



Physical Access to Emergency Response Acute Ischemic Stroke Treatment in Alabama Hospitals

BACKGROUND/INTRODUCTION

Stroke is an often-underdiagnosed medical condition that accounts for roughly one out of every 19 deaths in the US and is a leading cause of disability that can be very expensive to treat in the long term. The stroke belt spans the southeastern region of the United States and illustrates the disproportionate stroke incidence rate experienced by residents of southeastern states. Preliminary research with data from the AHA found that one of the states in the stroke belt, Alabama, has the lowest proportion of hospitals with stroke or TeleStroke services. Despite known evidence-based practices in the treatment of acute ischemic stroke, some stroke patients in the US do not receive effective treatment due to limited proximal distance to neurological experts. TeleStroke is a healthcare service made available to provide increased access to neurological care for stroke patients unable to get to medical facilities with on-site stroke-related care in a timely manner. Given this information, Alabamians could benefit most from the introduction of TeleStroke technology to existing facilities which is what this study aims to suggest.

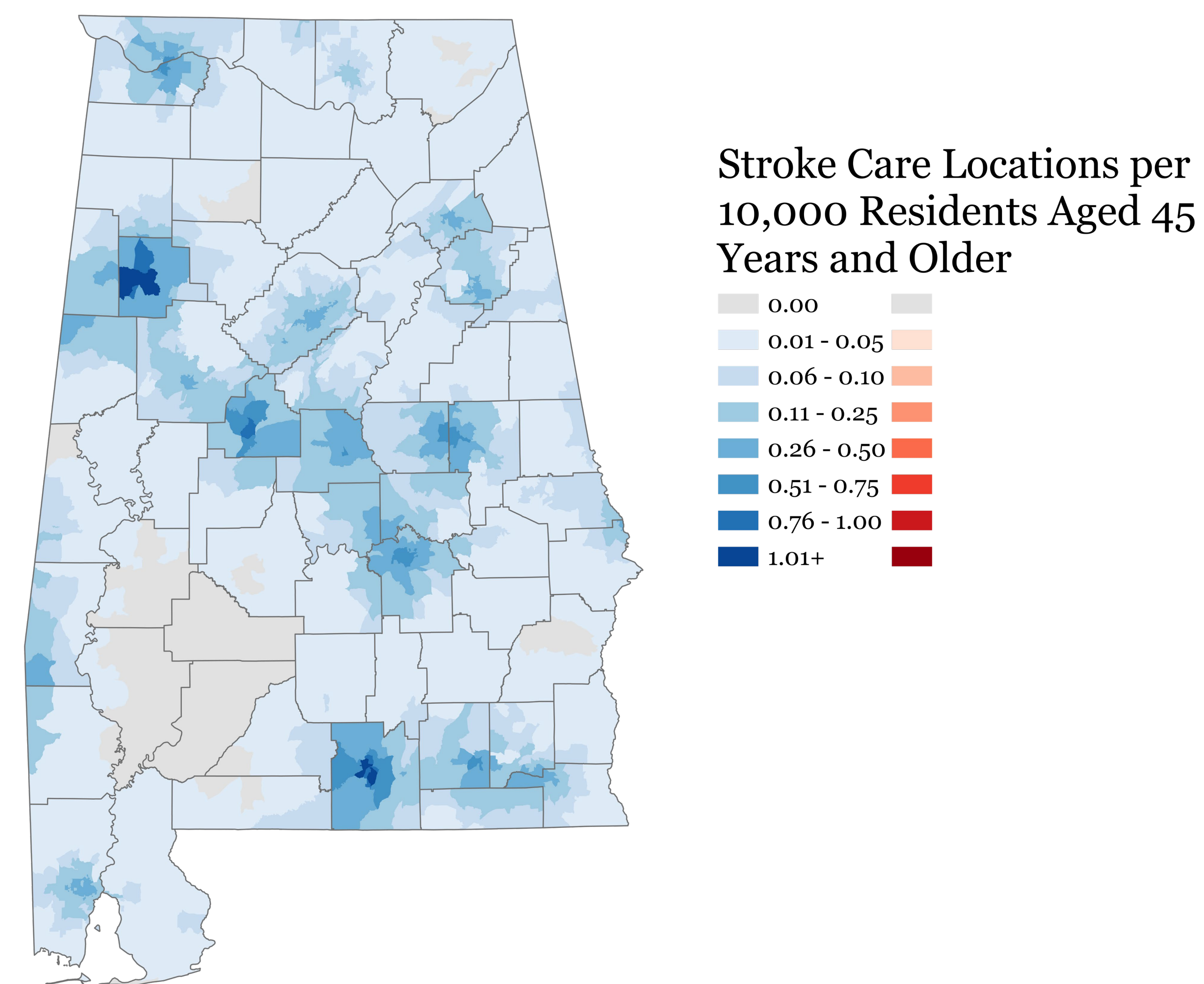
METHODS

Data on hospitals in the US that offer evidence-based stroke care come from the American Hospital Association. Hospitals that have staffed neurologists or offer TeleStroke services are considered as being able to offer ideal stroke care. The population of interest in this analysis is between US citizens aged 45 years and older, and US citizens aged 65 and older. Population counts and additional characteristics at the US Census Tract level came from the US Census Bureau American Community Survey 5-year estimates. We measured accessibility to advanced maternal care birthing hospitals using the Enhanced Two-Step Floating Catchment Approach (E2SFCA). Travel time estimates for the E2SFCA were generated using ArcGIS Pro© and StreetMap Premium© and transformed into prehospital travel time using previously published formulas. A location-allocation model was used to identify hospitals ideal to host TeleStroke services with the goal of increasing access to at-risk populations.

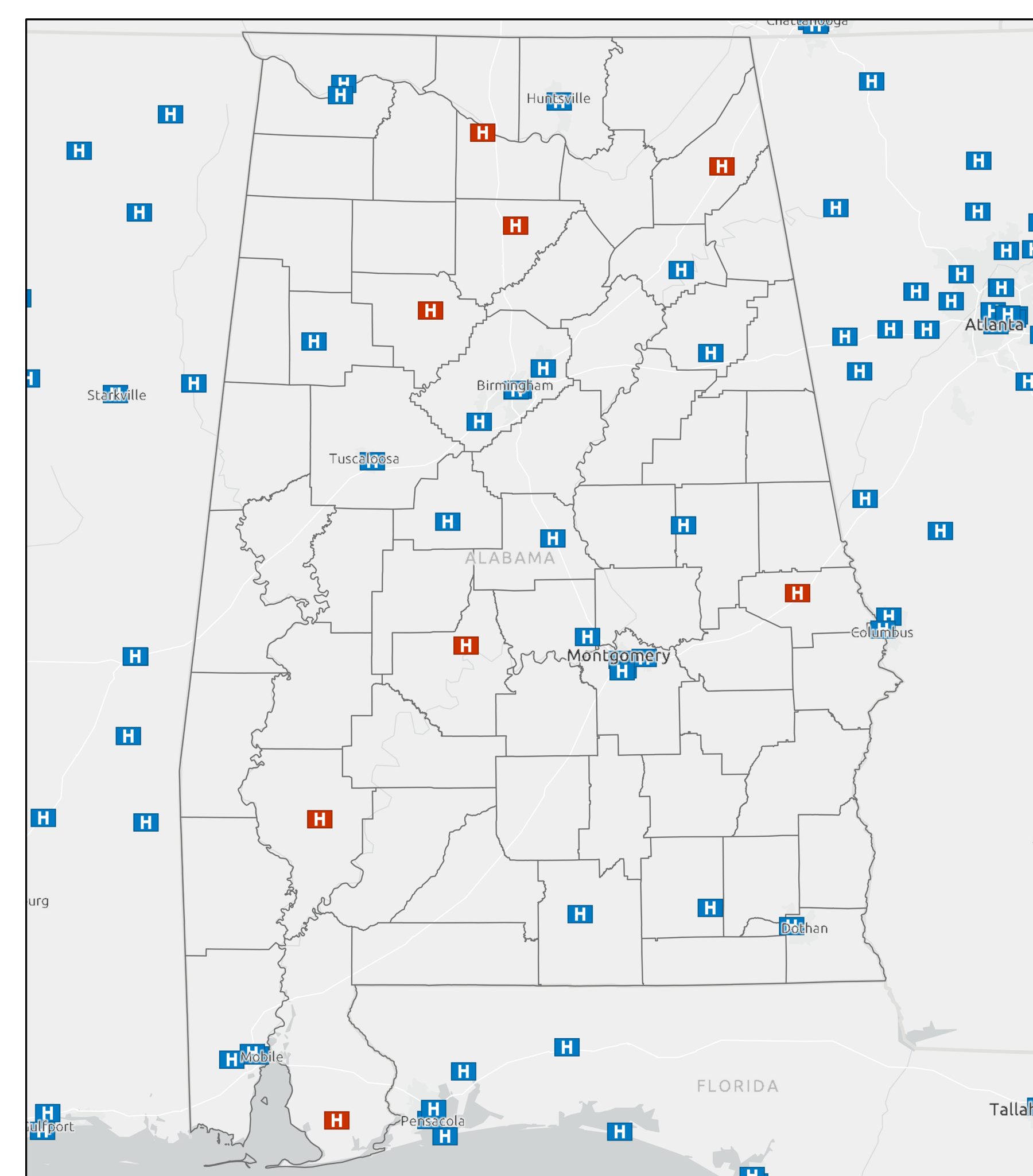
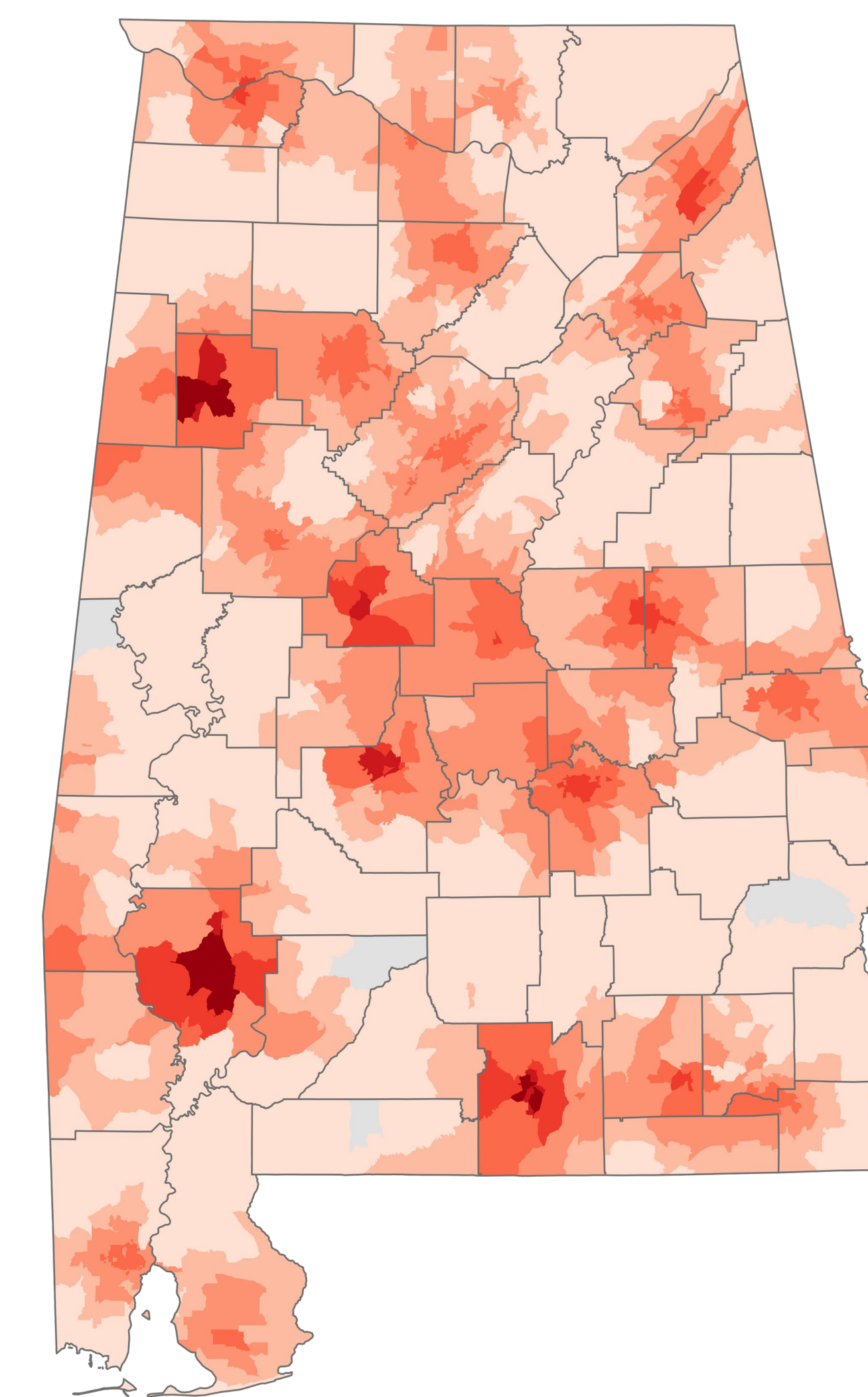
LIMITATIONS

- AHA data Self Reporting
- Prehospital travel time estimated using a previously published model, but actual travel time will vary
- Physical access is only one dimension of access and results should not be considered holistic

Current Accessibility Scores

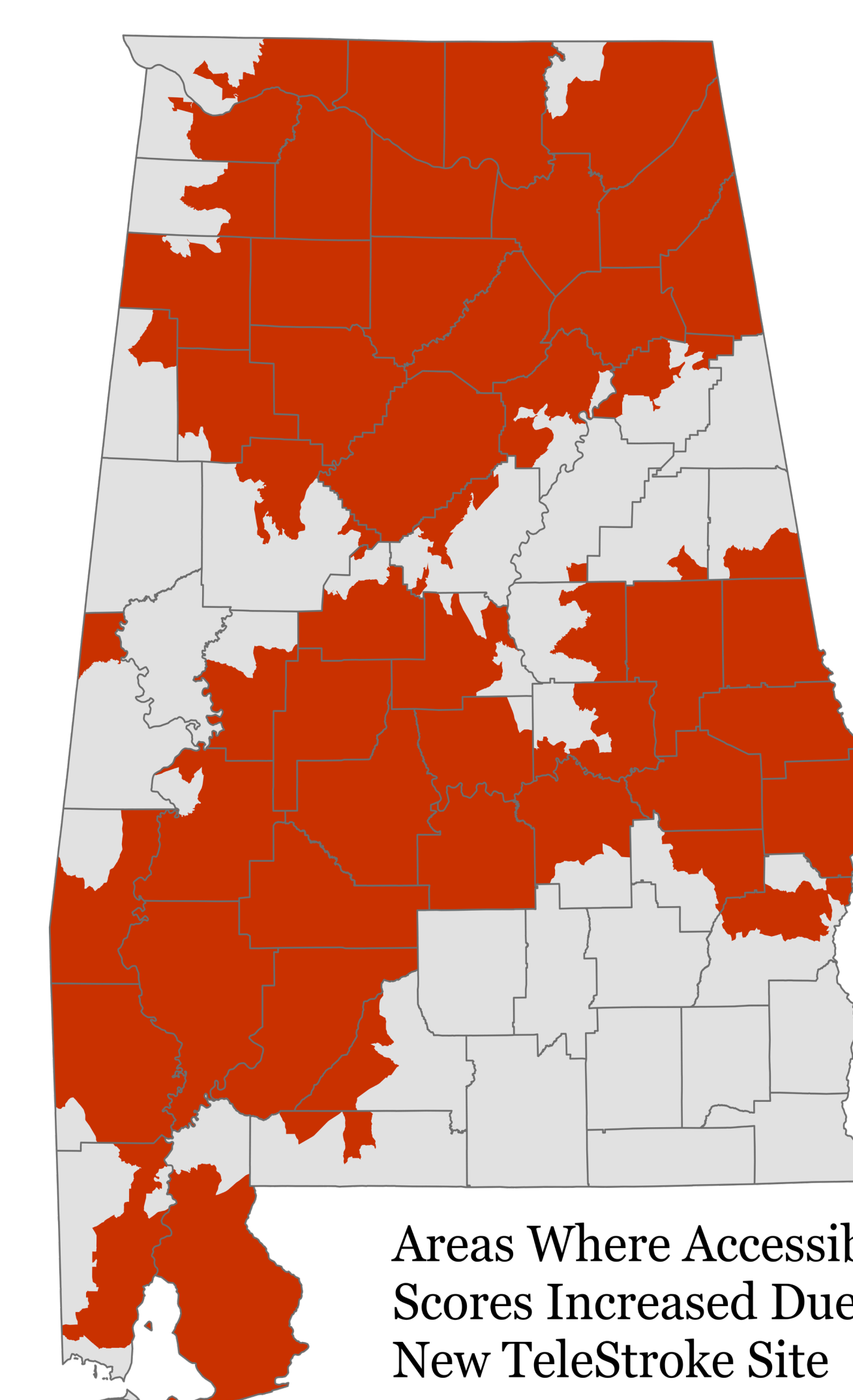


Accessibility Scores After Allocation of New TeleStroke Sites



AHA Hospital Locations Offering Stroke Care

■ New TeleStroke Care Hospital Locations
■ Existing Stroke Care Hospital Locations



Areas Where Accessibility Scores Increased Due to New TeleStroke Site

■ Not Impacted by New TeleStroke Sites
■ Positively Impacted by New TeleStroke Sites

RESULTS

- Clearly demonstrated disparities in accessibility to stroke care in the stroke belt, magnified in the black belt region of Alabama
- TeleStroke facilities help ease the disparity of accessibility
- The E2SFCA identified optimal suggested additional stroke care sites
- 8 sites were identified using location allocation optimization as realistic locations to be implemented immediately to improve access
- If these sites are implemented, the model predicts access will be increased for 76.79% (~1.6/2 million) of the population aged 45 and older

CONCLUSION

- First study to use the E2SFCA method to operationalize physical access to stroke care
- Using E2SFCA allowed the model to consider competitive environment and allocate based on more than just travel time
- As TeleStroke technology becomes more affordable, additional locations may be added to achieve even greater physical access across the states

REFERENCES

- AHA. (n.d.). *AHA Data*. American Hospital Association. Retrieved March 24, 2022, from <https://www.ahadata.com/>
- CDC. (2021, May 25). *Stroke treatment*. Stroke Treatment. Retrieved March 24, 2022, from <https://www.cdc.gov/stroke/treatments.htm#:~:text=If%20you%20get%20to%20the,of%20recovering%20from%20a%20stroke.>
- Nelson, R. E., Saltzman, G. M., Skalabrin, E. J., Demaerschalk, B. M., & Majersik, J. J. (2011). The cost-effectiveness of telestroke in the treatment of acute ischemic stroke. *Neurology*, 77(17), 1590–1598. <https://doi.org/10.1212/WNL.0b013e318234332d>