

# Mapping Public Health Accessibility and Inequities Across Maine Using GIS

Jacob Osmer

Faculty Advisor: Will Kochtitzky

School of Marine and Environmental Programs University of New England (UNE), Biddeford, Maine 04005

## ABSTRACT

Unfortunately, your ZIP code can have an effect on your health. This project aims to analyze public health accessibility in Maine by mapping the proximity of households to public health facilities, including hospitals, public health offices, libraries, schools, etc. Using GIS, geographic disparities and potential health inequity hotspots across the state of Maine can be mapped. Data from Maine DOT, Google Maps, and UNE COM highlights rural-urban differences in access.

## BACKGROUND/EXISTING DATA

- According to the 2023 National Health Interview Survey, chronic pain and high-impact chronic pain are the most common reasons for someone to seek medical care.
- It has been found that women are more likely to have chronic pain in Maine and that while no association was found between county of residence and chronic pain, there was an association found between county of residence and usage of public health insurance (Malon et. al 2018).
- People in rural areas have lower access to health care like primary care providers, specialists, and other resources (Chen 2020).
- Geography, lower incomes, higher numbers of minority populations, and cultural and historical risk factor patterns contribute to higher rates of morbidity and mortality (Rickett 2002).

## PAIN REGISTRY

In addition to data from the Maine GIS Data Catalog, I worked with the Maine Pain Registry. "The Maine Pain Registry, a collaboration between investigators from UNE and MaineHealth, is a comprehensive, statewide chronic pain registry, aimed at advancing epidemiological research and ultimately enhancing health care practices in pain management throughout the state of Maine" (UNE COM). Survey data includes age, sex, gender, county, pain level in the last 7 days, and other questions related to the social determinants of health.

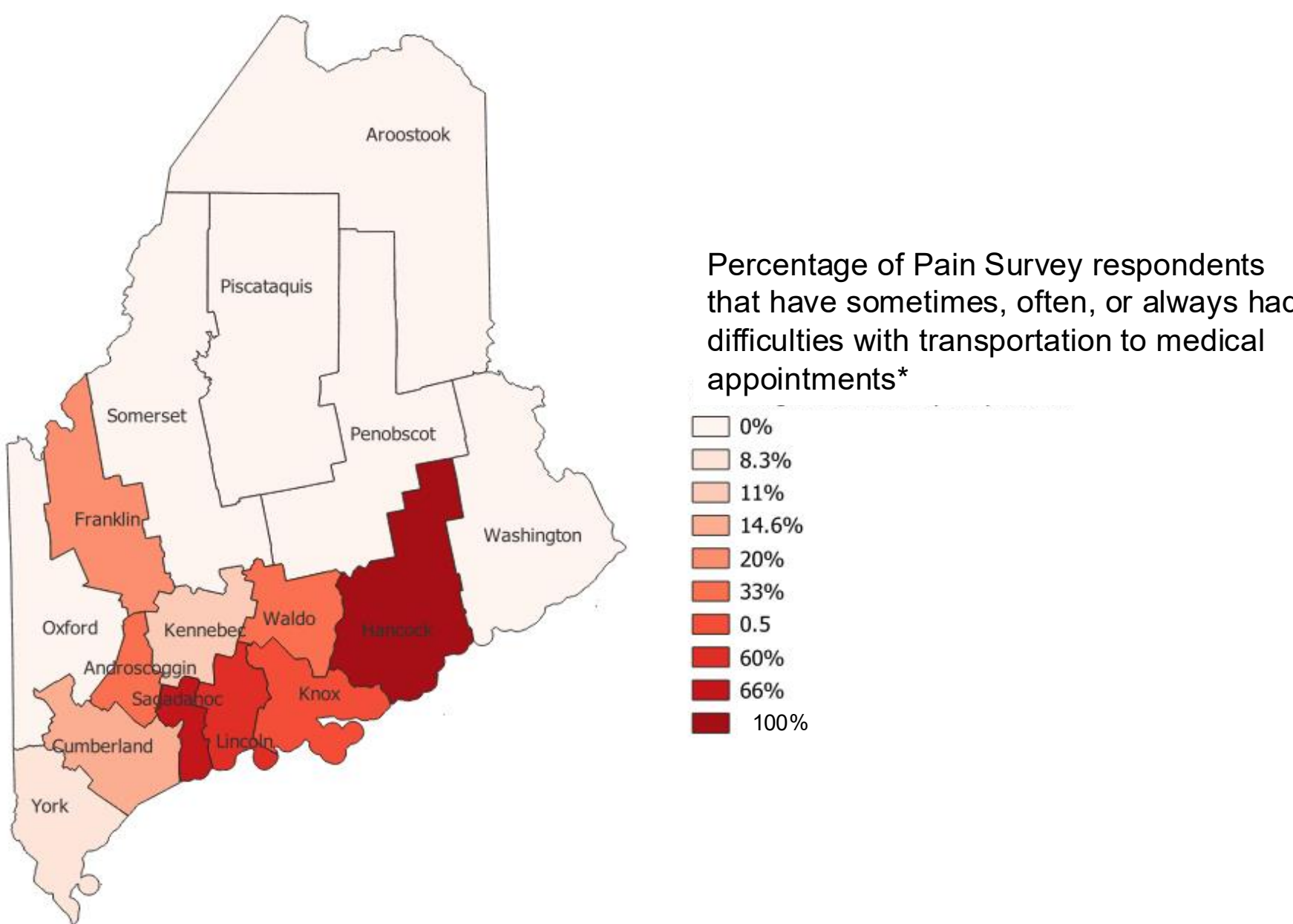


Figure 1. Percentage of pain survey respondents by county that have sometimes, often, or always had difficulties getting transport to medical appointments. \*Some counties have as few as 1 response

## HYPOTHESIS

I predict that counties with higher percentages of rural areas (defined by being further from highways/major roads and having lower population density) and less public infrastructure will have fewer public health facilities, have a smaller percentage of that county's population near those facilities, and show higher rates of chronic pain.

## ROAD TYPE AND DENSITY

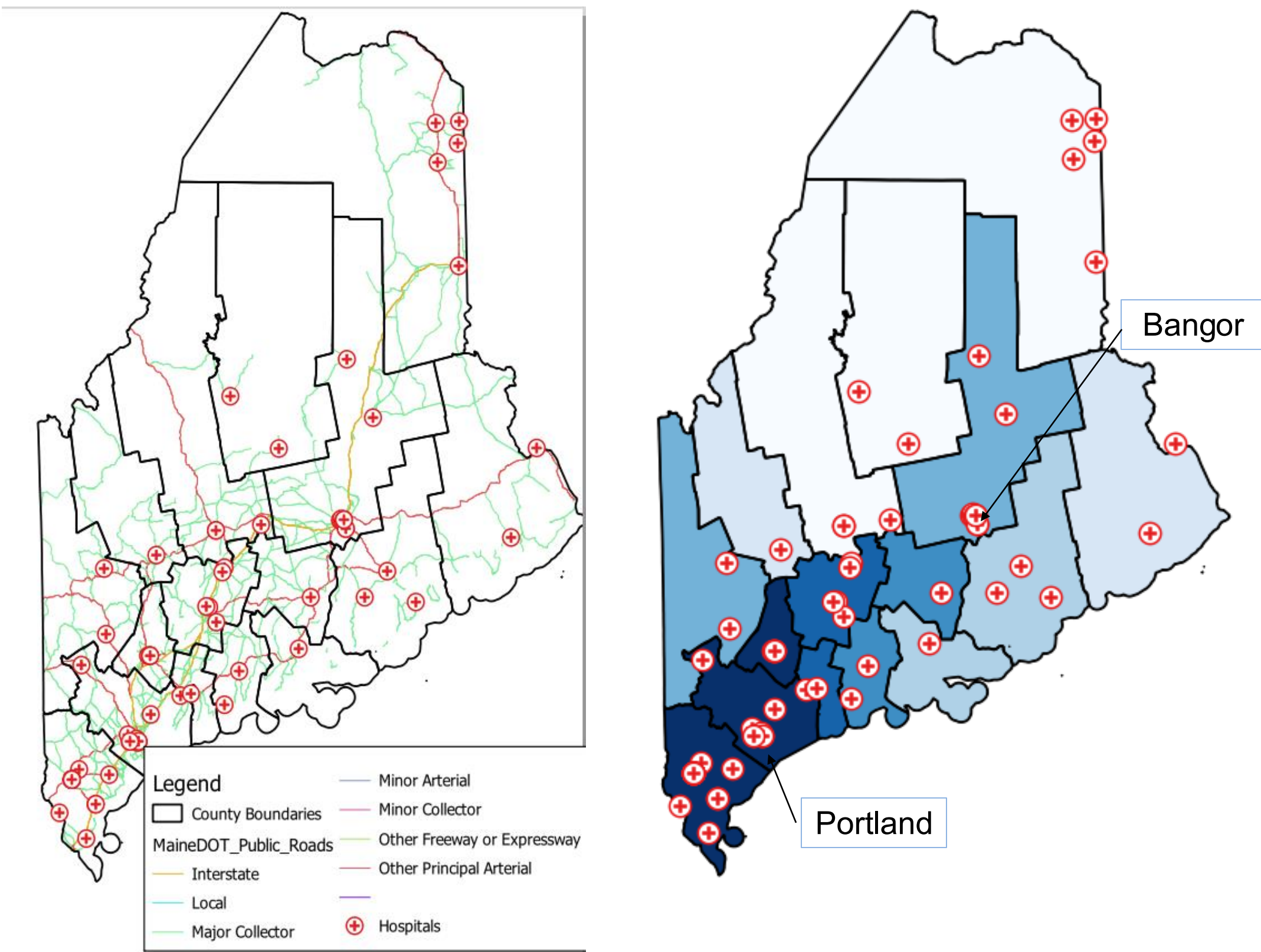


Figure 2 (left). Map of hospital locations relative to Maine highways. Figure 3 (right). Map of hospital locations overlaid on road density (road length/county area).

## POPULATION DENSITY

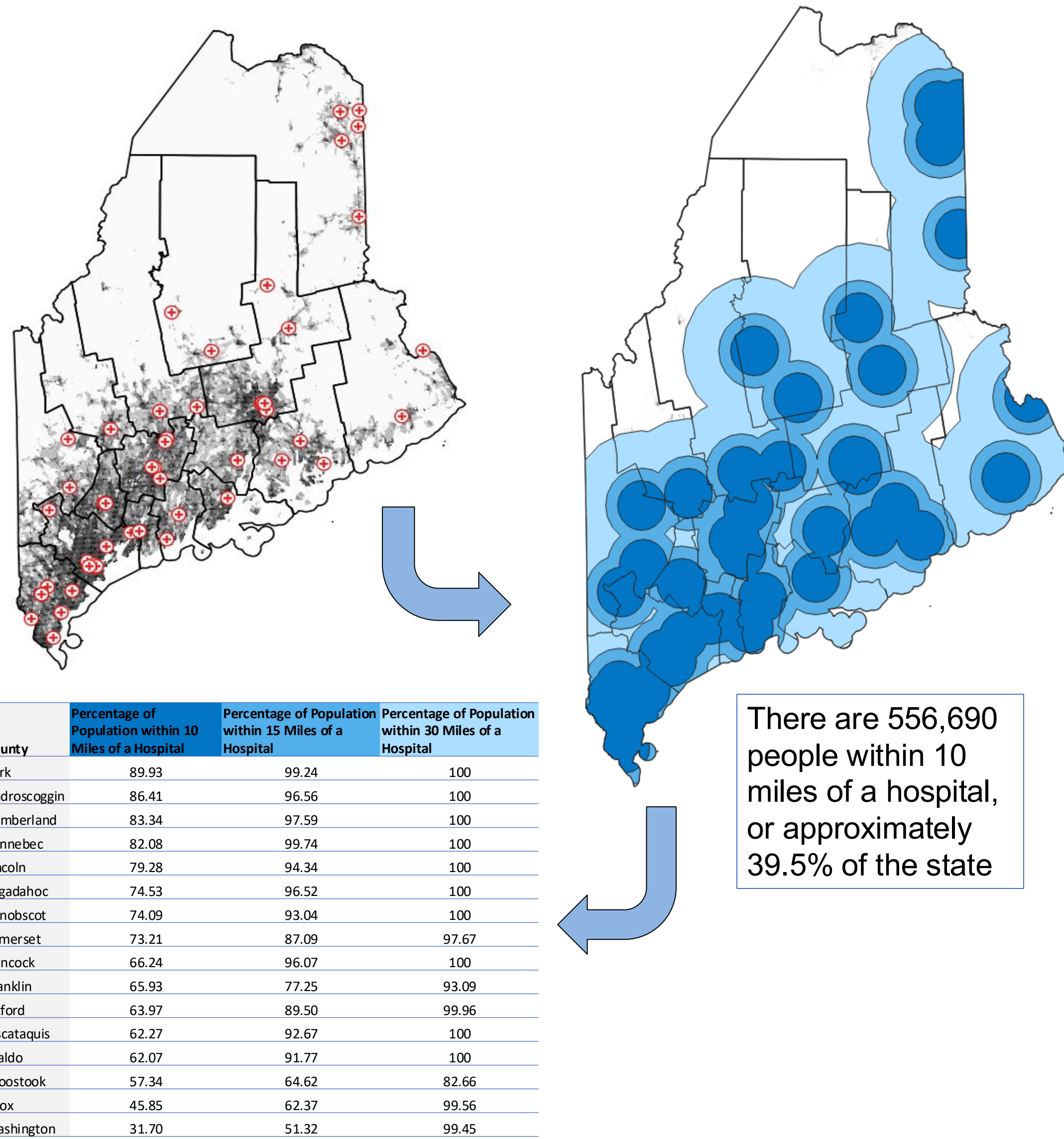


Figure 4 (top left). Maine population density data (people per square kilometer) with hospital locations overlaid). Figure 5 (right). Map of 10-, 15-, and 30-mile radius circle around hospitals. Figure 6 (bottom left). Resulting table of percentages of county population who live within 10, 15, and 30 miles of a hospital.

By creating 10-, 15-, and 30-mile buffers around Maine hospitals, I was able to calculate the percentage of the population of each county that lives within these distances. York county has the highest percentage at 89.93% of the county's population being within 10 miles. This is approximately 97,700 people.

## PROXIMITY TO PUBLIC HEALTH LOCATIONS

The green areas on the map (overlayed on the road density map to the left) show the areas in which people live within 10 miles of a:

- Hospital
- EMS station
- Nursing home
- School
- Library

As you can see, a very small portion of Maine is within a reasonable distance to the public health facilities which provide people with medical care, free internet, and education

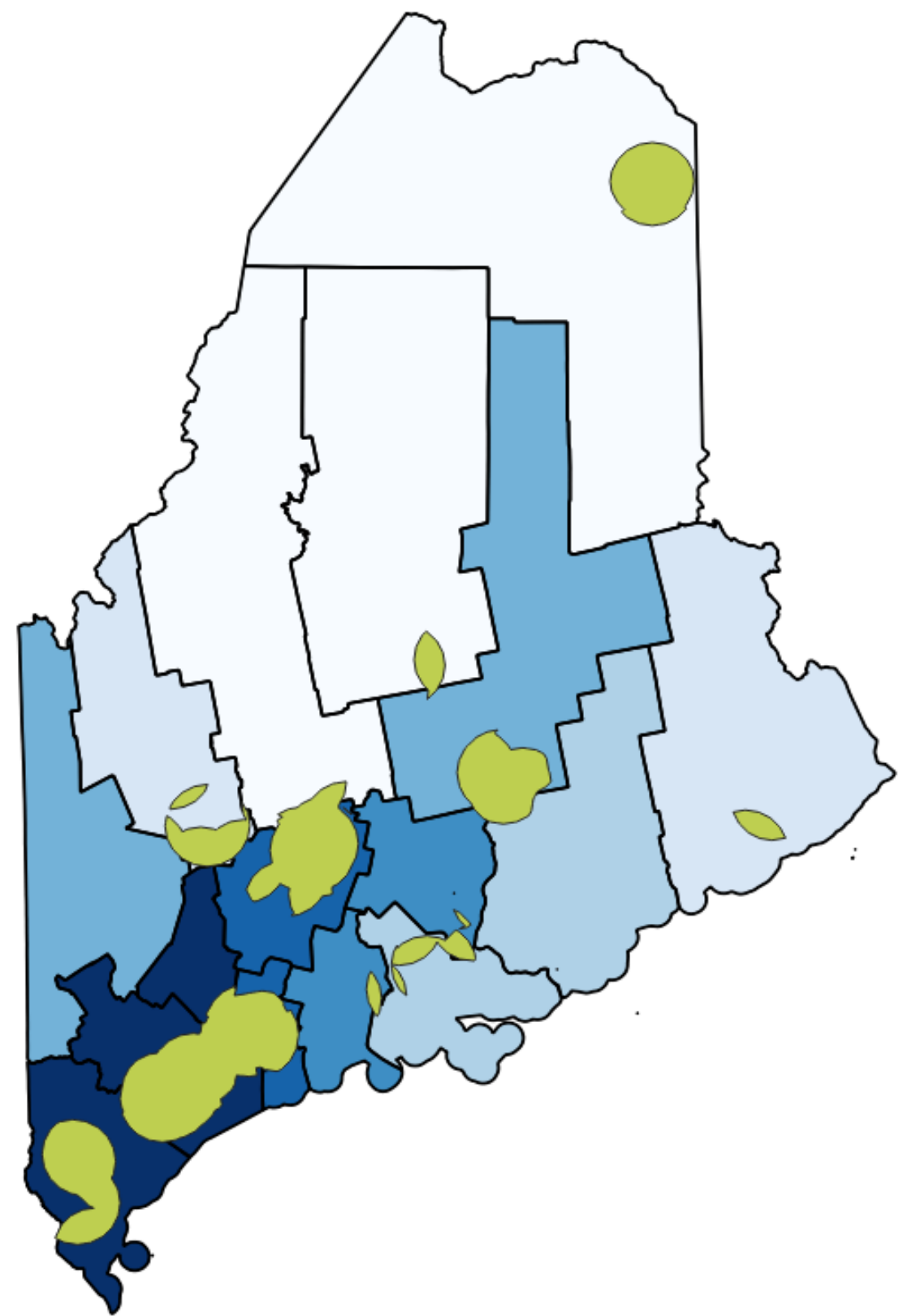


Figure 7. Map of areas in which people live within 10 miles of a hospital, EMS station, nursing home, school, and library overlaid on the road density map.

## CONCLUSIONS

- More rural areas (further from highways and lower population density) like Northern and Northwestern Maine have lower access to public health facilities.
- Approximately 39.5% of the state's population, or 556,690 people, are within 10 miles of a hospital.
- There does not seem to be an obvious correlation between average pain in the last 7 days and county of residence, but more survey data could reveal new insights. The Pain Registry currently has 148 respondents as of September 2024. With an estimated 30% of a people in Maine suffering from chronic pain (Malon et al. 2018), this highlights the incompleteness of data we have on chronic pain and that more survey data is needed.

## WORKS CITED

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