Davis Cover

Examining the Environmental Legacy of White Flight

GEOG 414

Introduction

Pedestrian fatality rates in the United States have been steadily increasing throughout the United States for the last decade, having risen to the highest number in forty years in 2021 (Governors Highway Safety Association, 2022), though where pedestrian fatalities occur in the United States is not distributed evenly. Most occur in urban areas and on large multi-lane roadways (Smart Growth America, 2022). People of color, particularly Native and Black Americans, are much more likely to be killed while walking compared the rates of White Americans, at triple and double the rates respectively (Smart Growth America, 2022). In addition, people in low-income areas also are more likely to be killed while walking, likely due to not having a car and therefore needing to navigate dangerous car-centric American cities on foot (Smart Growth America, 2022).

While these stats provide a comprehensive overview of the pedestrian safety crisis in the United States as a whole, a number of assumptions are made by the data that blurs the nuances of the crisis. Firstly, research defines "urban areas" as simply lying within the boundaries of designated metropolitan statistical areas by the US Census Bureau. This makes no distinction between comparably more walkable, older, urban areas and comparably newer suburban areas, which have a *vastly* different built environment that has been associated with a higher risk of pedestrian fatalities (Ewing & Hamidi, 2015). Secondly, research has been largely unable to suggest *why* low-income and/or minority communities experience higher levels of pedestrian fatalities. Is it simply because minority communities in the United States tend to be less wealthy, and therefore without access to vehicles, or perhaps that minority communities have less political capital necessary to lobby for the interests of their communities? Most State Departments of

Transportation, the owners of the majority of roads that pedestrian fatalities happen on, are accountable to state legislatures, which are increasingly being gerrymandered to reflect the interests of primarily suburban, White Americans (Chen and Rodden, 2013).

In this paper, I will seek to test the effect of demographic shifts in the American suburbs, both to see how much more dangerous suburban areas are to people walking, and to test whether or not the range of demographic shifts (often known as "White Flight") has any effect on an area's danger for pedestrians.

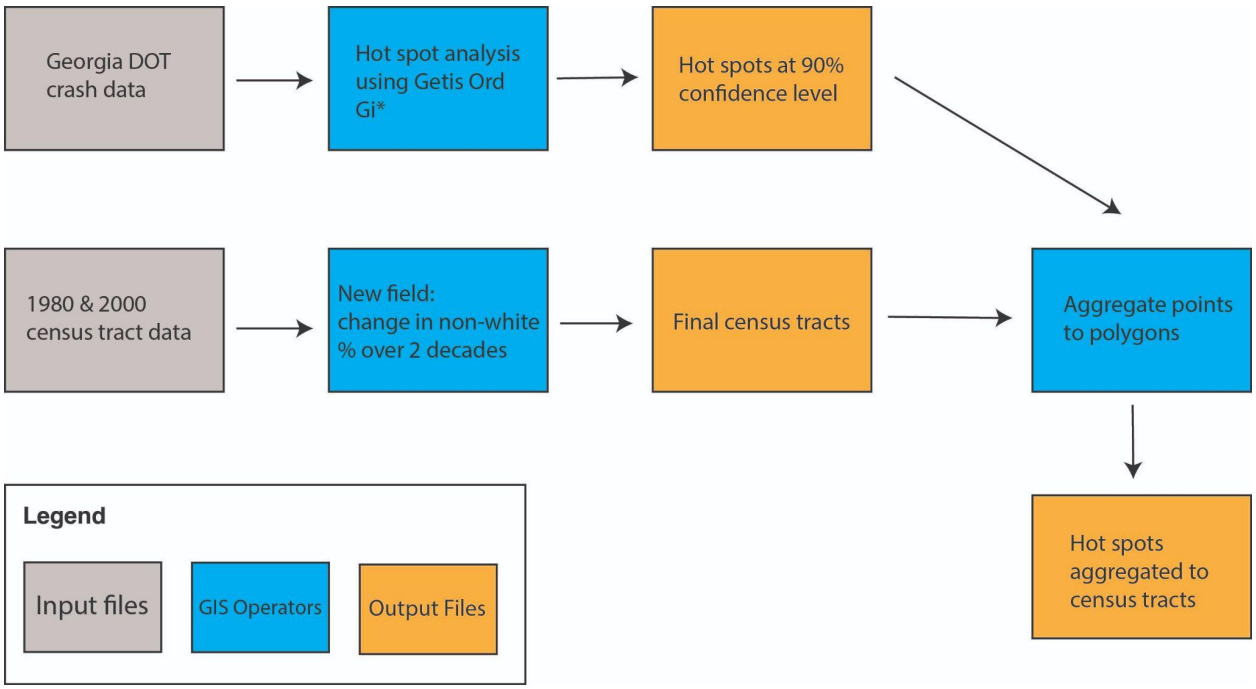
Methods

For this study, I chose the Atlanta, Georgia metropolitan area to examine. Atlanta, Georgia has the largest Black population of any metropolitan area besides New York City, the highest percentage of Black Americans among any major metropolitan area in the country, immense suburban sprawl, a long history of white flight, and is among the most dangerous metropolitan areas for pedestrians in the country, making it well suited for this study. To do this, I combined pedestrian fatality hot spot points with historical census data in ArcGIS Pro, and did further statistical analysis using R.

I gathered pedestrian-car collision point data from the Georgia State Department of Transportation, gathering around 11,000 crashes between January 1, 2016 and December 31, 2021. Demographic and income data in the form of tract-level shapefiles were compiled from the GeoLytics Neighborhood Change dataset accessed via the McGill library, which contained census data from 1980 and 2000 used to create an indicator of demographic change across the

metropolitan area (non-white percentage in 2000 subtracted from non-white percentage in 1980). During the 1980s and 1990s, the Atlanta Metropolitan Area experienced a rapid demographic shift in its southern suburbs as Black Atlantans moved south, while existing White suburbanites moved further to the fringes of the metro area, or to the white-majority northern suburbs. Demographic change since then has been less intense, and more geographically dispersed.

The following cartographic model depicts this process visually.



Once these hot spots were aggregated to census tracts, I exported the data as a table and derived a linear model as well as a range of t-tests assessing to what extent my results were statistically significant.

Results

A hot spot analysis using the Getis-Ord Gi* statistics produced 1,290 points evaluated to lie within a hot spot for pedestrian fatalities at a confidence level of 90%, 95%, or 99%. Therefore, about 1 in 10 pedestrian-car collisions over the 6 year timeframe lie within fatality hot spots. Notably, there are 0 points within the urban core of Atlanta. Every point produced lies in the suburban areas of Atlanta, and most of them lie in the previously-mentioned southern suburbs.

The average demographic differential for all census tracts within the metro area was around 0.232 percentage points, meaning the average census tract in the Atlanta metro shifted 23 percentage points less-White from 1980 to 2000. Amongst tracts that had 1 or more points located within them, the mean differential was around 33 percentage points. Amongst *non-White* majority tracts with 1 or more points located within them, the mean differential was around 49 percentage points. An unpaired t-test confirmed that the mean differential between the latter 2 categories was statistically significantly different from the mean, metro-wide differential at a 99% confidence level.

Data were also compared by splitting all tracts into White flight or non-White flight tracts. White flight tracts were defined as being White majority in 1980, non-White majority in 2000, with a mean differential above the average of 23 percentage points. This operationalization seeks to identify tracts that flipped from White to non-White majority at a pace that exceeded the general trend of the metropolitan area. Non-White flight tracts were defined as tracts that failed to meet 1 or more of the previous criteria. Approximately 22% of total census tracts were identified as White flight, with an average of 3.3 hot spot points per tract. The remainder of census tracts that

were identified as non-White flight tracts averaged 0.91 points per tract, which was confirmed to be statistically significantly different at a 99% confidence level by an unpaired t-test.

Discussion

The results of this study showed that there is a statistically significant pattern of pedestrian fatality-prone areas lying within suburban areas of Atlanta that have experienced White flight, which provides added nuance to the attributes of areas that can be used to target safety improvements and interventions. It also provides evidence to the claim that non-white majority neighborhoods might have less political capital to lobby for safety improvements to suburban areas that are much more hostile to pedestrians than older urban neighborhoods with similar demographic conditions, or that State Departments of Transportation are less likely to act in neighborhoods that do not reflect the demographic and socioeconomic characteristics of the majority of the constituents in which they are accountable to.

Notably, income-specific tests were excluded from this paper. This is because in a linear model ran, while average household income o*n its own* in both 2000 and 2020 were statistically significant predictors of hot spots, once the non-white differential or non-white population in 2000 was added to the model, average household income no longer retained it's statistical significance, while the latter two variables were significant at a 99% confidence level.

One potential limitation of this paper is the ever-present issues with aggregating points to polygons, the Modifiable Areal Unit Problem, however that is the only format historical census data is presented it in, and therefore the only format that would be able to identify areas that

underwent significant demographic shifts, therefore they are inherent constraints with this type of study.

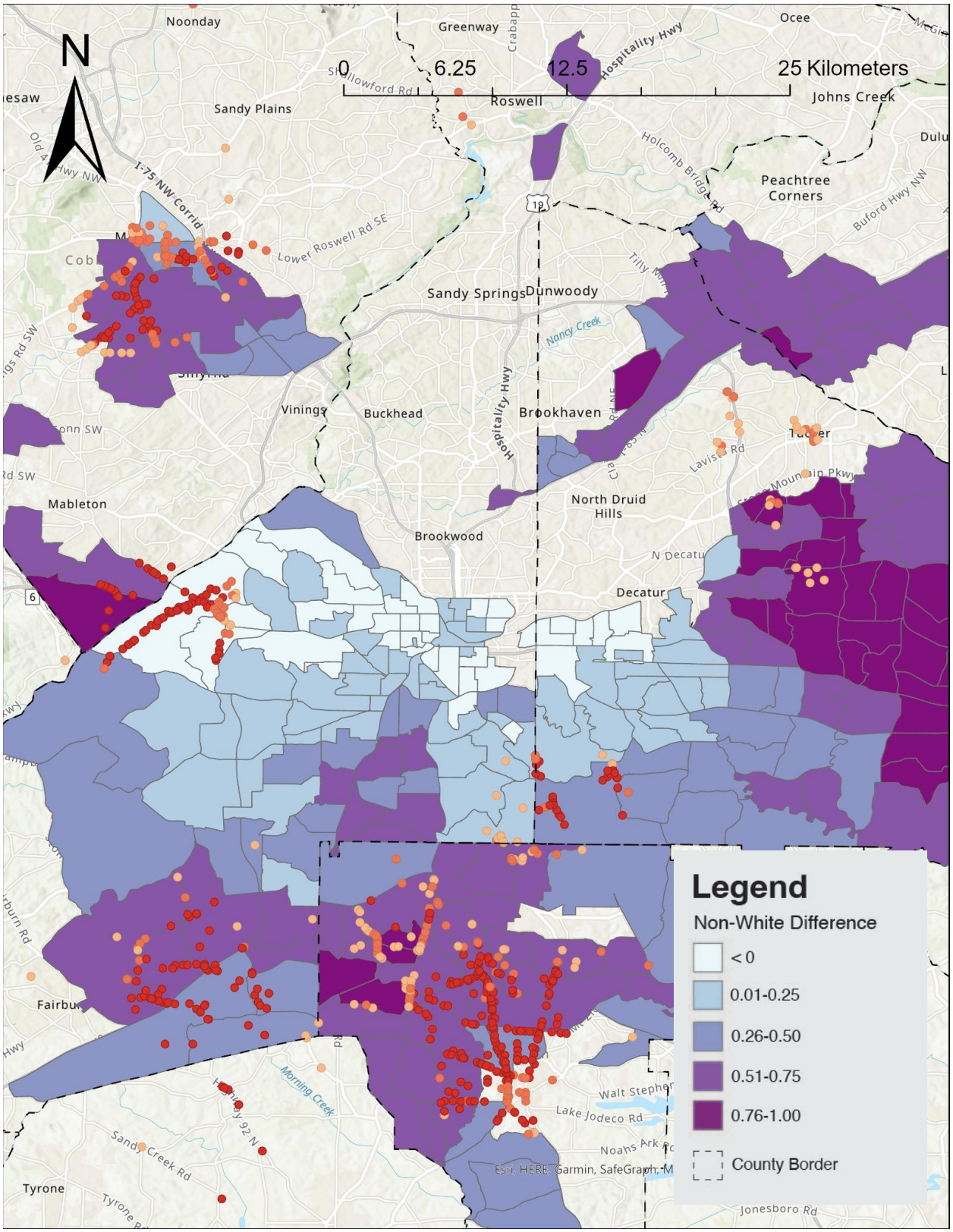
Conclusion

These results suggest the discrepancy between low and high-income areas may have more to do with the ability of communities to lobby for improvements rather than income-related justifications like car ownership or rates of walking and cycling. While those certainly play a role, as American cities continue to gentrify, more and more residents in low-income, minority communities will be pushed out of city centers, and into hostile suburban areas where they are more likely to be killed while walking. The findings in this study suggest that more needs to be done to address the specific needs of minority-majority suburban neighborhoods as the pedestrian safety crisis continues to accelerate in the United States, and clarifies some of the vague statistics used in most noteworthy reports on the characteristics of pedestrian fatalities in the United States.

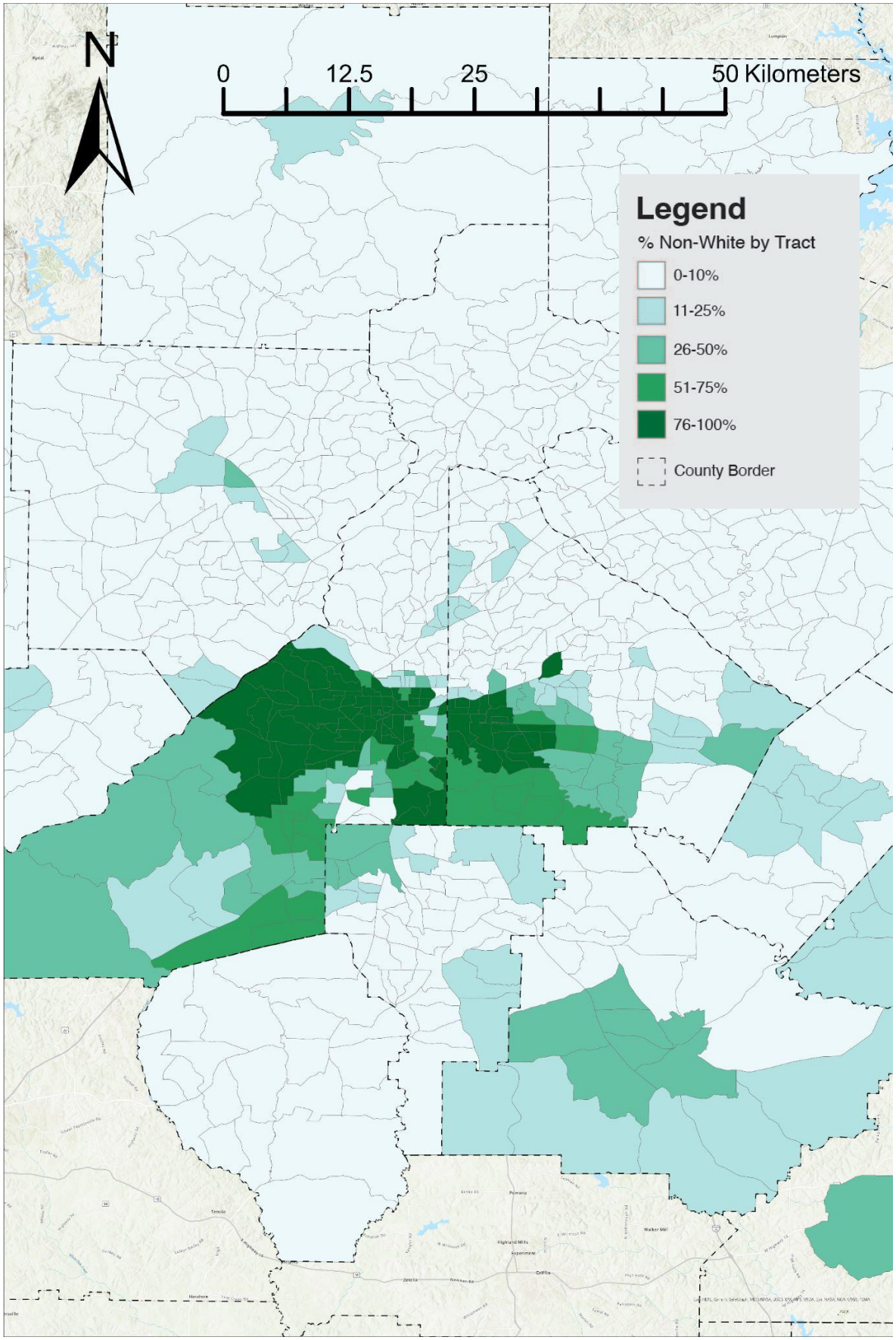
Final Layouts

Map 1: Non-White Majority Census Tracts with Pedestrian Fatality Hot Spots

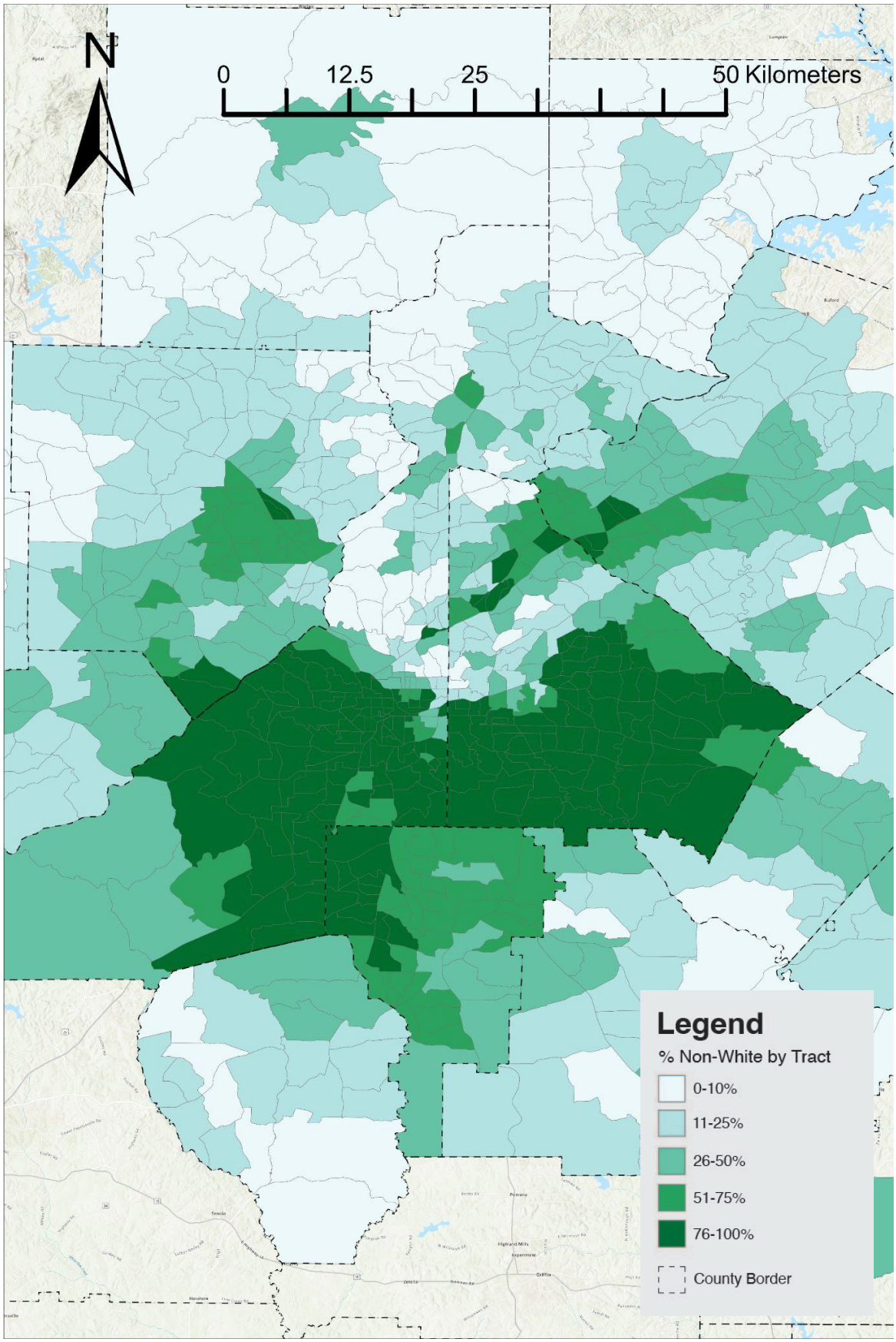
in Atlanta, Georgia



Map 2: Demographic Map of Atlanta, Georgia in 1980



Map 3: Demographic Map of Atlanta, Georgia in 2000



References

Chen, J., & Rodden, J. (2013). Unintentional gerrymandering: Political geography and electoral bias in legislatures. Quarterly Journal of Political Science, 8(3), 239–269. https://doi.org/10.1561/100.00012033

Ewing, R., & Hamidi, S. (2015). Urban sprawl as a risk factor in motor vehicle occupant and pedestrian fatalities. Transportation Research Record: Journal of the Transportation Research Board, 2513(1), 40–47. https://doi.org/10.3141/2513-05

New Projection: U.S. Pedestrian Fatalities Reach Highest Level in 40 Years. (2022, May 19). Governors Highway Safety Organization. Retrieved December 7, 2022, from https://www.ghsa.org/resources/news-releases/GHSA/Ped-Spotlight-Full-Report22.

Smart Growth America. (2022). (rep.). Dangerous by Design, 2022. Retrieved December 7, 2022, from https://smartgrowthamerica.org/wp-content/uploads/2022/07/Dangerous-By-Design-2022-v3.pdf.