

Copyright
by
Charmelis A. Reyes Cruz
2023

**The Report Committee for Charmelis A. Reyes Cruz
Certifies that this is the approved version of the following Report:**

**Causes of Displacement: A look into the State of Puerto Rico's Housing
Crisis Before, During, and After Hurricane Maria**

**APPROVED BY
SUPERVISING COMMITTEE:**

Jacob A. Wegmann, Supervisor

Alex Karner, Co-Supervisor

**Causes of Displacement: A look into the State of Puerto Rico's Housing
Crisis Before, During, and After Hurricane Maria**

by

Charmelis A. Reyes Cruz

Report

Presented to the Faculty of the Graduate School of
The University of Texas at Austin
in Partial Fulfillment
of the Requirements
for the Degree of

Master of Science in Community and Regional Planning

**The University of Texas at Austin
May 2023**

Acknowledgements

I would like to express my gratitude to everyone who has supported me throughout the course of this paper. First and foremost, I would like to thank my supervising committee, especially Dr. Jacob Wegmann, for his guidance, feedback, and support throughout the entire process. I would like to give a special thanks to Bianca Graulau for inspiring this report and for all her work towards informing people about Puerto Rico's situation. I would also like to thank my friends and family for their unwavering support and encouragement throughout my academic career. Without their love and support, this research project would not have been possible. Finally, I would like to thank all the people and organizations that contributed to the recovery of Puerto Rico after the impact of Hurricane María and who continuously work towards improving living conditions in the island.

Abstract

Causes of Displacement: A look into the State of Puerto Rico's Housing Crisis Before, During, and After Hurricane Maria

Charmelis A. Reyes Cruz, MSCRP

The University of Texas at Austin, 2023

Supervisor: Jacob Wegmann, Alex Karner

The displacement of Puerto Rican people due to social, political, and economic factors has created a cycle of disrepair, where migration trends due to precarious economic conditions prevent economic growth. The housing market on the island has also been affected, resulting in more people losing their homes or becoming rent-burdened. This report aims to understand Puerto Rico's socioeconomic situation, taking into consideration the impact of Hurricane Maria. To achieve this, an extensive literature review was conducted using reports from governmental agencies and nonprofit organizations, academic research papers, and news articles. US Census and American Community Survey data were also used to examine trends in the economy, demographics, and housing over the study period. The report is divided into three chapters: pre-storm conditions, storm impact, and post-storm conditions.

The research found that Puerto Rico's economic crisis was triggered by changes in tax law that repealed incentives for foreign companies to locate on the island, leading to a shift from manufacturing to a service-based economy. This resulted in younger families migrating due to a lack of alternatives, with Hurricane Maria worsening the situation by damaging the island's physical and economic infrastructure and prompting a population relocation. Recovery efforts have focused on attracting foreign investment rather than addressing preexisting issues, resulting in slow progress. Despite this, there have been some improvements in socioeconomic, demographic, and housing conditions.

Table of Contents

List of Tables	9
List of Figures	10
Introduction.....	11
Brief Historical Background.....	12
Implication of Puerto Rico's Status as a Commonwealth	13
Twenty-first Century Political Challenges	14
CHAPTER 1: PRE-HURRICANE MARÍA PERIOD (2000-2016)	16
1.1 The Economy and the Job Market	16
1.2 Population Change and Migration Patterns	19
1.3 Housing Markets.....	22
1.3.1 The Sales Housing Market.....	22
1.3.2 The Rental Housing Market.....	25
CHAPTER 2: HURRICANE MARÍA’S IMPACT (2017-2018).....	28
2.1 Hurricane María	28
2.1.1 Hurricanes Irma and Maria	28
2.1.2 Impact on the Infrastructure.....	29
2.1.3 Impact on the Economy	30
2.2 Hurricane María’s Impact on Housing	33
2.2.1 Impact on Housing.....	33
2.2.2. Housing Recovery Assistance	37

2.3 Challenges and Opportunities	40
CHAPTER 3: POST HURRICANE MARÍA (2018 – PRESENT)	41
3.1 Recovery Efforts	41
3.1.1 The CDBG-DR Action Plan	41
3.1.2 Nonprofit Organizations	43
3.1.3 Informal Reconstruction	44
3.1.4 Opportunity Zones and Foreign Investment	45
3.2 Effects on Puerto Rico’s Social-Economic Structures.....	47
3.2.1 Economy and Job Market	47
3.2.2 Population and Households	49
3.3 Effects on the Housing Stock.....	50
3.3.1 The Sales Housing Market.....	50
3.3.2 The Rental Housing Market.....	51
DISCUSSION.....	53
CONCLUSION	55
REFERENCES.....	56

List of Tables

Table 1: Economic Indicators for Puerto Rico.....	19
Table 2: Housing Stock Conditions in San Juan (2000, 2010)	24
Table 3: Federal Disaster Recovery Aid	32
Table 4: FEMA Reported Home Damages by Owners and Renters.....	38
Table 5: CDBG-DR Action Plan Programs and Assignments.....	42

List of Figures

Figure 1: the Old San Juan, Puerto Rico.....	12
Figure 2: 2019 Protest for Gov. Ricardo Rosselló resignation	14
Figure 3: Sector Growth in Puerto Rico, Percent Change, 2000 to August 2017	17
Figure 4: Total Population in Puerto Rico	20
Figure 5: Population Ages for 2000, 2010, and 2016.....	21
Figure 6: Affordable Rental Units Gaps by Income Breaks for 2016	27
Figure 7: Hurricane Irma Trajectory and Cone	28
Figure 8: Hurricane María Trajectory and Cone	29
Figure 9: Aerial view of the flooded neighborhood of Juana Matos after Hurricane Maria	33
Figure 10: Housing vacancy rates before and after Hurricane María.....	35
Figure 11: Median Home Value and Vacant Homes, 2010 – 2021	36
Figure 12: Percent change of average home value by municipality (2016 to 2018)	36
Figure 13: Percent change of vacancy by municipality (2016 to 2018)	37
Figure 14: Houses with blue tarps in Puerto Rico after Hurricane María	39
Figure 15: Map of Opportunity Zones in Puerto Rico.....	46
Figure 16: Job Sector Growth in Puerto Rico, Percent Change, 2001 to August 2019....	49
Figure 17: Affordable Rental Units Gaps by Income Breaks for 2020	52

Introduction

Displacement is a significant issue affecting communities worldwide, mainly impacting minority groups and vulnerable populations. For this report, displacement will be defined as the relocation of individuals and families from their homes, driven (directly or indirectly) by changes in the physical, social, or economic environments (UC Berkeley, n.d.). Events that can trigger displacement are mostly related to social-economic decisions or the outcomes of those decisions made by people with a high social standing or political power. Events such as rent increases, evictions, gentrification, urban renewal, change in policies or the economy, and the response to natural disasters can trigger displacement in communities. Displacement can have significant and long-lasting impacts on individuals and communities, including loss of livelihoods, disruption of social and cultural ties, and increased vulnerability to poverty and exploitation.

Puerto Rico's citizens have been experiencing displacement for social, political, and economic reasons, often resulting in outmigration. Since 2006 Puerto Rico has been facing an economic downfall caused by a combination of factors, including Puerto Rico's colonial status and government mismanagement, which led to excessive public debt and economic collapse. The administration was forced to implement austerity measures that cut social and infrastructure spending. However, the effects of the financial crisis intensified after Hurricane Maria, a Category Four storm that directly hit the island on September 21st, 2017. The aftermath of this weather event was devastating to the physical and economic integrity of Puerto Rico, leaving it in a more vulnerable position than it already was. This event marks a shift in displacement dynamics internally (within the island) and externally (migration patterns). The displacement of people caused by Hurricane Maria and the ongoing crisis aggravated the housing affordability crisis for the local citizens, mainly for the 40% living under the US standard poverty rate. According to Ayuda Legal Puerto Rico, a nonprofit that provides education and legal resources to communities, economic insecurity and a lack of job opportunities are the main drivers of displacement and outmigration (Ayuda Legal Puerto Rico, 2020).

For these reasons, this report will explore the leading causes and consequences of displacement in Puerto Rico and its effects on affordable housing. The report is divided into three parts: socioeconomic and housing conditions of the island before Hurricane Maria (before 2017); the effects and recovery efforts of the storm (2017 – 2018); and socioeconomic and housing conditions in the island during the years after the atmospheric event (after 2018). At the end of the report, we will discuss the intersectionality of displacement and affordable housing and identify some recommendations and conclusions.

BRIEF HISTORICAL BACKGROUND



Figure 1: the Old San Juan, Puerto Rico

Source: Frankstravelbox.com

Puerto Rico (PR) is a 100-mile-long by 35-mile-wide tropical island archipelago in the Caribbean Sea. It comprises 78 municipalities, with San Juan as its capital. Christopher Columbus arrived on the island in 1493 on his second voyage to the Americas. Puerto Rico remained under Spanish governance up until the nineteenth century. Due to the strong

revolutionary and independence movement, Spain granted the island autonomy in 1897. This status did not last long, as Spain lost the Spanish-American War in 1898 and had to hand over Guam and Puerto Rico to the United States (US) as dictated by the Treaty of Paris (Discover PR, 2022). Since then, the US Congress has held decision-making power over Puerto Rico. In 1917 Congress granted US citizenship to people born in Puerto Rico, mainly to recruit soldiers for World War I (History, 2009). Whatever its original intent, this decree allowed the locals to travel between the Island and US mainland, and in some cases, to settle on the mainland without restrictions. Currently, the island's status is as a US Commonwealth. In 1950 the US Congress acted again, passing the Puerto Rico Federal Relations Act, which allowed Puerto Rico to adopt its own constitution and elect a governor. However, Congress still holds veto power over the Puerto Rican Legislature.

IMPLICATION OF PUERTO RICO'S STATUS AS A COMMONWEALTH

Puerto Rico's status as a commonwealth has significant implications for the island's political, economic, and social landscape. As a U.S. territory, Puerto Rico is subject to federal laws and regulations but does not have the same rights and privileges as U.S. states. This unique political status has led to ongoing debates over Puerto Rico's political future and its relationship with the United States.

One major implication of Puerto Rico's status as a commonwealth is its lack of voting representation in the U.S. Congress. Puerto Ricans are U.S. citizens but cannot vote in presidential elections or send voting representatives to Congress. This lack of political representation has limited Puerto Rico's ability to advocate for its interests and has contributed to a sense of disenfranchisement among many Puerto Ricans.

Another significant implication is its limited ability to address economic and social challenges. Puerto Rico is not a sovereign nation and does not have the same ability to negotiate trade deals, secure international aid, or address its debt crisis as independent countries do. Additionally, Puerto Rico's political status has contributed to unequal treatment in federal funding and assistance programs, which has limited the island's ability to address issues such as poverty, education, and healthcare (Vargas-Ramos, 2018).

TWENTY-FIRST CENTURY POLITICAL CHALLENGES

Puerto Rico has experienced significant governance struggles in recent years, including corruption scandals, high debt loads, the imposition of a fiscal control board, and vigorous movements for statehood and independence. These challenges have significantly impacted the island's political, economic, and social landscape and have prevented growth.

Puerto Rico has been shocked by a series of political scandals in recent years that have undermined public trust in the island's government and institutions. One high-profile example is the corruption scandal that led to the resignation of former Governor Ricardo Rosselló in 2019. Rosselló and several members of his administration were implicated in a wide-ranging corruption scheme that involved the mismanagement of government contracts and the allocation of public funds to political allies. Additionally, leaked messages revealed derogatory remarks about women, LGBTQ+ individuals, and Hurricane Maria victims, which sparked massive protests across the island and led to Rosselló's resignation (Mazzei & Robles, 2019). The corruption scandals have highlighted the need for greater transparency and accountability in Puerto Rico's political system.



Figure 2: 2019 Protest for Gov. Ricardo Rosselló resignation

Source: [CNN.com](https://www.cnn.com)

Another major governance struggle in Puerto Rico has been high debt loads. According to the Federal Reserve Bank of New York, Puerto Rico's debt levels reached \$74 billion in 2017, making it one of the most indebted territories or states in the United States (Braun, 2017). A combination of factors, including economic decline, population loss, and mismanagement by local officials, has fueled the debt crisis. In 2016, Puerto Rico filed for bankruptcy under Title III of the PROMESA Act, a federal law that established a framework for restructuring the island's debt (Wessel, 2022). The debt crisis has significantly impacted the island's economy, including cuts to public services and increased taxes. Consequentially, Puerto Rico has been subject to the oversight of a fiscal control board since 2016. The board was established under the PROMESA Act and has the power to oversee the island's finances and make recommendations to address its debt crisis. However, the board has been criticized for its lack of transparency and accountability and for its focus on austerity measures rather than long-term economic development. Critics argue that the board's oversight has undermined Puerto Rico's sovereignty and ability to address its own economic challenges.

Additionally, Puerto Rico has experienced vigorous movements for both statehood and independence. Statehood supporters argue Puerto Ricans should have the same rights and privileges as other U.S. citizens. In contrast, independence supporters say Puerto Rico should be a sovereign nation as the island fundamentally differs from the U.S. The debate over Puerto Rico's political status has been ongoing for decades and has been shaped by historical, cultural, and economic factors. There have been multiple referendums, as well as bills submitted to Congress, that have gone nowhere. The issue of Puerto Rico's political status has significant implications for the island's future, including its relationship with the United States and its ability to address the challenges it faces.

CHAPTER 1: PRE-HURRICANE MARÍA PERIOD (2000-2016)

1.1 The Economy and the Job Market

As of the time of writing, in early 2023, Puerto Rico has been in a recession for approximately 17 years. Many factors led to this economic condition; however, one of the most significant events was the repeal of Section 936 of the US Tax Code. Section 936 was enacted to incentivize development on the island by encouraging US Corporations to establish subsidiaries in Puerto Rico. Firms owned 80% or more by a foreign entity got a 100% deduction on dividend earnings within US territories. This approach was successful; the Puerto Rican economy grew rapidly throughout the 1970s and 1980. However, in the 1990s, the tax policy became very unpopular as it was viewed as a way for corporations to evade taxes. So, in 1996 President Clinton signed legislation to phase out section 936 over a period of 10 years (Dietz et al., 2020). It finally expired in early 2006, and as the tax breaks vanished, so did the subsidiaries, taking with them thousands of jobs. This event, combined with Puerto Rico's growing public debt, drove the economy to shrink and unemployment to rise to historic levels.

The economy on the Island started shifting. According to the US Department of Housing and Urban Development's (HUD) Comprehensive Housing Market Analysis, in the fiscal year 2016-2017, unemployment was 11.3%, down from 11.8% the previous year. Despite surface appearances, this reduction was not due to the job market improving but to it shrinking. Jobs have been declining by 1.4% per year since they peaked in 2005 (HUD, 2017). From 2006 to 2016, the labor force went from 1,254,000 to 1,002,000 jobs (Department of Labor and Human Resources, 2016). Before the changes in tax policy, the largest job sectors were government, construction, and manufacturing. However, the tax code changes greatly affected these sectors, with each of them decreasing employment by more than 20% from 2000 to 2017 (HUD, 2017). The construction sector had a steep employment decline during this period, dropping by more than 70% or 7.2% annually, as shown in *Figure 3*. The economic downturn (lack of business growth) and declining population (no need for new housing) decreased the demand for new construction (HUD,

2017). Concurrently, manufacturing jobs declined by approximately 50% or 4% annually due to international competition (countries with lower wages and higher tax breaks) and technological advances (increased worker productivity) (HUD, 2017).

In 2016, the highest job vacancy rate was found in the Public Administration industry (Department of Labor and Human Resources, 2016). A spike in population loss, among other factors, caused the government's tax base to decrease. The Government sector, the largest job provider in PR, saw itself forced to reduce spending. So, in the summer of 2010, the government laid off thirty thousand government employees. These mass layoffs were made possible by Act 7, signed by Governor Luis Fortuño, who declared a fiscal emergency in the government (Valentin, 2011). That year unemployment spiked to its highest level, 16.3% (Department of Labor and Human Resources, 2016). Since 2000 up until 2017, the government job sector declined by approximately 25% or 3.2% annually (HUD, 2017).

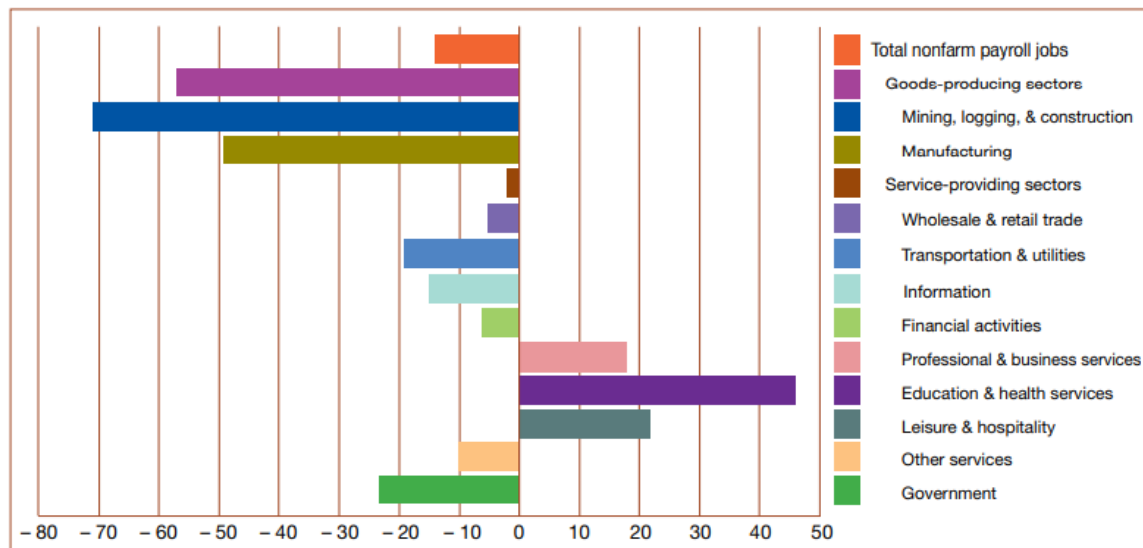


Figure 3: Sector Growth in Puerto Rico, Percent Change, 2000 to August 2017
Source: HUD Comprehensive Housing Market Analysis, 2017

On the other hand, leisure and hospitality, education and health services, and professional services sectors saw some growth from 2000 to 2017. The education and health services sector has seen the most growth since 2000, with over 45% growth or 2.3%

annually (HUD, 2017). An aging population has created an increased demand for healthcare and health services. Also, tourism is a significant contributor to the local economy. Three-point-seven million people (more than the Island's population at the time) visited PR in 2016. This sector has grown more than 20% or 1.2% yearly since 2000 (HUD, 2017). The professional business sector has also seen significant growth for the same period. **Figure 3** shows that the sector grew by more than 15% or 1.0% annually (HUD, 2017). These statistics speak to the resilience of Puerto Rican people. In the face of the shrinking job market and crippling economy, many opted to become self-employed or start their own businesses. In 2016, the highest percentage of new jobs was within the arts, entertainment, and recreation industries (Department of Labor and Human Resources, 2016).

According to the Federal Reserve Economic Data (FRED) portal, the minimum wage in PR was \$5.15 since 1998 and was increased to \$7.25 in 2010, complying with Federal standards. According to the 2015 Occupational Employment Survey, the mean hourly wage was \$13.56, and the hourly median wage was \$9.61 (Department of Labor and Human Resources, 2016). The large gap between the two is explained by high earners lifting up the average wage over the median. The median family income has continuously grown but at the slow rate of 1.3% from 2010 to 2016, not even keeping up with the average inflation of 1.89% for the same period (Webster, 2023). In 2016 MFI on the Island was \$20,078 according to 5-year ACS 2016 estimates.

Before Hurricane Maria, projections from the 2016 Puerto Rico Economic Analysis Report pointed out that most new jobs would be within the service industry in the next ten years. However, the most profitable was expected to be the healthcare industry. The professional services, leisure and hospitality, and the self-employed sector follow for industries with the highest projected growth. Agriculture was also expected to increase slightly. The government sector was forecasted to have the most significant job decrease for 2026. Still, economists were hopeful for the island's economy in 2016 since one of the up-and-coming industries was data processing and related services (Department of Labor and Human Resources, 2016).

Table 1: Economic Indicators for Puerto Rico

Year	2000	2010	2016
Population	3,808,610	3,725,789	3,529,385
Population Change	8%*	-2%**	-5%***
GDP (in \$Billions)	\$61.7	\$98.4	\$104.3
Job Growth	16%	-1%	-12%
Median Household Income	\$14,412	\$18,862	\$20,078
Median Home Value	\$75,100	\$120,300	\$111,900
Minimum wage	\$5.15	\$7.25	\$7.25

Source: US Census (2000, 2010), ACS 5-Year Estimate (2016), US Bureau of Labor Statistics, The Word Bank Database

*Population change from 1990 to 2000.

** Population change from 2000 to 2010.

*** Population change from 2010 to 2016.

1.2 Population Change and Migration Patterns

Established in 1917, the Jones Act granted people born in Puerto Rico US Citizenship, allowing them to move without restriction between the Island and US mainland. The unique political relationship between Puerto Rico and the United States allows for continuous, unrestricted movement across borders, access to jobs and government resources, and integration into the US lifestyle (Borjas & Freeman, 1992). In Puerto Rico, the population grew steadily following WW2, going from 2.2 million in the 1950s to its peak of 3.8 million in 2004. However, the growth rate slowed from the 1970s until 2005, when it turned negative (Abel & Deitz, 2014), as shown in **Figure 4**. In the 2000s, the population decline was slower, with an average decline of 0.2%. However, since 2010, the population has declined by an average of 1.5%, with a net out-migration of 60,900 people per year (HUD, 2017). By the 1970s, about 25% of people born in PR lived in the US, and by 2012 the percentage rose to 32% (Abel & Deitz, 2014). The main contributors to the population decline were failing birthrates and significant net out-migration.

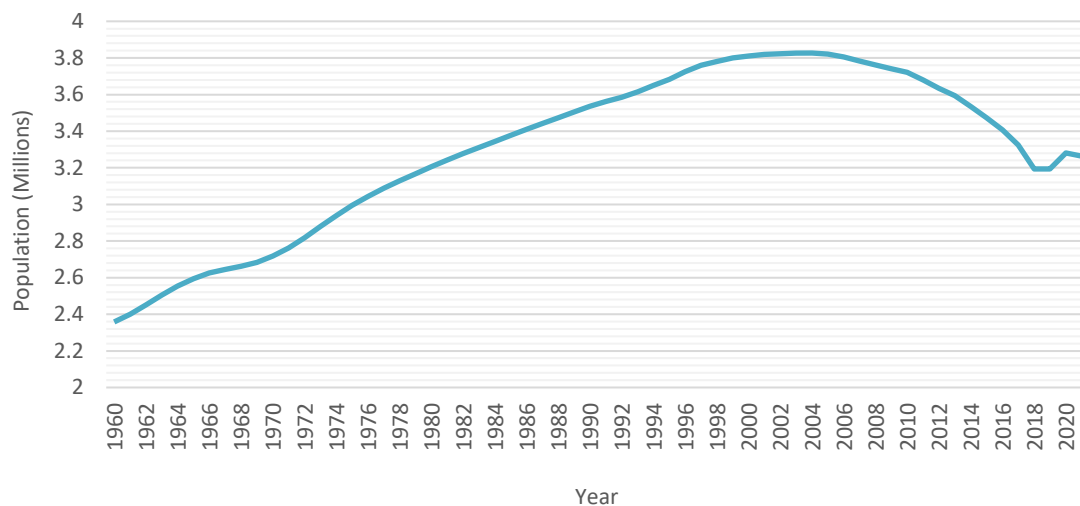


Figure 4: Total Population in Puerto Rico
Source: The World Bank Database

The natural increase in population has been shrinking as well. As Dr. Jaison Abel—head of the Urban and Regional Studies division at the Federal Reserve Bank of New York—framed it in his article, the population decline can be attributed to causes commonly seen in other developed countries, such as increased access to birth control, increase in women’s participation in the labor force, rising incomes, and higher educational attainment (Abel & Deitz, 2014). These all can apply to PR; however, the leading cause of Puerto Rico’s population decline was the economic crisis. As explored in Abel’s study, Puerto Rico’s out-migrants tend to be from the younger and less educated demographic (Abel & Deitz, 2014). Most people who left the Island were between the ages of 20-34, considered the prime childbearing years. Consequentially, the number of children five years or younger dropped. Disproportional loss of young people accelerated the aging of the population. Inhabitants 65 and older continued to increase, reaching nearly 18% of the total population in 2016 (much higher than the 11% as recently as 2000), as seen in **Figure 5**. The median age of the residents of the Island reached 40.7 in 2016, compared to 37.9 on the US mainland. Over the past decades, there has also been a rise in deaths due to a largely aging population (HUD, 2017).

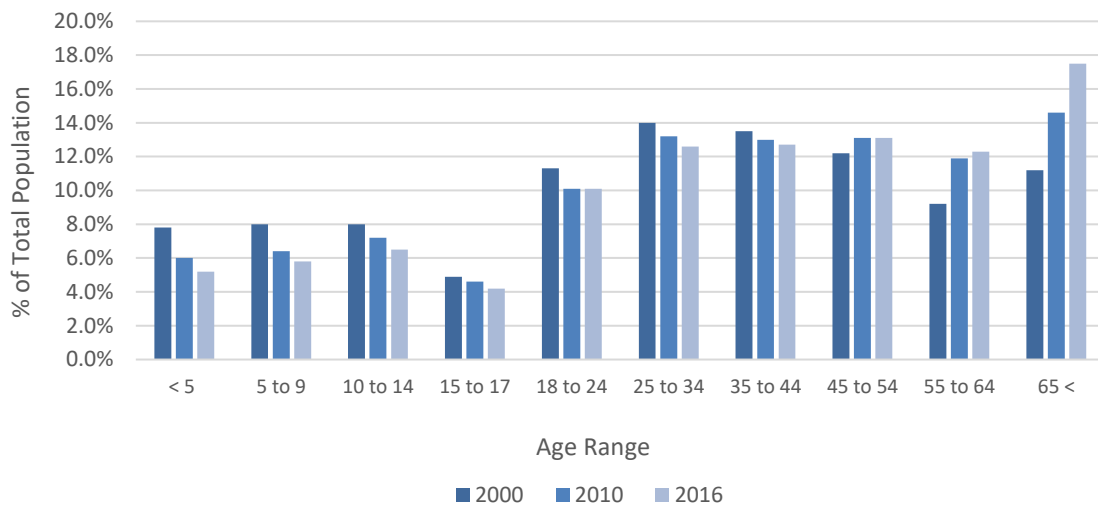


Figure 5: Population Ages for 2000, 2010, and 2016

Source: US Census (2000, 2010), ACS 5-Year Estimate (2016)

The people leaving the Island are mostly individuals with at least a high school diploma (Abel & Deitz, 2014). Relatively unskilled workers migrate to the US mainland because of greater access to job opportunities. They gain experience and valuable skills, and some return to PR as their acquired skills make them more valuable to local firms (Ramos, 1992). The segment of the population with less educational attainment than a high school diploma might meet economic restraints that would not allow them to make the move to the mainland and have no choice but to get by with minimum wage jobs. Meanwhile, it was easier for the population with higher education—especially the ones with a degree in health professions—to find jobs and stay, even though they are paid significantly less than their counterparts in the US. According to the Puerto Rico Economic Analysis Report for 2016, most job opportunities on the island are within the health industry, with an increased demand for nurse practitioners, pharmacists, and physical therapists (Department of Labor and Human Resources, 2016). Yet again, people with college degrees are not overrepresented in the outmigration population, according to Dr. Abel’s research. Migration has tilted the population composition to a higher educated local population, going from 13.6% of people over 25 years with a Bachelor’s Degree in 2000 to 18.3% in 2016 (Abel & Deitz, 2014).

In summary, before the impact of Hurricane Maria in 2017, Puerto Rico was already experiencing a decrease in population caused by a shrinking job market, a shifting economy, lower birth rates, and an increase in deaths. Most people leaving the Island had at least a high school diploma but were relatively unskilled. Moreover, because most people who migrated were young, the median age in Puerto Rico increased.

1.3 Housing Markets

1.3.1 THE SALES HOUSING MARKET

According to HUD's Comprehensive Housing Market Analysis, Puerto Rico was experiencing a soft housing sales market during the years before Hurricane Maria. Due to the population decline and the economic crisis, vacancy rates have been increasing. The total vacancy rate was estimated at 21.3% for 2016, of which 10% were listed in that sales market (ACS, 2016). Since 2010, the homeownership rate has gone down by 1.4% points annually. An estimated 300,000 additional units which are not listed on the market were also vacant. In 2016, only 1,650 units for sale were under construction (HUD, 2017).

The decline in homeownership and the slowdown in the home sales market were highly related to the local economic downturn, combined with the 2008 Great Recession and National Housing Crisis, causing rates of "serious delinquency" to go up (HUD, 2017). Serious delinquent status implies that a person has not paid their mortgage in 90 or more days (missed three or more payments) and is at high risk of defaulting and being forced into foreclosure (Chen, 2022). Mortgage originations have decreased by approximately 80% since they peaked in 2005 (HUD, 2017).

The high vacancy rate has also slowed down the construction of new homes. Single-family home permits have been limited during the prolonged economic downturn (HUD, 2017). However, this measure is uncertain because not all home development on the Island is permitted. The government estimates that about half of all the housing stock was built illegitimately, some on government-owned land (HUD, 2017). This is a big issue when it comes to property rights, tax collection, FEMA natural disasters relief fund, and overall

safety. If homes are not built up to code, they might not be able to withstand wind or earthquake loads, making them unsafe for the people who reside in them.

About 75% of new home construction occurs in the San Juan Metropolitan Statistical Area (SJMSA) (HUD, 2017). This area is home to about 70% of Puerto Rico's population (ACS, 2016) and is the setting for most economic and government activity. San Juan (SJ), Puerto Rico's capital city, is the densest city in the Metro Area. SJ can serve as a proxy to the housing market condition that most of Puerto Ricans are experiencing. For 2010, US Census data shows that San Juan had an owner vacancy rate of 4.6%, slightly higher than the 3.4% in the rest of PR. Median home value for the same year in the Capital City was \$165,700, also higher than the \$120,300 for the rest of the Island. Additionally, more than 61% of housing structures in the city were 40 years or older, 9.6% lacked a complete kitchen, and 2% were overcrowded. See *Table 2*.

In conclusion, Puerto Rico had a declining and aging sales housing market before Hurricane Maria. Due to financial hardship, fewer people could afford to own or buy a house. Homeownership decreased, and the rate of vacant units grew, so the government started limiting building permits. Nonetheless, people still built informally, a significant risk due to the Island's susceptibility to natural disasters. Using San Juan as a proxy revealed that the housing stock was aged, a percentage was incomplete, yet few units were overcrowded.

Table 2: Housing Stock Conditions in San Juan (2000, 2010)

Year	2000	2010
Age of Structure		
< 10 years	9%	3%
10 - 20 years	10%	7%
20 - 40 years	46%	28%
> 40 years	35%	61%
Bedrooms per Unit		
No bedrooms	21%	4%
1 bedroom	19%	13%
2 bedrooms	22%	24%
3 bedrooms	27%	43%
>3 bedrooms	10%	16%
Incomplete Units		
Units lacking complete plumbing	4.3%	Unavailable
Units lacking complete kitchen	2.6%	9.6%
Overcrowding Unit		
Overcrowded owner units as a percent of total owner units	12%	2%
Overcrowded renter units as a percent of total rental units	22%	6%
Total overcrowded units as a percent of total units	17%	4%
Percent of occupied housing units in SJ.	90%	87%

Source: US Census (2000, 2010)

1.3.2 THE RENTAL HOUSING MARKET

HUD's Comprehensive Housing Market Analysis found that the rental market in Puerto Rico was also soft during the years before Hurricane Maria. For 2016, there was a 12.8% vacancy rate on rental units, mostly due to out-migration and population loss. Due to the surplus of available units, only 500 build-for-rent (BFR) structures were constructed in 2016 (HUD, 2017). Large-scale, market-rate apartment complexes are very scarce in PR, and the ones that do exist are high-end beachfront properties that are usually used for vacationing or as short-term rentals. The largest portion of renter-occupied units on the Island are single-family homes, accounting for approximately 48% of the market. The second largest portion is made up of high-rise condominiums, which were not BFR, but were meant to be owner-occupied. Regardless, investors would acquire and rent them out.

From 2000 to 2010, the population declined, yet the number of households increased (US Census, 2000 – 2010). This increase was due to the household size shrinking on the Island. This also contributed to the decrease in home ownership, as explained by HUD. Since families got smaller, it is likely that the income also decreased, and households had to depend on only one income. Consequentially, the number of families renting their homes increased.

The average rent for 2016 was \$463, yet this cost varies by region. The average rent in 2016 for a two-bedroom apartment in San Juan was \$472, and in Guayama—a municipality in the rural Southern region of the Island—it was \$355 (ACS, 2016). Compared to rents in the US mainland, these costs might seem low. Regardless, the median family income (MFI) in Puerto Rico is also much lower. According to data from the 5-year ACS estimate, MFI on the Island was \$20,078 in 2016, or lower than in any of the 50 US mainland states. However, there was considerable disparity between owner-occupied and renter-occupied units, with an MFI of \$35,270 and \$11,520, respectively. If we take the Island-wide MFI to determine rent affordability, the average household would be able to pay \$558 for housing accommodations, according to HUD's affordable rent standard of 30% on the household income, but this does not represent the reality of the most vulnerable families. Fifty-two percent of all renter households reported being cost-burdened, meaning

they are paying more than 30% of their income in rent (HUD, 2017). Eighty-nine percent of all households that paid a rent higher than \$1,000 were in the San Juan Metro Area, making them the majority income group in the city with the highest median rents in Puerto Rico. Since most service and tourism job opportunities are in the San Juan Metro Area, it makes sense for so many low-income families to locate there. SJ is the tourism hub of the Island. It is where most high-end hotels and the Luis Muñoz Marín International Airport are located; where all the cruise ships arrive; where most imported goods are offloaded, and where most of the economic activity for the leisure and hospitality industry operates.

To deeply understand the rental market status during the years before Hurricane Maria, a comparison was made between existing housing units and households for San Juan, Puerto Rico, and US levels. The data used for the analysis was collected from the 2000 and 2010 US Decennial Census, the 5-year ACS 2016 estimate, and HUD's CHAS data for the City of San Juan. **Figure 6** shows the gap between supply and demand for housing affordable to people earning within each income category. Results show that more than 45% of renter households in San Juan and in Puerto Rico in general have salaries of less than \$10,000, compared to only 13% of renter households in mainland US. That income category is roughly 50% MFI for Puerto Ricans, meaning that the affordable rental price for this income group of \$278. However, the most significant share of existing rental units are priced between \$300 and \$599 at the SJ and PR levels. **Figure 6** shows a 28% gap in the rental stock for families earning less than \$10,000 in SJ and a 48% gap Island-wide. On the other hand, there was a 15% and 9% surplus for units priced at \$600 to \$999 at city and Island levels, respectively. These statistics circulate back to the effects of the out-migration of the middle class, reducing demand for rental units in this price range. Also, people in higher income bands rent apartments that are cheaper than what they can afford, and conversely low-income people have to strain to afford the rent on higher-rent apartments that they cannot comfortably afford. So, regardless of the surplus, middle-income units remain unaffordable to lower-income people who were struggling to find units within their affordability range.

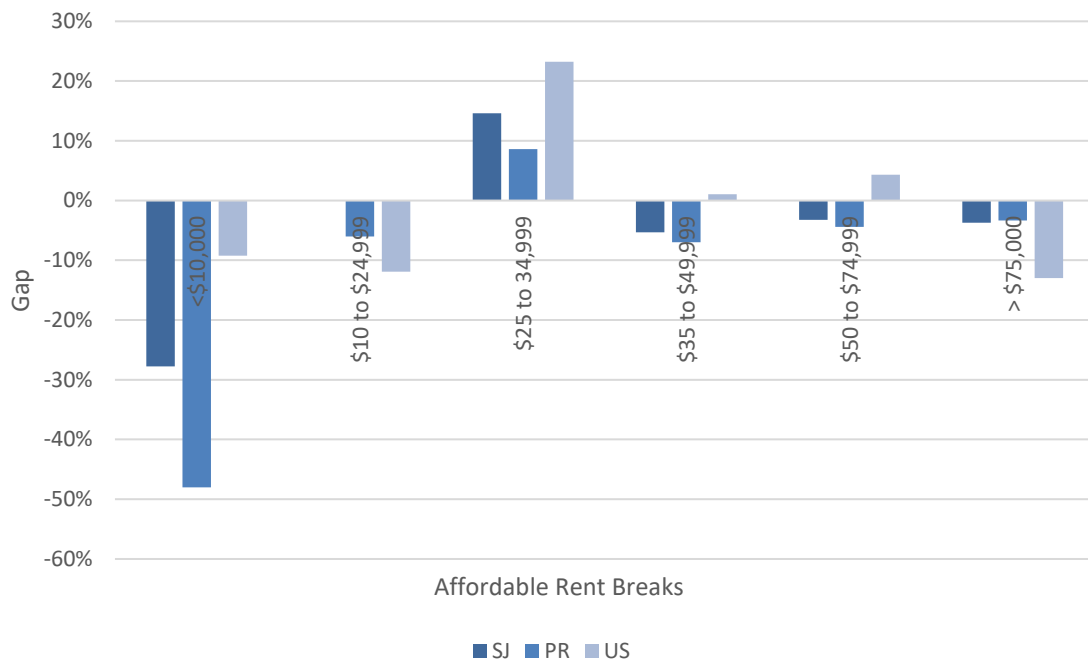


Figure 6: Affordable Rental Units Gaps by Income Breaks for 2016
Source: ACS 5-Year Estimate (2016)

CHAPTER 2: HURRICANE MARÍA'S IMPACT (2017-2018)

2.1 Hurricane María

2.1.1 HURRICANES IRMA AND MARIA

The 2017 North Atlantic Hurricane season was one of the most active and costly on record, having 17 named storms, more than the 12.1 average, and causing approximately \$265 billion in damages (NOAA, 2018). Among the most notorious storms were hurricanes Harvey, Irma, and María. Irma was a category five hurricane with peak wind gust speeds of over 160 miles per hour when it passed 58 miles northeast of San Juan on September 6, 2017 (FEMA, 2018). Even though this powerful storm did not directly pass through Puerto Rico, the whole Island was within Irma's cone and felt attenuated storm effects, as illustrated in **Figure 7**. San Juan Bay's highest recorded sustained wind speed was 55 mph, with a 74-mph wind gust (FEMA, 2018). Yet, the wind was not the major issue. Irma caused storm surge flooding on the northern coast, and the central and eastern portions of the Island experienced 10 – 15 inches of rain (FEMA, 2018). The flooding and winds caused damage to homes, and more than a million Puerto Ricans lost power. In effect, the ground was saturated, reservoirs were near capacity, the north coast suffered erosion, and there was damaged vegetation and fallen trees. The damage Hurricane Irma caused was not to the scale of Hurricane María, but it weakened Puerto Rico's fragile infrastructure and ecosystems.



Figure 7: Hurricane Irma Trajectory and Cone

Exactly two weeks later, hurricane María made landfall in Puerto Rico on September 20, 2017, as a category four storm with sustained winds speeds of 155 mph (FEMA, 2018). María's eye crossed diagonally through the Island, entering from the southeast through the municipality of Yabucoa and exiting from the northwest through Arecibo, as shown in **Figure 8**. The Island saw record-breaking rainfall, averaging more than 15 inches in 48 hours, triggering disastrous floods and landslides (Rand Corporation, 2018). The areas most severely affected were the center and east, the regions with the most precipitation during hurricane Irma.

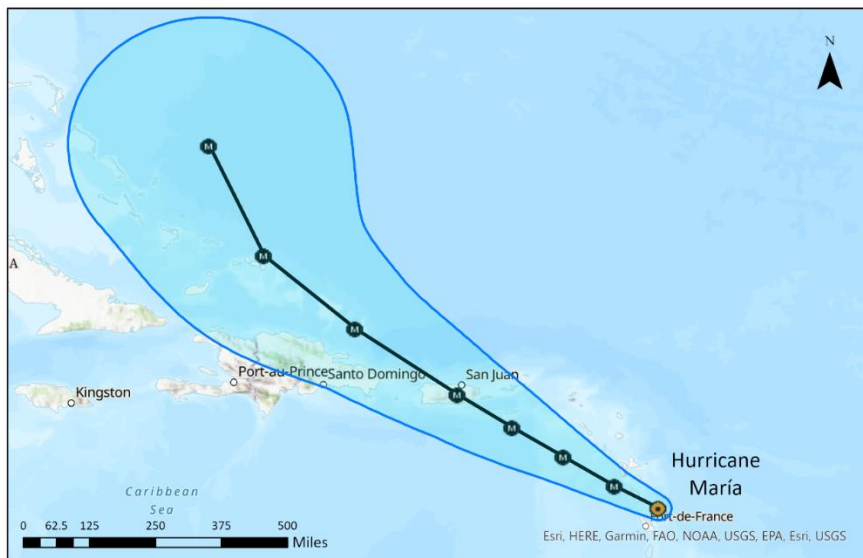


Figure 8: Hurricane María Trajectory and Cone

2.1.2 IMPACT ON THE INFRASTRUCTURE

Hurricane María caused catastrophic damage to the Island's infrastructure, leaving most of Puerto Rico's 3.4 million residents without power, water, or access to essential services. The storm's impact on Puerto Rico's infrastructure was devastating, with many areas of the Island left in disrepair for months after the storm.

The electric grid was one of the critical infrastructures affected by Hurricane Maria. According to the US Department of Energy, Maria caused the most significant power outage in US history, affecting the entire Island. The storm destroyed or damaged over

80% of the Island's power lines, leaving residents without power for months (US Department of Energy, 2018). Many of the Island's hospitals and medical facilities also lost power, creating a significant health crisis for residents. The lack of electricity also impacted water treatment plants, leaving many without access to clean water.

Puerto Rico's transportation infrastructure was also severely impacted by the hurricane. The storm caused widespread flooding, landslides, and road closures, making it difficult for emergency vehicles and aid workers to reach those in need. Entire communities were left isolated after the storm destroyed their only entry points. The Luis Muñoz Marín International Airport was damaged, causing flights to be canceled or delayed for weeks after the storm. The ticket price of the few flights available skyrocketed, only allowing the wealthiest residents to escape the catastrophe. The Island's ports were also damaged, making bringing essential supplies and aid challenging.

In addition to the damage caused to Puerto Rico's electricity and transportation infrastructure, Hurricane Maria significantly impacted the Island's communication systems. Many cell phone towers were damaged, leaving residents without access to communication services. This made it difficult for residents to contact their loved ones or emergency services during the storm's aftermath.

In summary, Hurricane Maria had a catastrophic impact on Puerto Rico's infrastructure. The storm caused extensive damage to the Island's electricity, transportation, and communication systems, leaving residents without access to essential services for months. The storm's long-term effects continue to be felt in Puerto Rico, with many areas of the Island still in a state of disrepair. The recovery efforts following Hurricane Maria have been slow and challenging, highlighting the need for more resilient infrastructure in the face of future natural disasters.

2.1.3 IMPACT ON THE ECONOMY

Hurricane Maria profoundly impacted Puerto Rico's economy, which was already facing high levels of debt, a shrinking population, and increased poverty and unemployment rates before the storm, as described in previous sections. The hurricane

caused extensive damage to buildings, homes, and infrastructure and disrupted transportation and supply chains, causing many businesses to shut down or reduce operations. The damage to the different sectors of the economy led to many people becoming temporarily and permanently out of work. In the immediate aftermath of the hurricane, many residents lost their jobs, leading to a sharp increase in unemployment and poverty rates. Lost wages were reflected directly in sales and consumption, having a significant impact on government sales tax and income tax revenues (Estudios Tecnicos Inc., 2017).

According to estimates from the Puerto Rican government, the storm caused more than \$100 billion in damages and lost economic output (Associated Press, 2018). The impact was felt the most within the tourism, agriculture, and manufacturing industries, which were already struggling before the hurricane. The storm severely impacted the tourism industry, which makes up 10% of Puerto Rico's GDP. Many hotels and resorts were damaged, and the lack of electricity and essential services made it difficult for the industry to recover quickly. The agricultural sector also suffered significant losses, with crops destroyed and livestock killed by the storm. The manufacturing industry, a major employer on the Island, also faced significant challenges, with many factories forced to shut down or reduce operations due to damages or power outages. The Island's GDP fell by 8%, and about 8,000 small businesses failed to recover (Ortiz, 2018).

In the months following the storm, FEMA and other federal agencies assigned billions of dollars in disaster relief funds to the Island. This included assistance for housing, infrastructure, and public services. **Table 3** displays information from FEMA's "Hurricane María by the Numbers" report, which summarizes the aid categories and quantities disbursed. In future chapters, we will explore the disbursal of these funds and their impact on different sectors of Puerto Rico's economy.

Table 3: Federal Disaster Recovery Aid

Category	Aid
Public Assistance	\$29.2 Billion
<i>Debris Removal</i>	<i>\$725 Million</i>
<i>Emergency Protective Measures</i>	<i>\$4.4 Billion</i>
<i>Permanent Work and Management Costs</i>	<i>\$24 Billion</i>
Hazard Mitigation Grant Program	\$179 Million
HUD Community Development Block Grant Disaster Recovery Program	\$20 Billion
Power Reconstruction and Permanent works	\$9.5 Billion
FEMA Individual Assistance	\$1.5 Billion

Source: FEMA

2.2 Hurricane María's Impact on Housing



Figure 9: Aerial view of the flooded neighborhood of Juana Matos after Hurricane Maria
Source: [nbcnews.com](https://www.nbcnews.com)

2.2.1 IMPACT ON HOUSING

Hurricane María caused significant damage to homes in Puerto Rico, leaving many residents without safe and habitable housing. The strong winds, heavy rains, and flooding caused severe structural damage, including roof and wall collapse and damage to foundations and other critical components of homes and buildings. According to FEMA's Mitigation Assessment Team report, the storm caused damage to more than 470,000 homes in Puerto Rico, which make up approximately one thirds of the total housing stock (FEMA, 2018).

The impact of Hurricane María on homes was particularly devastating for low-income families and those living in rural areas. These communities often lacked access to proper infrastructure, such as more than one access point to the community, bridges in good

conditions, roads designed for emergency vehicles, a stable or well-maintained electric grid, or countermeasures against landslides or floods; thus, were already living in homes vulnerable to the storm's effects. As a result, many families were forced to leave their homes and seek temporary housing elsewhere. The recovery efforts following Hurricane María were slow, leaving many residents without access to safe housing.

Due to the state of the economy and the general devastation caused by María, outmigration skyrocketed. Researchers for the University of Minnesota estimated that between 114,000 and 213,000 people (2 and 4 % of the total population of Puerto Rico, respectively) left the island in the year after Hurricane María (DeWaard et al., 2020). These circumstances accelerated the already elevated rate of foreclosures and depreciation of homes. According to an article for The New York Times, in the immediate aftermath of María, the number of delinquent mortgages in Puerto Rico rose to 143,200 (Goldstein, 2018). To mitigate the hardship on homeowners, the Federal Housing Administration (FHA) established a 180-day foreclosure moratorium in Presidentially-Declared Major Disaster Areas (PDMDAs) for Hurricane María in Puerto Rico and the US Virgin Islands, which later got extended by 60 days (HUD Exchange, 2018). However, as soon as the moratorium was lifted, creditors rushed to file for foreclosure actions. Among the entities filing for cases were Citigroup and Santander banks, Wall Street investment firms, and even the US Department of Agriculture, which had underwritten approximately 3,000 mortgages in rural areas of the Island (Goldstein, 2018).

ACS 1-year estimate data shows that the housing vacancy rate before the hurricane (2016) was 22.1%. This rate increased to 23.9% after the storm (2018), even though the total number of housing units decreased by 0.5%. **Figure 10** shows the distribution of vacant housing units by type. The Figure displays how the “other vacant” housing units, which includes foreclosed and abandoned homes, increased as a portion of the total number of vacancies. Simultaneously, vacancy rates had to decrease for other categories due to the need for shelter for displaced homeowners who decided to stay on the Island.

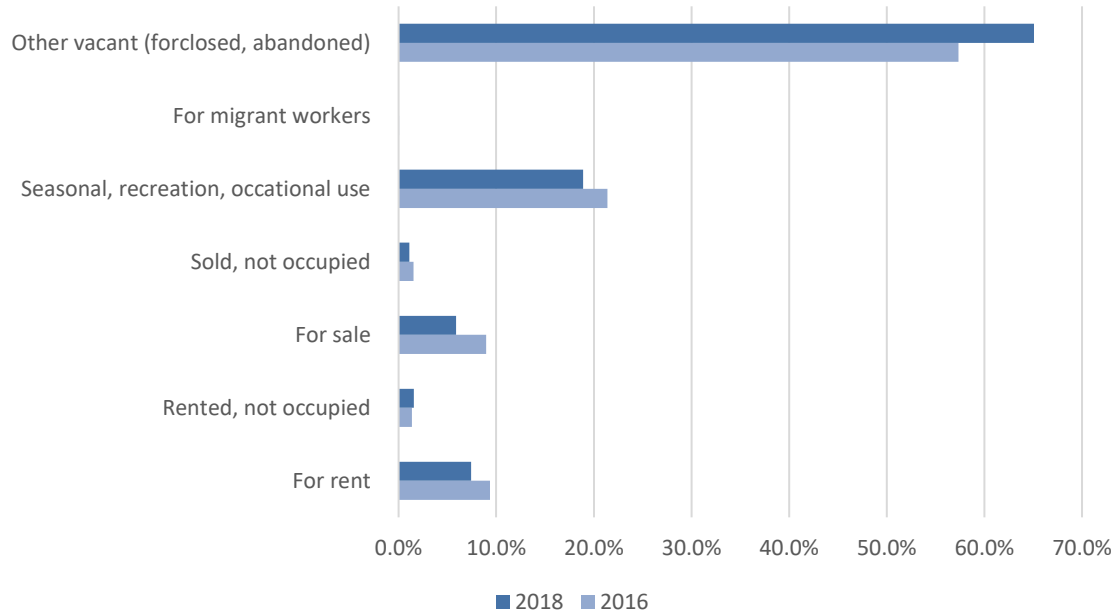


Figure 10: Housing vacancy rates before and after Hurricane María
Source: ACS 1-Year Estimate 2016, 2018

A study developed by the Center for Puerto Rican Studies at the City University of New York found that as the number of vacant homes increased, median home values declined in Puerto Rico between 2000 and 2016 (Hinojosa, 2018). This trend continued during the first 2 years of recovery from the storm but has been changing since 2019. Between 2016 and 2017 there was a significant drop in home values, decreasing by 16%, yet in 2018 they rose again, but did not reach 2016 numbers. Data for 2020 is not available due to the Covid-19 pandemic, however, **Figure 11** shows that for 2021 vacancy decreased and the average home increased as the demand for home started to grow in the island. More about this will be discussed in the next chapter.

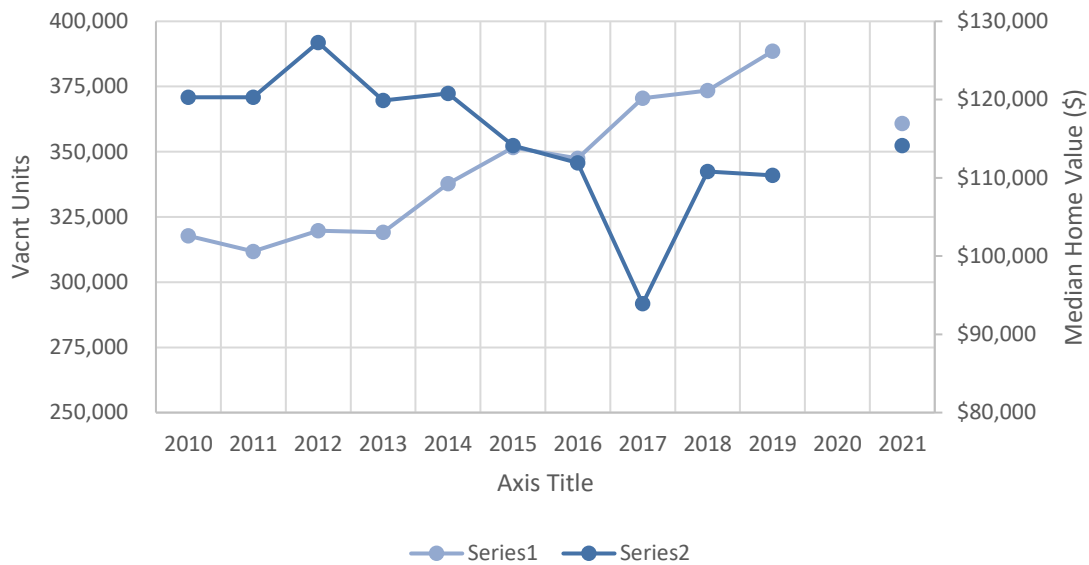


Figure 11: Median Home Value and Vacant Homes, 2010 – 2021
Source: ACS 1-Year Estimate 2010 - 2021

Figures 12 and 13 show the percent change in average home value (AHV) and vacancy, respectively. Average home values decreased by at least 5% in 64% of the municipalities on the Island, and vacancy increased by at least 5% in 65% of cities from 2015 to 2020.

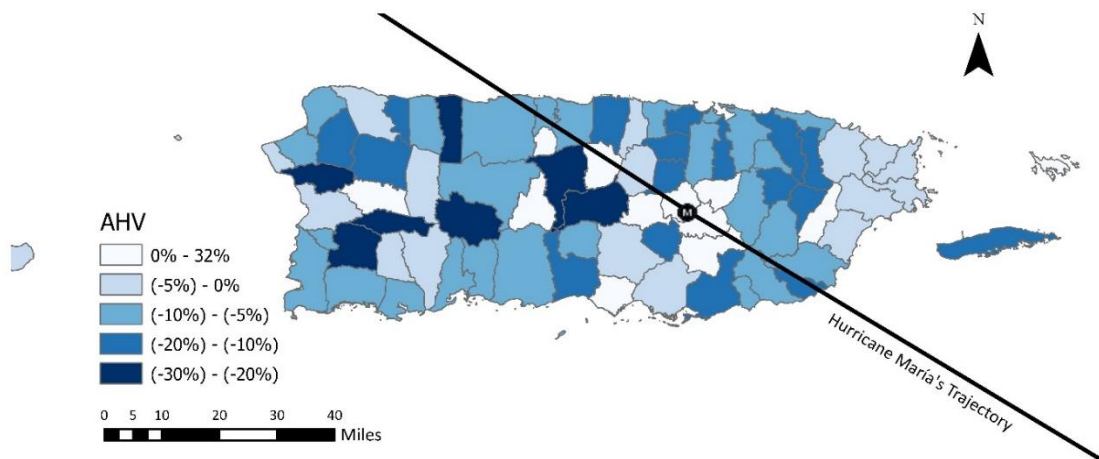


Figure 12: Percent change of average home value by municipality (2016 to 2018)

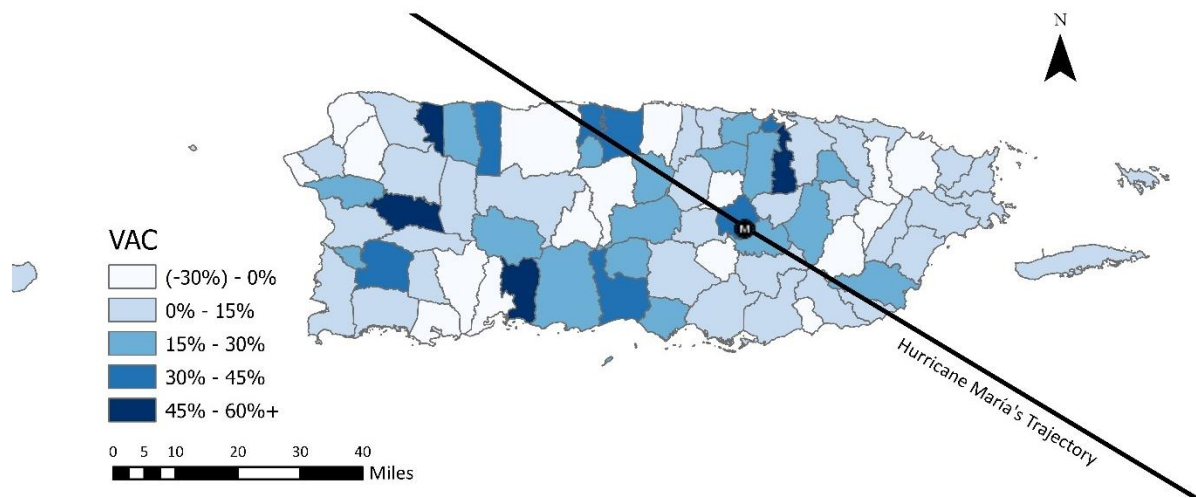


Figure 13: Percent change of vacancy by municipality (2016 to 2018)

2.2.2. HOUSING RECOVERY ASSISTANCE

FEMA reported 357,492 damaged homes (FEMA, 2021)—approximately 23% of Puerto Rico’s total housing stock. As a response, FEMA launched a massive relief effort to help Puerto Ricans recover from the disaster. One of the most significant efforts was the Transitional Shelter Assistance (TSA) program, which provided temporary housing for displaced residents. Under the TSA program, eligible individuals and families were provided with hotel rooms or other short-term lodging options while they worked to fix their homes or find a more permanent housing solution (FEMA, 2017). The program was initially set to expire in January 2018 but was later extended multiple times, providing critical support to thousands of affected residents (FEMA, 2018).

In addition to the TSA program, FEMA also launched the Individual and Households Program (IHP), which provided financial assistance to individuals and families affected by the hurricane. Under the IHP, eligible residents could receive funds to repair or replace damaged homes, cover temporary housing costs, and meet other critical needs related to the hurricane (FEMA, 2018). The program was extended until late 2019, and a total of \$1.5 billion were approved to be distributed (FEMA, 2019).

Table 4: FEMA Reported Home Damages by Owners and Renters

Data Type	Total Homes	Damage Value < \$10k	\$10k < Damage Value < \$20k	Damage Value > \$30K
Owner Data	335,085	308,169	22,584	4,332
Renter Data	22,407	16,444	5,820	143
Total	357,492	324,613	28,404	4,475

Source: The Housing Crisis in Puerto Rico and the Impact of Hurricane Maria, 2018

Despite the availability of funds, approximately 60% of applications for individual assistance were denied due to the lack of evidence of ownership (Garcia, 2021). As mentioned in the previous chapter, many people in Puerto Rico built their homes informally on government-owned land and do not possess a title or deed. There is also the case of people living on land that has been subdivided generationally in their families but never went through a formal subdivision process (Garcia, 2021). FEMA's strict home ownership regulations preclude families living in informal settlements from accessing federal aid. Many homeowners were unable to make essential repairs to their homes. They opted for temporary solutions, such as using blue tarps to prevent water from infiltrating the roof, as shown in **Figure 14**. Local nonprofit organizations, such as Ayuda Legal and Fundacion Fondo de Acceso a la Justicia, together with the National Low-Income Housing Coalition (NLIHC), advocated for FEMA to provide additional alternatives. The efforts resulted in FEMA accepting a sworn declaration with the owner's personal information and property address as valid proof of ownership. Yet, many Puerto Ricans who were initially denied the aid remained in the dark due to the lack of marketing of the new documentation option (Garcia, 2021).



Figure 14: Houses with blue tarps in Puerto Rico after Hurricane María

Source: navigacloud.com

Recovery efforts also included significant support for public housing authorities and other organizations responsible for providing affordable housing in Puerto Rico. FEMA provided funding and technical assistance to help these organizations repair and rebuild damaged housing units, ensuring low-income residents had access to safe and affordable housing. Additionally, Puerto Rico was awarded \$20 billion in HUD Community Development Block Grant Disaster Recovery (CDBG-DR) program (FEMA, 2021). These funds are meant to address unmet housing, economic development, and infrastructure needs. The next chapter will explore the implementation of these funds.

2.3 Challenges and Opportunities

The devastation caused by Hurricane María in Puerto Rico highlighted the urgent need to update the aging housing stock. Due to the ongoing economic crisis, many homes and buildings damaged or destroyed by the hurricane were already in poor condition. The influx of billions of dollars in disaster aid presented an opportunity for the island to rebuild and improve the quality and resilience of its housing stock. There is also an opportunity to eliminate informal construction and open pathways toward formal home ownership. As Hinojosa suggests in her report, a way to achieve this is by transferring vacant housing units for social purposes (Hinojosa & Melendez, 2018). This way, the gap between available units and the need for up-to-code safe housing can be shrunk. This would also allow the relocation of families from at-risk areas, such as flood zones and areas prone to landslides, and the creation of opportunity zone to encourage investment and redevelopment of depressed areas.

Nonetheless, these opportunities do not come without challenges. Acquiring vacant homes for social purposes will require a monumental effort from local entities, detailed logistics, and efficient funds management, something the Puerto Rican government is not known for. There is also the risk of triggering gentrification and increasing displacement and outmigration. Therefore, countermeasures must be put in place to prevent causing more harm. The implemented measures must be tailored to local conditions since the cost of living, cultural practices, the local economy, and many other aspects are different in Puerto Rico compared to the US mainland. Lastly, relocation of families can be challenging since people have built bonds and support systems within their communities that are vital for their subsistence. Relocation must be voluntary, and there must be other options for the ones that decide to stay.

CHAPTER 3: POST HURRICANE MARÍA (2018 – PRESENT)

3.1 Recovery Efforts

3.1.1 THE CDBG-DR ACTION PLAN

The Puerto Rico Department of Housing (PRDOH) is responsible for administering the CDBG-DR grant in collaboration with the Central Office of Recovery, Relocation, and Resilience (COR3) and FEMA. It created the CDBG-DR Action Plan (the Action Plan), which defines how to address the humanitarian needs created by the impact of hurricanes Irma and María. The action plan evaluates damages and accordingly designs programs to address the repairs of both housing and infrastructure. According to PRDOH, the strategies for fund allocation focus on supporting long-term recovery and resilience (PRDOH, 2019a); however, the action plan also focuses on relocation. HUD must revise and approve this document and its amendments to ensure the programs are efficient and recovery funds are used appropriately.

The action plan assigns funds to initiatives such as the Home Repair, Reconstruction, and Relocation (R3) Program. R3 focuses on priority applicants—people with disabilities, older adults, and low-income households—households with demonstrable hardship and those with substantially damaged homes (Molden, 2020). It provides economic assistance to homeowners in non-hazard areas and relocation assistance to eligible homeowners living in hazardous zones. R3 has the largest assignment of funds within the Housing category of the Action Plan, with \$2.9 billion (PRDOH, 2022). The Title Clearance Program, which was assigned \$40 million, helps legitimize homeowner titles and address the existing lack of documentation problem in Puerto Rico (PRDOH, 2019b). It gives priority to homeowners who FEMA rejected for individual assistance. There is also the Rental Assistance Program, assigned \$20 million, which provides rental assistance for families or individuals at risk of homelessness due to the hurricane (PRDOH, 2020). These are only some examples of the 18 programs developed and funded by the CDBG-DR Action Plan, as shown in *Table 5*.

Even though the housing programs created by the Action Plan have the potential to support homeowners getting back on their feet, they also have the likelihood to cause displacement among vulnerable families. The action plan includes an anti-displacement statement declaring that funded recovery activities will minimize displacement; otherwise, displaced people will receive 42 months of rental assistance payments or temporary housing until new units are rehabbed or constructed (Molden, 2020). Yet, the government's relocation approach prioritizes moving families out of risky areas instead of investing in mitigation and resilience. According to a report by Ayuda Legal Puerto Rico (AYPR), approximately 638,100 people are living in landslides-prone areas, 331,200 people in FEMA flood hazard areas, and 4,200 people live in the intersection of both (Molden, 2020). These relocation policies could affect approximately 30% of the island's population. Households can still opt out of relocation assistance but will not qualify for funds to repair their homes. As mentioned in the ALPR report, relocation should be voluntary. Forcing people to leave their neighborhoods will break vital community bonds and essential support systems for some families. Households should have a say on how they want their recovery process to look like and which is the best location for them to thrive.

Table 5: CDBG-DR Action Plan Programs and Assignments

Program	Funding Assigned
Planning Programs	
Municipal Recovery Planning Program	\$56,050,508
Puerto Rico Geospatial Framework Program (GeoFrame Program)	\$50,000,000
Whole Community Resilience Planning Program	\$55,000,000
Housing Programs	
Home Repair, Reconstruction, or Relocation Program	\$2,945,280,619
Homebuyer Assistance Program	\$295,000,000
Title Clearance Program	\$40,000,000
Rental Assistance Program	\$20,000,000
Housing Counseling Program	\$17,500,000
Community Energy and Water Resilience Installations Program	\$300,000,000
CDBG-DR Gap to Low Income Housing Tax Credits Program (LIHTC)	\$963,000,000
Social Interest Housing Program	\$32,500,000
Economy	
Economic Development Investment Portfolio Program	\$800,000,000
Re-grow PR Urban-Rural Agriculture Program	\$92,500,000

Program	Funding Assigned
Workforce Training Program	\$90,000,000
Small Business Incubators and Accelerators Program	\$85,000,000
Tourism & Business Marketing Program	\$25,000,000
Infrastructure	
Non-Federal Match Program	\$1,500,000,000
Multi-Sector	
City Revitalization Program	1,298,000,000
Total	\$8,664,831,127

SOURCE: [HTTPS://CDBG-DR.PR.GOV/EN/PROGRAMS/](https://CDBG-DR.PR.GOV/EN/PROGRAMS/)

3.1.2 NONPROFIT ORGANIZATIONS

Despite the historical assignment of funds to the island, the PRDOH identified \$31 billion in unmet needs to return the housing stock to pre-hurricane standards and account for the additional resilience costs (Molden, 2020). Different nonprofit organizations helped reduce the gap by providing resources and services to underserved neighborhoods. One such organization was the Hispanic Federation, which launched Unidos Disaster Relief and Recovery Program in response to Hurricane María. The program provided emergency relief to those affected by the hurricane and long-term recovery assistance focused on rebuilding homes, schools, and community centers. The Hispanic Federation also worked to address food insecurity and access to health on the island. This organization also committed \$43 million to support over 130 local community-based groups and initiatives focusing on ground-up recovery projects (Hispanic Federation, 2023). These projects are designed around long-term recovery, resiliency, sustainability, increased self-sufficiency, and community empowerment.

Another nonprofit organization that played a critical role in the recovery efforts was All Hands and Hearts–Smart Response. This organization mobilized volunteers worldwide to assist with the cleanup and rebuilding efforts in Puerto Rico. Volunteers worked to repair homes and infrastructure and support needy residents. All Hands and Hearts also partnered with local organizations to provide resources and support to those affected by the hurricane (All Hands and Hearts, 2023).

Local nonprofit organizations in Puerto Rico, such as Brigada Solidaria del Oeste and Proyecto Matria, also played a crucial role in the recovery efforts after Hurricane Maria. These organizations were deeply embedded in their communities and deeply understood the needs and challenges faced by residents on the island. They provided various support services, including food and water distribution, emergency shelter, medical care, and assistance in rebuilding damaged homes.

Overall, nonprofit organizations were instrumental in the recovery efforts following Hurricane María in Puerto Rico. These organizations provided vital resources and support to those in need and worked to fill the gap and rebuild homes and infrastructure on the island.

3.1.3 INFORMAL RECONSTRUCTION

Due to Puerto Rico's long history as a Spanish colony, many Spanish housing policies, which differ significantly from US housing policies, remain in force on the island. For example, self-help building practices were encouraged for lower-income families that could not afford to buy a house or hire a contractor (Talbot et al., 2022). Therefore, it is not a surprise that many households with limited options engaged in informal reconstruction, as is the status quo on the island. For this report, informal reconstruction is defined as the restoration of homes without proper plans signed by a licensed engineer or architect or without going through the formal permitting process. Informal reconstruction offers a more straightforward path toward recovery that otherwise would not be available to vulnerable communities. According to a study from Iowa State University, those unable to receive FEMA funds were more likely to engage in this type of recovery method; however, 83% of the sample for this study engaged in a combination of formal and informal reconstruction methods (Talbot et al., 2022). As seen in the previous section, most of the homes inspected by FEMA had damages estimated to be under \$10,000. For some families, the amount of aid granted was not enough to fully fix and upgrade their homes to a code-compliant state. Nearly all construction materials and supplies are imported into Puerto

Rico, which significantly increases costs. It is also complicated, costly, and time-consuming for a low-income person to obtain construction permits.

Informal construction is not widely regulated or penalized; on the contrary, PRDOH has been running a program for decades called Material Assistance (Ayuda de Materiales in Spanish), which provides construction materials to low-income families (PRDOH, 2023). The only requirements to qualify for the program are to be the land owner and have proof of low-income status. Otherwise, there is no mention of formal permitting or plans.

Informal reconstruction practices have a significant downside; the structure can be unsustainable and unsafe if done wrong, as some people tend to disregard construction code standards and use unskilled labor. However, in the face of slow government action and barriers to access aid, as supported by the Iowa State study, positioning informal reconstruction as an alternative to recovery could be viable with the appropriate checks in place.

3.1.4 OPPORTUNITY ZONES AND FOREIGN INVESTMENT

Opportunity Zones is a federal program created under the Tax Cuts and Jobs Act of 2017. Opportunity Zones are economically distressed communities where new investments, under certain conditions, may be eligible for preferential tax treatment (Department of Economic Development and Commerce, 2023). The intention is to channel funds held by private investors into low-income communities to support economic revitalization and job creation in exchange for temporary tax deferrals and exclusion from taxable income of capital gains (Molden, 2020). Ninety-eight percent of Puerto Rico was designated as an opportunity zone under the Tax Cuts and Jobs Act requirements (Department of Economic Development and Commerce, 2023), as shown in *Figure 15*.

According to an article published by Next City, developers and investors are eager to take advantage of the economic benefits and invest in the island; however, low-income families are not as excited as they fear being displaced (Gallardo, 2020). This fear is not without merit, as communities are already experiencing the effects of gentrification. Many

projects funded through this initiative focus on tourism, luxury homes and resorts, and high-end facilities for large corporations. An example is the new headquarters of Banco Popular, one of the island's largest banks, in San Juan's central business district. The project will include office space, a wellness center, a 126-room high-end hotel, retail space, and parking. The project will be financed with a \$300 million fund already approved by the government (Serrano-Roman, 2022). Initiatives like this one are criticized for incentivizing the wrong kind of economic growth. This development will create jobs, but they will be minimum wage service jobs that will not contribute towards the upward mobility of low-income individuals. On the contrary, this type of development increases property taxes for the locals, and the people who cannot afford to pay are forced to move. The corporations and investors only pay a 5% contribution on net income tax on net earnings, and receive a 100% exemption on dividends or distributions (Serrano-Roman, 2022).



Figure 15: Map of Opportunity Zones in Puerto Rico

Source: Puerto Rico Department of Economic Development and Commerce

In addition to the tax benefits offered through the Opportunity Zones program, Puerto Rico has also established a number of other incentives to encourage investment in the island, including Act 22 and Act 60. Act 22, also known as the "Individual Investors Act," allows investors to pay no local taxes on passive income, including capital gains, interest, and dividends. To qualify, investors must become residents of Puerto Rico and spend at least 183 days a year on the island (Espada, 2021). This way, they would also be

exempt from Federal taxes since these do not apply to Puerto Rican residents. Act 60, also known as the "Export Services Act," offers tax incentives to businesses that export services from Puerto Rico. The incentives include a 4% corporate tax rate and a 100% exemption on dividends on Puerto Rico-source income (Espada, 2021). This is all possible thanks to section 933 of the US tax code, which allows Puerto Rico to collect taxes from its bonified residents on Puerto Rico-sourced income (Frost, 2020). These laws are attracting the wrong kind of attention to the island. Many investors move to Puerto Rico, take advantage of the tax breaks, and do not contribute anything back to the social welfare of the island. On the contrary, a common practice among these individuals is buying residential properties to flip and resell them at inaccessible prices for the locals or converting them into short-term rentals, creating a shortage of inventory in available housing options (Marcos et al., 2022).

Due to years of disrepair and the ongoing economic crisis, Puerto Rico's housing stock was already vulnerable. It will take a monumental effort, meaningful investment, and careful planning to make the housing stock, infrastructure, and economy resilient against the threats of climate change. Puerto Rico does not need any more luxurious resorts or minimum wage jobs; it needs community-focused investment, pathways toward upward mobility, and policies that benefit local entrepreneurs.

3.2 Effects on Puerto Rico's Social-Economic Structures

3.2.1 ECONOMY AND JOB MARKET

According to the Puerto Rico Economic Analysis Report for FY 2020-2021, the island saw its first gross national product (GNP) rise since 2012, with a 1.8% increase for 2019, indicating that the recovery efforts had a favorable effect on the economy. However, GNP went down again by 3.2% for FY 2020 due to the Covid-19 pandemic and the cooldown of recovery work (Department of Labor and Human Resources, 2021). The gross domestic product (GDP) also decreased by 1.7% for FY 2020 after experiencing a 4% increase in FY 2019. For 2020 the main contributor to GDP was the manufacturing sector, contributing 48.2% of the GDP, followed by the service sector, with 43.7% (Department of Labor and Human Resources, 2021). There was a 5.9% increase in personal income in

2018, which can be attributed to the federal aid packages distributed after Hurricane María. For FY 2019 and 2020, personal incomes decreased by 4.4% and 2.9%, respectively (Department of Labor and Human Resources, 2021). To address inflation, the government increased the minimum hourly wage from \$7.25 to \$8.50 on January 1st, 2022. It plans to continue increasing wages periodically, with two more scheduled increases on July 1st, 2023, to \$9.50, and on July 1st, 2024, to \$10.50 (Felipe-Santos, 2021).

The labor market remains weak; however, the island has seen some job improvement in the years following Hurricane María. According to HUD's Comprehensive Housing Market Analysis for the fiscal year 2018-2019, total non-farm payrolls increased by 1.6%; ten out of eleven sectors saw positive growth (HUD, 2019). The fastest-growing employment sector was the professional and business services sector, with an average increase of 3.8%, followed by the wholesale and retail sector with 3.0% (HUD, 2019). The mining, logging, and construction sector saw the most significant percent change, with an increase of 16.9%, largely due to the influx of funds for recovery and reconstruction (HUD, 2019). The government sector was the only one to decline in the 12 months period, with a 4.2% reduction in jobs. This reduction can be tied to the migration of young families with school-age children. As mentioned in previous sections, the central government oversees all public schools in Puerto Rico, and enrollment has been decreasing by 3.5% annually since the economic crisis began. However, the government continues to be the largest job sector on the island, with more than 23% of total non-farm jobs (HUD, 2019).

Unemployment rates have been declining since they peaked in 2016 (16.4%), not because of economic improvements but due to the shrinking of the labor force. In 2019, unemployment decreased to 8.4% from 10.3% one year earlier (HUD, 2019). Job growth is forecasted to remain positive, with payrolls increasing by 0.4% annually, presenting higher rates in the first years after Hurricane María because of the recovery efforts and the influx of recovery funds into the local economy (HUD, 2019). As observed in *Figure 16*, education and health services continue to be the leader in employment sector growth due to Puerto Rico's aging population.

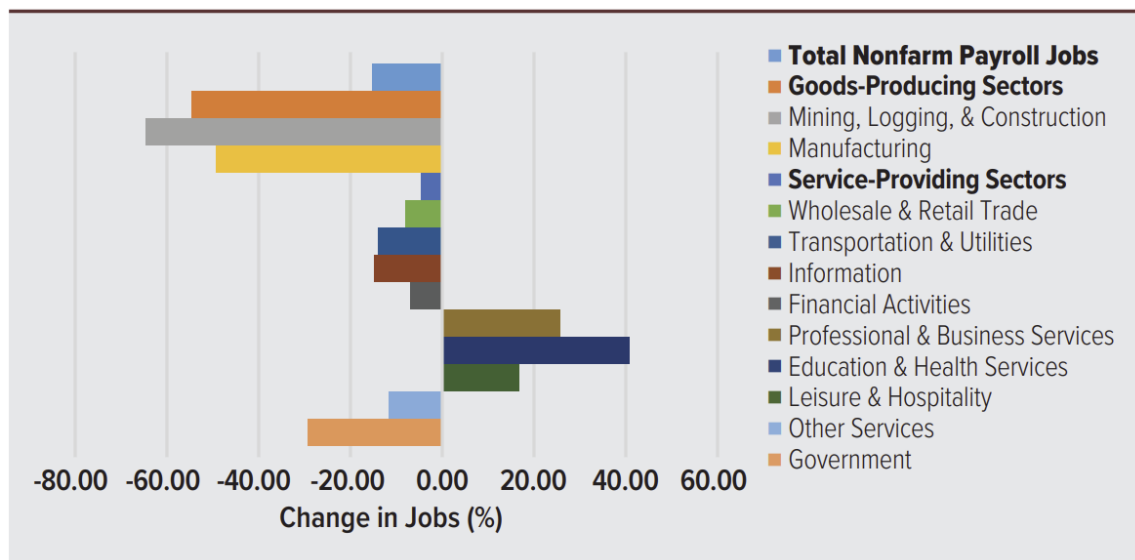


Figure 16: Job Sector Growth in Puerto Rico, Percent Change, 2001 to August 2019
Source: HUD Comprehensive Housing Market Analysis, 2019

3.2.2 POPULATION AND HOUSEHOLDS

Not much has changed in population trends compared to the years before Hurricane María. According to HUD's Comprehensive Housing Market Analysis, young families continue migrating out of PR to find better job opportunities, and the local population keeps aging (HUD, 2019). Naturally, there was a spike in outmigration during the year following the storm. Net outmigration from July 2017 to July 2018 was estimated at 123,400, a 53% increase from the previous year (HUD, 2019). Most of the decline was among the population under 18 years (9.6%). In this one year, the population's median age increased from 41.4 to 42.9 years of age (HUD, 2019). The population over 65 increased by nearly 0.4%, primarily due to aging in place. The net natural change turned negative in the 2017–2018 period. This is because of the high number of deaths caused by the hurricane. The official estimate was 2,975 deaths caused directly or indirectly by María (Santos-Burgoa et al., 2018).

Surprisingly, there was a minor increase of 209 (less than 1%) inhabitants from 2018 to 2019. According to a study from the University of Minnesota, 13.4% of people who migrated from Puerto Rico in 2017-Q3 returned by 2019-Q2 (DeWaard et al., 2020).

However, downward trends continued in 2020, with a 1.1% decrease from 2019 to 2020 (Department of Labor and Human Resources, 2021). The population declined by 2.3% after the hurricane and is expected to continue declining by 0.6% annually, but at a slower rate (HUD, 2019).

3.3 Effects on the Housing Stock

3.3.1 THE SALES HOUSING MARKET

As foreign investors keep growing their investment property portfolios, it is becoming more challenging for locals to find accessible housing. According to the Center for Investigative Journalism (CPI, in Spanish), the increase in foreign capital, the proliferation of unregulated short-term rentals, the halt in construction of affordable housing, and the impact of hurricanes, earthquakes, and the Covid-19 pandemic have created the perfect storm for the average price of properties for sale to increase in the years after Hurricane María (Suarez et al., 2022). As observed in the previous section, immediately after the passing of the storm in 2017, the average home price dropped, and vacancy rates went up due to a wave of outmigration, an increase in foreclosures, and homes deemed unsafe due to extensive damage from the hurricane. At the same time, the government passed Opportunity Zones legislation and created Act 60, and more foreigners applied for Act 22 benefits as the government tried to attract more private investment to the island. This resulted in a wave of purchases, mainly cash sales in coastal cities and the San Juan Metro Area (Suarez et al., 2022). In 2021, the seasonally adjusted purchase-only house price index surged 15.4%, a sharp increase compared to the 0.2% observed in the previous year (Delmendo, 2021).

Suddenly, the availability of affordable housing to buy or rent shrank. The rapid increase in activity in the home sales market caused speculation, which led to the rise in home prices. For investors, the higher prices were still a fraction of the cost of a home in the mainland US, but for the locals, it meant they could no longer compete to purchase homes in high-demand areas. Even the families participating in government programs to assist with home purchases were having difficulty competing with cash offers.

Consequently, families had no other option but to move further away from the city center, decreasing their access to job centers, government services, schools, and health facilities and spending more time and money commuting.

Consequently, the construction of homes picked up in 2019 due to increased demand. Almost a decade of nearly no new home building contributed to the current shortage. The PRDOH secretary announced in October 2022 that the government expects to add 981 affordable units within six new developments already under construction (Pacheco, 2022). Additionally, it plans to purchase 1,000 houses for resale at subsidized prices to low- and moderate-income families (Pacheco, 2022). Another factor contributing to this problem was the slow release of the CBDG-DR funds. Up until 2022, only 50 of the 1,633 units proposed by the R3 program had been built because of the unavailability of funds (Pacheco, 2022).

3.3.2 THE RENTAL HOUSING MARKET

The rental housing market in Puerto Rico remains soft after Hurricane María. Vacancy rates slightly decreased from 12.8% to 12.3% as more people had to rent due to losing their homes (HUD, 2019). Vacancies in government-owned affordable units also decreased from 4.4% in 2018 to 4.1% in 2019. In addition, the Puerto Rico Public Housing Authority provided approximately 33,000 renter households with Section 8 vouchers in that same year. There are also 17,000 units on the island under the Low-Income Housing Tax Credit program (HUD, 2019).

The average monthly rent for 2021 was \$502, an 8.2% increase from rents before Hurricane María (ACS, 2021). Median family income rose to \$21,967, an increase of 9.4% in the four years since the storm. Using the 2021 MFI to calculate an affordable rental rate, the average household could pay \$610 for housing accommodations, according to HUD's affordable rent standard of 30% of household income. Yet approximately 40% of Puerto Rico's population remains under US Federal poverty guidelines, so this price can still be too high for some families. An updated affordable housing gap analysis shows that not much has changed since 2016. *Figure 17* indicates a 50% gap between households and

housing units available in the <\$10,000 category, representing 50% MFI or less. According to a report by the Center for a New Economy, the proliferation of vacation rentals has contributed to a shortage of affordable housing options, particularly in popular tourist destinations like San Juan and Vieques (Santiago-Bartolomei, 2020). As more property owners convert their homes or apartments into short-term rentals, the supply of available units for long-term renters decreases, driving up rental prices and making it harder for low-income families to find affordable rental housing.

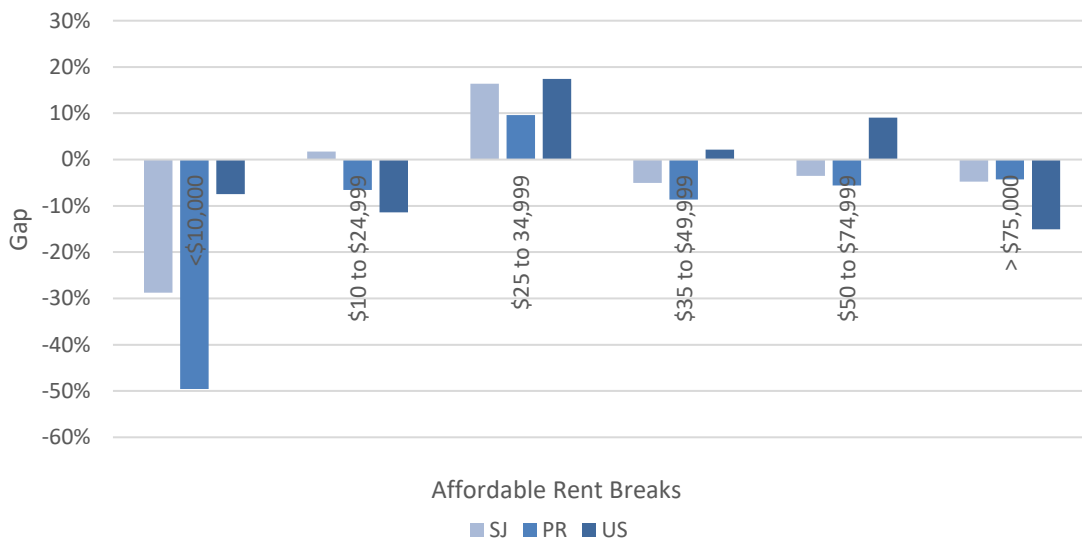


Figure 17: Affordable Rental Units Gaps by Income Breaks for 2020
Source: ACS 5-Year Estimate (2020)

DISCUSSION

Now that we have a better understanding of Puerto Rico's situation before and after Hurricane Maria, we can say that the main causes of displacement on the island were the economic crisis driven by flawed tax policies and the lack of options for low-income people to subsist. Puerto Rico has experienced many complex changes in the last two decades that have restructured its economy, population profile, and housing stock. In the early 2000s, changes in the US tax code ignited a recession that would last until the present day. The government failed to place countermeasures to prevent the economy from collapsing, so Puerto Rico shifted from a robust manufacturing industry to a service economy. The government turned into the largest provider of jobs; however, this quickly became unsustainable since many people started migrating due to the lack of job opportunities. With a shrinking tax base, the government could not afford its massive workforce and laid off thousands of employees, but not without getting deeply in debt first. The lack of investment in public infrastructure, education, and social programs lowered the quality of life on the island. Additionally, necessities such as housing became more inaccessible, as more than half of renters on the island reported being cost-burdened. Consequentially, people had no choice but to continue migrating. Therefore, displacement before Hurricane Maria was caused by the lack of job opportunities and the decaying quality of life for the locals.

Puerto Rico was already in precarious economic and demographic conditions before Hurricane María. Hence, the storm did not cause or change the island's socioeconomic crisis; it exposed the underlying problems and put them on the international radar. Hurricane María was so devastating because Puerto Rico's infrastructure and housing stock were aged and poorly maintained. Yet the situation presented an opportunity for the island to rebuild prioritizing resiliency and investing in deteriorated communities. However, the government took a different approach. It prioritized relocation instead of working with the communities to implement mitigation strategies and plan for the future. By making families relocate, the government is breaking essential support systems and

inhibiting people from taking advantage of job and education opportunities that may be harder to obtain elsewhere.

Additionally, federal agencies-imposed barriers that prevented the most vulnerable from accessing the help they desperately needed. Low-income families had to opt for informal reconstruction and rely on nonprofit organizations to bring their homes to livable conditions. This practice is unsustainable because it traps the homeowner in a cycle of destruction and rebuilding every time a significant climate event impacts the island. On the other hand, the families that did not find any type of support had to migrate. Some came back once the conditions stabilized, but many did not return. Consequently, during the storm's aftermath, there was a lot of indirect displacement from the handling of the recovery efforts.

During the following years, in an attempt to bring more private investment to Puerto Rico, the government imposed a series of regulations that gave tax breaks on capital investment to foreigners. These policies, aligned with favorable housing market conditions, caused the gentrification of many communities. The investors were not thinking about the socioeconomic wellness of the island; they were thinking about maximizing profits. A common practice was to flip a house and sell it for a profit or turn it into an overpriced vacation rental, which diminished the rental housing stock and hiked prices. In many areas, the locals were unable to find affordable housing options and were once again displaced from their communities.

CONCLUSION

For Puerto Rico to solve its economic, demographic, and housing crisis, the administration needs to look for localized solutions rather than looking for external solutions. The government must prioritize resilient infrastructure and plan for the long term. Puerto Ricans need a stable electric grid, not more luxury resorts. The government must invest in communities sustainably and equitably to promote economic development while preventing displacement. To achieve this, the government must acknowledge the actual needs of the communities it is trying to revive and let them be involved in their own recovery process.

The Puerto Rican people have shown time and time again how resilient they can be by adapting to the evolving economy and by enduring the hostile housing situation. The most vulnerable families, who cannot bear the cost of housing, should not have to be in a position where living in precarious conditions or moving are their only options. It is up to the government to work for the best interest of the residents by creating jobs that are in line with local, sustainable industries but that also incentive growth and innovation.

REFERENCES

- Abel, J. R., & Deitz, R. (2014). *The Causes and Consequences of Puerto Rico's Declining Population* (SSRN Scholarly Paper No. 2477891).
<https://papers.ssrn.com/abstract=2477891>
- All Hands and Hearts. (2023). Puerto Rico Hurricane Relief. *All Hands and Hearts*.
<https://www.allhandsandhearts.org/programs/puerto-rico-hurricane-relief/>
- Associated Press. (2018, December 4). *Puerto Rico lost \$43 billion after Hurricane Maria, according to govt. Report*. NBC News.
<https://www.nbcnews.com/news/latino/puerto-rico-lost-43-billion-after-hurricane-maria-according-govt-n943441>
- Ayuda Legal Puerto Rico. (2020). *The relationship between disaster recovery and displacement*. <https://www.ayudalegalpuertorico.org/wp-content/uploads/2020/11/ALPR-EE-ENG.pdf>
- Borjas, G. J., & Freeman, R. B. (1992). *Immigration and the Work Force: Economic Consequences for the United States and Source Areas*. University of Chicago Press. <https://www.nber.org/books-and-chapters/immigration-and-work-force-economic-consequences-united-states-and-source-areas>
- Braun, M. (2017, May 15). Debt Island: How \$74 Billion in Bonds Bankrupted Puerto Rico. *Bloomberg.Com*. <https://www.bloomberg.com/news/articles/2017-05-15/debt-island-how-74-billion-in-bonds-bankrupted-puerto-rico>
- Chen, J. (2022, February 19). *What Is a Serious Delinquency in a Mortgage?* Investopedia. https://www.investopedia.com/terms/s/serious_delinquency.asp
- Delmendo, L. (2021, October 16). *Investment Analysis of Puerto Rican Real Estate Market* (Puerto Rico) [Text]. Global Property Guide.
<https://www.globalpropertyguide.com/Caribbean/Puerto-Rico>
- Department of Economic Development and Commerce. (2023). *Opportunity Zones* Department of Economic Development and Commerce. Department of Economic Development and Commerce. <https://www.ddec.pr.gov/en/opportunity-zones>

- Department of Labor and Human Resources. (2016). *Puerto Rico Economic Analysis Report 2015-2016*.
https://www.doleta.gov/performance/results/AnnualReports/docs/2017_State_Plans/Economic_Reports/Puerto%20Rico/PR%20Economic%20Analysis.pdf
- Department of Labor and Human Resources. (2021). *Puerto Rico Economic Analysis Report 2020-2021*.
[https://www.dol.gov/sites/dolgov/files/eta/Performance/pdfs/annual_economic_reports/2021/PR%20Economic%20Analysis%20Report%20FY%202020-2021%20\(000000002\)%20en%20pdf.pdf](https://www.dol.gov/sites/dolgov/files/eta/Performance/pdfs/annual_economic_reports/2021/PR%20Economic%20Analysis%20Report%20FY%202020-2021%20(000000002)%20en%20pdf.pdf)
- DeWaard, J., Johnson, J. E., & Whitaker, S. D. (2020). Out-migration from and return migration to Puerto Rico after Hurricane Maria: Evidence from the consumer credit panel. *Population and Environment*, 42(1), 28–42.
<https://doi.org/10.1007/s11111-020-00339-5>
- Dietz, C., Karumatt, N., & Mueller, K. (2020). *Commercial Real Estate Analysis and Recommendations for Economic Development*. University of Michigan.
https://www.investpr.org/wp-content/uploads/2021/11/5ecd24fc6e6afb7ee682073f_UM-Ross-Commercial-Real-Estate-Team-Final-Report.pdf
- Discover PR. (n.d.). *A Brief History of Puerto Rico*. Discover Puerto Rico. Retrieved April 9, 2023, from <https://www.discoverpuertorico.com/island/history>
- Espada, M. (2021, April 16). *Influencers, Developers, Crypto Currency Tycoons: How Puerto Ricans Are Fighting Back Against the Outsiders Using the Island as a Tax Haven*. Time. <https://time.com/5955629/puerto-rico-tax-haven-opposition/>
- Estudios Tecnicos Inc. (2017). *Preliminary Estimate: Cost of Damages by Hurricane María in Puerto Rico*. <https://estadisticas.pr/files/inline-files/Preliminary%20Estimate%20Cost%20of%20Maria-1.pdf>
- Felipe-Santos, J. (2021, October 7). *Puerto Rico Adopts Minimum Wage Act*. SHRM. <https://www.shrm.org/resourcesandtools/legal-and-compliance/state-and-local-updates/pages/puerto-rico-adopts-minimum-wage-act.aspx>

- FEMA. (2017, October 20). *Transitional Sheltering Assistance Available to Residents of Puerto Rico Displaced by Hurricanes Irma and Maria* / FEMA.gov.
<https://www.fema.gov/press-release/20210318/transitional-sheltering-assistance-available-residents-puerto-rico-displaced>
- FEMA. (2018). *Mitigation Assessment Team Report: Hurricanes Irma and Maria in Puerto Rico*. https://www.fema.gov/sites/default/files/2020-07/mat-report-hurricane-irma-maria-puerto-rico_2.pdf
- FEMA. (2019, September 30). *FEMA Extends Individual and Households Program Deadline Through Nov. 30* / FEMA.gov. <https://www.fema.gov/press-release/20210318/fema-extends-individual-and-households-program-deadline-through-nov-30>
- FEMA. (2021, November 2). *DR-4339 Hurricane Maria By The Numbers* / FEMA.gov.
<https://www.fema.gov/fact-sheet/hurricane-maria-numbers>
- Frost, G. (2020, April 22). *Tax-Weary Americans Find Haven in Puerto Rico* / Frost Law / Washington DC. Washington DC Tax Law Attorney | Montgomery County IRS Audit Lawyer. <https://www.districtofcolumbiataxattorney.com/articles/tax-weary-americans-find-haven-in-puerto-rico/>
- Gallardo, L. (2020, July 2). Why Puerto Ricans Fear Opportunity Zones. *Next City.Org*.
<https://www.proquest.com/docview/2419746174/abstract/DC4D69C666404BD0PQ/1>
- Garcia. (2021, May 21). *The Lack of Proof of Ownership in Puerto Rico Is Crippling Repairs in the Aftermath of Hurricane Maria*.
https://www.americanbar.org/groups/crsj/publications/human_rights_magazine_home/vol--44--no-2--housing/the-lack-of-proof-of-ownership-in-puerto-rico-is-crippling-repai/
- Goldstein, M. (2018, July 16). After Storm, Foreclosures in Puerto Rico Stopped. They're Starting Again. *The New York Times*.
<https://www.nytimes.com/2018/07/15/business/puerto-rico-hurricane-foreclosures.html>

- Hinojosa, J., & Melendez, E. (2018). *The Housing Crisis in Puerto Rico and the Impact of Hurricane Maria*. https://centropr-archive.hunter.cuny.edu/sites/default/files/data_briefs/HousingPuertoRico.pdf
- Hispanic Federation. (2023). *Unidos Disaster Relief and Recovery Program to Support Puerto Rico*. Hispanic Federation. <https://www.hispanicfederation.org/unidos/>
- History. (2009, November 16). *Puerto Ricans become U.S. citizens, are recruited for war effort*. History.Com. <https://www.history.com/this-day-in-history/puerto-ricans-become-u-s-citizens-are-recruited-for-war-effort>
- HUD. (2017). *Puerto Rico Comprehensive Housing Market Analysis*. <https://www.huduser.gov/portal/publications/pdf/PuertoRico-comp.pdf>
- HUD. (2019). *Puerto Rico Comprehensive Housing Market Analysis*. <https://www.huduser.gov/portal/publications/pdf/PuertoRico-CHMA-19.pdf>
- HUD Exchange. (2018, March 2). *60-Day Extension of Foreclosure Moratorium for Hurricane Maria Affected Areas in Puerto Rico and the U.S. Virgin Islands*. <https://www.hudexchange.info/news/60-day-extension-of-foreclosure-moratorium-for-hurricane-maria-affected-areas-in-puerto-rico-and-the-u-s-virgin-islands>
- Marcos, C. M., Mazzei, P., & Rodriguez, E. P. (2022, January 31). The Rush for a Slice of Paradise in Puerto Rico. *The New York Times*. <https://www.nytimes.com/2022/01/31/us/puerto-rico-gentrification.html>
- Mazzei, P., & Robles, F. (2019, July 25). Ricardo Rosselló, Puerto Rico's Governor, Resigns After Protests. *The New York Times*. <https://www.nytimes.com/2019/07/24/us/rossello-puerto-rico-governor-resigns.html>
- Molden, O. (2020). *The Relationship Between Disaster Recovery and Displacement in Puerto Rico*. https://static1.squarespace.com/static/561dcdc6e4b039470e9afc00/t/5fab2a792158c42cdf76bbb4/1605053051956/EE_AyudaLegal_Report_10232020.pdf

- NOAA. (2018, January). *Annual 2017 Tropical Cyclones Report*.
<https://www.ncei.noaa.gov/access/monitoring/monthly-report/tropical-cyclones/201713>
- Ortiz, J. L. (2018, December 4). *Hurricane Maria's economic impact on Puerto Rico: At least \$43 billion, possibly as high as \$159 billion*. USA TODAY.
<https://www.usatoday.com/story/news/2018/12/04/hurricane-maria-economic-impact-puerto-rico/2209231002/>
- Pacheco, I. (2022, October 19). *Vivienda se apresta a realizar compra masiva de propiedades*. El Vocero de Puerto Rico.
https://www.elvocero.com/gobierno/agencias/vivienda-se-apresta-a-realizar-compra-masiva-de-propiedades/article_3321dc68-4f50-11ed-b59d-e3b610aa653d.html
- PRDOH. (2019a, August 29). The Action Plan. *CDBG*. <https://cdbg-dr.pr.gov/en/action-plan/>
- PRDOH. (2019b, September 23). Title Clearance. *CDBG*. <https://cdbg-dr.pr.gov/en/title-clearance/>
- PRDOH. (2020, January 28). Rental Assistance. *CDBG*. <https://cdbg-dr.pr.gov/en/rental-assistance/>
- PRDOH. (2022, December 29). Home Repair, Reconstruction, or Relocation Program. *CDBG*. <https://cdbg-dr.pr.gov/en/download/home-repair-reconstruction-or-relocation-program/>
- PRDOH. (2023). *Reglamento para establecer el prodedimiento del programade ayude de materiales*.
<https://www.vivienda.pr.gov/docs/REGLAMENTO%20PARAESTABLECER%20ELPROCEDIMIENTO%20DEL%20PROGRAMADEAYUDADE%20MATERIALES%20%282%29.pdf>
- Rand Corporation. (2018). *Hurricanes Irma and Maria: Impact and Aftermath*.
<https://www.rand.org/hsrd/hsoac/projects/puerto-rico-recovery/hurricanes-irma-and-maria.html>

- Santiago-Bartolomei, R. (2020, September 14). Housing and Digital Platforms: Airbnb in Puerto Rico. *CNE – Centro Para Una Nueva Economía – Center for a New Economy*. <https://grupocne.org/2020/09/14/housing-and-digital-platforms-airbnb-in-puerto-rico/>
- Santos-Burgoa, C., Sandberg, J., Suárez, E., Goldman-Hawes, A., Zeger, S., Garcia-Meza, A., Pérez, C. M., Estrada-Merly, N., Colón-Ramos, U., Nazario, C. M., Andrade, E., Roess, A., & Goldman, L. (2018). Differential and persistent risk of excess mortality from Hurricane Maria in Puerto Rico: A time-series analysis. *The Lancet Planetary Health*, 2(11), e478–e488. [https://doi.org/10.1016/S2542-5196\(18\)30209-2](https://doi.org/10.1016/S2542-5196(18)30209-2)
- Serrano-Roman, A. (2022, May 3). *Puerto Rico’s Opportunity Zone Program Has Sluggish Start*. <https://news.bloombergtax.com/daily-tax-report/puerto-ricos-opportunity-zone-program-starts-slow-misses-mark>
- Suarez, D., Rodriguez, V., & Sosa, O. (2022, December 19). *A Nightmare for Puerto Ricans to Find a Home, While Others Accumulate Properties*. Centro de Periodismo Investigativo. <https://periodismoinvestigativo.com/2022/12/a-nightmare-for-puerto-ricans-to-find-a-home-while-others-accumulate-properties/>
- Talbot, J., Poleacovschi, C., & Hamideh, S. (2022). Socioeconomic Vulnerabilities and Housing Reconstruction in Puerto Rico After Hurricanes Irma and Maria. *Natural Hazards*, 110(3), 2113–2140. <https://doi.org/10.1007/s11069-021-05027-7>
- UC Berkeley. (n.d.). *Displacement of human populations*. Understanding Global Change. Retrieved April 9, 2023, from <https://ugc.berkeley.edu/background-content/displacement-of-human-populations/>
- US Department of Energy. (2018, April 4). *Hurricanes Nate, Maria, Irma, and Harvey Situation Reports*. Energy.Gov. <https://www.energy.gov/ceser/articles/hurricanes-nate-maria-irma-and-harvey-situation-reports>
- Valentin, A. (2011, March 10). *Ley 7 ha sido la “más nefasta.”* <https://www.noticel.com/ahora/20110310/ley-7-ha-sido-la-mas-nefasta/>

- Vargas-Ramos, C. (2018). Political Crisis, Migration and Electoral Behavior in Puerto Rico. *Centro Journal*, 30(3), 279–312.
- Webster, I. (2023). \$220 in 2010 to 2016. Value of \$220 from 2010 to 2016. <https://www.in2013dollars.com/us/inflation/2010?amount=220>
- Wessel, L. S. and D. (2022, August 17). Puerto Rico’s bankruptcy: Where do things stand today? *Brookings*. <https://www.brookings.edu/blog/up-front/2022/08/17/puerto-ricos-bankruptcy-where-do-things-stand-today/>