

Hurricanes Helene and Milton Disaster-Induced Transportation Barriers and Their Impact on Access to Health Facilities for Vulnerable Communities.

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Introduction

2024 Hurricane Helene in Southeastern US

- Category 4 Hurricane Helene made landfall on Sept. 26 over Florida’s Big Bend region.
- As it moved inland, it weakened, degenerating into a post-tropical storm over Tennessee on Sept 27.
- Caused catastrophic flooding over the SE, particularly in western NC, East TN, and southwestern VA.
- Caused 250 deaths and an estimated total of \$78.7 billion in damage

2024 Hurricane Milton in Florida

- Hurricane Milton made landfall near Siesta Key late on October 9.
- Milton rapidly weakened as it moved across the state into the Atlantic Ocean.
- It became extratropical on October 10.
- Killed at least 42 in the US
- Estimated damage of US\$34.3 billion

Research Questions

- Were there disaster-induced transportation barriers impeding the affected population from accessing medical facilities after Hurricanes Helene and Milton in **Florida**?
- Were there barriers impeding the affected population from accessing medical facilities after Hurricane Helene in Georgia, **North Carolina**, and South Carolina?
- Did these transportation barriers disproportionately impact socially vulnerable populations, including disadvantaged populations, living in locations of poor property and transportation infrastructure and healthcare access?

2024 Hurricane Helene

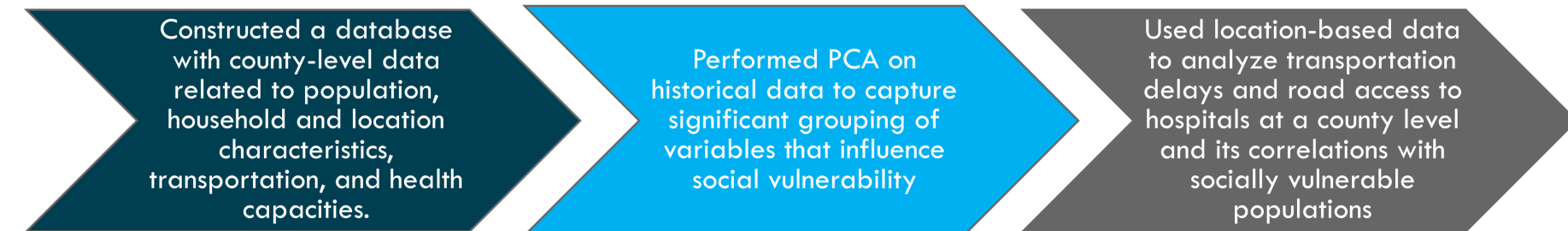


Image from National Hurricane Center

Damage to Homes and Natural Resources in Cherokee, NC. Photos courtesy of Dr. Kman, The Ohio State University.

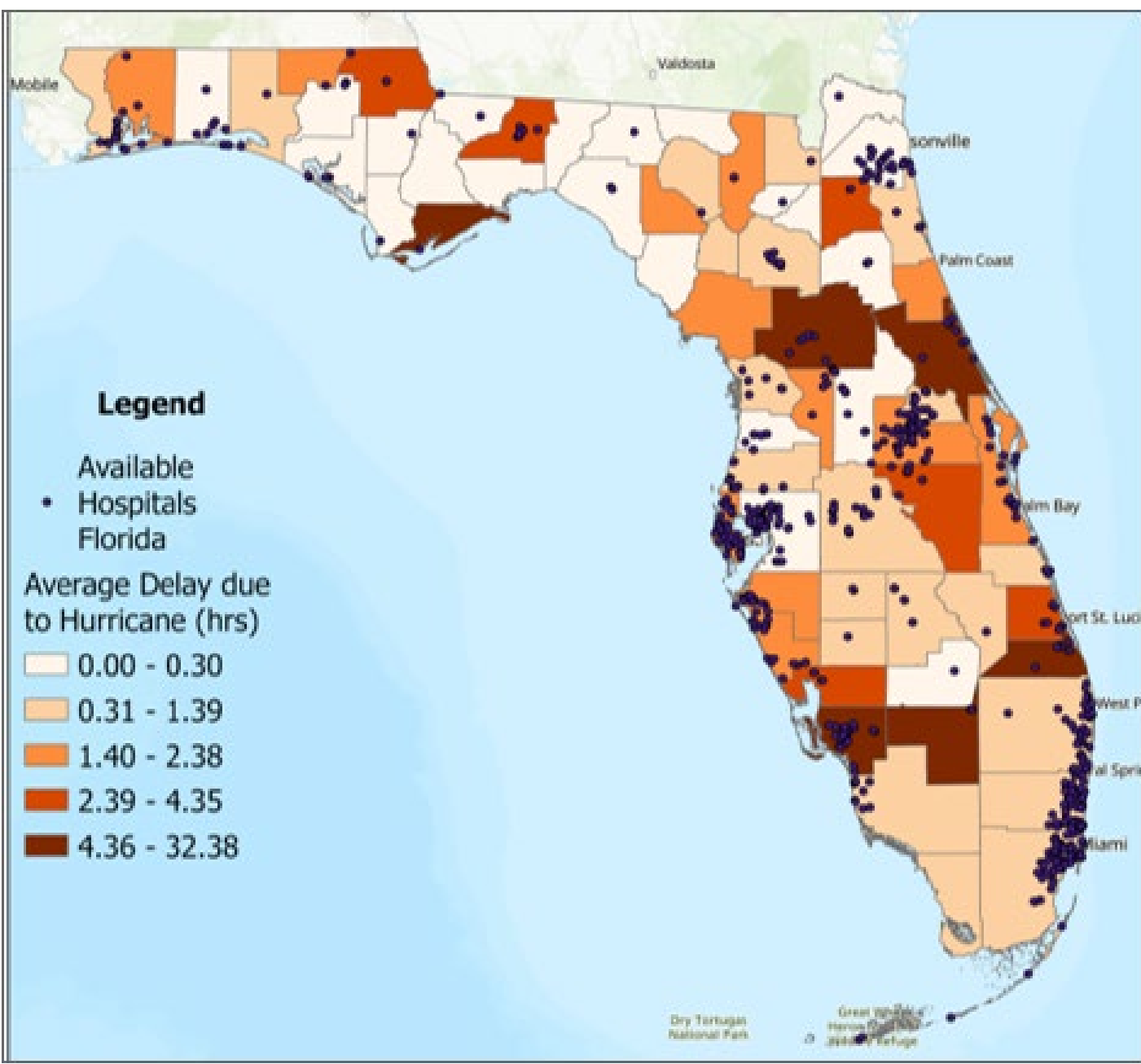
Methodology

- Collected and analyzed county-level data for both states, identifying the variables influencing social vulnerability.
- Identified variable groupings among transportation network and health-related variables using Principal Component Analysis.
- Developed regression models with post-disaster location-based data to analyze transportation delays, including travel time to hospitals before and after the hurricanes.



Average Hurricane-Related Delays in Florida

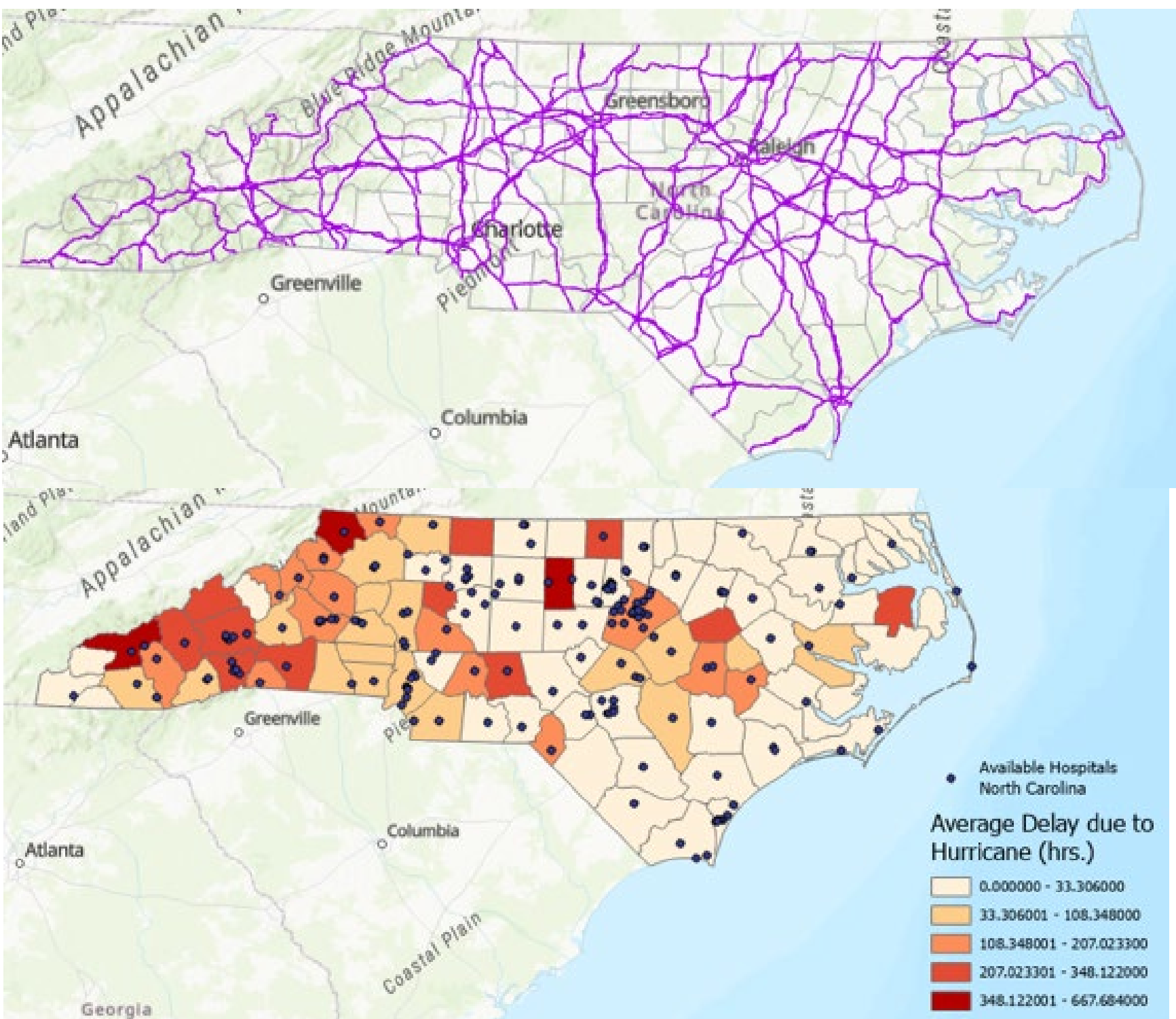
- ↓ Opened gas stations per capita
- ↓ Opened hospitals per capita
- ↑ Average distances to hospitals in the county
- ↑ Proportion of persons aged 65 or higher
- ↑ Persons below 150% poverty estimate



Access to Hospitals in North Carolina

Dependent variable:
Distance to the closest hospital with disruptions

- ↓ Opened hospitals per capita
- ↓ Number of bridges per sqmi
- ↓ Proportion of housing in structures with 10 or more units
- ↑ Proportion of unemployed
- ↑ Proportion of persons aged 65 or higher
- ↑ Proportion of uninsured people



Note. All p values < .05.

Findings

- The regression model results show several key findings:
 - For every additional operational gas station per 10,000 residents, congestion-related delays were reduced by 33 minutes, while hurricane-related delays decreased by 21.5 minutes.
 - Each additional hospital per 10,000 residents lowered congestion-related delays by 2.3 hours and hurricane-related delays by 1.6 hours.
- These insights emphasize the critical role of emergency transportation infrastructure in mitigating disaster-related healthcare access barriers.



Implications for Policy & Practice

- Transportation access to hospitals after Hurricanes Helene and Milton in Florida and North Carolina disproportionately affected socially vulnerable groups.
- Disaster-induced transportation barriers particularly impacted populations living in areas with
 - A higher proportion of people with lower education,
 - Higher unemployed individuals,
 - Uninsured households, and
 - People aged 65 or older.
- The study underscores the need for policy interventions, including:
 - Improving emergency transportation strategies,
 - Increasing hospital and gas station availability in disaster-prone areas, and
 - Incorporating transportation access variables into social vulnerability assessments.

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