# Understanding Household-Level Disaster Preparedness and Socio-Demographic Disparities: A Spatial Analysis of Florida.

**Noella Mumba and Schilder Ominde,** University of Notre Dame

December 2024

KEOUGH SCHOOL OF GLOBAL AFFAIRS

## Introduction

Disasters, whether predictable like hurricanes or unpredictable like earthquakes, pose significant threats to communities, particularly in regions prone to extreme weather events. Florida, with its unique geographical location and climate, has experienced a high frequency of weather-related disasters. From 1980 to July 2024, the state has recorded 89 confirmed weather and climate disaster events, resulting in losses exceeding $1 billion, as reported by the National Centers for Environmental Information. As climate change continues to intensify weather patterns, understanding the socio-demographic factors that influence disaster preparedness at both the household and community levels becomes more important. Therefore, variations in demographic characteristics, such as sex, employment status and education level, can influence how households prepare for disaster highlighting the need for targeted interventions and policies. This research, aims to investigate to what extent do socio-demographic factors spatially influence disaster preparedness in Florida.

**Figure 1: Overview Map: Distribution of Florida Respondents and Their Disaster Preparedness Status**
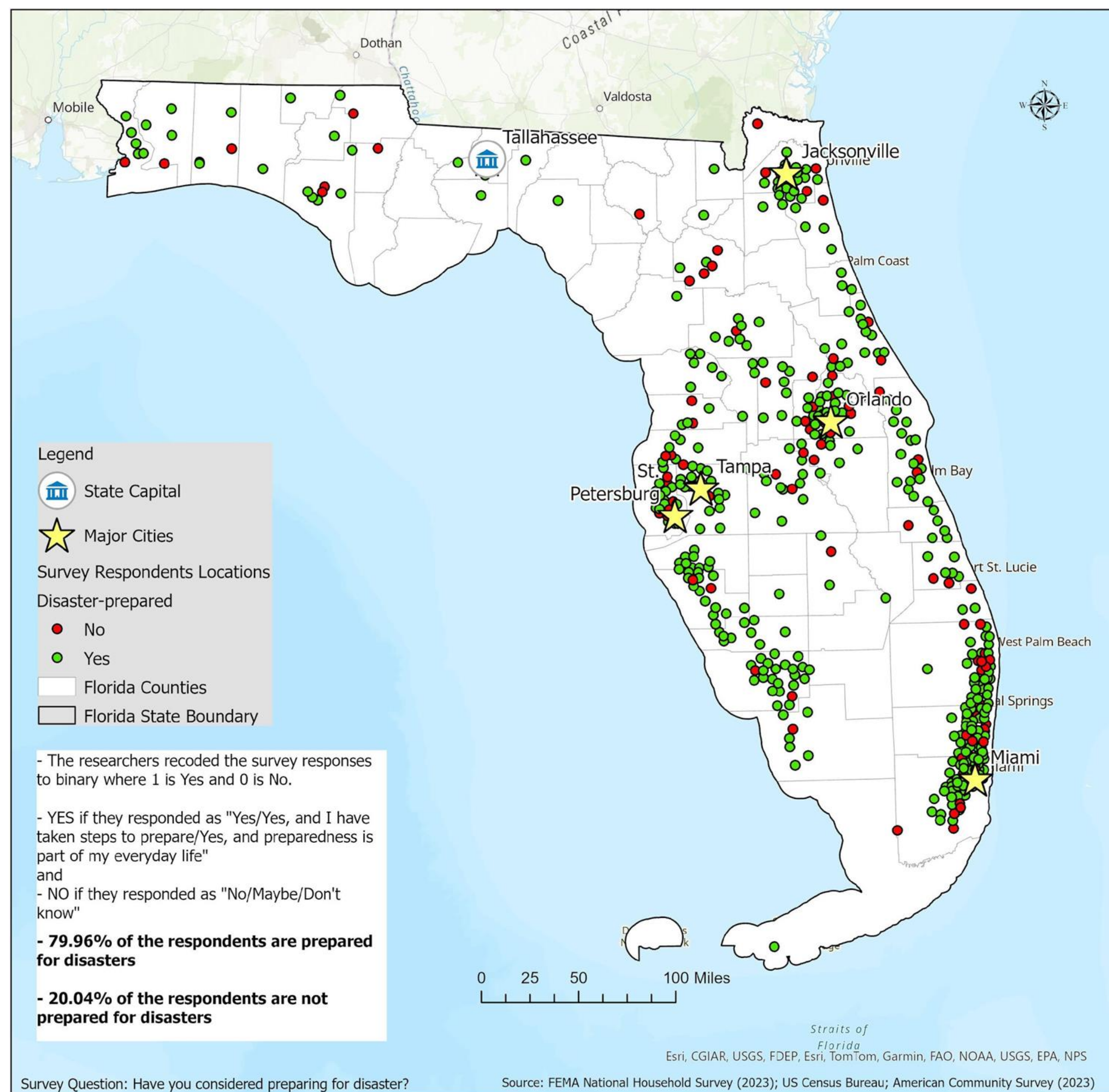


## Methodology

In answering the research question, FEMA's 2023 National Household Survey on disaster preparedness was used. This data provided disaster-preparedness information of the 978 survey respondents across the 67 counties in Florida. The research also leveraged the American Community Survey (ACS) data to collect socio-demographic information i.e. education, sex and unemployment across Florida's counties.

The survey respondents' locations were geocoded using their zip codes to aid in spatial analysis of their geographic locations.  Once the layers were created, the socio-demographic data was joined to the Florida county boundaries layer  using a common field.

To visualize the relationship between socio-demographic factors and disaster preparedness, the research used choropleth maps using graduated colors to determine the quantitative distribution of males, females, education levels and unemployment rates across the different counties. We conducted a hotspot analysis on the disaster preparedness to determine the statistically significant hot and cold spots among the survey respondents. Cold spots would show survey respondents who have indicated that they are not disaster-prepared while the hotspots would show respondents who  have indicated that they are disaster-prepared.

## Research Questions

1. How well are households prepared for future disasters?
2. How do variations in demographic factors such as sex, employment status and education level influence the spatial distribution of disaster preparedness across households in Florida?

## Results

❖ Figure 1 shows the locations of survey respondents along with their disaster preparedness status. The research finds that 20% (symbolized by the red dots in Figure 1) of households are not prepared for disasters, this represents a significant portion of the population. Since the survey includes 978 households, it means that nearly 200 households are not prepared, highlighting a critical concern for disaster readiness.

❖ For sex and disaster preparedness, our initial hypothesis was that women would be more prepared than men. However, the results of our spatial analysis challenged this assumption, revealing that men are, in fact, more disaster prepared than women. As depicted in Figure 2a, Florida counties with a higher percentage of females aged 18 and over exhibit more cold spots areas with lower levels of disaster preparedness compared to counties with a higher percentage of males (see Figure 2b), indicating a significant gender disparity in disaster preparedness.

❖ Also, unemployment rates exhibit a negative correlation with disaster preparedness. As shown in Figure 3, counties with higher unemployment rates tend to cluster in areas characterized by cold spots of disaster preparedness.

❖ In contrast, education shows a positive correlation with disaster preparedness. As illustrated in Figure 4, counties with a lower percentage of high school graduates tend to exhibit a higher number of cold spot areas characterized by lower levels of disaster preparedness. This suggests that regions with fewer high school graduates are less prepared for disasters. Meanwhile, individuals with a high school education demonstrate greater levels of disaster preparedness compared to those without such educational qualifications, underscoring the vital role education plays in disaster preparedness.

❖ **Note:** These findings suggest that socio-demographic factors influence disaster preparedness, but they do not fully account for the differences observed across Florida counties, indicating a need for further research.

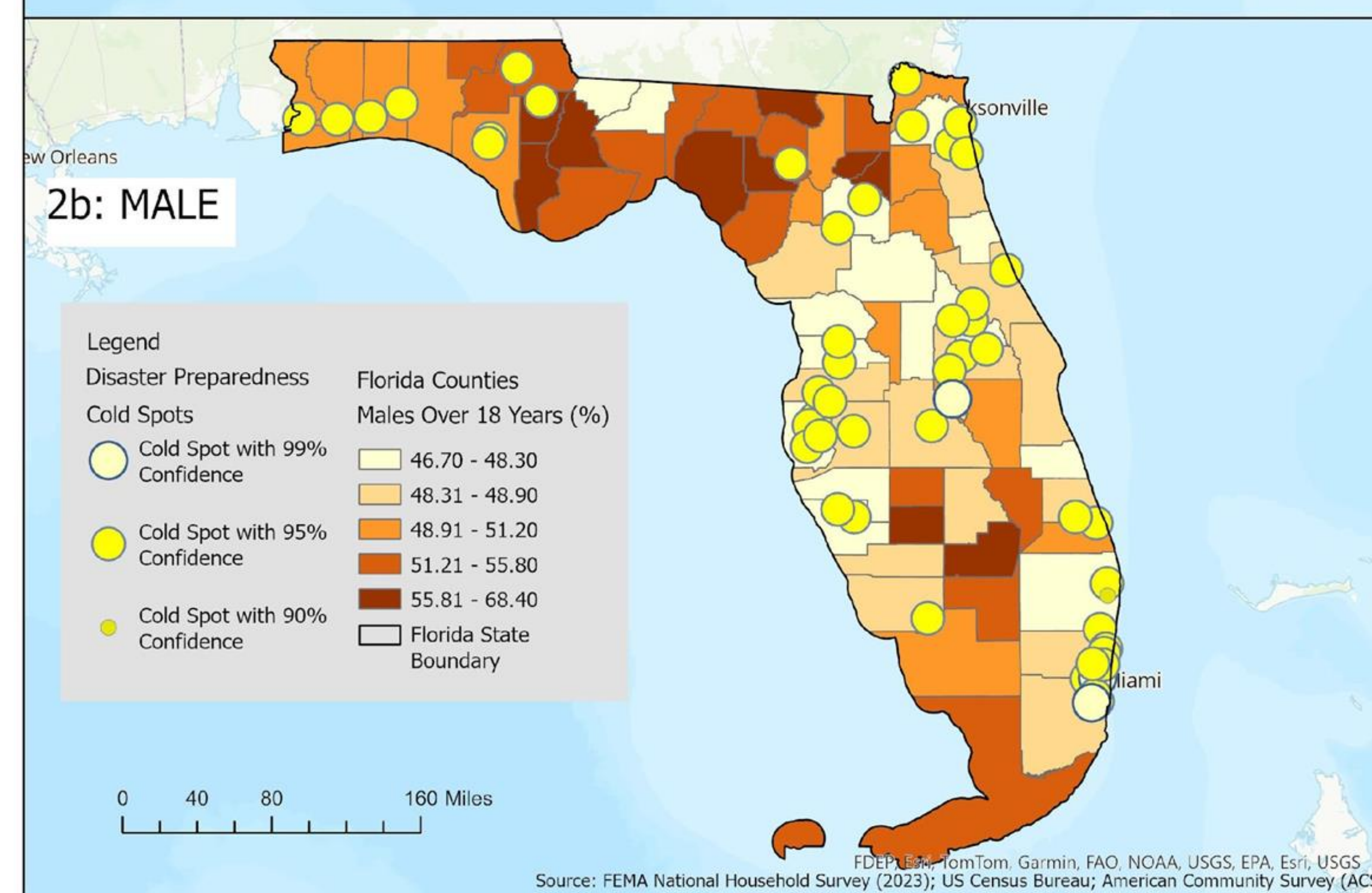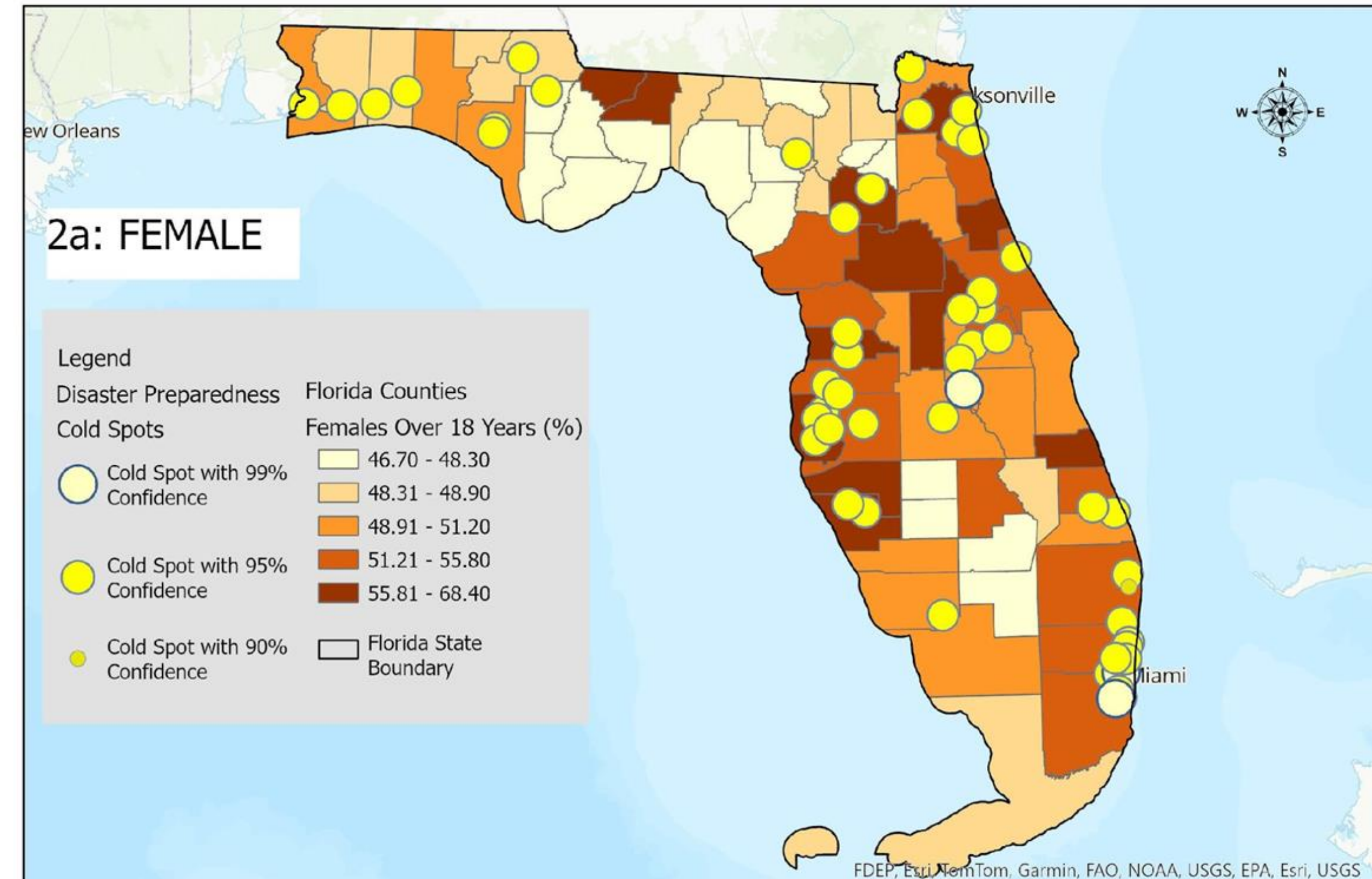**Figure 2: Map of Sex and the Lack of Disaster Preparedness**



**Figure 3: Map of Unemployment and the Lack of Disaster Preparedness**
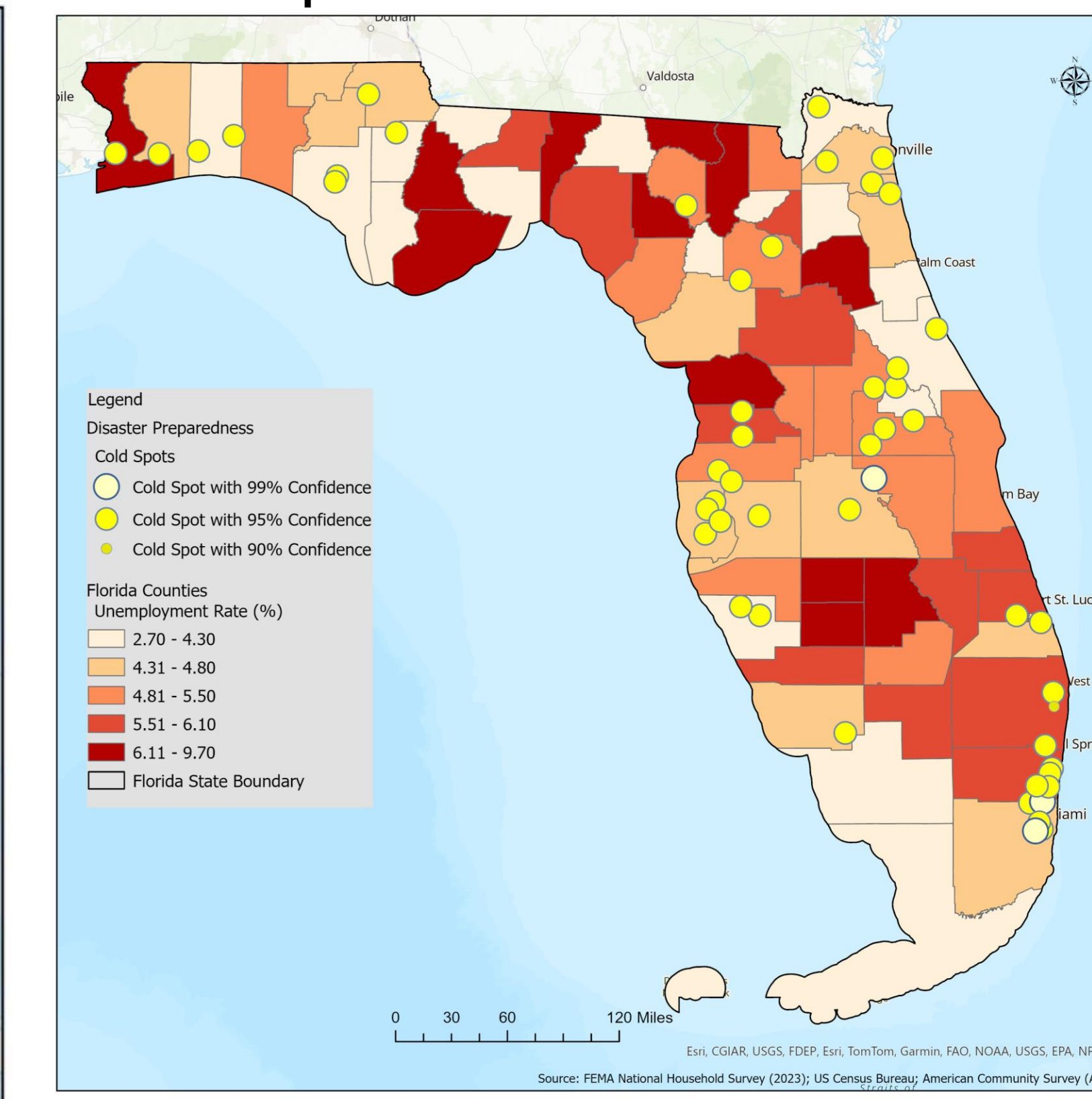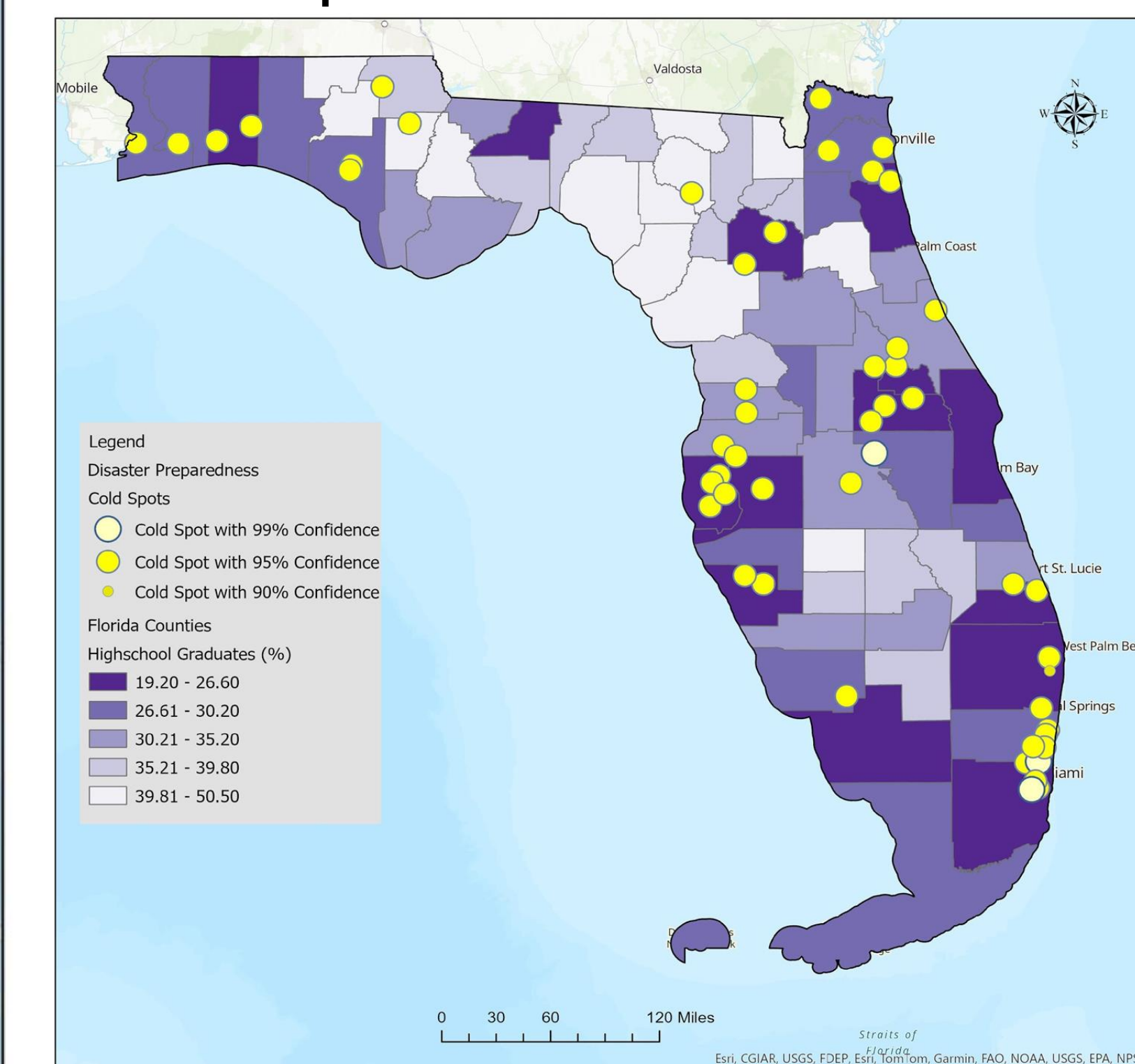


**Figure 4: Map of Education and the Lack of Disaster Preparedness**



## Policy Recommendations

❖ Recognizing that unemployment is a barrier to disaster preparedness, we recommend the government to prioritize more job creation in counties where households are not disaster-prepared. This approach will build their resilience against disaster especially in anticipation of forecasted hurricanes.

❖ Additionally, more targeted sensitization should be done to females in Florida to inform them of the importance of preparing for disaster. Further research should be done to understand why females are less disaster-prepared and whether there are underlying factors driving this phenomena.

❖ Disaster preparedness education should be embedded into the national curriculum at all 3 levels of education with a particular emphasis on primary schools. This foundational approach will foster early awareness, preparedness, and resilience among young learners.

❖ The government should enhance the accessibility of disaster preparedness resources and information to all demographics (i.e. women, unemployed population and people with no high school education) and diversify dissemination channels for disaster preparedness information.

## Conclusions

In conclusion, socio-demographic factors play a critical in shaping disaster preparedness among households in Florida. As the state continues to face an increasing number of weather-related disasters, understanding the nuances of how demographic characteristics such as sex, employment status, and education level influence preparedness is essential for developing effective strategies to enhance community resilience.The findings indicate that certain demographic groups may be more vulnerable to the impacts of disasters due to lower levels of preparedness, underscoring the need for targeted interventions that address these disparities. For instance, the analysis revealed that males tend to be more prepared than females, and higher education levels correlate positively with preparedness. While high unemployment rates exhibit clusters of low preparedness, indicating that economic factors also play a significant role in individuals' ability to prepare for disasters. These insights provide valuable implications for policymakers, emergency management agencies, and community organizations.

## Sources

1. FEMA. 2023. "National Household Survey." Federal Emergency Management Agency. 2023. Accessed November 1, 2024. https://www.fema.gov/about/openfema/data-sets/national-household-survey.

2. US Census Bureau. 2024. "TIGER/Line shapefiles." Census.Gov. October 9, 2024. Accessed November 1, 2024. https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-line-file.html.

3. US Census Bureau. 2023. "American Community Survey (ACS)." 2023. Accessed December 3, 2024. https://www.census.gov/programs-surveys/acs/.

4. Herald-Tribune, Sarasota. 2024. "Hurricanes Are Known Threat in Florida, but These Natural Disasters May Surprise You." Treasure Coast Newspapers, July 11, 2024. https://www.heraldtribune.com/story/news/2024/07/11/florida-natural-disasters-county-risks-map-threats/74353527007/.