Analyzing Socially Vulnerable Areas in Louisiana During Hurricane Katrina

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Abstract

The purpose of this research is to analyze the social vulnerability of various populations in Louisiana during Hurricane Katrina. Hurricane Katrina struck the Gulf Coast of the United States on August 29, 2005. When the storm made landfall, it had a Category 3 rating on the Saffir-Simpson Hurricane Scale (SSHS) and caused a fatality of 1,833 people. A number of social variables can be used to identify at-risk populations such age, income, and minority populations that are more susceptible to storms. Python, GIS and remote sensing was utilized in this research to produce descriptive statistics and a social index that highlights the populations that are higher risk from a geospatial perspective. Using the U.S. Census Bureau data, one of the main components of the research is to create a social vulnerability index that maps out these variables.
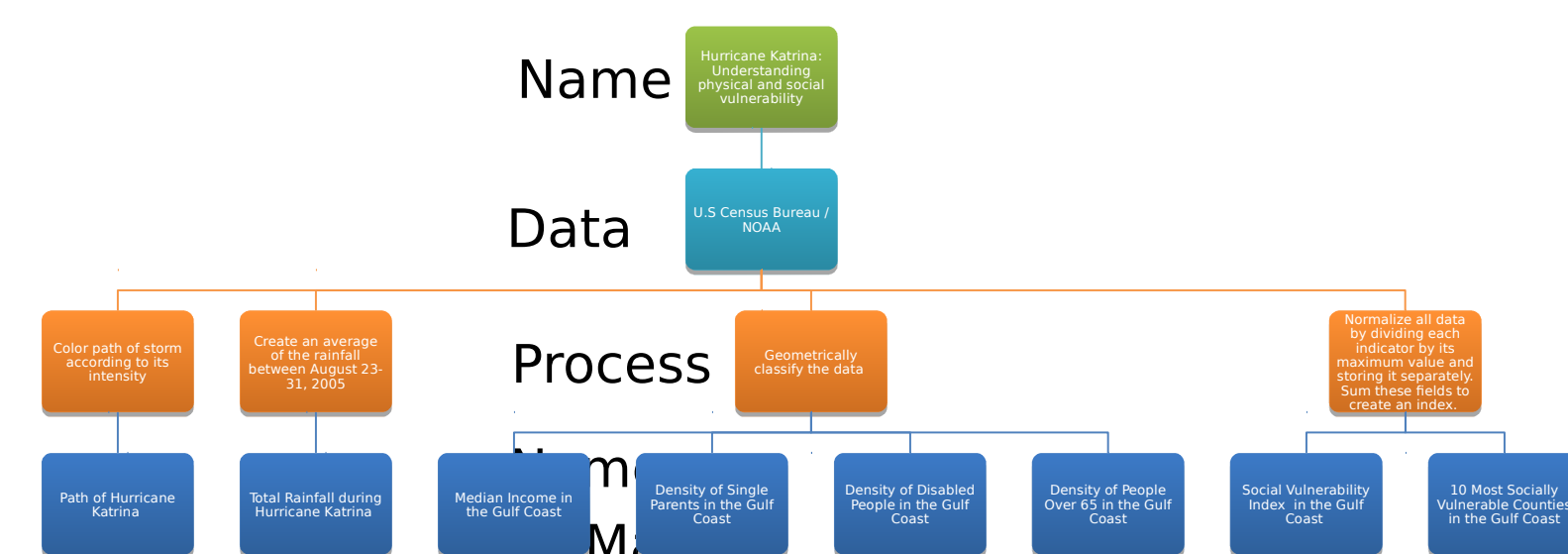
Background

Hurricane Katrina struck the Gulf Coast of the United States on the morning of August 29, 2005. When the hurricane made landfall along the Gulf Coast, it had dropped from a Category 5 hurricane to a Category 3 on the Saffir-Simpson Hurricane Scale and winds had reached an excess of 125 mph. Damage was largely concentrated along the Gulf Coast within a 100-mile radius of where the storm made landfall.

Although the storm's wind and water were overwhelming, Katrina was also a man-made disaster. Most of the damage came from the failure of the city's primary flood protection systems. Because New Orleans is naturally shaped like a bowl with its outer edges formed by earthen levees, floodwalls, and natural ridges; when the flood protection system failed during Katrina, the natural bowl shape filled with water. The failed flood protection system kept the floodwaters in the city until pumps were able to dry out the city. Approximately 80% of the city was flooded with neighborhoods taking the brunt of the impact and 70% of all occupied units were flooded.

The hurricane took around 1,833 lives and nearly half of these victims were over the age of 74. The storm also displaced over a million people in the Gulf Coast region. As such, the population of New Orleans fell from 484,674 before Katrina to 230,172 after Katrina. The CRS (Catholic Relief Services) estimates that one-fifth of those displaced by the storm were likely to have been poor, and 30% had incomes that were below 1.5 times the poverty line. This only goes to say that Hurricane Katrina made one of the poorest areas in New Orleans... victims. Overall, the total damages from the storm were $135 million, more than any other hurricane in history.

Methodology

Name — Hurricane Katrina understanding physical and social vulnerability

Data — U.S Census Bureau / NOAA
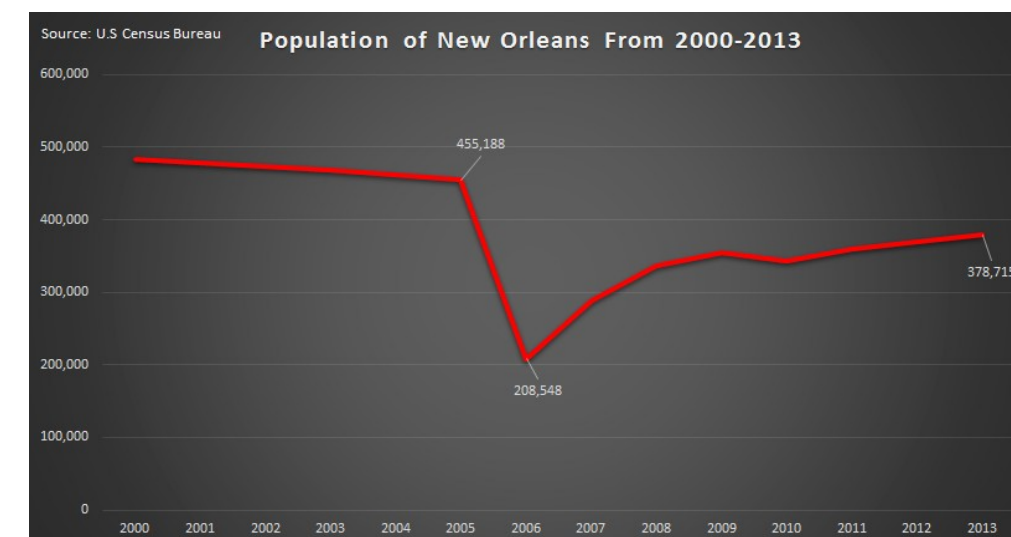
Process

Number of Maps

Data & Results

Chart 1. The population dropped dramatically due to Hurricane Katrina as people fled the cities.
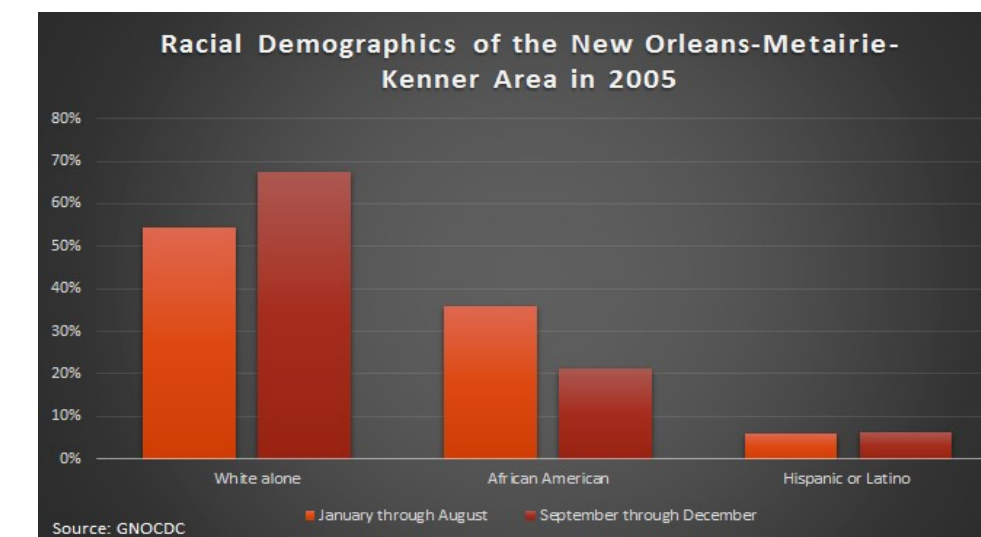

Chart 2. The population of African American people decreased dramatically as they were one of the most disadvantaged groups in the disaster.
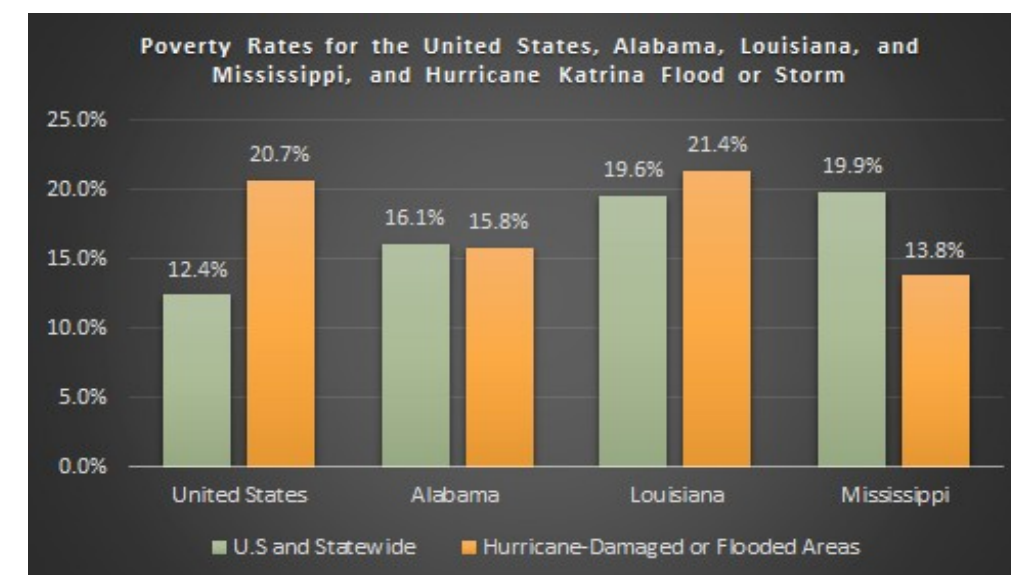

Chart 3. The poverty rates were significantly higher for Hurricane damaged areas as compared to the rest of the country.
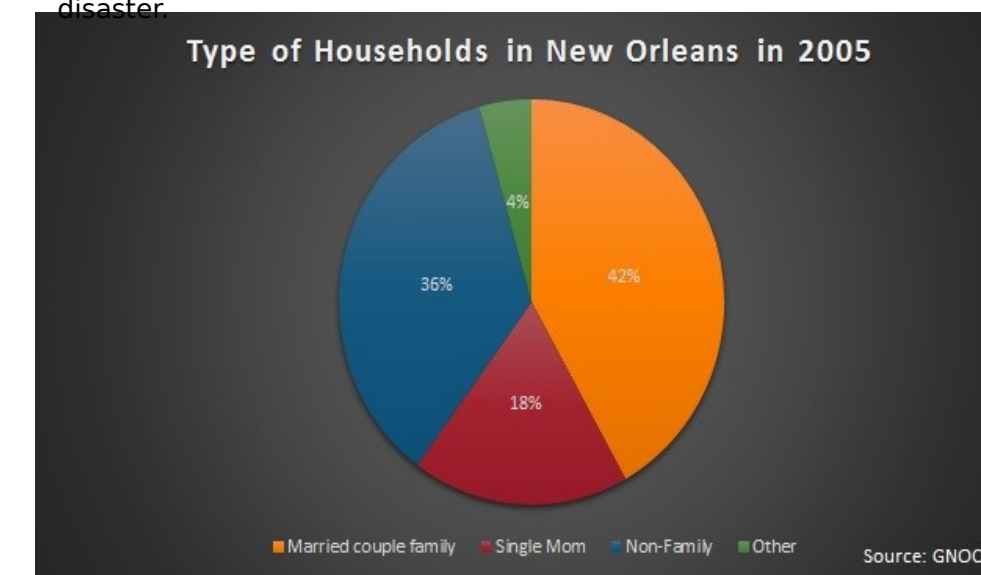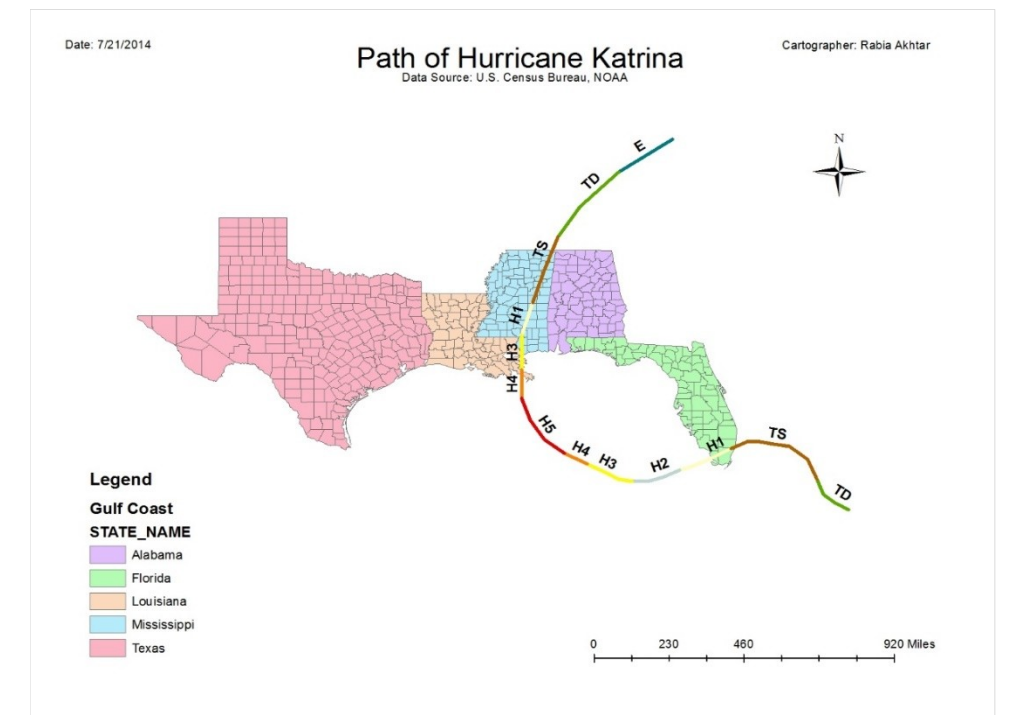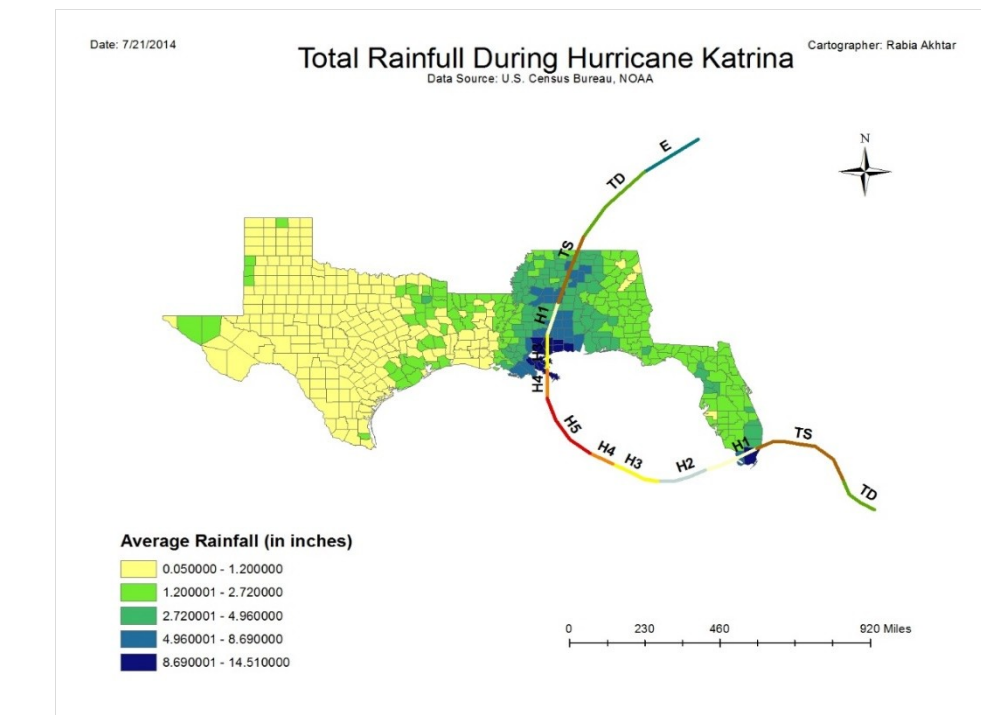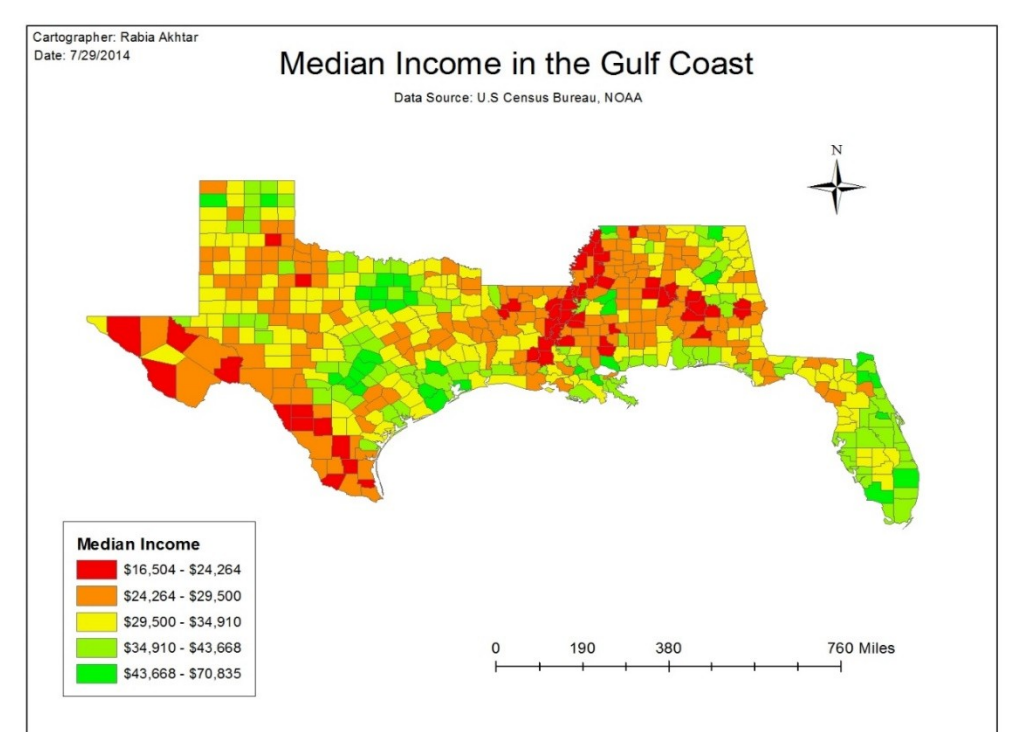

Chart 4. New Orleans had a significant portion of households that were headed my single moms.
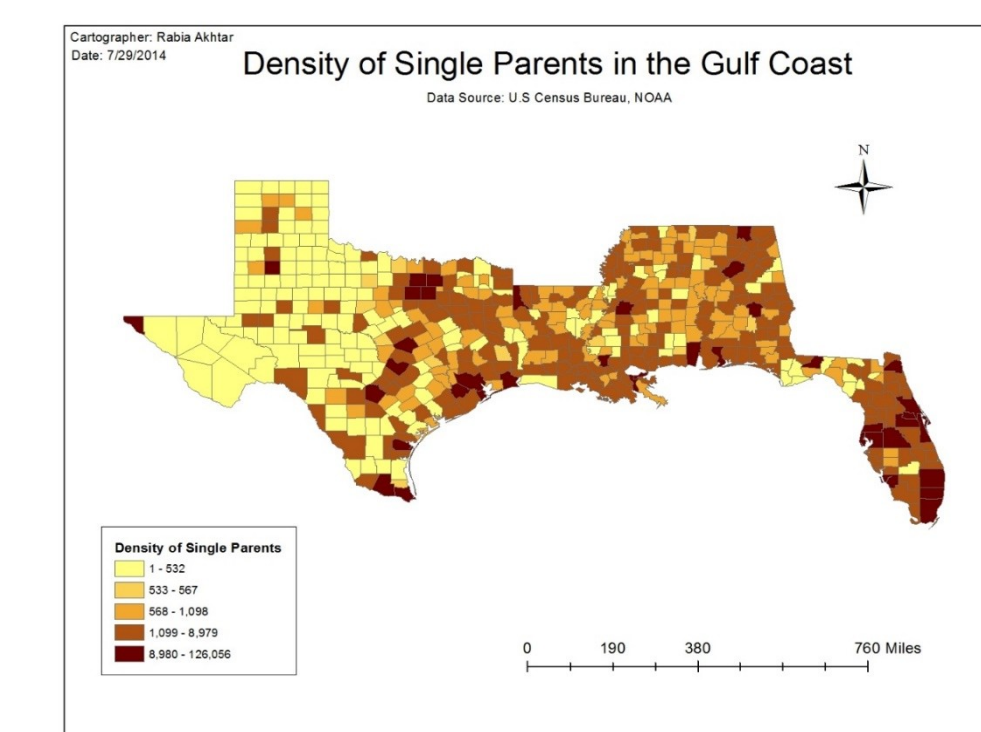

Map 1: This map shows the path of Hurricane Katrina and its changes in intensity.


Map 2: This map shows the total rainfall during Hurricane Katrina. When it first made landfall it resulted in the most rainfall.


Map 3: The median income is pretty low in the area where the hurricane hit making these areas more vulnerable to the storm.


Map 4: Although the counties that have the highest density of single parents are spread out, they are also dense in the Louisiana area.
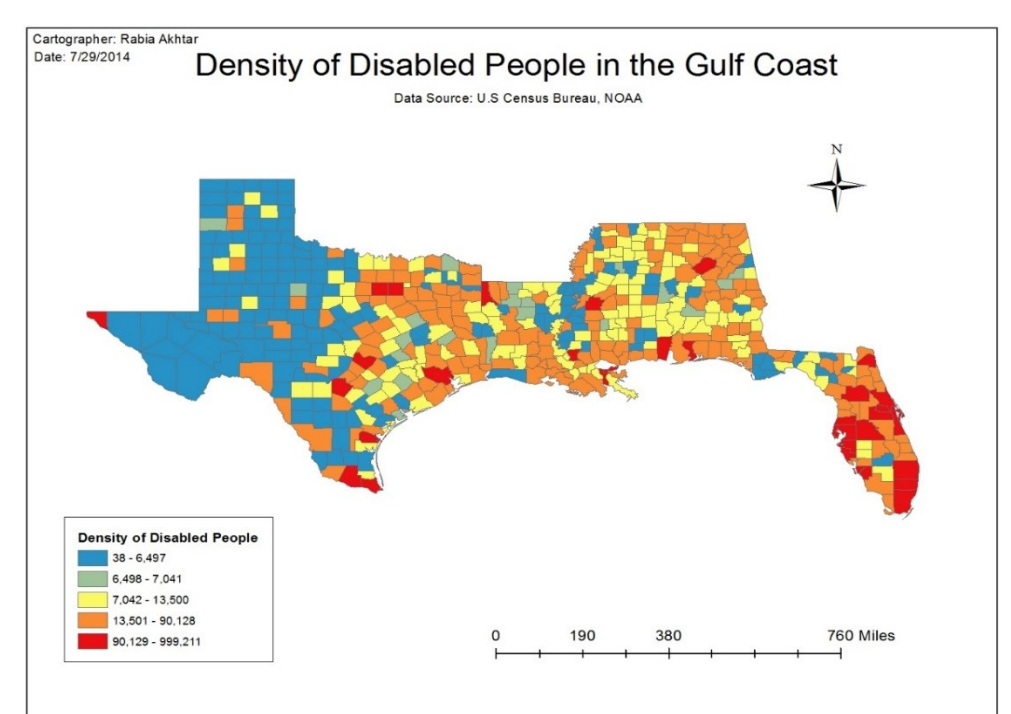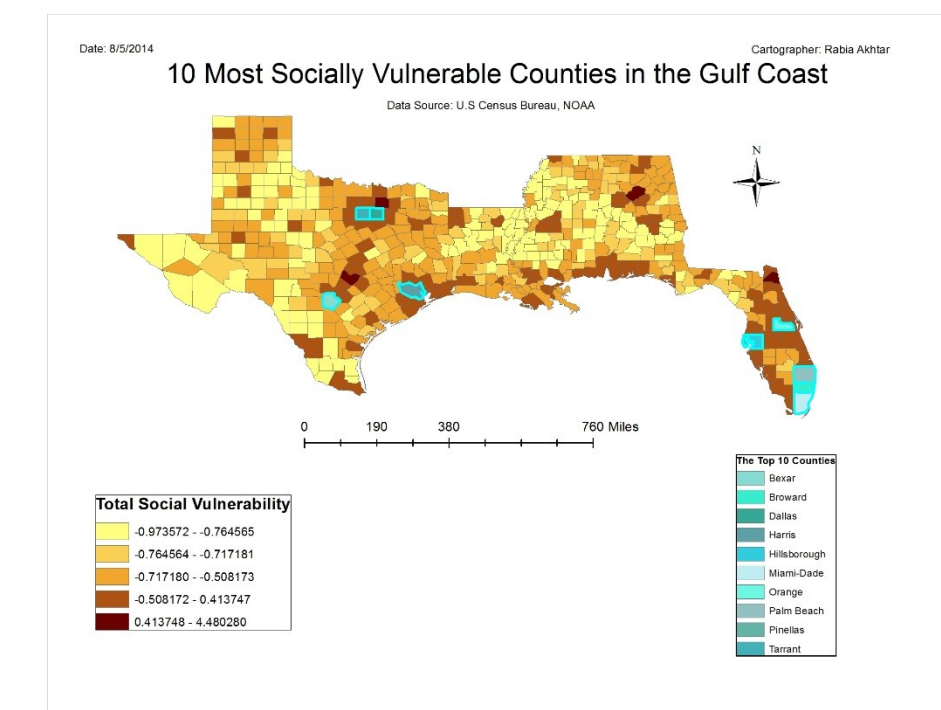

Map 5: As expected Florida seems to have the most disabled people. However, the Louisiana area has a very high density of disabled people.
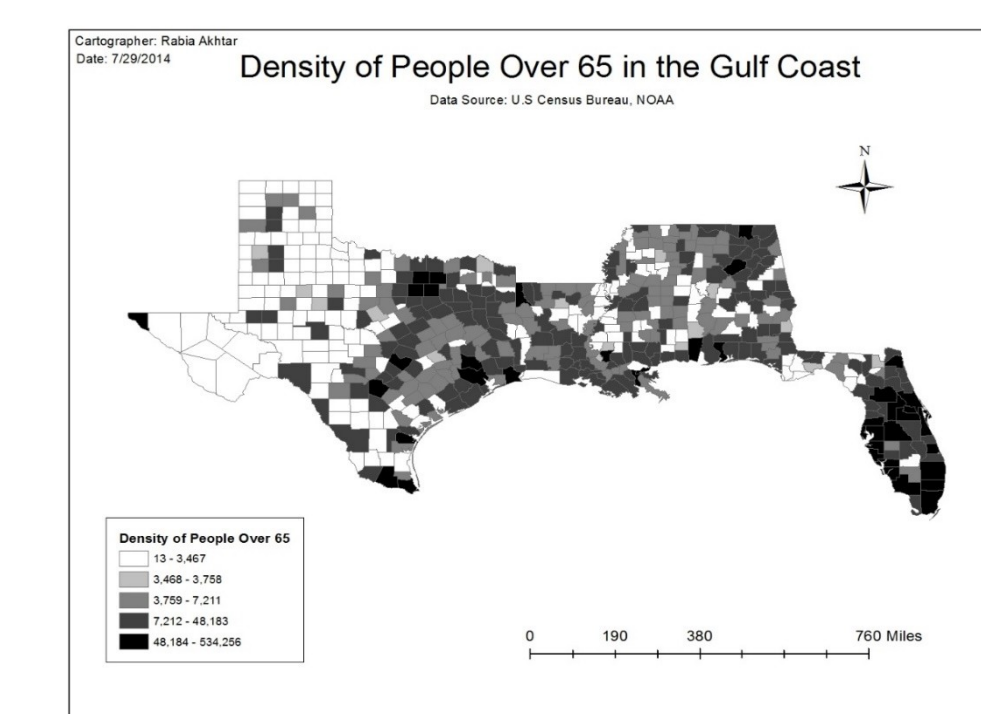
Map 6: The Louisiana coastal area and Texas has one of the highest densities of people over 65, albeit Florida has the highest.
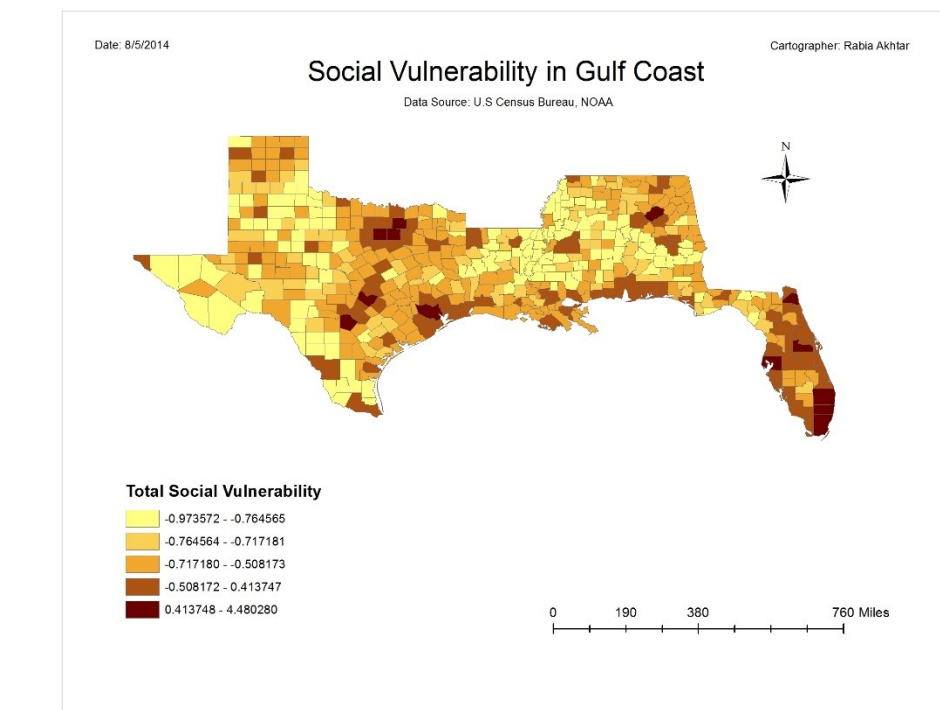
Map 7: This index shows the most vulnerable areas in the Gulf Coast by considering a variety of variables.

Map 8: This index shows the 10 most vulnerable counties in the Gulf Coast.

Analysis & Conclusion

New Orleans had the perfect ingredients for disaster before Hurricane Katrina hit. Poverty, over confidence, topography, and other variables amplified the already catastrophic effects of the Category 3 hurricane. In Chart 3, the hurricane damaged area had a 20.7% poverty as compared to the nationwide rate of 12.4% before the storm hit. Hurricane Katrina caused a significant drop in population and in the population of African Americans (Charts 1 & 2). In Map 3, the Louisiana area also had one of the lowest median incomes in the country while this area also had a high density of single parents, disabled people, and people over 65 (Maps 4,5,6). This increased the social vulnerability of the area to the storm. The index thus highlights these vulnerable areas. New Orleans recovery, albeit slow, has left the city stronger than before. Building codes have improved to help protect against floods. Recovery included more tourist attractions and better housing for the homeless. This has come to show the versatility of people against a disaster.

Future Research

It is suggested for future research to consider number of pets, number of vehicles, and other variables that might prevent people from evacuating on time. Other research can focus on the way financial aid was distributed and what problems occurred to hinder it from being distributed in an even and timely fashion.

Citations

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