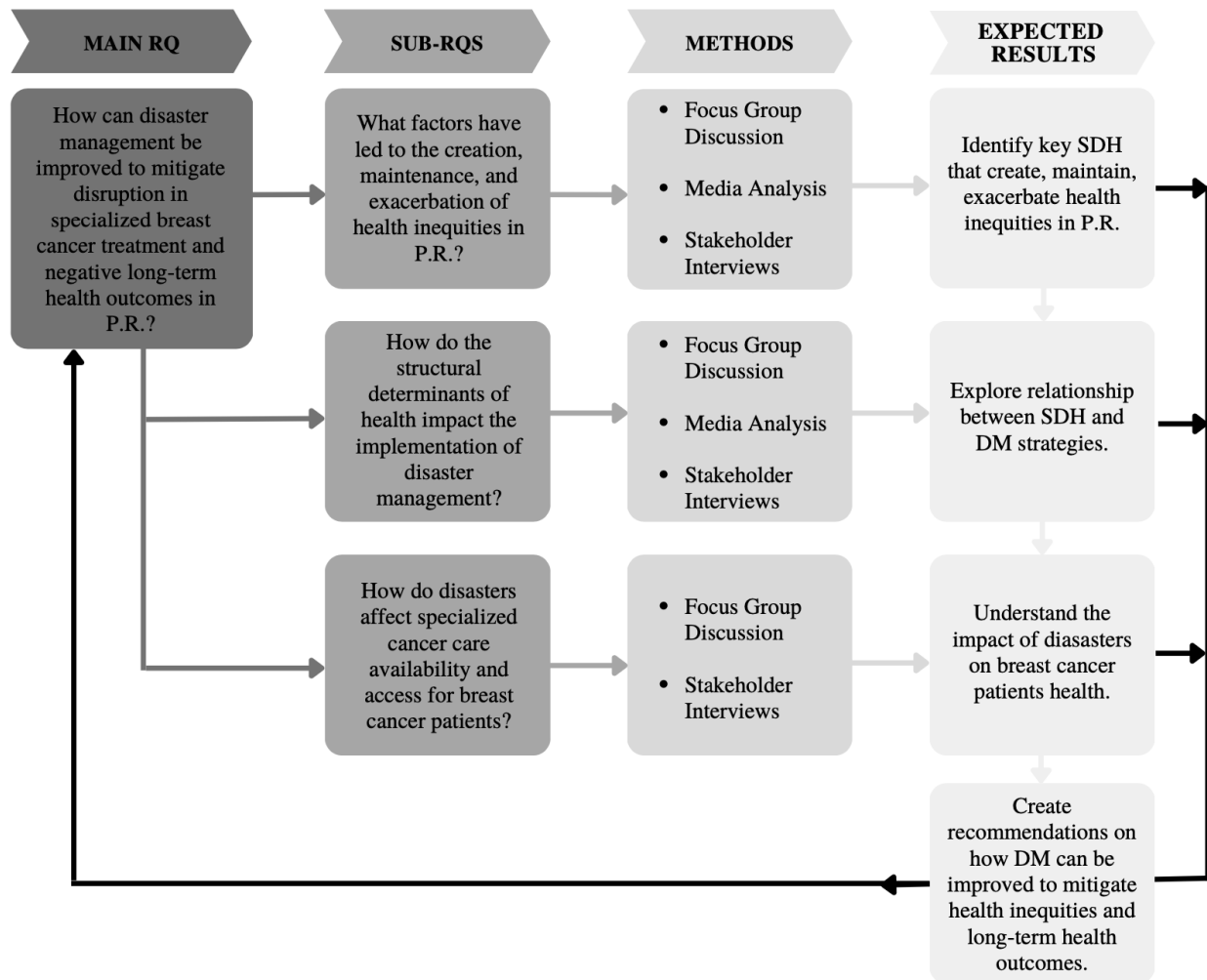


Figure 13. Flow Diagram of RQs, Methods, and Expected Results (Author's own).

5.2. Key Concepts and Definitions

Table 3. Key Concepts, Definitions, and Operationalization

KEY CONCEPT	DEFINITION	CONTEXT IN P.R. / OPERATIONALIZATION
Specialized Breast Cancer Treatment & Care	According to the American Cancer Society (2022), “treatment is based on the type of breast cancer and its stage. Other factors, including your overall health, menopause status, and personal preferences are also taken into account.” Treatment can include surgery, radiation, chemotherapy, hormone therapy, targeted drug therapy, immunotherapy, or a combination of these treatments (American Cancer Society, 2022).	Traditionally specialized cancer treatment has remained overlooked in DM strategies. Although research shows that cancer is the highest cause of death in P.R. and continuity of treatment after disasters are imperative for long-term health outcomes of patients. Therefore, this research will look to understand how specialized cancer treatment is impacted by disasters and by DM strategies. Ultimately, the goal of this research is to strategize ways in which

		specialized cancer care can be integrated into DM strategies.
Disaster	FEMA (2022c, p. 5) defines disasters as “typically largescale and cross geographic, political, and academic boundaries. Disasters require a level of response and recovery greater than local communities can provide.”	For this research, we will focus on three disasters that occurred in P.R. between 2017-2022: 1. Hurricane <i>Maria</i> , 2017 2. Earthquake Sequence, 2019-2020 3. COVID-19 Pandemic, 2019-Ongoing
Disaster Vulnerability	Defined as the conditions determined by the “physical, social, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards,” (UNDRR, 2007).	Women and persons with chronic illnesses (such as cancer), have been identified as the most vulnerable to disasters. In P.R., breast cancer is the leading cause of death for women; therefore, this research focuses on the disaster vulnerability for this specific demographic.
Disaster Management (DM)	Part of the overarching Disaster Risk Management (DRM) strategies. Mainly preparedness, relief, and recovery strategies (UNISDR, 2012, p. 3).	Strategies assisting communities after a disaster takes place include preparedness, relief, and recovery strategies. In P.R., the implementation of DM strategies is the responsibility of the federal (U.S. government and FEMA) and local (territorial and municipalities) governments. Therefore, this research will look at the strategies implemented by these agencies after the concurrent disasters.
Preparedness	Defined as the “phase [that] includes planning, training, and educational activities for events that cannot be mitigate,” (FEMA, 2022c, p. 3).	This research will investigate preparedness efforts implemented after the concurrent and compounding disasters. Specifically, to health care services: how to deal with power outages, interrupt to specialized care services, loss of transportation, and more.
Relief	Defined as the “response phase occurs in the immediate aftermath of a disaster. During the response phase, business and other operations do not function normally. Personal safety and wellbeing in an emergency and the duration of the response phase depend on the level of preparedness,” (FEMA, 2022c, p. 4).	This research will investigate relief efforts implemented after the concurrent and compounding disasters.
Recovery	Refers to “restoration efforts occur concurrently with regular operations and activities. The recovery period from a disaster can be prolonged” (FEMA, 2022c, p. 4).	This research will investigate recovery response efforts implemented after the concurrent and compounding disasters.
Health Equity	The critical guiding principle of SDH. Defined as “absence of unfair and avoidable or remediable differences in health among social groups” (WHO, 2010, p. 4).	Particularly relevant for this research because prior to the concurrent disasters, health inequities were significant in P.R. Therefore, this research will examine how existing health equities have been intensified through the concurrent disasters.

Social Determinants of Health (SDH)	Health outcomes do not only relate to healthy habits but also is affected by larger systematic social and economic factors (WHO, 2010). The SDH can be defined as “circumstances in which people are born, grow up, live, work and age, and the systems put in place to deal with illness” (WHO, 2013).	The different elements of the CSDH framework will be used as a guide for the interviews and FGD questions to understand which determinants are relevant in P.R. The emergence of other context-specific determinants may arise throughout the research.
Structural Determinants	The structural determinants (or the social determinants of health inequities) refer “specifically to interplay between the socioeconomic-political context, structural mechanisms generating social stratification and the resulting socioeconomic position of individuals” (WHO, 2010, p. 28).	To identify the structural determinants at play in P.R., the socioeconomic and political context based on the factors listed below were mapped out as the socioeconomic position.
Socioeconomic & Political Context	According to the WHO (2010, p. 25), “this is a deliberately broad term that refers to the spectrum of factors in society that cannot be directly measured at the individual level. “Context”, therefore, encompasses a broad set of structural, cultural and functional aspects of a social system whose impact on individuals tends to elude quantification but which exert a powerful formative influence on patterns of social stratification and, thus, on people’s health opportunities.”	To map out the context, the following is included: (1) governance, (2) macroeconomic policy, (3) social policies, (4) public policy, (5) cultural and societal values and (6) epidemiological conditions.
Socioeconomic Position	Can be understood as the “social hierarchy, which define social structure and social class relationships within the society. These features are given according to the distribution of power, prestige and resources. The principal domain is social class / position within the social structure, which is connected with the economic base and access to resources. This factor is also linked with people’s degree of power, which is in turn is again influenced by the political context.” (WHO, 2010, p. 35).	One’s socioeconomic position within the social hierarchy is often determined by factors such as income level, education level, occupation status, as well as, social class, gender, and race/ethnicity.

5.3. Data Collection

The data collection entails three parts: media analysis, in-depth semi-structured stakeholder interviews, and a case study which will be explained below.

5.3.1. Media Analysis

Due to the current situation in P.R., media has become a powerful resource for understanding, documenting, and proving a nonpartisan perspective on the impact of the disasters

in P.R. Additionally, there is limited academic research on P.R. Therefore, this research included a media analysis of 35 articles published by U.S. and local agencies. First, the following local news outlets were initially searched for related articles: El Nuevo Día, El Vocero, La Estrella, Metro, News Is My Business, NotiCel, Primera Hora, Puerto Rico Daily Sun, La Democracia, La Perla del Sur, The San Juan Star and Centro de Periodismo Investigativo. As well as U.S. news outlets: TIMES, CNN, The Washington Post, The New York Times and more. The keywords searched include Hurricane *Maria*, COVID-19, earthquakes 2020, disaster management, FEMA, disaster politics, vulnerability, preparedness, relief, and recovery. Articles published after Hurricane *Maria* and between 2017 and 2022 were included. Initially, 300 articles were identified through data search, and after the screening and selection process, 35 articles were selected for inclusion. Articles that required a subscription for access were excluded from this research; future research should examine these articles as well. The database search, screening, and selection process are described in *Figure 14*. A list of the media sources used in this analysis can be found in *Appendix VII*. Media documents were used to compare and validate the experiences and opinions expressed by the stakeholders and breast cancer patients.

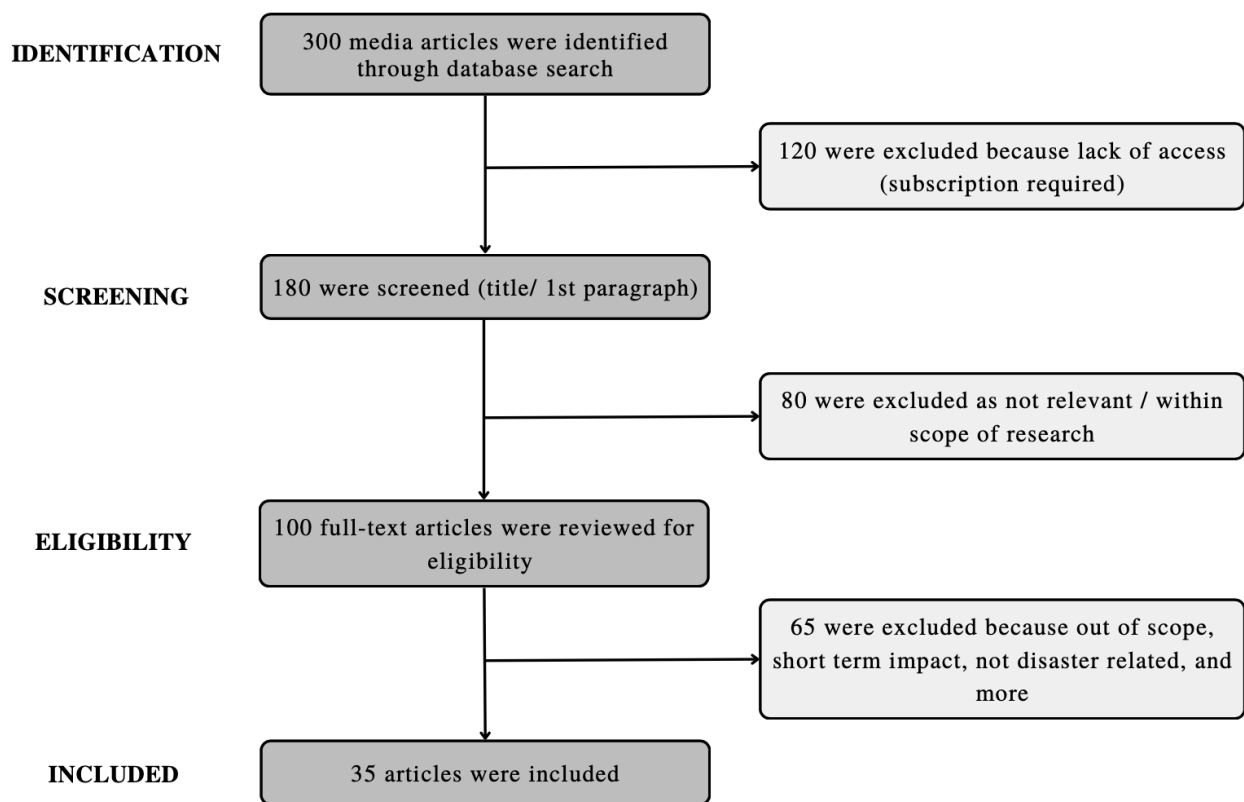


Figure 14. Flow Chart of Database Search (Author's own)

5.3.2. Semi-Structured Stakeholder Interviews

Additionally, primary qualitative research was conducted using semi-structured interviews with key stakeholders involved (directly and indirectly) in DM, such as climate change lawyers,

specialized doctors (oncologists), public health agencies (e.g., the P.R. Health Department), governmental officials, and more. The background of the stakeholders was intentionally kept broad because, after the concurrent disasters, initial research showed that civil society, communities, and health-related non-governmental organizations (NGOs) facilitated significant efforts for relief and response to the disasters. Over 60 stakeholders were contacted and invited to be interviewed; however, there was an expected relevantly low response rate given the time frame and period of the research and the availability and accessibility of some of the stakeholders. To get the best response rate, different contacting techniques (emailing, LinkedIn, and more) were used. The in-depth semi-structured interviews were conducted until saturation was reached, resulting in a total of 15 in-depth interviews (see *Appendix VIII* for an overview of participants). The stakeholder interviews are used as the primary dataset for analysis and were supplemented with an FGD case study to describe the lived experiences of breast cancer patients. The preliminary interview guide (*Appendix IX*) was assembled based on the literature review findings and the objectives of the research. This guide will be used as a standard but semi-flexible guideline allowing questions to be restructured, omitted, or added depending on the conversation. The sample of key stakeholders was selected in collaboration with the UPR RLC team through purposive sampling. The UPR RLC team contacted potential participants by email and invited them to participate in a one-time 60-minute interview. Each participant received a copy of the “participant information sheet” (*Appendix X*) describing the purpose, expectations, and deliverables of the research, as well as an informed consent form (*Appendix XI*).

5.3.3. Case Study: FGD with Breast Cancer Patients

As there is limited research on the lived experiences of breast cancer patients in P.R., an FGD was held as a case study to better understand what social factors impacted patients after the concurrent disasters. We examined federal and local DM implementation from the perspective of breast cancer patients, as they are the presumed beneficiaries of these policies. Like the interview questions, the preliminary FGD guide (*Appendix XII*) was assembled based on the literature review findings and the research objectives. The format of the guide followed a funnel structure. It began with broad questions intended to build rapport and to introduce the topics; it then moved to more specific questions that provided detailed data relevant to the research question and ended with a broader set of questions to provide closure (Hennink, Hutter & Bailey, 2020). The breast cancer patients were contacted through the collaborating organization, *Connecting Path's*, which had received their contact information from the American Cancer Society. The inclusion criteria were that the participant was native Puerto Rican; diagnosed with breast cancer in the last five years; in critical need of life-sustaining treatment and care after *Maria*, the 2020 earthquakes, and COVID-19; identifies as female; and provides informed consent. Each patient was sent an informed consent form (*Appendix XIII*) and participant information sheet (*Appendix X*) before the planned FGD. The documents were written in Spanish and checked for language appropriateness by a native Spanish speaker. During the start of the FGD, participants were allowed to ask any questions or clarifications regarding the informed consent form. Each participant provided written and verbal

consent prior to the start of the FGD. A translator, provided by the UPR RLC, was present for the FGD to translate the questions to Spanish for the patients and their responses back to the interviewer in English. Unfortunately, several limiting factors (i.e., availability of translator and breast cancer patients, Hurricane *Fiona*, and the time difference between the researcher and participants) resulted in a low attendance rate for the FGD. For this reason, the FGD will not be interpreted as representative of the lived experiences of breast cancer patients in P.R. but rather be used as a supplementary case study to support the findings from the literature, media analysis, and stakeholder interviews.

5.4. Data Analysis

5.4.1. Transcriptions

Each interview and FGD were manually transcribed verbatim. To ensure reliability and to create credibility, each transcription was double-checked by the researcher and a member of the UPR RLC team. Once there were no more discrepancies between the transcription and the audio recording, the transcription was uploaded to NVIVO for coding, which will be explained below.

5.4.2. NVIVO and Coding

To ensure transparency and data management, the interviews, media documents, and FGD were uploaded to the software NVIVO to be analyzed and coded. The data interpretation and results were solely the researcher’s responsibility. The coding schema emerged inductively and was organized into three domains and eight sub-domains, as shown in *Figure 15*:

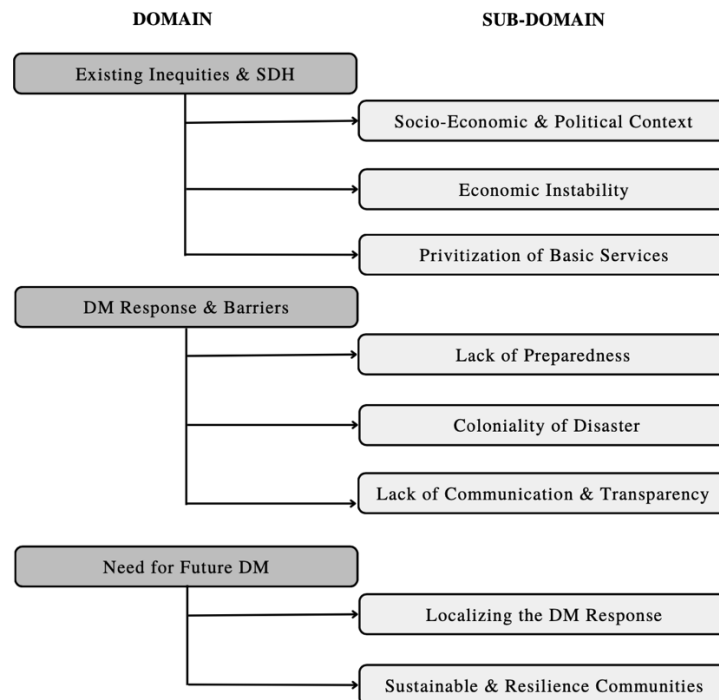


Figure 15. Domain & Sub-Domain Schema of Codes (Author’s own)

As the sample size for the primary research was relevantly small, the results were cross-checked and validated through the process of triangulation with other data sources (i.e., media, policy, and grey literature). Each domain was populated with a variety of nodes, and from these nodes, the discussion points in response to the main RQ (the ways in which DM strategies can be improved to incorporate the SDH and long-term health outcomes) were synthesized.

5.5. Ethical Issues

All research records were kept confidential. No names or identifying information was used in the results or reports. All participants received an informed consent form, were given the opportunity to discuss any questions prior to the interviews and gave signed statements on consent to participate. The interview and FGD questions were checked for language appropriateness and understanding by a native Spanish speaker. The interviews and FGDs were conducted in Spanish and English, depending on the native language of the participant, and were digitally recorded. Ethical approval has been granted for this research through the researcher's collaborative partner: *Connecting Path's*. See *Appendix XIV* for more information.

5.6. Statement on Researcher's Positionality and Reflexivity

It is important to mention the researcher's positionality during this research as our position influences how we approach, conduct, analyze and interpret our data (Jacobson & Mustafa, 2019). The researcher comes from a sociology, sustainable development, and public health background, which motivated her interest in understanding DM from a public health, holistic, and systematic perspective. Further, it allowed her to approach this topic from different academic lenses. As an American citizen, she is aware of the socioeconomic and political challenges in the U.S. and how systems impact access to health and health outcomes. Before the research, her epistemological position was that structural determinants (such as governance, policies, distribution of resources, inequities, and opportunities) directly and indirectly influence health outcomes that are outside of the individual's control. She also believes that research should transcend academic and theoretical purposes and have a direct societal impact by working with various academic and non-academic stakeholders. Therefore, she was compelled to understand how the existing inequities in P.R. influenced the health outcomes of vulnerable populations. However, she is not a Puerto Rican, nor is Spanish her first language, and therefore, her contextual knowledge was limited before the start of the research project. This posed a challenge throughout the research process as the researcher was an 'outsider' to local knowledge and lived experiences of the concurrent disasters. On the other hand, being an outsider served as a benefit as it allowed the researcher to look at the research problem from a neutral perspective. When the researcher traveled to P.R., she was confronted with many of the day-to-day issues that participants raised throughout the data collection (i.e., unstable internet, inflated food costs, and more). She was also able to travel to places where the disasters occurred and witness the destruction caused (i.e., broken-down, abandoned housing structures, inadequate roads, and more). During the fieldwork, the researcher experienced challenges

contacting available stakeholders and patients partly because the COVID-19 pandemic was still ongoing. As the researcher was not a native Puerto Rican or had experienced what it is like to live with breast cancer, she utilized phenomenology as her philosophical perspective. Phenomenology allows researchers to understand, describe and analyze experiences without having first-hand experience (Converse, 2012). This perspective guided the researcher to understand from the perspective of stakeholders and patients.

6. RESULTS

6.1. Socioeconomic and Political Context

To fully understand the impact of the three concurrent and compounding disasters, the socioeconomic and political context of P.R. will be explained as it is against this backdrop in which the effects of the disasters were exacerbated. Significant research on *disaster-ology* has already linked the importance of the historical socioeconomic and political context to the impact of disasters. Some of the well-established assumptions are that disasters are not “natural” but in fact socially produced; disasters are not sudden events but are created over time through slow and structural violence; and vulnerability is a product of racio-colonial governance (Bonilla, 2020). The findings indicate that the influence of colonial and neoliberal governance and, in turn, the development of inequitable macroeconomic, social, and public policies in P.R. created substandard SDH and vulnerabilities. P.R. is considered “the oldest colony in the world,” which has significantly influenced the development of P.R. and the human rights, democracy, and sovereignty of Puerto Ricans (Benach et al., 2019). In 1898, as part of the truce to end the Spanish-American War, Spain gave P.R. to the U.S., and in 1917, Puerto Ricans became recognized as citizens of the U.S. (Malavet, 2004). Although P.R. has autonomy over local matters, the U.S. government poses many restrictions on how P.R. “manages government affairs, including education, transportation, communication, foreign trade, and public health” (García et al., 2021, p. e263). This has forced P.R. into a state of dependency on the U.S. and a lack of self-determination. To date, although P.R. is officially classified as an unincorporated territory of the U.S., it can best be understood as a U.S. colony. For example, Puerto Ricans living on the island do not have the right to vote for the next U.S. president and are treated as second-class citizens (Rudner, 2019). Some researchers assert that colonialization is a disaster in itself, posing dehumanizing reforms and systemic discrimination (Bonilla, 2020; Rodríguez-Madera et al., 2021). During the disasters, the treatment of Puerto Ricans as second-class citizens became apparent through the discriminatory and differential treatment by the federal government, as explained in *Section 3.2*. Therefore, we examine the historical implementation of neoliberal policies as the mechanism that has perpetuated this reality.

Neoliberal policies and reforms over the past couple of decades have defined P.R.’s governance and implementation of macroeconomic (i.e., incentives and taxes), social (i.e., immigration, housing, and employment patterns), and public policies (i.e., education and healthcare) (Rodríguez-Madera et al., 2021). Neoliberal ideology can be understood as the

promotion of public policies throughout the world that are based on the narrative that (a) the state (or what is usually referred to in popular parlance as “the government”) must reduce its interventions in economic and social activities; (b) labor and financial markets must be deregulated in order to liberate the enormous creative energy of the market; and

(c) commerce and investments must be stimulated by eliminating borders and barriers to the full mobility of labor, capital, goods, and services. (Navarro, 2009)

However, contrary to popular discourse on the impact of neoliberal policies on the “state” (i.e., that the state is “losing power” or “disappearing”), the manner of intervention from the state has changed rather than diminished (Navarro, 2009). In the case of P.R., neoliberal policies and reforms that have been put forth have prioritized the interests of the few over the well-being of the nation. This highlights the importance of *class* (and the distribution of power that is associated with class) which has allowed public interventions to be beneficial to some and detrimental to others. The most influential examples of the neoliberal policies implemented in P.R. are listed below in *Table 4*.

Table 4. *Overview of Influential Neoliberal Policies in P.R. (Author’s own).*

POLICY	KEY FEATURES
Jones–Shafroth Act (1917)	<ul style="list-style-type: none"> • Granted Puerto Ricans as “fully U.S. citizens.” • However, without the ability to vote in presidential elections or have voting representatives in congress. • Therefore, cementing their position as “second-class citizens.”
Merchant Marine Act (Jones Act)	<ul style="list-style-type: none"> • Passed in 1930, restricts international shipping and allows the U.S. to control P.R. maritime waters and ports to protect U.S. interests. • This resulted in inflated costs for food and other products.
Operation Bootstrap & Internal Revenue Code Section 936	<ul style="list-style-type: none"> • Employed to stimulate economic growth and to transform P.R. from an agrarian society to an industrialized state. • Passed in 1976, Section 936 was rolled out in 1996 and allowed for incentives such as federal tax exemptions and low labor costs to attract U.S. companies to P.R. • Section 936 had a significant impact on P.R. as it allowed U.S. businesses to operate without paying taxes, and it shifted P.R. towards an export-based economy benefiting the U.S. market instead of the local economy. • This is evident as over these 20 years, contrary to the initial goal of stimulating economic growth for P.R., the U.S. economy grew 17% more than the Puerto Rican economy. • Further, in 2006, Section 936 was repealed, causing many companies to divest from P.R. and leaving many locals without a job.

<p>Bonds</p>	<ul style="list-style-type: none"> • Accumulation of the debt was in part due to bonds issued by the government, which allowed “favorable treatment consisted of giving bond investors higher returns & loosening borrowing limits; lenders [bondholders] to Puerto Rico [bond issuer] were exempt from local, state & federal taxes” (Lafarga Previdi & Vélez Vega, 2020, p. 2). • Once Section 963 was repealed, the government was forced to rely on borrowed funds from bonds to balance the budget. • The local government tried to file for bankruptcy; however, due to an unexplained 1984 amendment to the tax code, P.R. was written out of the bankruptcy law and, therefore, unlike the states, it could not afford to declare bankruptcy. • Further, in 1952, it was written in the island’s constitution that the repayment of debt must be prioritized over public services, and the U.S. persuaded the UN to remove P.R. from the list of non-self-governing societies. • As a result, it could not follow the path of sovereign nations to deal with its debt.
<p>Financial Crisis of 2008</p>	<ul style="list-style-type: none"> • Along with the removal of the tax incentives for U.S. businesses which created an economic compression in P.R., the globally felt financial crisis of 2008, hit P.R. hard. • This led to the implementation of destructive budget cuts (in education, health, environmental protection, and more) and furthered massive layoffs. • As well as the accumulation of a paralyzing governmental debt. • Further plummeting P.R. into a socioeconomic crisis.
<p>Puerto Rico Oversight Management, Economic Stability Act (PROMESA)</p>	<ul style="list-style-type: none"> • Instead, most recently in 2016, the U.S. Congress passed PROMESA, locally referred to as “La Junta”, to supervise (and to control) the ongoing socioeconomic crisis and to ensure debt repayment. • Board was appointed and elected by U.S. Congress; not allowing Puerto Ricans to have the right to govern themselves or have a say in their future. • Directly threatens P.R.’s democracy and sovereignty. • It prioritized debt repayment over the funding of essential social services. • Further, shrinking the budget of the state and divesting from education, healthcare, employee pensions, infrastructure (i.e., roads, ports, and energy grid), and more.

	<ul style="list-style-type: none"> • It also raised the sales and government fees – before 2006, P.R. did not have a sales tax and by 2017, it reached the highest in the U.S. (11.5%) • The imposition of this law ties back to the “second-hand status” of P.R. citizens and undermines the principle that P.R. is a self-governing territory
Sources	(Lafarga Previdi & Vélez Vega, 2020; Figueroa & Rolón, 2020; Bonilla, 2020; Rodríguez-Madera et al., 2021; García et al., 2021; MacEwan, n.d)

6.2. Creation of Substandard Structural SDH and Compounded Impact from Disasters

The neoliberal policies described above have led to substandard structural SDH leading to significant inequities and vulnerabilities, which were, in turn, further exacerbated by the concurrent and compounding disasters. As illustrated by *Figure 16*, the findings of this research revealed that unemployment, poverty, access to healthcare, out-migration, electricity, and food security were key SDH and were also exacerbated and compounded by the concurrent disasters.

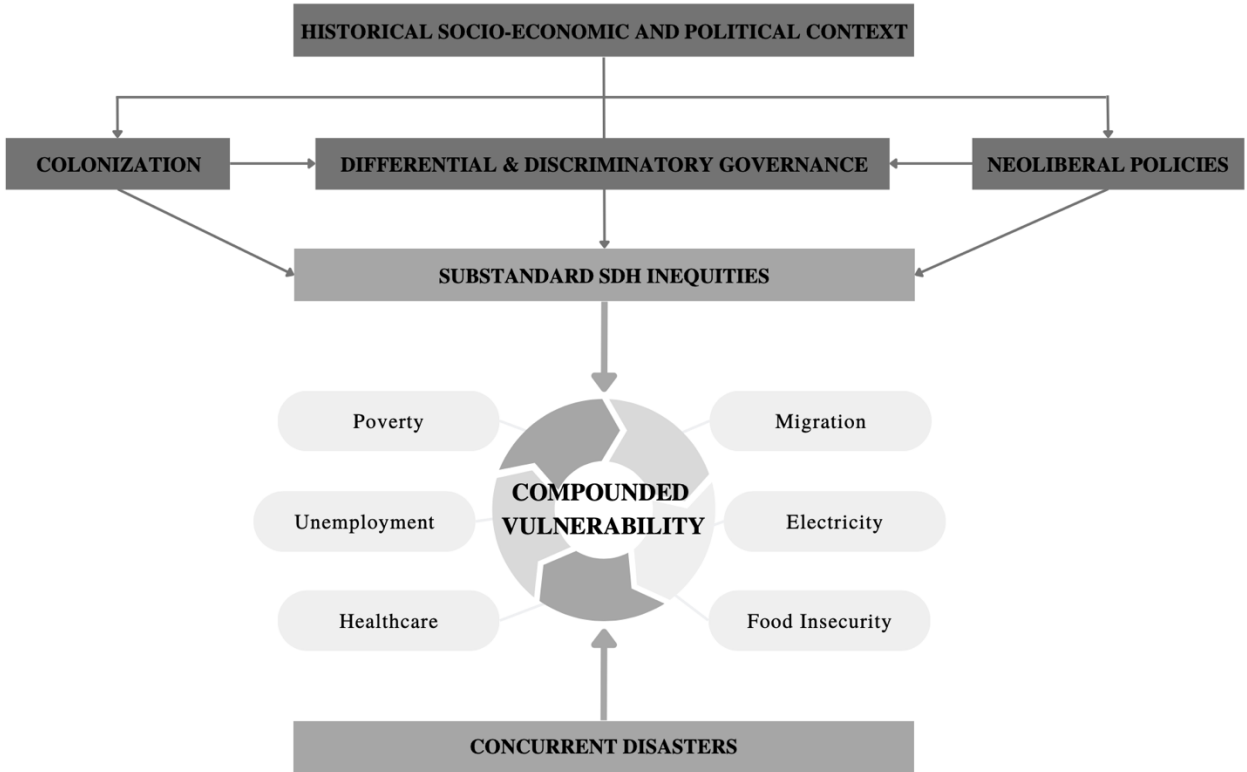


Figure 16. Mind Map Illustrating Compounded Impact of SDH & Disasters (Author’s own)

The findings reveal that economic instability was the key SDH that has resulted in high rates of poverty, unemployment, and food insecurity, the spur of mass out-migration, the privatization of healthcare, and the unmaintained electrical grid and power infrastructure. Before the disasters (2006-2016), “the economy declined 10%, lost a quarter million jobs, carried a debt of \$70 billion, and spurred further out-migration from the island to the mainland U.S.,” resulting in a population decline of 12% (Rudner, 2019). In 2018, according to the Economist Intelligence Unit, P.R. was projected to become the second worst-performing and poorest economy in the world, right behind Venezuela (The Economist, 2018). As a result, according to the Henry J. Kaiser Family Foundation (2020), in 2019, the poverty rate in P.R. was 43.5%, whereas the overall poverty rate in the U.S. was 12.3%. Research shows that poverty is closely linked to disaster vulnerability (Gray, 2017). In comparison to the overall U.S. unemployment rate (3.6% in 2022), the unemployment rate in P.R. is almost doubled at 6.8% and in 2017, peaked at 10.3% (U.S. Bureau of Labor Statistics, 2022a; U.S. Bureau of Labor Statistics, 2022b; Veenema et al., 2019). As mentioned, after the repeal of Section 963, P.R.’s labor market was further eroded, threatening job security, pushing many Puerto Ricans to work jobs below their skill set or migrate to the U.S. mainland.

The consequences of unemployment and poverty are far-reaching and can influence one’s access to education, healthcare, housing, and food security. For example, it has a direct influence on food insecurity and access to healthy food choices. The U.S. Department of Agriculture defines food insecurity as “a household-level economic & social condition of limited or uncertain access to adequate food” (USDA, 2022). One of the most significant factors here is the Merchant Marine Act (Jones Act) and Operation Bootstrap, which have forced P.R. to import almost 90% of its food and pay inflated costs for products (Benach et al., 2019). One stakeholder explains the inconsistency and inflated costs of food,

I went to a supermarket, and I wanted to buy watermelons and they were 75 cents the pound. The next day, the same watermelons in the same position, in the same supermarket. Then those watermelons were 1,75 the pound. The same ones. (Stakeholder Interview, Epidemiologist and Former Employee of the Municipality of San Juan, Female).

This example reveals how Puerto Ricans are subjected to the negative consequences of colonial and neoliberal policies every day. In 2020, 33.2% of the population in P.R. experienced food insecurity which is more than double in comparison with the U.S. overall (12.3%) (Lafarga Previdi & Vélez Vega, 2020; Veenema et al., 2019). Further, food insecurity can have a negative impact on the ability to manage chronic illnesses and decrease one’s overall health. Additionally, disasters often interrupt access to power which can further compound food insecurity and food safety, force reliance on shelf-stored foods, and push people further into precarious situations such as poverty and displacement (Veenema et al., 2019). For example, food insecurity was compounded by the concurrent disasters because of the massive power outages, dependence on the importation of products, and lack of preparedness. After *Maria*, about 85% of imports were halted due to the

shutdown of ports, local farms were inoperable, and supermarkets lost electricity. Of the supermarkets that were able to use generator power, they had limited stock due to the dependence on imports (Mazzei & Armendariz, 2018). This exemplifies how neoliberal policies, specifically Operation Bootstrap, which forced P.R. to become dependent on the importation of foods and move away from local agriculture, had significant impacts on food insecurity after the disasters.

In addition, the declining economic productivity and slow recovery from disasters have triggered mass emigration from the younger generations and healthcare professionals. Although population displacement is a common occurrence after disasters, it can have a significant influence on the demographic composition of a community or country (Acosta et al., 2020). P.R. is one of the countries with the highest migration rates in the world, with the number of Puerto Ricans living in the mainland U.S. (5.4 million) outnumbering those living in P.R. (3.4 million) (Benach et al., 2019). It is important to note that without the net migration of P.R., the poverty rate in P.R. would be 53% instead of 44% (Benach et al., 2019). As a result (*Figure 17*), population projections depict a 50% decrease in the (working) population over the next 30 years, leaving a skewed aging population in P.R. (Keenan & Hauer, 2020). The shift in population demographics has significant implications for the future of P.R. as it results in an older, poorer population with limited family support and more vulnerable to disasters (Veenema et al., 2019). It is also important to note that age is the main risk factor for breast cancer, and social support and social networks is a key SDH for breast cancer (Becker, 2015; Coughlin, 2019). Socially isolated women are likely to have poorer physical and mental health, reduced overall quality of life, and are twice as likely to die from breast cancer than socially integrated women (Coughlin, 2019). Therefore, the changing population demographic can bare serious consequences for breast cancer patients. Rather than addressing the underlying inequities that trigger this migration, the federal and local governments have favored out-migration (Benach et al., 2019).

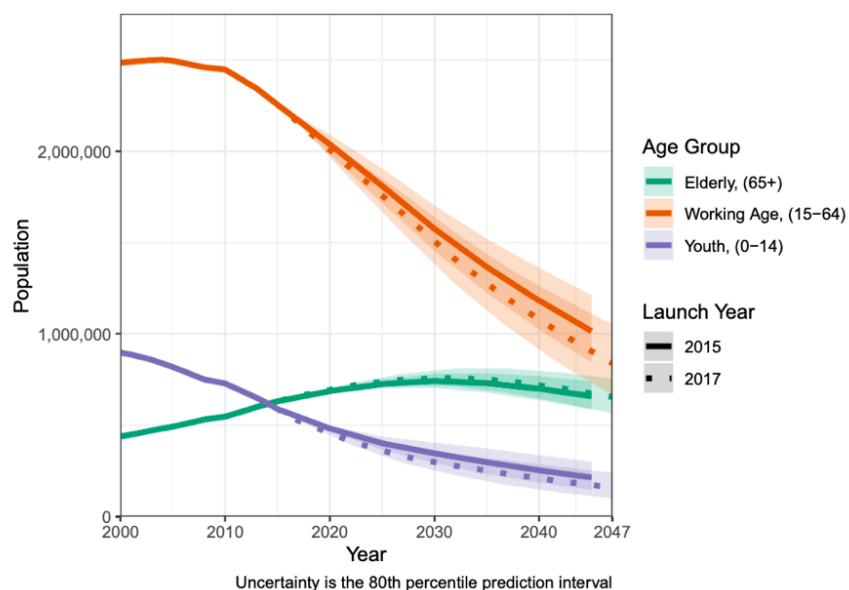


Figure 17. *Projected Population for Select Age Groups for Puerto Rico (2017–2047)* (Keenan & Hauer, 2020, p. 4)

The maintenance of basic infrastructures, such as the electrical grid, has been ignored by neoliberal policies resulting in fragile and ill-equipped infrastructures. Despite being a tropical island with a high potential for wind and solar alternatives, approximately 98% of P.R.'s electricity is generated by fossil fuels (Lafarga Previdi & Vélez Vega, 2020). As a result, the electrical grid collapsed during *Maria* leaving the island without power for days and months. Some residents did not have access to electricity for nearly a year (Bonilla, 2020). Access to electricity is essential for every aspect of the island's vital infrastructure, such as hospitals, pharmacies, supermarkets, schools, refrigerators, and more (Rodríguez-Madera et al., 2021). It is important to note that the majority of excess deaths that occurred after *Maria* are attributed to the lack of electricity (Acevedo, 2022). Still, to this day, P.R. experiences unstable and intermittent power. Instead of prioritizing sustainable, affordable, and reliable electricity, P.R. has privatized the electrical grid and sold it to a private entity, LUMA Energy, which has continued the island's dependence on fossil fuels (Tucker, 2022; Díaz, 2022b; Gonzalez, 2022). This dependence has serious economic consequences for Puerto Ricans as they are forced to spend about 8% of their income on electricity, whereas the average person in the mainland of the U.S. spends about 2% (Díaz, 2022b).

Likewise, the neoliberal policies have resulted in the commodification, marketization, and privatization of the P.R. healthcare system. Research shows the overarching challenges in the healthcare system are (1) privatization and rise in managed care, (2) the aging population with high rates of poverty and chronic illnesses, (3) difficulty receiving referrals, proper care, and long wait times, and (4) the out-migration of healthcare professionals (Lafarga Previdi & Vélez Vega, 2020). P.R. relies greatly on Medicare, Medicare Advantage, and Medicaid funding to support its healthcare services, and more than half of the islanders are dependent on these services (Veenema et al., 2019; Roman, 2015). A major contributor to the downfall of P.R.'s healthcare system is that it receives 70% less funding than the 50 other states of the U.S. and the District of Columbia, although as citizens, Puerto Ricans equally pay their share of taxes and social security (Roman, 2015; Veenema et al., 2019). Further, the unequal support and treatment for P.R.'s healthcare are responsible for about 25 billion of P.R.'s total debt (Roman, 2015). On top of this, the Center of Medicaid, and Medicare Services (CMS) has implemented several cutbacks on Medicare Advantage reimbursements in P.R., while in the mainland of the U.S., rates are projected to increase by 3% (Roman, 2015). Additionally, PROMESA has cut \$4.3 million from the P.R. Comprehensive Cancer Center (Lafarga Previdi & Vélez Vega, 2020). Specifically for breast cancer, research by Layne et al. (2018) reveals that patients in U.S. territories (like P.R.) were less likely to receive recommended and timely cancer care. Although Medicare is the largest payer for cancer care in the U.S., Layne et al. (2018) found that treatment (in terms of type and timeliness) was inferior in U.S. territories than in the mainland of the U.S. As mentioned, out-migration has severely affected the availability of healthcare professionals; as a result, P.R. has fewer registered nurses, emergency medicine specialists, and cancer care specialists than compared to the U.S. (Layne et al., 2018). Over 5,000 doctors have left P.R., resulting in a decline of 36% of doctors and long waiting times for patients to make appointments or forced migration to find better medical

services (Lafarga Previdi & Vélez Vega, 2020). As a result of this inadequate and ill-prepared healthcare system, excess death occurred after each disaster, and breast cancer patients remain the most vulnerable (Veenema et al., 2019).

The creation of the substandard SDH illustrates that Puerto Ricans are not afforded the basic needs, resources, and opportunities to live healthy lives. It has placed P.R. in a vicious cycle. Without access to basic services such as education, housing, healthcare, and electricity, people's ability to manage chronic illnesses, retain employment, and make healthy food choices are restricted. Those who are financially able move out of P.R., leaving behind an older and poorer population. While also further restraining the government's ability to pay back its debt resulting in further divestment and defunding of basic services. Further, without the recognition of the socioeconomic and political context, this vicious cycle is further compounded by the concurrent disasters. Ultimately leaving Puerto Ricans already vulnerable prior to the disasters and disproportionately at risk once a disaster occurs.

6.3. Implementation Gap in DM Strategies

The impact of these neoliberal policies has resulted in devastating repercussions (disinvestment, privatization, and unequal distribution of resources and opportunities), illustrating that P.R. was in a state of emergency long before the concurrent disasters. Other social scientists explain the notion of *slow emergency*, indicating that the crisis that followed the concurrent disasters is a result of a “decades-long series of neoliberal policy reforms and dehumanizing colonial governance strategies that privatized critical infrastructure and weakened social safety nets” (Padilla et al., 2021, p. 2). One interviewee expresses,

First of all, you had to call it multiple disasters in plural, right? Because we didn't have just a hurricane. We had a hurricane. And then we have flooding, we had displacement, we had, you know, landslides. We had all sorts of different blackouts, you know, all sorts of either natural disaster or man-made disasters. You know infrastructure disasters but also the critical services and buildings, etc. weren't working right. So, it's not a right or correct assessment to say just a hurricane, right? More much more than that. (Stakeholder Interview, Psychology Professor, Male).

As explained by this stakeholder, it was not the disaster alone but the compounding impact of the underlying socioeconomic and political context and the creation of substandard structural SDH that influenced the country's ability to prepare and respond to disasters. As a result, there is an implementation gap between DM strategies and the reality of P.R. Therefore, the impact of DM strategies cannot be viewed in isolation from this reality. If DM strategies do not acknowledge or incorporate the existing inequities, it will continue exacerbating and perpetuating health inequities. In other words, the myopic DM strategies can be understood as an SDH. As a result of this gap

between DM strategies and the reality of P.R., three major barriers to effective DM strategies were highlighted throughout the research: (1) inadequate preparedness; (2) top-down hierarchical implementation; and (3) lack of data and transparency (visualized in *Figure 18*, below).

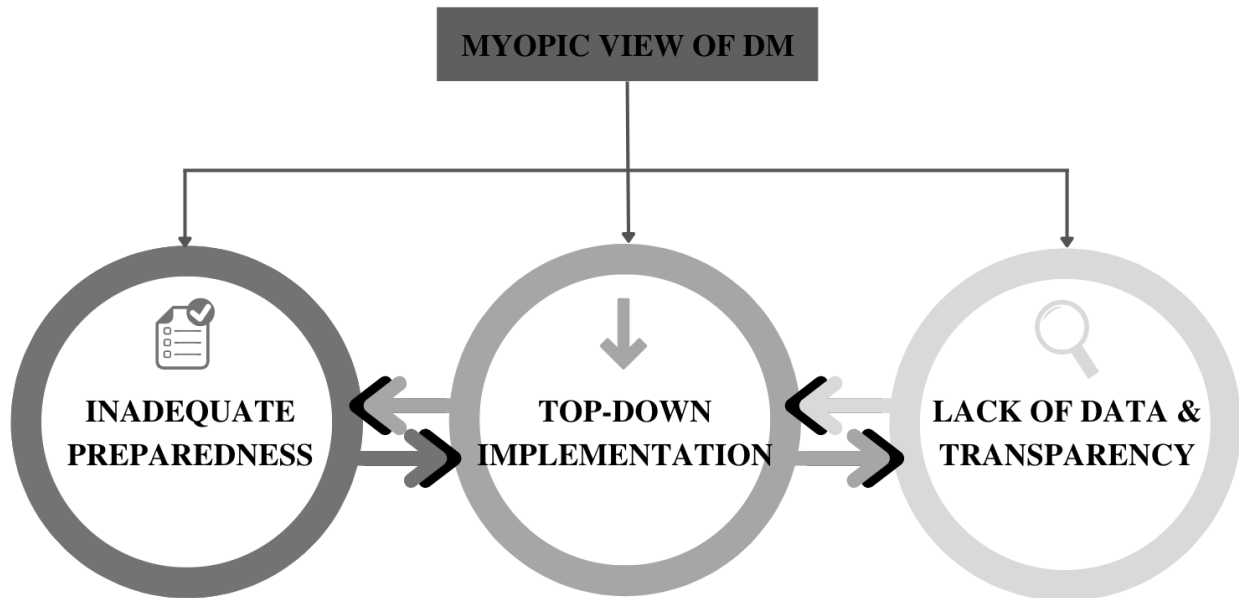


Figure 18. *Key Barriers to Effective DM Implementation (Author’s own)*

The first major barrier to DM in P.R. was the lack of overall preparedness. As explained in *Sub-Section 1.2.3.*, the first phase of DM strategies calls for preparedness efforts which consist of planning, training, and educational activities for events that cannot be mitigated. However, traditional DM strategies in P.R. remain reactive rather than proactive. There are numerous examples of how lack of preparedness presented as a barrier to DM strategies, of which one of the most repeated by stakeholders was the lack of emergency plans. Although there are laws and regulations to ensure that hospitals have emergency plans and alternative power sources in the case of emergencies, without enforcement, documentation, and transparency, these emergency plans continue to be illusive. For example, it is required for private and public hospitals to have a minimum of two electric generators or other sources of energy if the primary power source is not working. Additionally, they must have a “20-day reserve of diesel, water, and medicines and essential items” (Padilla & Pascual, 2022). However, research shows that regardless of this order, there is no evidence that hospitals have enacted these measures, and there is no transparency or documentation of these plans (Padilla & Pascual, 2022). Further, basic information, such as a map locating all hospitals, clinics, and centers in P.R. has not been created, meaning that in the event of an emergency, alternative routes to these locations cannot be mapped out (Díaz Torres, 2022). This is partly because hospitals and key services have been privatized over the years; as a result, these private entities are not required to disclose their emergency plans, and transparency remains low. Leaving hospitals, employees, and communities unaware of what actions are necessary when a disaster occurs. As one stakeholder describes,

It's when a human right such as health is privatized or its services become more inaccessible, you know, not only services become less accessible, but also the information and the documents. And most of these private companies, they basically behind the argument that, hey, we are not government, so do not treat us with the same standards. And that's a big problem, you know, in Puerto Rico. (Stakeholder Interview, Professor of Public Health, Female).

Additionally, the lack of preparedness can be tied to the lack of community-level engagement and top-down implementation of DM strategies. Although the federal and local governments are responsible for spearheading DM strategies, local and community-level organizations are essential for successful implementation. Research shows that local municipalities and community organizations are better at identifying vulnerable populations and areas of critical need. In turn, they are better at managing and prioritizing resources to ensure that they reach those most in need (Rosas et al., 2021). Numerous examples from the concurrent and compounding disasters illustrate that DM resources were inadequately distributed. One of the most recollected examples was when residents found warehouses filled with disaster aid that had never been distributed (see **Section 3.2.**; Chavez & Rivera, 2020). Part of the reason these resources were never distributed was because of a lack of coordination and communication among key stakeholders. Many stakeholders expressed that they were kept in the dark about resources and aid available at the time. This directly contradicts the strategic priorities and principles stated by FEMA that DM strategies must be a whole community effort, as explained in **Sub-Section 1.2.3.** Many interviewees voiced that this is partly due to the deeply rooted and internalized cultural mindset that P.R. is dependent on the U.S. and lacks self-determination. Specifically, it is this mindset that is dangerous because the lack of responsiveness and coordination is a matter of life and death for Puerto Ricans. For example, one interviewee shared,

[Colonization] produces in practice public officials in the federal and the local level that do not have the knowledge or the practice or the habit of thinking about problem solving with the community. It's always like a very paternalistic. Even arrogant way of saying, we know the solutions to your problems, and communities don't know squat (Stakeholder Interview, Climate Change & Disaster Management Advocacy Lawyer, Female).

The third barrier to DM implementation was the lack of data and transparency. As mentioned, to successfully strategize emergency plans, knowledge of alternative routes to hospitals, clinics, and other care centers should be known. In addition to this, data is critical for identifying where the most critical need is, who the vulnerable populations are and what is their susceptibility to disaster risk. Research shows that data is instrumental in decision-making processes; however, as one stakeholder explained,

There are 78 municipalities in Puerto Rico and only a few of them have tracking systems to identify which patients would need when they lack a priority, attention during an emergency. So not all municipalities have those tracking systems and those who have tracking systems. Their systems are not uniform. And that's also a big responsibility of the central government of the Puerto Rico Department of Health, not being able to coordinate that with municipalities. So, to me, the main problems, you know, are about lack of transparency, lack of information and lack of coordination, not only with municipalities, but also with other agencies, with other central government agencies. There are there's not a lot of communication. For example, I ask them if there are if there is updated information on maps or routes that can allow people to know which routes they should take. In case there are there is an emergency. That information is not available. (Stakeholder Interview, Investigator, Male).

Without proper preparedness, whole community-level coordination, data, and transparency, DM strategies were inadequate to deal with the concurrent disasters. Vulnerable populations remained isolated, unidentified, and unsupported. It is evident that health inequities impact disasters and vice versa – they do not exist in a vacuum. However, it is important to note that after the disasters, Puerto Ricans were not passive and stepped into the roles and responsibilities of the State after the disasters. There are countless examples of local organizations and communities mobilizing to support those who could not support themselves after the concurrent disasters. These examples exhibit the power of community-level intervention and provide evidence that successful DM strategies cannot be achieved without bottom-up, inclusive, and community-level coordination. However, current DM strategies have misused these initiatives to portray how PR is “resilient.” Unfortunately, the resiliency that is currently promoted takes the burden from those that are responsible (the State) and places it on the individuals, as explained by one stakeholder,

The thing is that the term resiliency has become prostituted by especially by politicians. Right? Like, oh, we're resilient like it's a positive thing. It's a positive result of a very, very bad process. So, it's a good result but it comes from trauma and suffering so I don't want it. I don't want to go through it. So, so we don't want to build resilient communities because that only means that we're going to make them suffer. You know, we want to build resilient systems, not resilient people. We need resilience systems. Resilient infrastructure, not people. People need to suffer to become resilient. (Stakeholder Interview, Psychology Professor, Male).

As a result, Puerto Ricans are not only burdened by the exacerbation of health inequities but also by being forced to carry out their own DM response to ensure that their loved ones and communities survive disasters and their aftermath.

6.4. Intersecting the SDH and Disaster Vulnerability for Breast Cancer Patients

As explained in **Section 3.3.**, breast cancer patients typically require complex, extensive, and multiple rounds of treatment and care, and that can vary from patient to patient and stage of diagnosis. P.R. suffered health inequities before the concurrent and compounding disasters; the presence of breast cancer adds an additional layer of complexity to disaster vulnerability which is compounded by these pre-existing inequities. As mentioned, women and people with chronic illnesses, such as breast cancer, are among the most vulnerable after disasters. Therefore, breast cancer patients face a “double jeopardy” of disaster risk due to their gender and illness. On top of this, P.R.’s socioeconomic and political context has disproportionately created disaster vulnerabilities, however, especially for medically fragile populations such as breast cancer patients. However, DM strategies do not consider or prioritize this demographic, resulting in delayed treatment, increased psychological stress, and preventable morbidity and mortality. Selected participants, contacted through the organization, *Connecting Path’s*, came from underserved and impoverished communities in P.R. Through the FGD case study with breast cancer patients, women shared their difficult stories of undergoing breast cancer treatment while enduring the concurrent disasters and inadequate access to care. The themes that emerged from these conversations were heightened psychological stress (i.e., fear, stress, and isolation), the importance of social networks, and disrupted access to care (i.e., delayed or canceled appointments and loss of power).

As explained in **Section 1.2.2.**, a patient that experiences a delay of more than three months has a more than 10% lower five-year survival rate (Richards et al., 1999). However, DM strategies remain short-sighted, and delay in treatment was a common occurrence among all the women during the concurrent disasters. One woman explained her experiences during COVID-19,

I tested positive for COVID while receiving my treatment, but my medical center wasn’t kind to me. They stopped all my treatments, and I couldn’t come back until I tested negative for COVID. That I think was the hardest for me because you know while having cancer the treatment is going to be hard, but you go through it to get better and so to have that taken away from me was very difficult because it felt like they were taking away my chances at getting better and surviving. I think COVID has been the worst part of it all because a lot of treatments and appointments were postponed or canceled so that made it harder for us to get treatment and get better. (Patient, Female, Employed, Age 57)

In addition, the unstable electricity posed a significant challenge to healthcare for all types of patients after the concurrent disasters. As explained in **Section 6.2.**, access to and stabilized electricity is essential for DM otherwise, hospitals and other key services and businesses render

inoperable. Another woman expressed how unstable power continues to be an issue, even five years after Hurricane *Maria*,

You never know when the powers going to go out and because of this sometimes you lose your appointments. I've received countless of late notice cancelations because of power outages which keeps me from receiving my treatments. This kind of thing happens way too often and it some way I believe that the condition our electrical system today is still connected to the whole hurricane Maria incident. And I still can't comprehend how hospitals have backup generators for this exact reason yet those don't work either. That to me is very scary and it adds to my stress levels. (Patient, Female, Employed, Age 57)

Other women mentioned that the bureaucratic procedures and slow response to emergencies, as explained in **Section 3.2.**, were a burden to try and get an appointment while enduring the trauma of these disasters and undergoing breast cancer treatment. One woman, who was diagnosed with breast cancer for the second time, shared that she had lost her sister to breast cancer during *Maria* and asserted, “the lack of medical access and treatment is the main reason my sister isn’t alive today. Because she couldn’t receive her treatment on time and the fact that there was no power,” (Patient, Female, Employed, 57).

Additionally, many women expressed the fear and loneliness they felt during and after the disasters. As mentioned in **Section 6.2.**, social support and networks are essential for breast cancer patients. Socially isolated women are more likely to have poorer physical and mental health, reduced overall quality of life, and are twice as likely to die from breast cancer than socially integrated women (Coughlin, 2019).

One woman explained,

When I had surgery for the first time it was during the earthquakes when everything was at its peak, and I had to go into surgery thinking that an earthquake could happen at any given moment and it's not easy going into surgery in general is scary and going in with this whole other weight on your shoulders that something could go wrong or that something terrible could happen is terrifying. I prayed nothing would happen and I told my husband that if something where to happen that he should be ready, and he just told me that he'd barge if anything where to happen and that he would get me out of there. The things we were living at the time weren't easy and at many times even as I prayed to God I felt alone. Facing things alone isn't easy. (Patient, Female, Unemployed, Age 46)

Another woman echoed in agreeance,

You would start to think if an earthquake occurs while I'm receiving the treatment what do I do where do I go I'm connected to this machine I could get hurt and your head would spiral into all these terrifying scenarios. For me personally I think the earthquakes have had the biggest impact even more than COVID on our emotional state while receiving treatment. (Patient, Female, Unemployed, Age 49)

These themes that emerged from the lived experiences of breast cancer patients tie directly to the existing health inequities described in **Section 6.2**. Patients were subjected to delayed and cancel treatment because hospitals, clinics, and centers were not equipped to manage continued specialized care after disasters. Likewise, power outages pose many problems for DM strategies but also interrupt treatment and heighten psychological stress for breast cancer patients. Further, the out-migration of young generations and health professionals affects patients twofold: it further isolates them from social networks, and it makes accessibility to healthcare services strenuous. It is important to note although the women did not know each other prior to the FGD, they expressed that the opportunity to share their emotions and recognize themselves in the stories of the other women felt like therapy. By sharing their experiences, future patients can find support, and stakeholders in DM strategies can learn how to better support these women.

7. DISCUSSION

In this section, the synthesis of the results to answer the RQs will be summarized, the theoretical contribution will be explained, the practical recommendations will be presented, and the limitations of this research will be discussed.

7.1. Synthesis of Results for RQs

The purpose of this research was to understand the relationship between SDH and DM strategies in P.R., two concepts that have previously not been studied together. It aimed to investigate how current DM strategies can exacerbate existing health inequities and produce negative long-term health impacts (i.e., delay in treatment and heightened psychological stress) through the case study of breast cancer patients. Different data sources were used to answer these questions, such as literature, media, stakeholders (involved directly and indirectly in DM strategies), and breast cancer patients. The overarching research question was, “*How can disaster management be improved to mitigate disruption in specialized breast cancer treatment and negative long-term health outcomes in P.R.?*” The results demonstrate that if DM strategies do not acknowledge the context in which they are embedded and implemented, health inequities will continue to be maintained and aggravated. Current DM strategies remain short-sighted and reactive. Therefore, DM strategies can be improved to mitigate adverse long-term health outcomes by taking a broader perspective and incorporating the SDH perspective in decision-making and planning processes. To do this, a clear understanding of the SDH factors that create, maintain, and exacerbate health inequities in P.R. is needed (*SRQ1*). Therefore, this research has investigated different factors (socioeconomic and political context, governance, policies, and more) (see **Section 6.2**). The investigation revealed that the historical colonial and neoliberal governance has led to sub-standard structural inequities such as poverty, unemployment, inadequate access and availability of healthcare, ill-maintained vital infrastructures (such as the electrical grid), and more. To bridge the concept of SDH and DM this research explored how these sub-standard structural inequities impact the effectiveness of DM strategies (*SRQ2*). The evidence has shown that disasters compound the same inequities as the SDH resulting in compounded disaster vulnerabilities. This reveals that there is an implementation gap between DM strategies and the needs of Puerto Ricans. The findings indicate three key barriers because of this implementation gap: (1) lack of overall preparedness efforts, (2) top-down hierarchical implementation, and (3) lack of data and transparency. Ultimately, Puerto Ricans have been left to survive the concurrent disasters on their own, and there is a call to build resilient communities rather than resilient individuals. Historically, vulnerable populations, especially medically fragile populations, remain overlooked in DM. Therefore, this research focused on the lived experiences of one of the more invisible groups, breast cancer patients, who face multiple dimensions of disaster vulnerability due to their gender, illness, and existing inequities. Through the stories shared by these women, it became clear that availability and accessibility to healthcare after disasters is a matter of life and death.

7.2. Theoretical Contribution

This research reveals that social processes such as colonial and neoliberal governance have shaped the healthcare system and undermined public health before, during, and after disasters in P.R. This extends on research by previous scholars emphasizing that colonialism and neoliberalism can be understood as political determinants of health (Navarro, 2009; Man et al., 2018; Gomez-Vidal, 2021). Therefore, there is a need for decolonization and democratization in P.R. This aligns with Ramos et al.'s (2022, p. 308) research that explains that decolonization practices can “enhanced public health and increased social power.” This research also contributes to broadening the discussion on planetary health, which sees neoliberal capitalism as a key mediator in socioeconomic crises and the “structuring of the economy that prioritizes exchange value above other types of value” (Mair, 2020). In P.R., there has been a deliberate and strategic implementation of policies that have prioritized the economic gain of the few over the well-being of Puerto Ricans. However, as explained in *Section 1.1.*, current planetary health discourse overlooks the significance of existing health inequities. Therefore, this research calls on planetary health to integrate existing inequities to better understand the relationship between human health and climate change. Further, there is significant research demonstrating how existing health inequities can create differential risks and vulnerabilities to disasters (Thomas et al., 2019; Veenema et al., 2019; Rudner, 2019; Asare et al., 2017). However, DM strategies have remained focused on short-term impacts, and there needs to be more evidence on how the SDH and DM impact long-term health impacts after disasters.

Therefore, this research brings together two concepts – DM and SDH – that have not been studied together before in P.R. It provides empirical evidence for understanding the complex ways in which the concurrent and compounding disasters further exacerbate existing health inequities in P.R. If DM strategies do not incorporate the socioeconomic and political context and the underlying health inequities, it will continue to perpetuate adverse long-term health outcomes. The extends on previous research, such as Theory from the South, which highlights the need to recognize local realities and context. Specifically, Bhan (2019) expresses that if strategies are “unrooted” from the context, then there will be a fundamental disconnect between theory and practice. Therefore, strategies must be embedded in the local context instead of from dominant modes of practice. These findings align with research conducted by Nomura et al. (2016), which states, “social determinants exert a powerful influence on different elements of risk, principally vulnerability, exposure and capacity, and thus, on people's health.” However, as advocated by Navarro (2009, p. 440), “It is not *inequalities* that kill, *but those who benefit from the inequalities* that kill.” If the mechanisms in which health inequalities are created (such as colonialism and neoliberalism) are politically motivated, then DM strategies and policies cannot remain apolitical. In this case, the neutrality of DM is not neutral at all, as it allows for the subversion of public health. Therefore, the theoretical contribution of this research is the construction of a new conceptualize of DM strategies by broadening the scope in which DM strategies operate. This is

particularly urgent for more vulnerable populations, such as cancer patients, requiring specialized, time-sensitive, and extensive treatment and care options. To do this, future research and DM strategies should empower and prioritize the voices of vulnerable populations (Navarro, 2009; Thomas et al., 2019).

7.3. Practical Recommendations

P.R. is caught in a vicious cycle where existing health inequities will continue to be exacerbated by disasters if not addressed by DM strategies. How can this catastrophic cycle be broken to mitigate the long-term health impacts of disasters? Current DM strategies in P.R. exacerbate vulnerabilities for all Puerto Ricans, especially for medically fragile populations, such as breast cancer patients. Yet, there is no incorporation or prioritization of this demographic, although breast cancer incidence in P.R. is significant and increasing. However, to guide DM strategies and to better prioritize action after disasters, it is critical to look past the traditional view of DM strategies as actions that occur after a disaster (Verna et al., 2019). Research shows that preparedness and proactive DM strategies are critical (Veenema et al., 2019; Tomio & Sato, 2014). However, particularly important is for DM strategies to approach preparedness through bottom-up and inclusive public engagement. Specifically, in P.R., research by Rosas et al. (2021) shows that municipalities can serve as a link between the federal and local governments and the people's needs to improve community preparedness and resiliency. Therefore, preventable morbidity and mortality can be mitigated by shifting the current imbalance of reactive and top-down D.M. to address the underlying health inequities and vulnerabilities.

Currently, there is growing recognition of the need to expand on current DM strategies to be more context-specific, decentralized, and bottom-up. For example, globally, the SDGs have called for the need to localize the SDGs, recognizing that one-size fits all approaches to DM are insufficient (United Nations Development Programme, 2022). To successfully unlock the barriers to DM and meet the SDGs, prioritization of local needs is critical. There is also an acknowledgment of the need to broaden DM to incorporate existing inequities and vulnerabilities to improve DM strategies. For example, the Center for Disease Control and Prevention (CDC) published the Building Resilience Against Climate Effects (BRACE) Framework, which is a five-step process to broaden DM strategies to better support existing vulnerabilities (CDC, 2022a). Additionally, the CDC supplemented this framework with the Justice, Equity, Diversity, and Inclusion (JEDI) in Climate Adaptation Planning – which specifically calls on the need to integrate the SDH in DM strategies (CDC, 2022b). These frameworks provide concrete step-by-step recommendations on how the SDH can be integrated into DM strategies, and long-term health outcomes can be mitigated. Additionally, there are many recommendations for how different stakeholders can better prepare for disasters; based on the analysis and existing literature, some key recommendations are summarized in *Table 5* on the next page.

Table 5. *Key Recommendations for Stakeholders (Author’s own)*

RECOMMENDATIONS FOR DM POLICY-MAKERS:
<ul style="list-style-type: none"> • Understand the influence of existing health inequities on DM implementation (i.e., create a Public Health Committee) • Redistribute resources and aid to reduce the degree of resource and health inequalities • Strengthening municipality and community level capacity as first responders to disasters • Integrate public engagement in decision-making processes to shift the power from top-down to bottom-up implementation
RECOMMENDATIONS FOR THE DEPARTMENT OF PUBLIC HEALTH:
<ul style="list-style-type: none"> • Develop a comprehensive and centralized public health surveillance system <ul style="list-style-type: none"> ○ Research by (Tomio & Sato, 2014) recommends a surveillance tool with at least three components: <ul style="list-style-type: none"> ▪ 1. Ability to identify vulnerable populations ▪ 2. Ability to access the needs of populations ▪ 3. Ability to monitor long-term impacts • Coordinate with municipalities, local organizations, and communities to understand needs and equitable distribution of resources
RECOMMENDATIONS FOR HEALTHCARE PROVIDERS:
<ul style="list-style-type: none"> • Coordinate with the Department of Public Health to identify vulnerable populations • Screen for SDH through patient surveys and provide a list of resource support options • Map out alternative routes and sister hospitals in case of power outages and loss of transport • Establish networks and partnerships with all health providers to ensure the distribution of medical supplies and treatment • Practice routine in-hospital emergency procedures for healthcare professionals • Communicate with patients to help individuals be better prepared for emergencies • Make plans for the continuity of treatment and care
RECOMMENDATIONS FOR PATIENTS:
<p>The National Cancer Institute (2022) and the CDC (2022c) provide patients recommendations. However, recommendations for patients should be feasible and, therefore, rely on proactive coordination and advocacy from other stakeholders. Here are two key recommendations:</p> <ul style="list-style-type: none"> • Plan with healthcare providers on how to stay in contact and how to ensure the continuation of care • Create an emergency kit with all essentials (medications, contact information, medical files)

7.4. Limitations

There are several limitations to consider in this research. One of the major limitations of this research to consider is the language barrier. P.R. is a predominantly Spanish-speaking country, and although the researcher can converse informally in Spanish, different tempos, dialects, and grammar may influence and impede the interpretation of information. Therefore, a native translator was present for the interviews and FGD conducted in Spanish, and the questions were checked for language appropriateness by the UPR RLC team. Additionally, the researcher was only physically present in P.R. for a short timeframe of two months (eight weeks) to conduct the fieldwork. This is a relevantly short timeframe to get acquainted, contact and confirm participants, and conduct the interviews and FGDs. Therefore, the preliminary interview and FGD guides were drafted before the researcher's arrival in the host country. Additionally, there is very limited data on P.R. available, and the sample size of the interviews and FGD were relevantly small; therefore, analysis may not be representative of all breast cancer patients' and stakeholders' experiences. As a result, the analysis of SDH, DM, and the impact on breast cancer patients is limited. However, the intention of this research was to widen the discussion and highlight the relationship between SDH and DM strategies. Although each patients' experiences are deeply personal, their voices should be heard, and their experiences may reflect similar situations of other vulnerable populations. Further research should be conducted to understand how other SDH that were not examined in this research may be influential in DM strategies. As well as future research should focus on how the integration of the SDH can be achieved in P.R.

8. CONCLUSION

Five years later, almost on the anniversary of Hurricane *Maria*, P.R. was struck by Category 1 Hurricane *Fiona* on September 18th, 2022. Although it was a Category 1 hurricane, it poured down record amounts of rainfall, releasing landslides and mudslides, flooding entire neighborhoods, and leaving Puerto Ricans isolated without power or water (Sanchez, 2022a). Again, the DM response was unprepared, and the same challenges to DM were exhibited. For example, FEMA assistance was only extended to 55 of the 78 municipalities, although some of the municipalities left behind were most impacted by the disaster (Marcos, 2022). Additionally, many citizens were without power for almost two weeks. According to the Department of Public Health, at least 25 people have died from *Fiona* (Sanchez, 2022b). Again, these deaths are associated with a lack of access to healthcare and electricity after the disaster. Further, although the economic loss of *Fiona* is still being calculated, the impact is assumed to be significant and compounded as the island is still recovering from the previous disasters (Díaz, 2022a). *Fiona* signifies that P.R. has not yet taken the necessary steps to improve DM's response for all, and after each disaster, the country becomes less prepared and able to take on this next disaster. However, P.R.'s future is not set in stone, and the time to enact a new conceptualization of DM is now.

Disasters offer a unique opportunity to learn from, reflect on, and to better understand how DM strategies can be improved. The concurrent and compounding disasters and, most recently, *Fiona*, have revealed time and time again that existing health inequities can no longer be ignored in DM strategies. P.R. presents a particularly urgent case as its geographic location, socioeconomic situation, and healthcare system make it one of the most vulnerable countries to disasters. Disaster vulnerabilities and the conditions that impact the exposure to and distribution of risks are complex, interrelated, and far-reaching. These vulnerabilities are not only a matter of climate change factors but also socioeconomic and political factors. Further, many citizens, such as breast cancer patients, are faced with multi-dimensions of disaster vulnerability due to the significant influence of various SDH determinants. Therefore, DM needs to widen its current conceptualization of how to mitigate disaster risks to include existing health inequities and long-term adverse health outcomes. This can best be achieved through bottom-up, inclusive, and whole community-level engagement. This research provides evidence of the necessity to fill the gap between DM and SDH and therefore calls on future research to determine specific actions and recommendations for P.R. to facilitate this integration. Puerto Ricans have exhibited tremendous resilience to the concurrent disasters despite the ongoing socioeconomic and political crisis and inadequate implementation of DM strategies. However, it is now time for stakeholders to act as agents of change for a more sustainable and healthy future for P.R.

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APPENDICES

Appendix I: Small Island Developing States

About Small Island Developing States:

“Small Island Developing States (SIDS) are a distinct group of 38 UN Member States and 20 Non-UN Members/Associate Members of United Nations regional commissions that face unique social, economic, and environmental vulnerabilities.”

“SIDS were recognized as a special case both for their environment and development at the 1992 United Nations Conference on Environment and Development held in Rio de Janeiro, Brazil.

The aggregate population of all the SIDS is 65 million, slightly less than 1% of the world’s population, yet this group faces unique social, economic, and environmental challenges.

SIDS face a host of challenges including for many, their remote geography. As a result, many SIDS face high import and export costs for goods as well as irregular international traffic volumes. Yet, they must rely on external markets for many goods due to the narrow resource base.

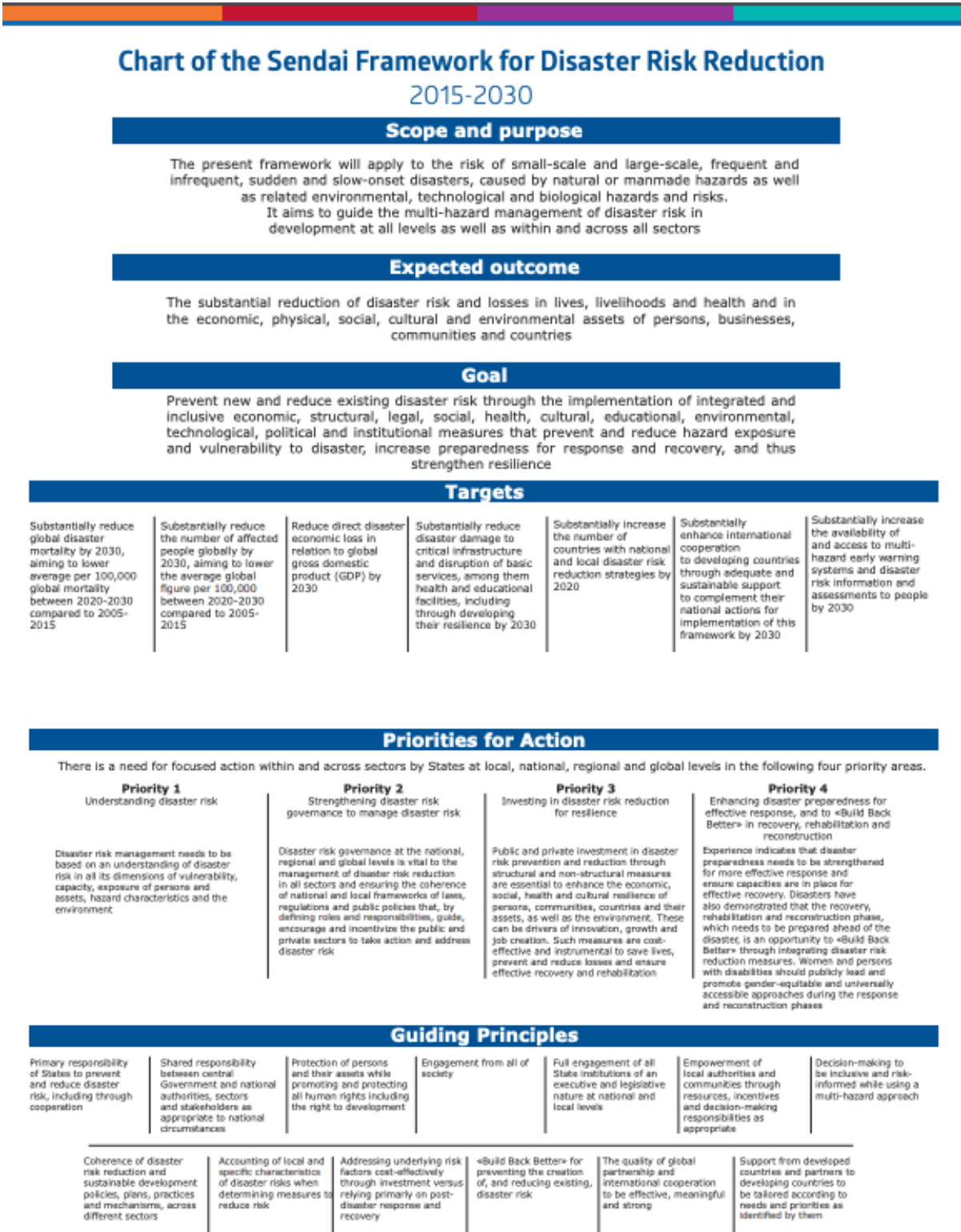
For SIDS, the Exclusive Economic Zone (EEZ)—the ocean under their control—is, on average, 28 times the country’s land mass. Thus, for many SIDS the majority of the natural resources they have access to comes from the ocean. Factors like small population size, remoteness from international markets, high transportation costs, vulnerability to exogenous economic shocks and fragile land and marine ecosystems make SIDS particularly vulnerable to biodiversity loss and climate change because they lack economic alternatives.

Climate change has a very tangible impact on SIDS. Hurricanes Harvey, Irma, Maria, and Nate turned the 2017 tropical cyclone season into one of the deadliest and most devastating of all time, destroying communications, energy and transport infrastructure, homes, health facilities and schools. Slow onset events such as sea level rise pose an existential threat to small island communities, requiring drastic measures such as relocation of populations, and the related challenges this poses. These challenges are compounded by limited institutional capacity, scarce financial resources and a high degree of vulnerability to systemic shocks.

Biodiversity is an important issue for the livelihood of many SIDS, as industries like tourism and fisheries can constitute over half of the GDP of small island economies. However, the importance of these natural resources extends beyond the economy; biodiversity holds aesthetic and spiritual value for many island communities. For centuries, these communities have drawn benefits from biodiversity in the form of food supply, clean water, reduced beach erosion, soil and sand formation, and protection from storm surges.

Strong biodiversity not only generates revenue through industries for SIDS, it also helps prevent the incurrance of additional costs that can result from climate change, soil erosion, pollution, floods, natural disasters, and other destructive phenomena.”




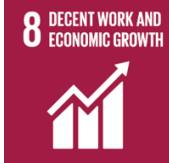



(Source: taken from United Nations, 2022b)



(Source: taken from UNDRR, 2021, p. 35)

Appendix III: Relevant SDGs

Table 6. *SDG Definition & Relevance (Author's own)*






SDG	DEFINITION	RELEVANCE
 <p>1 NO POVERTY</p>	“End poverty in all its forms everywhere”	Research shows that poverty rates in P.R. remain exceptionally high.
 <p>3 GOOD HEALTH AND WELL-BEING</p>	“Ensure healthy lives and promote well-being for all at all ages”	Existing health inequities and disasters compound citizens ability to live health lives.
 <p>7 AFFORDABLE AND CLEAN ENERGY</p>	“Ensure access to affordable, reliable, sustainable, and modern energy for all”	Stable, accessible, and affordable electricity remains a significant issue in P.R. and cause of preventable morbidity and mortality after disasters.
 <p>8 DECENT WORK AND ECONOMIC GROWTH</p>	“Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all”	Research shows that unemployment rates in P.R. are exceptionally high.
 <p>10 REDUCED INEQUALITIES</p>	“Reduce inequities within and among countries”	Health inequities are significant in P.R. and further compounded by the concurrent disasters and DM approach.
 <p>11 SUSTAINABLE CITIES AND COMMUNITIES</p>	“Make cities and human settlements inclusive, safe, resilient and sustainable”	Lack of investment and maintenance of basic infrastructures before and after disasters has resulted in dilapidated circumstances (i.e., abandoned and broken-down housing, unsafe roads and more).
 <p>13 CLIMATE ACTION</p>	“Take urgent action to combat climate change and its impacts”	If DM strategies do not acknowledge the local reality and needs of P.R. it will not be successful in combating climate change and its impacts.

(Source: United Nations, 2022c)

Appendix IV: FEMA Strategic Plan (2014-2018) – Priorities & Outcomes

5 STRATEGIC **PRIORITIES**

16 KEY **OUTCOMES**

	<p>PRIORITY 1: Be Survivor-Centric in Mission and Program Delivery</p> <ul style="list-style-type: none">• Disaster services are transparent, efficient, and effective in meeting the needs of survivors.• Local leaders and tribal officials are better prepared and positioned for effective recovery and mitigation.• Individuals and communities know the steps to take, have the tools required, and take appropriate actions before, during, and after disasters.
	<p>PRIORITY 2: Become an Expeditionary Organization</p> <ul style="list-style-type: none">• Unified and coordinated Federal response and recovery operations successfully support and complement state, local, tribal, and territorial incident operations.• FEMA's incident workforce is appropriately staffed and managed to rapidly mobilize, efficiently deploy, and effectively engage in multiple sustained operations in the response, recovery, and mitigation mission areas.• Incident operations are efficient, timely, and predictable.
	<p>PRIORITY 3: Posture and Build Capability for Catastrophic Disasters</p> <ul style="list-style-type: none">• Capability gaps are identified and addressed in National Preparedness System planning, training, and exercises.• Partnerships, tools, and resources are in place to support national-scale response and recovery operations for catastrophic disasters.• Survivors, bystanders, and grassroots organizations are better prepared and positioned to take immediate independent response actions in catastrophic events.
	<p>PRIORITY 4: Enable Disaster Risk Reduction Nationally</p> <ul style="list-style-type: none">• The whole community uses the best-available data and analytic tools to make better risk-informed decisions before, during, and after disasters.• Whole community partners make resilient investments in development and rebuilding.• Congressionally mandated reforms are implemented to advance flood insurance affordability, financial stability of the National Flood Insurance Program, and reduction of the risks and consequences of flooding nationwide.
	<p>PRIORITY 5: Strengthen FEMA's Organizational Foundation</p> <ul style="list-style-type: none">• FEMA has a qualified, effective, and engaged workforce recognized for its excellence.• Integrated analytics capabilities support effective and efficient operations and greater consistency and transparency in decision-making.• FEMA's strategy, resources, and performance outcomes align to maximize mission impact.• Business processes are transparent and produce consistent, high-quality results.

(Source: taken from FEMA, 2014)

Appendix V: FEMA Strategic Plan (2018-2022) – Strategic Goals



STRATEGIC GOAL 1: BUILD A CULTURE OF PREPAREDNESS

Resilience is the backbone of emergency management. The Nation's ability to weather storms and disasters without experiencing loss significantly reduces our risk. The most successful way to achieve disaster resiliency is through preparedness, including mitigation. Building a Culture of Preparedness within our communities and our governments will support a National effort to be ready for the worst disasters – at the individual, family, community, state, local, tribal, territorial (SLTT), and Federal levels.

Strategic Goal 1 promotes the idea that everyone should be prepared when disaster strikes. To be prepared, however, we must all understand our local and community risks, reflect the diversity of those we serve, and foster partnerships that allow us to connect with a diverse Nation. People who are prepared will be able to act quickly and decisively in the face of disasters, thereby preventing death and injuries, minimizing loss of property, and allowing for a more rapid and efficient recovery.



STRATEGIC GOAL 2: READY THE NATION FOR CATASTROPHIC DISASTERS

Catastrophic disasters, including low- and no-notice incidents, can overwhelm the government at all levels and threaten National security. They are life-altering incidents for those impacted, causing a high number of fatalities and widespread destruction. Catastrophic disasters disrupt lives and hurt our communities – economically and socially. Readiness is critical for FEMA and our partners to ensure that the response and recovery missions are appropriately executed and successful.

Strategic Goal 2 builds on the preparedness through Strategic Goal 1 and focuses us on enhancing our collective readiness. The Nation's readiness depends on emergency management professionals who execute the mission on behalf of Federal and SLTT governments. This requires a scalable and capable National incident workforce that can adapt and deploy to a changing risk landscape, greater integration with our partners at all levels, and the ability to communicate and coordinate effectively in every situation.



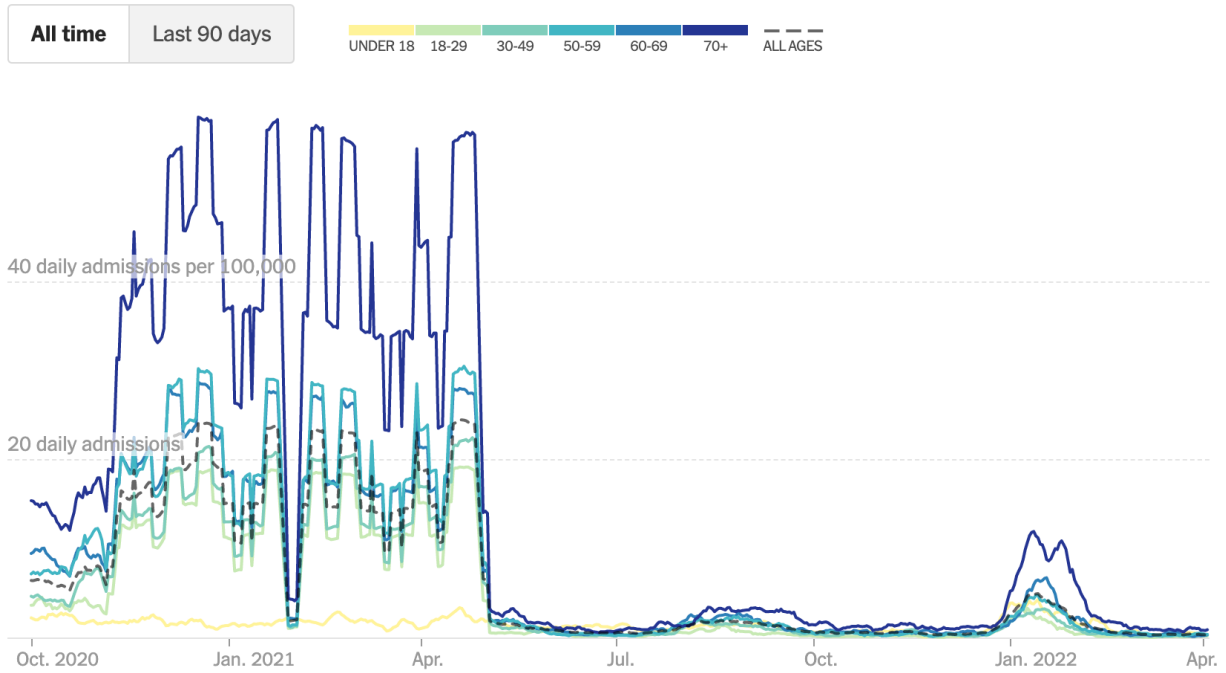
STRATEGIC GOAL 3: REDUCE THE COMPLEXITY OF FEMA

The Nation faces an evolving threat and hazard environment. FEMA must be flexible and adaptable to meet the needs of individuals and communities, and it must deliver assistance and support in as simple a manner as possible. We must innovate and leverage new technology to reduce complexity, increase efficiency, and improve outcomes.

Strategic Goal 3 promotes simpler, less complex processes to streamline our Agency and the support we provide to individuals and communities. By making it easier for employees to do their work, the Agency can better care for those we support. A simplified FEMA – one that streamlines survivor and grantee experiences and provides straightforward processes and policies for staff – will decrease administrative burdens, improve the stewardship of Federal taxpayer dollars, and allow for a more efficient and effective execution of our mission.

(Source: taken from FEMA, 2018)

Appendix VI: COVID-19 Pandemic Cases



Hot spots

AVERAGE DAILY CASES PER 100,000 PEOPLE IN PAST WEEK

10 30 50 70 100 250 FEW OR NO CASES



(Source: taken from The New York Times, 2020)

Appendix VII: List of Media Articles

Table 7. List of Media Sources

#	SOURCE	AUTHOR	LINK	CITATION
1	CNN	Chavez, N., & Rivera, R.	https://edition.cnn.com/2020/01/18/us/puerto-rico-emergency-director-fired/index.html	Chavez, N., & Rivera, R. (2020, January 19). Puerto Rico emergency director fired after residents discover warehouse full of Hurricane Maria supplies. <i>CNN</i> . Retrieved from https://edition.cnn.com/2020/01/18/us/puerto-rico-emergency-director-fired/index.html .
2	TIMES	Vick, K.	https://time.com/a-land-they-no-longer-recognize/	Vick, K. (n.d.). A Land They No Longer Recognized. <i>TIMES</i> . Retrieved from https://time.com/a-land-they-no-longer-recognize/ .
3	El Nuevo Día	Kuilan, G. R.	https://www.elnuevodia.com/noticias/gobierno/notas/aun-quedan-3646-estructuras-con-toldos-azules-a-casi-cinco-anos-del-azote-del-huracan-maria/	Kuilan, G. R. (2022, March 30). There are still 3,646 structures with blue awnings almost five years after the scourge of Hurricane Maria. <i>El Nuevo Día</i> . Retrieved from https://www.elnuevodia.com/noticias/gobierno/notas/aun-quedan-3646-estructuras-con-toldos-azules-a-casi-cinco-anos-del-azote-del-huracan-maria/ .
4	CBS News	Begnaud, D.	https://www.cbsnews.com/news/puerto-rico-health-care-system-collapse/	Begnaud, D. (2021, September 21). Health care system "collapse": Doctors, experts sound alarm over Puerto Rico's medical system. <i>CBS NEWS</i> . Retrieved from https://www.cbsnews.com/news/puerto-rico-health-care-system-collapse/ .
5	El Nuevo Día	Díaz, J.	https://www.elnuevodia.com/opinion/punto-de-vista/five-years-after-hurricane-maria-puerto-ricans-are-still-awaiting-energy-reliability-and-independence/	Díaz, J. (2022, September 29). Five years after Hurricane María, Puerto Ricans are still awaiting energy reliability and independence. <i>El Nuevo Día</i> . Retrieved from https://www.elnuevodia.com/opinion/punto-de-vista/five-years-after-hurricane-maria-puerto-ricans-are-still-awaiting-energy-reliability-and-independence/ .
6	Centro De Periodismo Investigativo	Díaz Torres, R. R.	https://periodismoinvestigativo.com/2022/03/few-changes-made-in-puerto-rico-to-access-health-information-and-services-when-the-next-hurricane-hits/	Díaz Torres, R. R. (2022, March 24). Few Changes Made in Puerto Rico to Access Health Information and Services in a Hurricane. <i>Centro De Periodismo Investigativo</i> . Retrieved from https://periodismoinvestigativo.com/2022/03/few-changes-made-in-puerto-rico-to-access-health-information-and-services-when-the-next-hurricane-hits/ .
7	Centro De Periodismo Investigativo	Almenas, V. C.	https://periodismoinvestigativo.com/2021/09/major-recovery-projects-to-be-paid-for-with-recovery-funds-moving-at-snails-pace/	Almenas, V. C. (2021, September 16). Major recovery projects to be paid for with recovery funds moving at snail's pace. <i>Centro De Periodismo Investigativo</i> . Retrieved from https://periodismoinvestigativo.com/2021/09/major-recovery-projects-to-be-paid-for-with-recovery-funds-moving-at-snails-pace/ .
8	Centro De Periodismo Investigativo	Mercado, E. M.	https://periodismoinvestigativo.com/2021/09/new-federal-audit-concludes-that-the-department-of-health-placed-the-lives-of-puerto-ricans-at-risk-during-hurricane-maria/	Mercado, E. M. (2021, September 16). New federal audit concludes that the Department of Health placed the lives of Puerto Ricans at risk during Hurricane María. <i>Centro De Periodismo Investigativo</i> . Retrieved from https://periodismoinvestigativo.com/2021/09/new-federal-audit-concludes-that-the-department-of-health-placed-the-lives-of-puerto-ricans-at-risk-during-hurricane-maria/ .
9	Centro De Periodismo Investigativo	Rodríguez Velázquez,	https://periodismoinvestigativo.com/2020/11/puerto-ricos-main-recovery-	Rodríguez Velázquez, V., & Díaz Torres, R. R. (2020, November 23). Puerto Rico's main recovery projects yet to get off the ground three years after Hurricane Maria.

		V., & Díaz Torres, R. R.	projects-yet-to-get-off-the-ground-three-years-after-hurricane-maria/	<i>Centro De Periodismo Investigativo</i> . Retrieved from https://periodismoinvestigativo.com/2020/11/puerto-ricos-main-recovery-projects-yet-to-get-off-the-ground-three-years-after-hurricane-maria/ .
10	Centro De Periodismo Investigativo	Pérez Sánchez, L. N.	https://periodismoinvestigativo.com/2020/10/a-personalized-fema-assistance-program-does-not-deliver-as-promised-2/	Pérez Sánchez, L. N. (2020, October 28). A Personalized Fema Assistance Program Does Not Deliver as Promised. <i>Centro De Periodismo Investigativo</i> . Retrieved from https://periodismoinvestigativo.com/2020/10/a-personalized-fema-assistance-program-does-not-deliver-as-promised-2/ .
11	Centro De Periodismo Investigativo	del Mar Quiles, C., & Moscoso, L.	https://periodismoinvestigativo.com/2020/09/recurrent-trauma-the-effects-of-climate-change-on-mental-health-in-puerto-rico/	del Mar Quiles, C., & Moscoso, L. (2020, September 11). Recurrent Trauma: The effects of Climate Change on Mental Health in Puerto Rico. <i>Centro De Periodismo Investigativo</i> . Retrieved from https://periodismoinvestigativo.com/2020/09/recurrent-trauma-the-effects-of-climate-change-on-mental-health-in-puerto-rico/ .
12	Centro De Periodismo Investigativo	Pérez Sánchez, L. N.	https://periodismoinvestigativo.com/2022/10/fema-paid-17-million-to-us-nonprofits-didnt-verify-if-they-met-their-obligations-after-hurricane-maria-in-puerto-rico/	Pérez Sánchez, L. N. (2022, October 5). Fema Paid \$17 Million to Us Nonprofits, Didn't Verify if They Met Their Obligations After Hurricane Maria in Puerto Rico. <i>Centro De Periodismo Investigativo</i> . Retrieved from https://periodismoinvestigativo.com/2022/10/fema-paid-17-million-to-us-nonprofits-didnt-verify-if-they-met-their-obligations-after-hurricane-maria-in-puerto-rico/ .
13	Centro De Periodismo Investigativo	Suárez, D.	https://periodismoinvestigativo.com/2022/09/us-commission-on-civil-rights-confirms-fema-discriminated-against-puerto-rico-after-maria/	Suárez, D. (2022, September 22). Us Commission on Civil Rights Confirms Fema Discriminated Against Puerto Rico After María. <i>Centro De Periodismo Investigativo</i> . Retrieved from https://periodismoinvestigativo.com/2022/09/us-commission-on-civil-rights-confirms-fema-discriminated-against-puerto-rico-after-maria/ .
14	The New York Times	Mazzei, P., & Armendariz, A.	https://www.nytimes.com/2018/02/06/us/fema-contract-puerto-rico.html	Mazzei, P., & Armendariz, A. (2018, February 6). FEMA Contract Called for 30 Million Meals for Puerto Ricans. 50,000 Were Delivered. <i>The New York Times</i> . Retrieved from https://www.nytimes.com/2018/02/06/us/fema-contract-puerto-rico.html .
15	Centro De Periodismo Investigativo	Padilla, J. W., Alemas, V. C., & Pascual, O. S.	https://periodismoinvestigativo.com/2022/09/fact-check-secretary-of-health-carlos-mellado-you-must-remember-that-those-hospitals-are-private/	Padilla, J. W., Alemas, V. C., & Pascual, O. S. (2022, September 23). [Fact Check] Secretary of Health Carlos Mellado: "You Must Remember That Those Hospitals Are Private." <i>Centro De Periodismo Investigativo</i> . Retrieved from https://periodismoinvestigativo.com/2022/09/fact-check-secretary-of-health-carlos-mellado-you-must-remember-that-those-hospitals-are-private/ .
16	Centro De Periodismo Investigativo	Encarnacion Martinez, J. M., Diaz Torres, R. R., & Maldonado, W.	https://periodismoinvestigativo.com/2022/10/luma-no-cumple-con-lo-que-dice-su-plan-para-emergencias/	Encarnacion Martinez, J. M., Diaz Torres, R. R., & Maldonado, W. (2022, October 7). Luma Does Not Comply with What Its Emergency Plan Says. <i>Centro De Periodismo Investigativo</i> . Retrieved from https://periodismoinvestigativo.com/2022/10/luma-no-cumple-con-lo-que-dice-su-plan-para-emergencias/ .
17	Centro De Periodismo Investigativo	Martinez Mercado, E.	https://periodismoinvestigativo.com/2022/09/salud-repite-durante-el-huracan-fiona-los-errores-de-maria-	Martinez Mercado, E. (2022, September 25). Health Repeats Maria's Mistakes During Hurricane Fiona with Patients Who Depend On Electricity. <i>Centro De Periodismo Investigativo</i> . Retrieved from

			con-pacientes-que-dependen-de-electricidad/	https://periodismoinvestigativo.com/2022/09/salud-repite-durante-el-huracan-fiona-los-errores-de-maria-con-pacientes-que-dependen-de-electricidad/ .
18	El Nuevo Día	Arroyo, M. P.	https://www.elnuevodia.com/noticias/locales/notas/oficina-del-contralor-senala-irregularidades-en-compras-de-equipos-para-el-control-del-covid-19/	Arroyo, M. P. (2022, October 12). Office of the Comptroller points out irregularities in purchases of equipment for the control of Covid-19. <i>El Nuevo Día</i> . Retrieved from https://www.elnuevodia.com/noticias/locales/notas/oficina-del-contralor-senala-irregularidades-en-compras-de-equipos-para-el-control-del-covid-19/ .
19	Politico	Gonzalez, G.	https://www.politico.com/newsletters/the-recast/2022/09/20/puerto-rico-hurricane-energy-crisis-00057731	Gonzalez, G. (2022, September 20). Puerto Rico's tragically foreseeable crisis. <i>Politico</i> . Retrieved from https://www.politico.com/newsletters/the-recast/2022/09/20/puerto-rico-hurricane-energy-crisis-00057731 .
20	Washington Post	Hernández, A. R., & MacMillan, D.	https://www.washingtonpost.com/nation/2021/11/16/puerto-rico-luma-energy/	Hernández, A. R., & MacMillan, D. (2021, November 16). An arrest warrant, a fugitive Ceo: Puerto Rico's effort to privatize its electrical grid is off to a rocky start. <i>Washington Post</i> . Retrieved from https://www.washingtonpost.com/nation/2021/11/16/puerto-rico-luma-energy/ .
21	NBC News	Timm, J. C.	https://www.nbcnews.com/politics/donald-trump/fact-check-trump-says-puerto-rico-got-92-billion-they-n1031276	Timm, J. C. (2019, July 18). Fact check: Trump says Puerto Rico got \$92 billion. They've seen only a fraction. <i>NBC News</i> . Retrieved from https://www.nbcnews.com/politics/donald-trump/fact-check-trump-says-puerto-rico-got-92-billion-they-n1031276 .
22	Washington Post	Bonilla, Y.	https://www.washingtonpost.com/outlook/how-puerto-rican-hurricanes-devastate-many-and-enrich-a-few/2017/09/22/78e7500c-9e66-11e7-9083-fbdfdf6804c2_story.html	Bonilla, Y. (2017, September 22). Why would anyone in Puerto Rico want a hurricane? Because someone will get rich. <i>Washington Post</i> . Retrieved from https://www.washingtonpost.com/outlook/how-puerto-rican-hurricanes-devastate-many-and-enrich-a-few/2017/09/22/78e7500c-9e66-11e7-9083-fbdfdf6804c2_story.html .
23	CNN	Sanchez, R.	https://edition.cnn.com/2020/01/29/us/puerto-rico-earthquakes-new-york-family/index.html	Sanchez, R. (2020, January 29). For Puerto Rico's earthquake families, trauma continues thousands of miles from home. <i>CNN</i> . Retrieved from https://edition.cnn.com/2020/01/29/us/puerto-rico-earthquakes-new-york-family/index.html .
24	NPR	Neuman, S.	https://www.npr.org/2022/09/20/1123846384/puerto-rico-hurricane-fiona-hurricane-maria-anniversary	Neuman, S. (2022, September 20). 5 Years on, failures from Hurricane Maria loom large as Puerto Rico responds to Fiona. <i>NPR</i> . Retrieved from https://www.npr.org/2022/09/20/1123846384/puerto-rico-hurricane-fiona-hurricane-maria-anniversary .
25	CNN	Tucker, E.	https://edition.cnn.com/2022/10/01/us/hurricane-fiona-puerto-rico-electrical-grid/index.html	Tucker, E. (2022, October 1). Behind the blackout triggered by Hurricane Fiona is a long-embattled history of Puerto Rico's weak and outdated electrical grid. <i>CNN</i> . Retrieved from https://edition.cnn.com/2022/10/01/us/hurricane-fiona-puerto-rico-electrical-grid/index.html .
26	NBC News	Acevedo, N.	https://www.nbcnews.com/news/latino/puerto-rico-hurricane-maria-anniversary-power-grid-rcna47729	Acevedo, N. (2022, September 18). Five years after Hurricane Maria, Puerto Rico's power crisis and a new storm revive grim memories. <i>NBC News</i> . Retrieved from https://www.nbcnews.com/news/latino/puerto-rico-hurricane-maria-anniversary-power-grid-rcna47729 .
27	Washington Post	Valdés Prieto, A.	https://www.washingtonpost.com/news/posteverything/wp/2018/06/05/i-saw-what-maria-did-to-puerto-rico-hospitals-the-death-toll-is-no-surprise-the	Valdés Prieto, A. (2018, June 5). I saw what Maria did to Puerto Rico's hospitals. The death toll is no surprise. <i>The</i>

			saw-what-maria-did-to-puerto-ricos-hospitals-the-death-toll-is-no-surprise/	<i>Washington Post</i> . Retrieved from https://www.washingtonpost.com/news/posteverything/wp/2018/06/05/i-saw-what-maria-did-to-puerto-ricos-hospitals-the-death-toll-is-no-surprise/ .
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Appendix VIII: Overview of Stakeholder Interview Participants

Table 8. *Table of Stakeholder Interview Participants*

#	OCCUPATION	GENDER	TITLE
1	Academic Local Government (Climate Change Committee)	Female	Professor of Public Health Law Lawyer
2	Local Government (Municipality San Juan)	Female	Epidemiologist
3	Local Government (Department of Health)	Male	Secretary of Health
4	NGO	Female	Climate Change Lawyer
5	Local Government (Department of Health)	Female	Puerto Rico Department of Health
6	Academic	Female	Professor Lawyer of International Human Rights
7	Centro De Periodismo Investigativo	Male	Journalist
8	Academic	Female	Professor of Public Health
9	Academic NGO	Male	Professor of Psychology Researcher Director
10	Local Government (Department of Health)	Female	Epidemiologist
11	Academic	Female	Director Lawyer
12	Local NGO	Female	Public Health Professional
13	Local NGO	Female	Founder & CEO
14	Federal Government	Male	Medical Epidemiology Consultant Public Health Advisor
15	Academic	Male	Professor of Psychology

Interview Instructions

INTRODUCTION

Welcome and thank you for volunteering to take part in this interview. My name is Sophie Mazur. I am collaborating with the UPR Resiliency Law Center for my Master thesis research at Utrecht University in the Netherlands. Thank you for taking the time to talk with me today. I'm here to learn about your experiences with disaster management after the concurrent disasters: hurricane *Maria* in 2017, the earthquake sequence in 2019, and the COVID-19 pandemic.

My focus for this research is twofold. Preliminary research shows that disruptions in cancer treatment have detrimental impacts on the survival rates and that breast cancer is one of the leading causes of death in PR. Additionally, we understand that medically fragile populations, such as cancer patients, are among the most vulnerable to disasters. First, it is to understand how disasters impact breast cancer patients' health outcomes in Puerto Rico and how disaster management can be improved to mitigate the negative health outcomes. Second, it is to understand the relationship between disaster management strategies and the social determinants of health (such as economic stability, built environment, access to healthcare and more). Therefore, I want to understand how disaster management exacerbates or perpetuates existing social and structural determinants of health and further compounds the negative health outcomes for breast cancer patients.

The goal of this research is to provide recommendations on how DM can account for these disparities in health outcomes to mitigate the influence of the social determinants of health and disasters.

INSTRUCTIONS

The interview should take no more than 60 minutes. There are no right or wrong answers, or desirable or undesirable answers. I would like you to feel comfortable saying what you really think and how you really feel.

CONSENT FORM INSTRUCTIONS

Before we get started, please take a few minutes to read and digitally sign the consent form. Please let me know if you have questions.

[Interviewee read and digitally sign consent form]

RECORDING INFORMATION

If it is okay with you, I will be recording our conversation. The purpose of this is so that I will be able to attentively listen to you. I assure you that all your responses will remain confidential, and I will compile the responses without any reference to individuals.

Before we begin the interview, do you have any questions? *[Discuss questions]*

If any questions (or other questions) arise at any point in this interview, you can feel free to ask them at any time. I would be more than happy to answer your questions.

Interview Guide

- 1. Let's begin with introductions (name, age, origin).**
- 2. Can you please explain what your academic and professional background?**
 - How is your work (or previous work) connected to disaster management and the social determinants of health?
- 3. How were you impacted by, if any, of the following disasters: Hurricane Maria, Earthquake Sequence 2020, COVID-19?**
 - Personally, or professionally?

4. How did your work connect directly or indirectly to these disasters?

We will be using the social determinants of health approach to understand which structural factors influence individual's health outcomes. Thereby, looking at education, healthcare, economic stability, neighborhood and built environment, and social and community context. This line of questioning will be about how these factors influenced health outcomes for Puerto Ricans prior to the disasters.

5. Could you explain how education (level, quality, and access to) influences one's health outcomes in PR?

- Do you think there is a relationship between education and health outcomes in PR?
- Can you explain how and why?
- How have governmental policies impacted education quality and access?

6. How does one's economic stability (employment, food security, housing instability and poverty) influence one's health outcomes in PR?

- Almost 43.1% of the population lives under poverty conditions
- Jones Act?
- Tax exemptions
- Emigration?

7. What is the relationship between neighborhood and built environment and health outcomes in PR?

- Food deserts?
- Safety, water, and air sanitation, and more
- Poor quality of infrastructure & environment

8. How does access to and quality of healthcare in PR influence one's health outcomes?

- Medicaid & Medicare?
- PROMESA?
- Emigration of doctors

9. What role does social and cultural context in PR play in one's health outcomes?

Emigration

- Displacement
- Decision-making processes
- Distrust in the government

10. How do federal and local governance influence the social determinants of health?

- Jones Act
- PROMESA
- La Reforma
- Plan Vital

11. After each disaster - Hurricane Maria, the earthquake sequence and COVID-19: Can you please explain how the disaster impacted in the healthcare system in PR?

- How did it impact specialized breast cancer care?

12. How did the federal and local respond to each of these disasters?

- What did they do or not do?
- FEMA?
- Department of Public Health?

13. How did disaster management strategies (preparedness, relief, and recovery) respond to these disasters?

- Federal, local, NGOS?
- What did they do or not do?

- 14. How did the disasters further exacerbate the influence of the social determinants of health?**
- 15. How does the relationship between the U.S. and PR influence the social determinants of health?**
 - Second-class citizenship
 - Differential governance
 - Debt
- 16. Who is responsible to ensure that disaster management is effective and equitable?**
- 17. How do you think disaster management can be improved to mitigate the influence of the social determinants of health?**
 - Representation in government
 - Forums
 - Statehood?
- 18. Who do you think is responsible and able to enact these changes in policy?**
- 19. Is there anything else you would like to share which we have not yet discussed?**
- 20. Is there anything you think I have missed?**
- 21. Can you make any other recommendations (resources, contacts of stakeholders) that I should investigate?**

Appendix X: Participant Information Sheet



Participant Information Sheet



Understanding the Impacts of Disasters on Specialized Breast Cancer Care in Puerto Rico

Incorporating Social Determinants of Health in Disaster Management Policy

INTRODUCTION

My name is Sophie Mazur. I am Research Fellow at the University of Puerto Rico Rio Piedras Resiliency Law Center (UPR RLC), and I am also pursuing my MSc in Sustainable Development with a specialization in International Development at Utrecht University, in the Netherlands.

I am currently conducting transdisciplinary research on the impact of disaster management (DM) on specialized breast cancer care from a social determinants of health (SDOH) perspective. Specifically, looking at how the needs of breast cancer patients after concurrent and compounding disasters: Hurricane *Maria* in 2017, the earthquake sequence in 2020 and the COVID-19 pandemic were impacted.

WHAT IS THE PURPOSE OF THIS RESEARCH?

This research will explore how current disaster management strategies can create and reinforce existing social determinants of health (such as economic stability, access, and availability of healthcare and more), specifically for specialized breast cancer care patients. Disaster management policies and research is mostly focused on the short-term health impacts after disasters and do not acknowledge the embedded health inequities. Therefore, through analyzing disaster management policies from a social determinants of health perspective, existing inequities can be adjusted for and incorporated in policies to minimize their effect. It will contribute to practical deliverables by providing recommendations on how the social determinants of health and breast cancer care can be incorporated in disaster management strategies.

WHY HAVE YOU BEEN INVITED TO TAKE PART?

You have been invited to participate because I would like to gain insight from key stakeholders involved directly or indirectly in DM policy. Given your experience, your views, opinions, and perceptions are invaluable as part of this research.

WHAT DO I HAVE TO DO?

Participation in this research is entirely voluntary. You will be asked for a one-time commitment of an (online or face-to-face) interview. The interview should take approximately 45-60 minutes to complete.

WHAT HAPPENS TO THE INFORMATION FROM THE INTERVIEW?

You will not be able to be identified or identifiable in any reports or publications. If you agree, I will record our conversation. The purpose of this is so that I will be able to attentively listen to you and listen back for details. The results will be used for the purpose of the master's degree dissertation and report for the UPR RLC.

WHAT ARE THE POSSIBLE BENEFITS OF TAKING PART?

While there are no immediate benefits for those willing to participate in this research, it is hoped that this research will have a beneficial impact by starting the conversation with key stakeholders on how to improve DM policy to incorporate the SDOH and long-term specialized cancer care.

WHO IS ORGANIZING AND FUNDING THE RESEARCH?

This study is self-funded by the researcher Sophie Mazur. The project is supported by the UPR Resiliency Law Center, involving Dr. Prof. Adi Martinez as well as Utrecht University, involving Prof. Ajay Bailey.

CONTACT FOR FURTHER INFORMATION

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Thank you for reading this information - please feel free to contact me if you have any questions.

Informed Consent Form

Formulario de consentimiento informado

<i>Por favor marque las casillas correspondientes.</i>	Sí	No
PARTICIPANTES EN LA ENTREVISTA:		
He leído y entendido el propósito de la entrevista que se llevará a cabo en [mm.dd.yyyy]. He podido hacer preguntas y mis preguntas han sido respondidas a mi entera satisfacción.	<input type="checkbox"/>	<input type="checkbox"/>
Consiento voluntariamente ser participante de esta entrevista y entiendo que puedo negarme a responder preguntas y puedo retirarme de la entrevista en cualquier momento, sin tener que dar una razón.	<input type="checkbox"/>	<input type="checkbox"/>
Entiendo que participar en la entrevista implica responder preguntas sobre mis experiencias personales y profesionales después de los desastres concurrentes en PR (el huracán María, la secuencia del terremoto en 2020 y el COVID-19). Se harán preguntas sobre temas como la gobernanza federal y local, los determinantes sociales de la salud y las barreras para los pacientes con cáncer de mama.	<input type="checkbox"/>	<input type="checkbox"/>
Entiendo que la entrevista ocurrirá en línea o cara a cara. Se grabará en audio y esta grabación se transcribirá como texto.	<input type="checkbox"/>	<input type="checkbox"/>
USO DE LA INFORMACIÓN EN LA ENTREVISTA:		
Entiendo que la información que proporcione se utilizará para la tesis de maestría de la investigadora para la Universidad de Utrecht y en colaboración con la organización, UPR Resiliency Law Center y Connecting Paths.	<input type="checkbox"/>	<input type="checkbox"/>
Entiendo que la información personal recopilada que puede identificarme, como [p. mi nombre], no será compartida más allá de la investigadora y sus asesores.	<input type="checkbox"/>	<input type="checkbox"/>
FIRMAS:		
<div style="display: flex; justify-content: space-between; align-items: flex-end;"> <div style="width: 30%; border-top: 1px solid black; margin-bottom: 5px;"></div> <div style="width: 30%; border-top: 1px solid black; margin-bottom: 5px;"></div> <div style="width: 30%; border-top: 1px solid black; margin-bottom: 5px;"></div> </div> <div style="display: flex; justify-content: space-between;"> Nombre de la participante [impreso] Firma Fecha </div>		
<p>He proporcionado con precisión la hoja de información al participante potencial y, en la medida de mis posibilidades, me aseguré de que la participante comprenda que está consintiendo libremente.</p> <div style="display: flex; justify-content: space-between; align-items: flex-end; margin-top: 10px;"> <div style="width: 30%; border-top: 1px solid black; margin-bottom: 5px;"></div> <div style="width: 30%; border-top: 1px solid black; margin-bottom: 5px;"></div> <div style="width: 30%; border-top: 1px solid black; margin-bottom: 5px;"></div> </div> <div style="display: flex; justify-content: space-between;"> Nombre de la investigadora [impreso] Firma Fecha </div>		
CONTACT DETAILS FOR FURTHER INFORMATION: / DATOS DE CONTACTO PARA MÁS INFORMACIÓN:		
<p>Investigadora: Sophie Mazur, MSc +31 6 39 85 42 52 s.b.mazur@students.uu.nl</p>		

Focus Group Discussion Instructions | Instrucciones de la entrevista

INTRODUCTION | INTRODUCCIÓN

Welcome and thank you for volunteering to take part in this interview. My name is Sophie Mazur. I am collaborating with the UPR Resiliency Law Center for my Master thesis research. Thank you for taking the time to talk with me today. I'm here to learn about your experience after one or more of the following disasters: hurricane *Maria*, the 2020 earthquakes and COVID-19. The goal today is to understand how the disasters have impacted your access to healthcare and breast cancer treatment.

Bienvenido y gracias por ofrecerse como voluntario para participar en esta entrevista. Mi nombre es Sophie Mazur. Estoy colaborando con el Centro de Derecho de Resiliencia de la UPR para mi investigación de tesis de maestría. Gracias por tomarse el tiempo para hablar conmigo hoy. Estoy aquí para conocer su experiencia después de uno o más de los siguientes desastres: el huracán María, los terremotos de 2020 y el COVID-19. El objetivo de hoy es comprender cómo los desastres han afectado su acceso a la atención médica y al tratamiento del cáncer de mama.

INSTRUCTIONS | INSTRUCCIONES

The interview should take no more than 2 hours. I will be the moderator in today's discussion. Working together with me today from UPR is [name] as the translator and Mabel Lassalle from Connecting Paths. [Name] will be supporting the research by translating the questions from English to Spanish.

The format we are using is a focus group discussion. A focus group is a conversation that focuses on specific questions in a safe and confidential environment. I will guide the conversation by asking questions that each of you can respond to. Please allow each other the time and space to respond to each question. There are no right or wrong answers to these questions. If you wish, you can also respond to each other's comments, like you would in an ordinary conversation.

La entrevista no debe tomar más de 2 horas. Seré el moderador en la discusión de hoy. Trabajando conmigo hoy de la UPR está [nombre] como traductora y Mabel Lassalle de Conectando Caminos. [Nombre] apoyará la investigación traduciendo las preguntas del inglés al español.

El formato que estamos usando es una discusión de grupo focal. Un grupo de enfoque es una conversación que se enfoca en preguntas específicas en un ambiente seguro y confidencial. Guiaré la conversación haciendo preguntas que cada uno de ustedes pueda responder. Permítanse unos a otros el tiempo y el espacio para responder a cada pregunta. No hay respuestas correctas o incorrectas a estas preguntas. Si lo desea, también puede responder a los comentarios de los demás, como lo haría en una conversación normal.

CONSENT FORM INSTRUCTIONS | INSTRUCCIONES DEL FORMULARIO DE CONSENTIMIENTO

Before we get started, please take a few minutes to read and digitally sign the consent form. Please let me know if you have questions. *[Interviewee read and digitally sign consent form]*

Antes de comenzar, tómese unos minutos para leer y firmar digitalmente el formulario de consentimiento. Por favor hágame saber si tiene preguntas. [El entrevistado lee y firma digitalmente el formulario de consentimiento]

RECORDING INFORMATION | INFORMACIÓN DE REGISTRO

If it is okay with you, I will be recording our conversation. The purpose of this is so that I will be able to attentively listen to you. I assure you that all your responses will remain confidential, and I will compile the responses without any reference to individuals.

Si te parece bien, grabaré nuestra conversación. El propósito de esto es para que pueda escucharte atentamente. Le aseguro que todas sus respuestas se mantendrán confidenciales y compilaré las respuestas sin ninguna referencia a individuos.

Before we begin the interview, do you have any questions? *[Discuss questions]*

Antes de comenzar la entrevista, ¿tiene alguna pregunta? [Discutir preguntas]

If any questions (or other questions) arise at any point in this discussion, you can feel free to ask them at any time. I would be more than happy to answer your questions.

Si surge alguna pregunta (u otras preguntas) en algún momento de esta entrevista, puede hacerlas en cualquier momento. Estaré más que feliz de responder a sus preguntas.

Focus Group Discussion Guide | *Guía de entrevista*

Introduction Questions | *Preguntas de introducción*

1. **Let's begin with introductions (name, age, origin).**
Comencemos con las presentaciones (nombre, edad, origen).
2. **Where do you live? Can you describe your home and neighborhood?**
¿Dónde vives? ¿Puede describir su casa y su vecindario?
 - **Are you married or single?**
¿Está casado o soltero?
 - **With whom do you live?**
¿Con quién vives?
 - **Do you have any children?**
¿Tienes hijos?
 - **Do you have a permanent place to live or are you worried about your housing situation?**
¿Tiene un lugar permanente para vivir o está preocupado por su situación de vivienda?
 - **If you do not have a house, where are you currently staying (i.e., with others, hotel, shelter, outside, etc.?)**
Si no tiene una casa, ¿dónde se hospeda actualmente (es decir, con otras personas, hotel, refugio, afuera, etc.?)
3. **What is your level of education?**
¿Cuál es su nivel de educación?
 - **Did you finish high school?**
¿Terminaste la escuela secundaria?
 - **Did you go to university?**
¿Ir a la universidad?
 - **Why or why not did you finish your high school education?**
¿Por qué o por qué no terminó su educación secundaria?
 - **Work?** (¿Trabaja?) | **Family reasons?** (Razones familiares?) | **Other?** (¿Otro?)
4. **Are you currently employed? Why or why not?**
¿Está trabajando actualmente? ¿Por qué o por qué no?

- **If so, what kind of work do you do?**
Si es así, ¿qué tipo de trabajo hace?
 - **If not, did you have to stop working because of your diagnosis?**
Si no, ¿tuvo que dejar de trabajar debido a su diagnóstico?
 - **[If applicable] Has your recent job change created financial stress?**
[Si corresponde] ¿Su reciente cambio de trabajo le ha creado estrés financiero?
5. **Before the disasters, did you worry about making ends meet at the end of the month?**
¿Se preocupó por llegar a fin de mes a fin de mes?
- **Do you have financial problems?**
¿Tuviste problemas económicos?
 - **Do you feel able to pay your rent and food?**
¿Se sintió capaz de pagar el alquiler y la comida?
 - **Do you have concerns about being able to afford all the expenses for your treatment?**
¿Le preocupaba poder pagar todos los gastos de su tratamiento?
6. **How are you eating? What do you eat?**
¿Cómo estás comiendo? ¿Que es lo que tú comes?
7. **Before the disasters, did you find yourself worrying about how you would put food on the table?**
Antes de los desastres, ¿Se encontró preocupado acerca de cómo pondría la comida en la mesa?
8. **Have you ever used a food bank or other community resource?**
¿Ha utilizado alguna vez un banco de alimentos u otro recurso comunitario?

Diagnosis & Treatment | *Diagnóstico y tratamiento*

I understand that you were diagnosed with breast cancer the next questions will be regarding your diagnosis and treatment.

Entiendo que le diagnosticaron cáncer de mama, las próximas preguntas serán sobre su diagnóstico y tratamiento.

9. **Could you share what stage and when you were diagnosed with cancer?**
¿Podría compartir en qué etapa y cuándo le diagnosticaron cáncer?
10. **What kind of treatment have you received for your diagnosis?**
¿Qué tipo de tratamiento ha recibido para su diagnóstico?
- **Physical treatment**
Tratamiento físico
 - **Mental treatment**
Tratamiento mental
11. **Where do you receive treatment (i.e., hospital, local clinic, etc.)?**
¿Dónde recibe tratamiento (es decir, hospital, clínica local, etc.)?
- **How do you get there?**
¿Cómo se llega allí?
 - **How far is it?**
¿Que tan lejos está?

- **If you go by car, do you drive yourself?**
Si vas en coche, ¿conduces tú mismo?
- **If you go by public transport, what does it cost?**
Si vas en transporte público, ¿cuánto cuesta?

12. Before the disasters, did lack of reliable transportation kept you from medical appointments, meetings, work or from getting things needed for daily living?
Antes de los desastres, ¿la falta de transporte confiable le ha impedido asistir a citas médicas, reuniones, trabajar o conseguir las cosas necesarias para la vida diaria?

13. What type of insurance do you have?
¿Qué tipo de seguro tiene?

- **Does it cover your breast cancer treatment?**
¿Cubre su tratamiento de cáncer de mama?
- **If not, what is covered and not covered?**
Si no, ¿qué está cubierto y qué no está cubierto?
- **If you must pay out-of-pocket, how do you pay for your treatment?**
Si debe pagar de su bolsillo, ¿cómo paga su tratamiento?

14. After your diagnosis, how did you feel?
Después de su diagnóstico, ¿cómo se sintió?

- **Were you sad? Did you need to talk to anyone? Did you have trouble sleeping?**
¿Estabas triste? ¿Necesitabas hablar con alguien? ¿Tuviste problemas para dormir?

15. Before the disasters, did you experience stress from your diagnosis?
¿Antes de los desastres, ¿experimentó estrés por su diagnóstico?

- **What caused your stress?**
¿Qué causó su estrés?

16. Do you have relatives or any close friends if you need help?
¿Tiene familiares o amigos cercanos si necesita ayuda?

Experience After Disasters | *Experiencia después de los desastres*

As aforementioned, this research will focus on the impacts of three major disasters: (1) Hurricane Maria, 2017, (2) the Earthquakes Sequence, 2020 and (3) COVID-19 pandemic. The next line of questions will be regarding your experience after these disasters and the impact on your treatment.

Como se mencionó anteriormente, esta investigación se centrará en los impactos de tres grandes desastres: (1) el huracán María de 2017, (2) la secuencia de terremotos de 2020 y (3) la pandemia de COVID-19. La siguiente línea de preguntas será sobre su experiencia después de estos desastres y el impacto en su tratamiento.

17. How did the disasters impact your cancer treatment?

¿Cómo afectaron los desastres a su tratamiento contra el cáncer?

- **What made receiving your treatment difficult (i.e., power outage, loss of transportation, etc.)**
¿Qué dificultó recibir su tratamiento (es decir, apagón, pérdida de transporte, etc.)
- **[If applicable], how long was your treatment delayed for?**
[Si corresponde], ¿cuánto tiempo se retrasó su tratamiento?

18. Did your health insurance coverage change?
¿Cambió su cobertura de seguro médico?

- **If so, how?**
Si es así, como?

19. Did you receive any help from the federal or local government programs or local community organizations?

¿Recibió alguna ayuda de los programas del gobierno federal o local o de las organizaciones comunitarias locales?

- **What kind of help did you receive?**
¿Qué tipo de ayuda recibió?
- **What prevented you from receiving help from programs?**
¿Qué le impidió recibir ayuda de los programas?

20. Did you experience heightened negative emotions after the disasters? Such as sadness, loneliness, or stress?

¿Experimentó emociones negativas intensas después de los desastres? ¿Tales como la tristeza, la soledad o el estrés?

21. Did your housing situation change after the disasters?

¿cómo cambió su situación de vivienda después del los desastres?

22. How did your economic situation change after the disasters (i.e., work, income, etc.).

¿Cómo cambió su situación económica después del los desastres (es decir, trabajo, ingresos, etc.).

23. What kind of help would you like to have received after the disasters?

¿Qué tipo de ayuda le gustaría haber recibido después de los desastres?

Closing Questions | Preguntas de cierre

24. Is there anything else you would like to share which we have not yet discussed?

¿Hay algo más que le gustaría compartir que aún no hayamos discutido?

Appendix XIII: Informed Consent Form (Breast Cancer Patients)

Informed Consent Form

Formulario de consentimiento informado

<i>Por favor marque las casillas correspondientes.</i>	Sí	No
PARTICIPANTES EN LA ENTREVISTA:		
He leído y entendido el propósito de la entrevista que se llevará a cabo en 09.05.22. He podido hacer preguntas y mis preguntas han sido respondidas a mi entera satisfacción.	<input type="checkbox"/>	<input type="checkbox"/>
Consiento voluntariamente a ser participante en esta entrevista y entiendo que puedo negarme a responder preguntas y puedo retirarme de la entrevista en cualquier momento, sin tener que dar una razón de ser el caso.	<input type="checkbox"/>	<input type="checkbox"/>
Entiendo que participar en la entrevista implica responder preguntas sobre mis experiencias personales y profesionales después de los desastres concurrentes en Puerto Rico (el huracán María, las secuencias de terremotos en el 2020 y el COVID-19). Se harán preguntas sobre temas como la gobernanza federal y local, las determinantes sociales de la salud y las barreras para los pacientes con cáncer de mama.	<input type="checkbox"/>	<input type="checkbox"/>
Entiendo que la entrevista ocurrirá en línea o de manera presencial. Se grabará en audio y esta grabación se transcribirá luego como texto.	<input type="checkbox"/>	<input type="checkbox"/>
USO DE LA INFORMACIÓN EN LA ENTREVISTA:		
Entiendo que la información que proporcione se utilizará para la tesis de maestría de la investigadora Sophie Mazur para la Universidad de Utrecht y en colaboración con la organización, "UPR Resiliency Law Center" y "Connecting Paths".	<input type="checkbox"/>	<input type="checkbox"/>
Entiendo que la información personal recopilada que puede identificarme, como [ej. mi nombre], no será compartida más allá de la investigadora y sus asesores.	<input type="checkbox"/>	<input type="checkbox"/>
FIRMAS:		
<div style="display: flex; justify-content: space-between; align-items: flex-end;"> <div style="width: 30%; border-top: 1px solid black; margin-bottom: 5px;"></div> <div style="width: 30%; border-top: 1px solid black; margin-bottom: 5px;"></div> <div style="width: 30%; border-top: 1px solid black; margin-bottom: 5px;"></div> </div> <div style="display: flex; justify-content: space-between;"> Nombre de la participante [impreso] Firma Fecha </div>		
He proporcionado con precisión la hoja de consentimiento informado a la participante potencial y, en la medida de mis posibilidades, me aseguraré de que la participante comprenda que está consintiendo libremente.		
<div style="display: flex; justify-content: space-between; align-items: flex-end;"> <div style="width: 30%; border-top: 1px solid black; margin-bottom: 5px;"></div> <div style="width: 30%; border-top: 1px solid black; margin-bottom: 5px;"></div> <div style="width: 30%; border-top: 1px solid black; margin-bottom: 5px;"></div> </div> <div style="display: flex; justify-content: space-between;"> Nombre de la investigadora [impreso] Firma Fecha </div>	<div style="display: flex; justify-content: center; align-items: center;"> <div style="border-top: 1px solid black; width: 100%;"></div> </div>	<div style="display: flex; justify-content: center; align-items: center;"> 09/05/22 <div style="border-top: 1px solid black; width: 100%;"></div> </div>



Ethical Consent Approval Statement

Understanding the Impacts of Disasters on Specialized Cancer Care in Puerto Rico
Incorporating Social Determinants of Health in Disaster Management Strategies

Connecting Paths PR, Inc.

1057 Calle Gonzalez Segundo Piso
00925 San Juan, Puerto Rico
(787) 945-2333
connectingpaths.adm@gmail.com

June 8th, 2022

RE: Understanding the Impacts of Disasters on Specialized Cancer Care in Puerto Rico

Dear Sophie Mazur,

I am pleased to inform you that the above referenced request for Ethical Approval of Research has been approved by Connecting Paths PR, Inc.

We have reviewed the interview questions, procedures and research proposal and granted full ethical approval from the date of this letter. This approval is valid until September 15th, 2022. Any changes in the procedures affecting the interaction with the participants should be reported to Connecting Path PR, Inc. An informed consent form and information sheet must be provided to participants in all circumstances.

We wish you great success in the research.

Sincerely,

A handwritten signature in blue ink that reads "Maria I. Lassalle".

Maria I. Lassalle
Founder, CEO
Connecting Paths PR, Inc.
Embracing Change-Transforming Lives