Insights from August 2016 LA Floods on Population Sociodemographic and Housing Price Changes

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Future Intelligent Resilient (FIRST) Lab

1. Introduction

- ❖ Extreme weather-related events increasingly causes displacement globally, with 5.4M people displaced due to flooding in 2018. Approx.1% of US migrants cite disasters as cause.
- ❖ Migration strains urban infrastructure and increases vulnerabilities in their new locations. In addition, population loss reduces local tax revenue, impairing community sustainably, disaster recovery and infrastructure maintenance/investments.
- ❖ Migration decisions are influenced by complex personal, socioeconomic, and environmental factors. Barriers such as moving costs and legal restrictions further shape migration choices.
- ❖ The interaction between demographic changes and housing prices remains underexplored in disaster migration research.
- ❖ Understanding the links between sociodemographic, hazards, and housing prices can improve strategic planning.

2. Research Question

RQ1: To what extent did racial, ethnic, and minority population status change as a result of the 2016 Louisiana flood event?

RQ2: To what extent did household income change together with the 2016 flood?

RQ3: To what extent has property value changed together with median household income and population characteristics?

3. Case Study: 2016 Great Floods of Louisiana (LA)

The August 2016 LA flood described as a "historic and unprecedented" event due to its severe impact from event unrelated to a hurricane:

- ❖ 13 fatalities and $10-15 billion damage estimation.
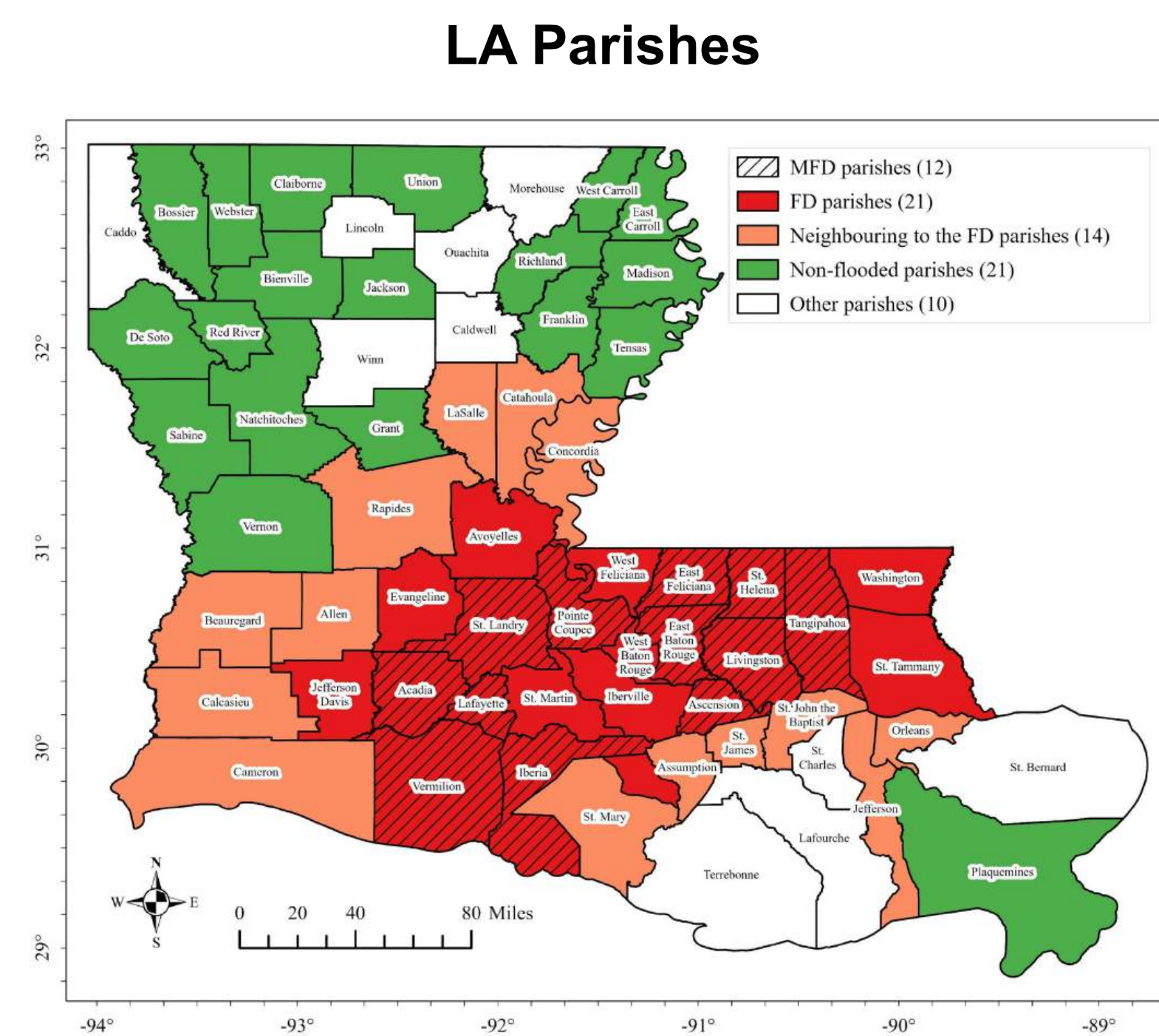- ❖ 21 parishes were declared federal disaster by FEMA (see those in Figure-1).

Figure 1: Proposed categories

4. Study Area: Louisiana

Louisiana is one of the most flood-prone states in the US. In the last 45 years, LA has experienced:

- ❖ 22% of the total flood events
- ❖ 21% of the national death toll
- ❖ Although it has only 1.35% of the nation's population (see Figure 2)

Figure 2: Floods in US and LA cost billions, 1980-2024

Population Demographics (2016)

- ❖ Non-Hispanic or Latino-
  - White: 58.84%
  - Black or African American: 32.10%,
- ❖ Hispanic or Latino: 4.94% in total. (See Figure 3)
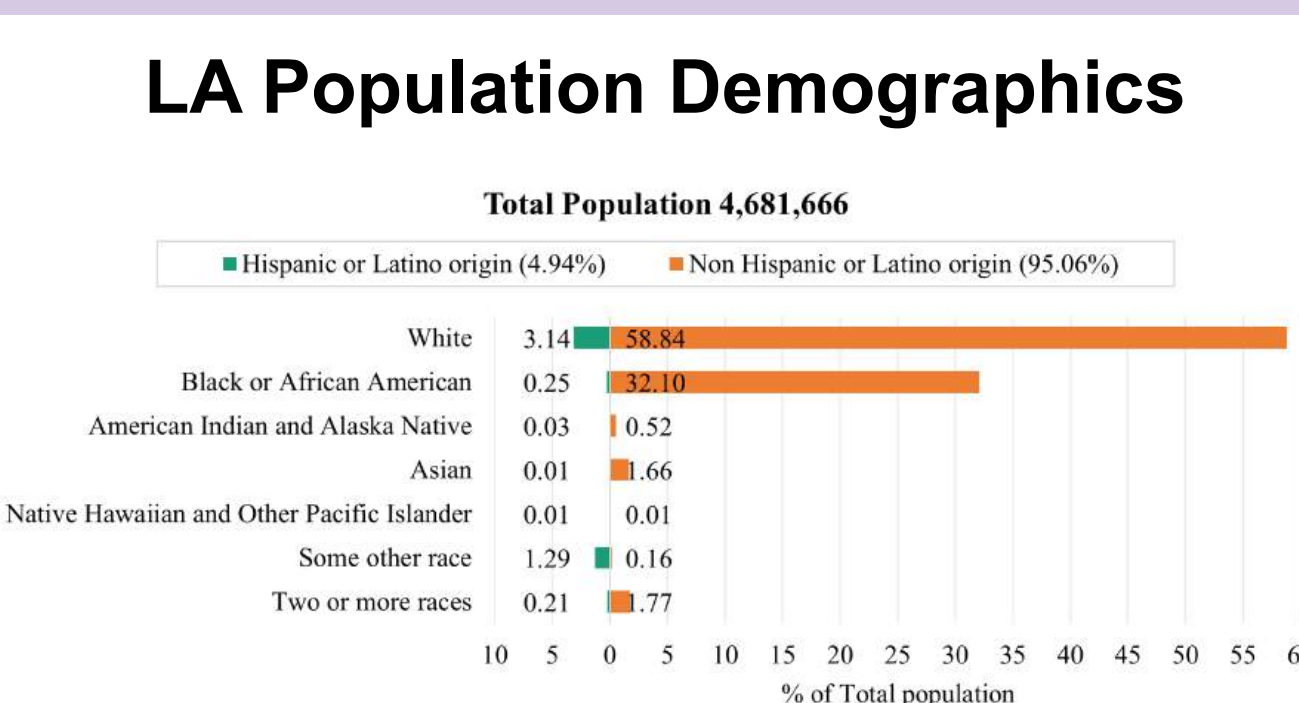
Figure 3: Population composition in LA, 2016

Household Income

- ❖ Highest income households: White (Non-Hispanic or Non-Latino)
- ❖ Lowest income households : Black or African American (See Figure 4)
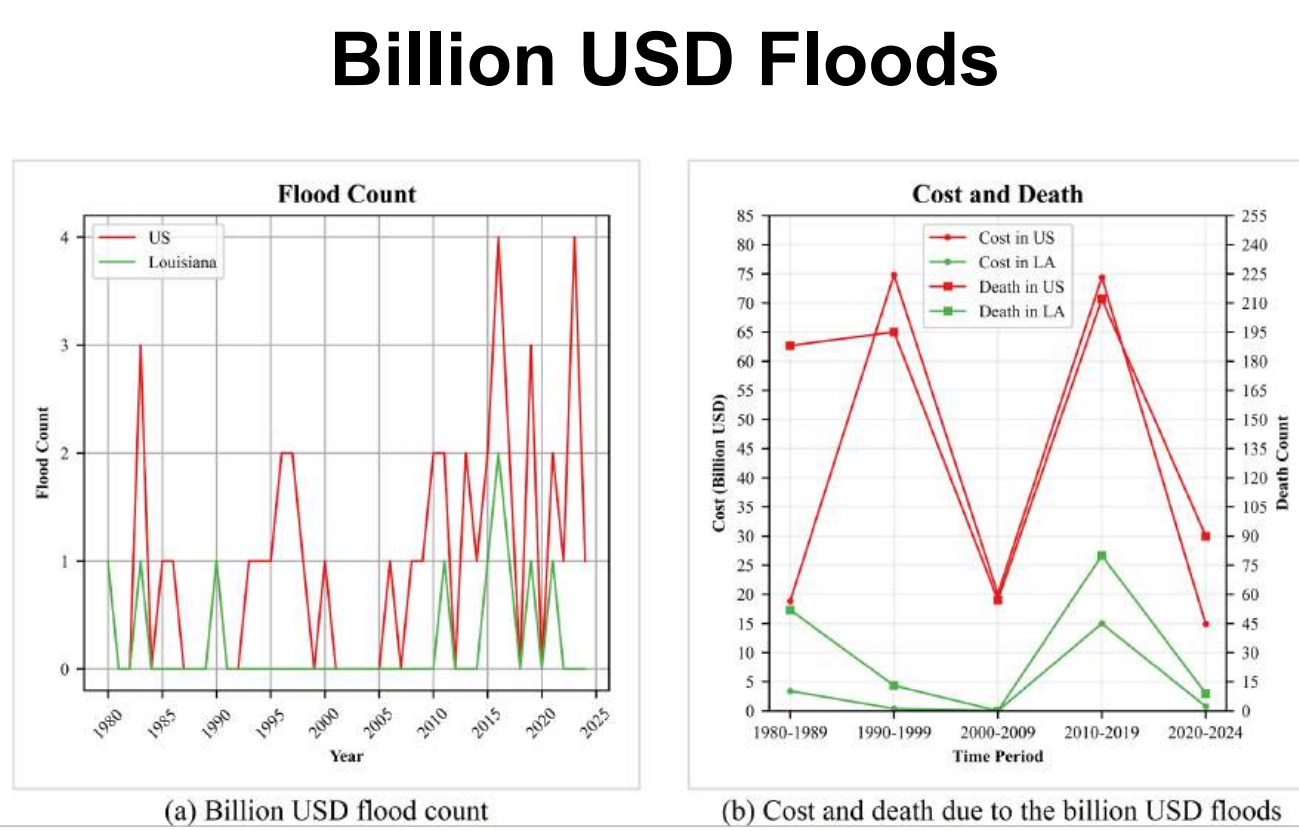 - Approximately 40-50% lower than the White households.
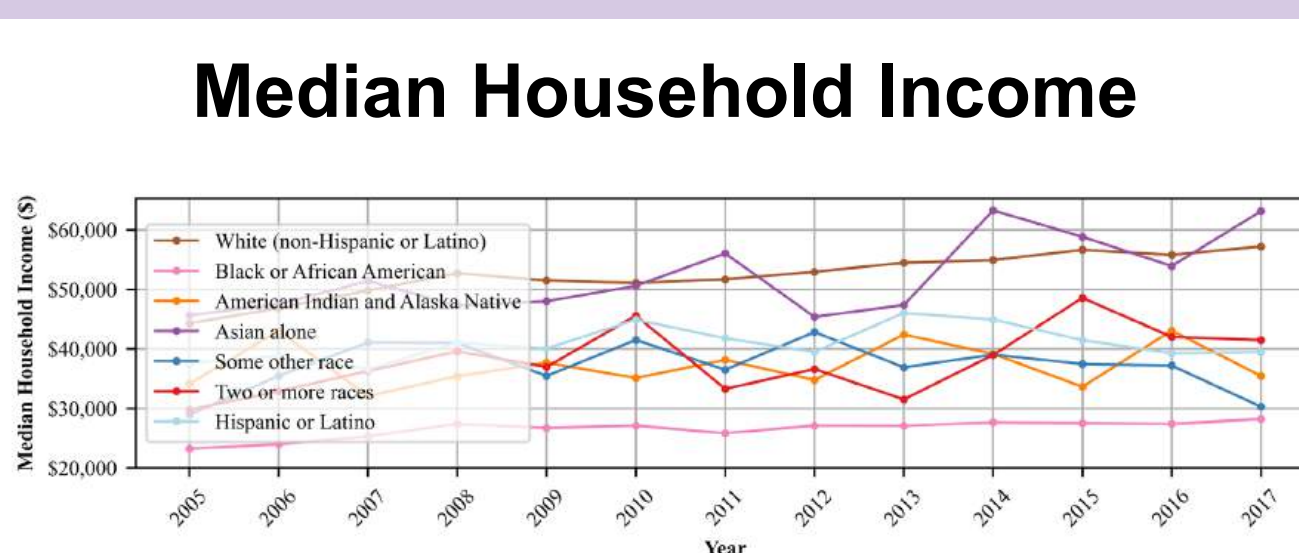

Figure 4: Median household income in LA, 2005-17

5. Data Source

US Census Bureau
- ❖ ACS 1-year Estimate
  - State-level population data by race
- ❖ ACS 1-year Supplement Estimate
  - Parish-level population data by race
  - Parish-level household income data
  - Parish-level housing price data

Federal Disaster Response Agency
- ❖ National Flood Insurance Program (NFIP)
  - Damage to insured buildings and contents
- ❖ Individuals and Households Program (IHP)
  - Damage to uninsured real and personal properties

United States Geological Survey
- Flood inundated area

Stephenson Disaster Management Institute (SDMI), LSU
- Flood affected area

6. Methodology

A. Descriptive Statistics:
(a) Mean, (b) Std Dev, (c) Min, (d) Q1,
(e) Median, (f) Q3, (g) Max, (h) Skewness

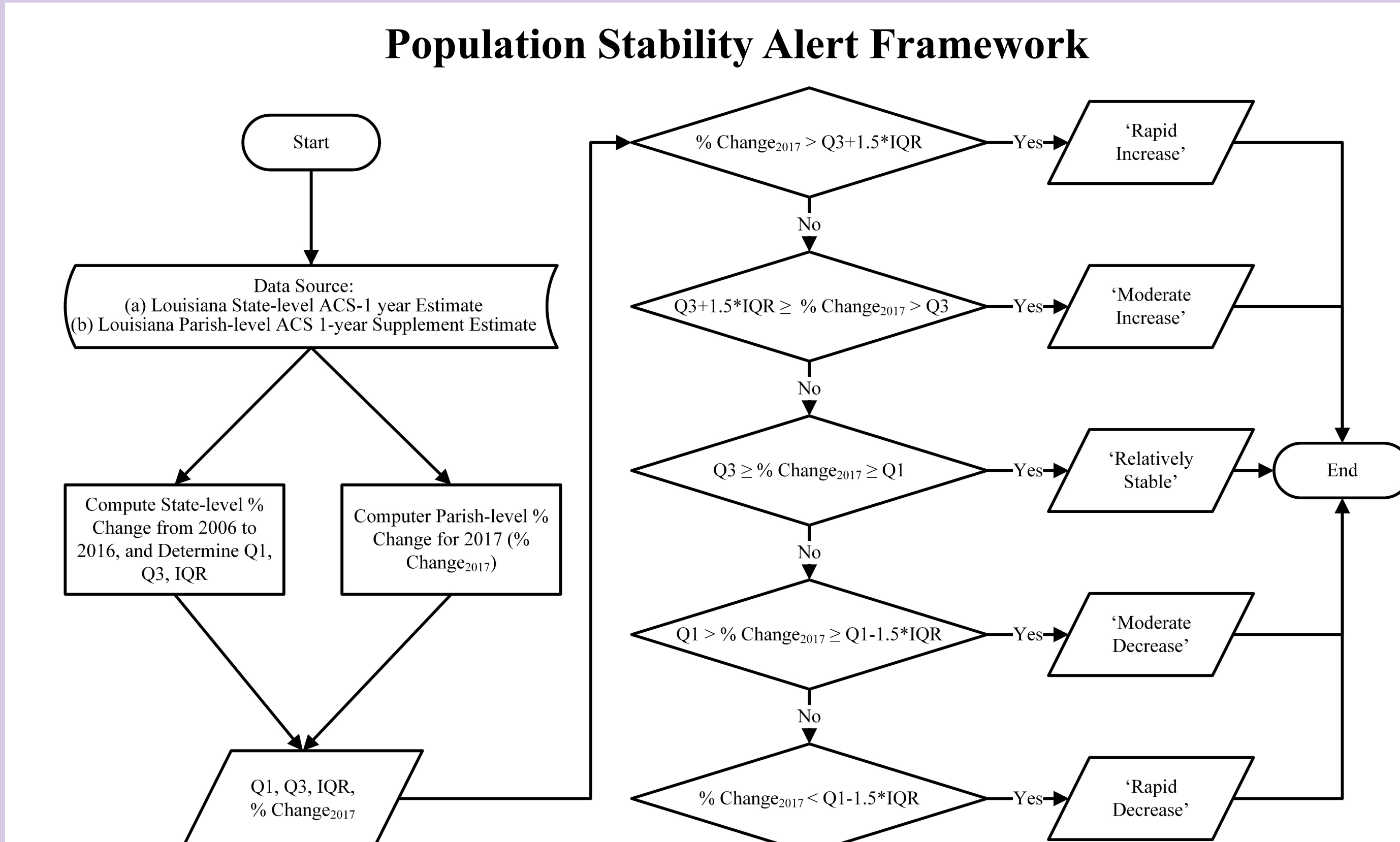**B. Proposed framework** (see Figure 5)

Figure 5: Flowchart algorithm (framework) for parish-level demographic shifts determination
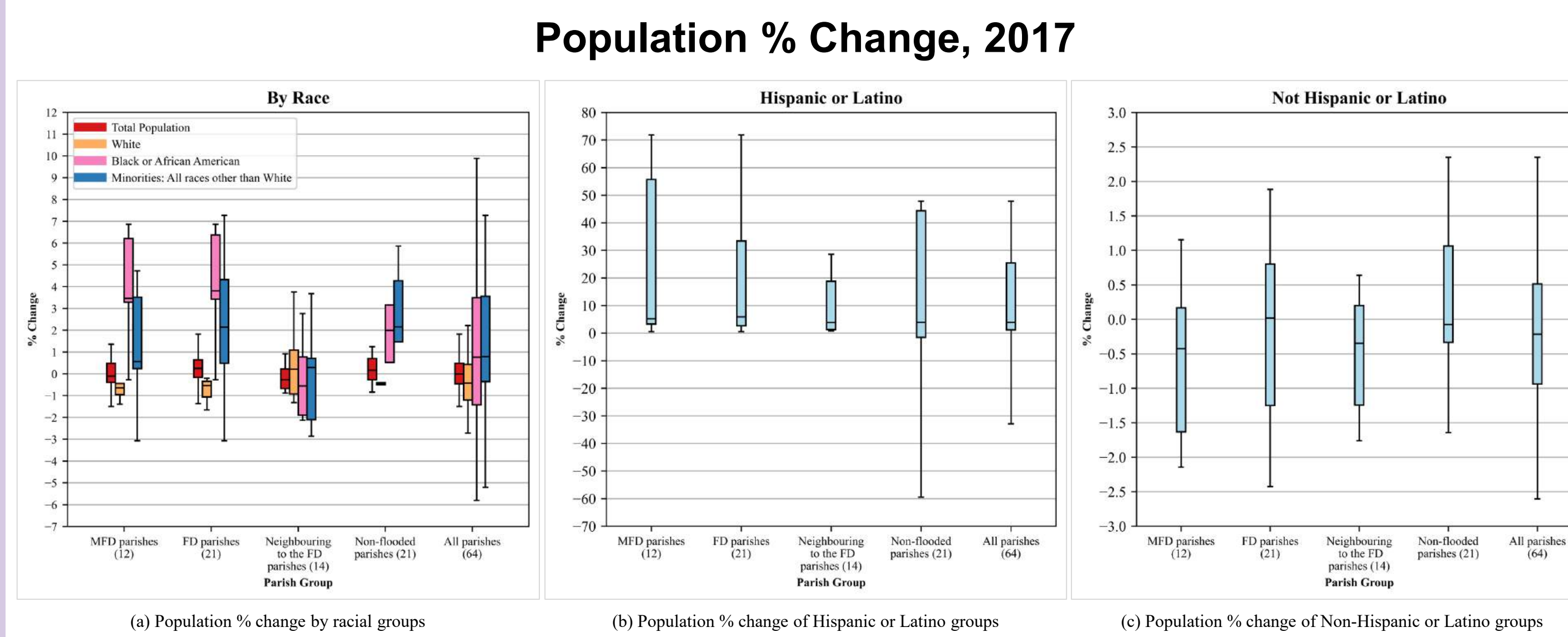
7.A Results: Descriptive Statistics

Figure 6: Box plots illustrating population % change in population by racial and ethnicity categories across parish groups in LA, 2017
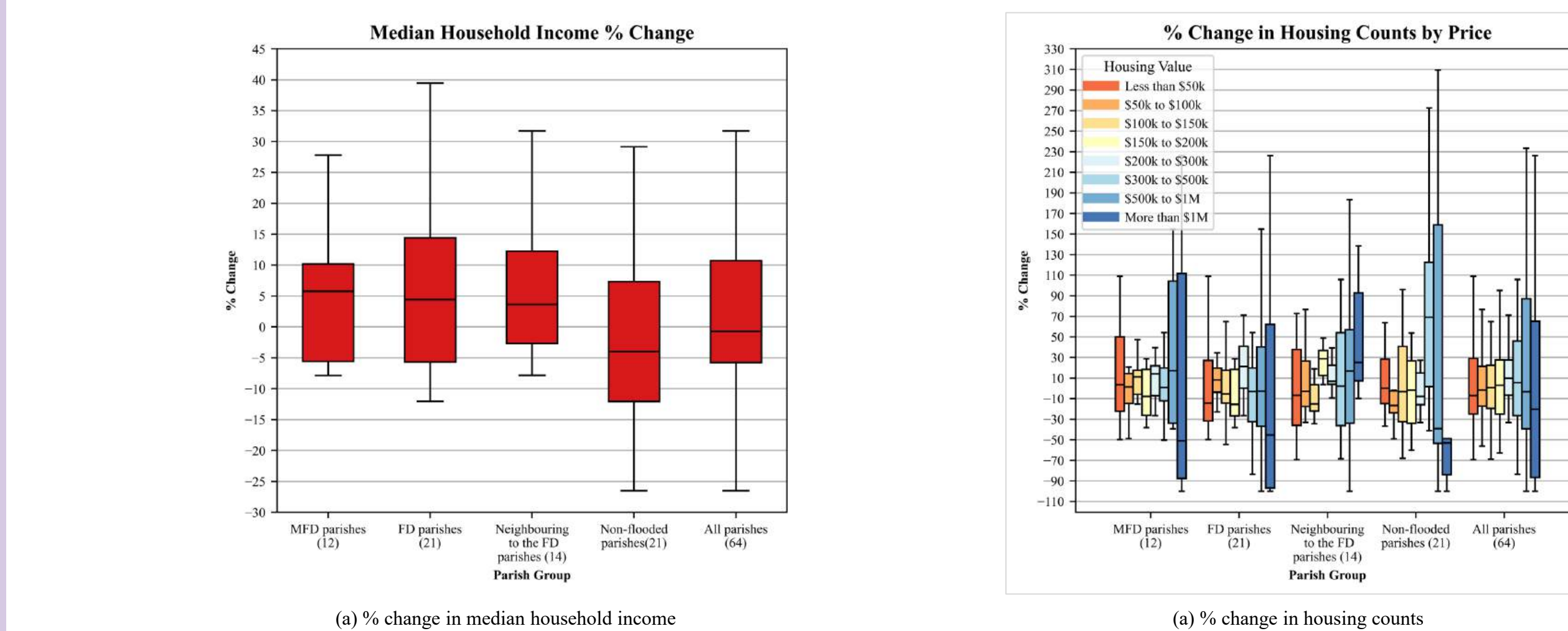

Figure 7: Box plots illustrating % change in (a) median household income and (b) housing counts by price across parish groups in LA, 2017
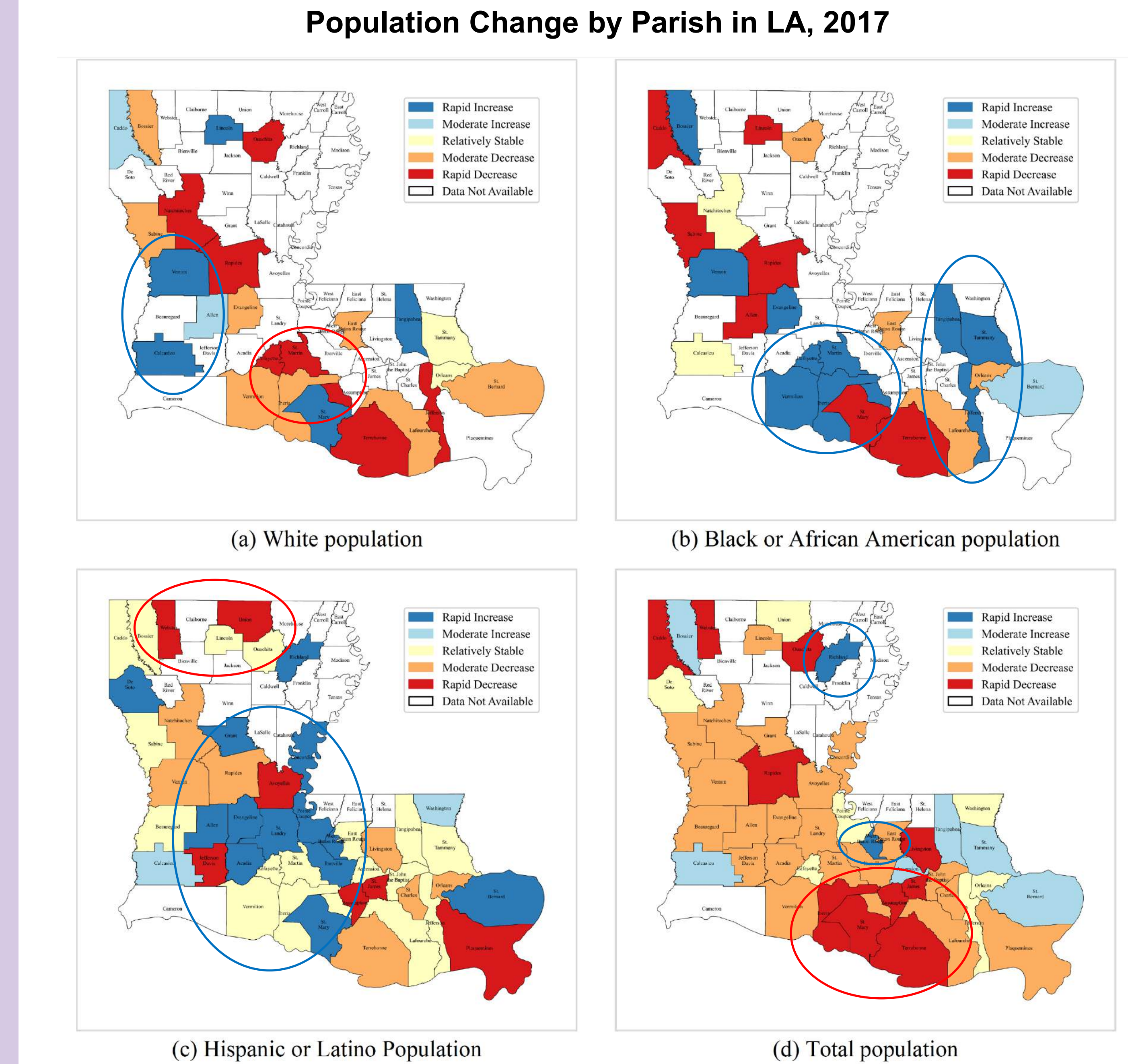
7.B Results: Proposed Framework

Figure 8: Comparative analysis of post-flood population changes in 2017 regarding the historical changes (2006-2016)
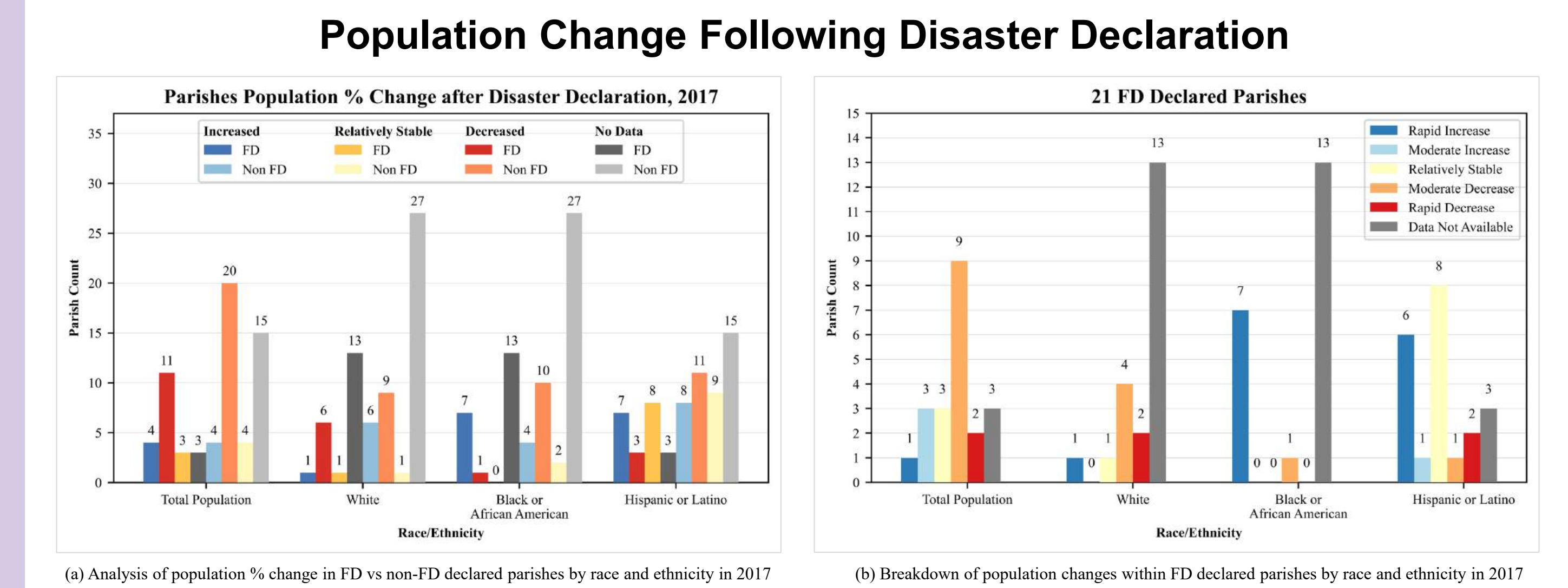

Figure 9: Bar plot illustrating population change in 2017 regarding the historical changes

7.C Results: Value Changes & Sociodemographic

Median Value of Population and Median Household Income % Change in 2017 (Number of data availability parishes)

	Total population	White population	Black or African American population	Hispanic or Latino population	Median Household Income for all population
MFD parishes (12)	−0.10%(10)	−0.64% (5)	3.47% (5)	5.25%(10)	5.78 %(10)
FD parishes (21)	0.25%(18)	−0.54% (8)	3.81% (8)	5.91%(18)	4.43%(18)
Neighboring to the FD parishes (14)	−0.27%(11)	0.22% (6)	−0.55% (6)	3.87%(11)	3.66%(11)
Non-flooded parishes (21)	0.17%(13)	−0.46% (5)	2.00% (5)	3.89%(13)	−4.00%(15)
All parishes (64)	0.00%(46)	−0.42% (24)	0.77%(24)	3.88%(46)	−0.70%(48)

Table 1: Relationship the change in population with the change in median household income

Housing Counts % Change in 2017 (Number of data availability parishes)

Price of House	Less than $50,000	$50,000 to $199,999	$200,000 to $499,999	$500,000 to $999,999	$1,000,000 or more
MFD parishes (12)	3.58%(10)	0.19%(10)	11.44%(10)	17.26%(10)	−51.01% (9)
FD parishes (21)	−14.27%(18)	1.52%(18)	14.79%(18)	−2.59%(16)	−45.26%(14)
Neighboring to the FD parishes (14)	−6.63%(11)	−0.39%(11)	9.83%(11)	16.91% (9)	25.29% (6)
Non-flooded parishes (21)	0.18%(11)	−3.02%(12)	12.25%(12)	−39.11% (8)	−53.07% (5)
All parishes (64)	−6.89%(48)	0.20%(48)	12.25%(48)	−3.30%(41)	−20.18%(30)

Table 2: Summary of % change in housing quantity by value across parish groups

8. Conclusions

- ❖ Significant difference for race % ethnicity in the flood and non-flooded areas.
- ❖ Growing movements of lower-income and minority populations in highly impacted areas.
- ❖ Presents the relationship between houses prices changes, socio economic characteristics and damage.
- ❖ Supports development of resilience strategies that consider demographic and economic dynamics post-disaster.