Assessing Accessibility to Healthcare Facilities in Greenville County

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Abstract

The main goal of this project was to asses accessibility to relevant healthcare facilities of three distinct age groups based on distance. In Greenville County, healthcare facilities are concentrated around suburban areas. Because of this, citizens living far away from city limits do not have readily available access to healthcare. This project aims to isolate high density areas of target age groups to asses how close relevant healthcare facilities are. The three age groups that were analyzed were: children ages zero to five, children ages five to seventeen, and adults age sixty five and up. These three groups were chosen for this project based on their vulnerability and increased need for quick access to healthcare facilities. Relevant healthcare facilities were chosen based on their purpose. The facilities that were chosen were: urgent care facilities, free clinics, hospitals, and pediatric These facilities were chosen because they are generally meant for emergency situations. In emergency situations, distance away from relevant healthcare facilities is perhaps the most important factor in ensuring the survival of a patient.

To asses accessibility, areas in which high densities of the target ages groups lived were identified. These high density areas were then compared to the locations of the relevant healthcare facilities to determine average, minimum, and maximum distances from each high density area to each type of healthcare facility. The near tool in ArcGIS desktop produced this data. Five maps were created. Three population density maps were created for each target age group, and two maps that showed locations of relevant healthcare facilities were also made. One map showed relevant facilities for adults sixty five and up and the other map showed relevant facilities for children zero to seventeen.

Analysis of the data showed that average distances were good across all age groups. However looking at the range of distances showed that high density block groups to the far north and south of Greenville county did not have good access to healthcare.

Methods
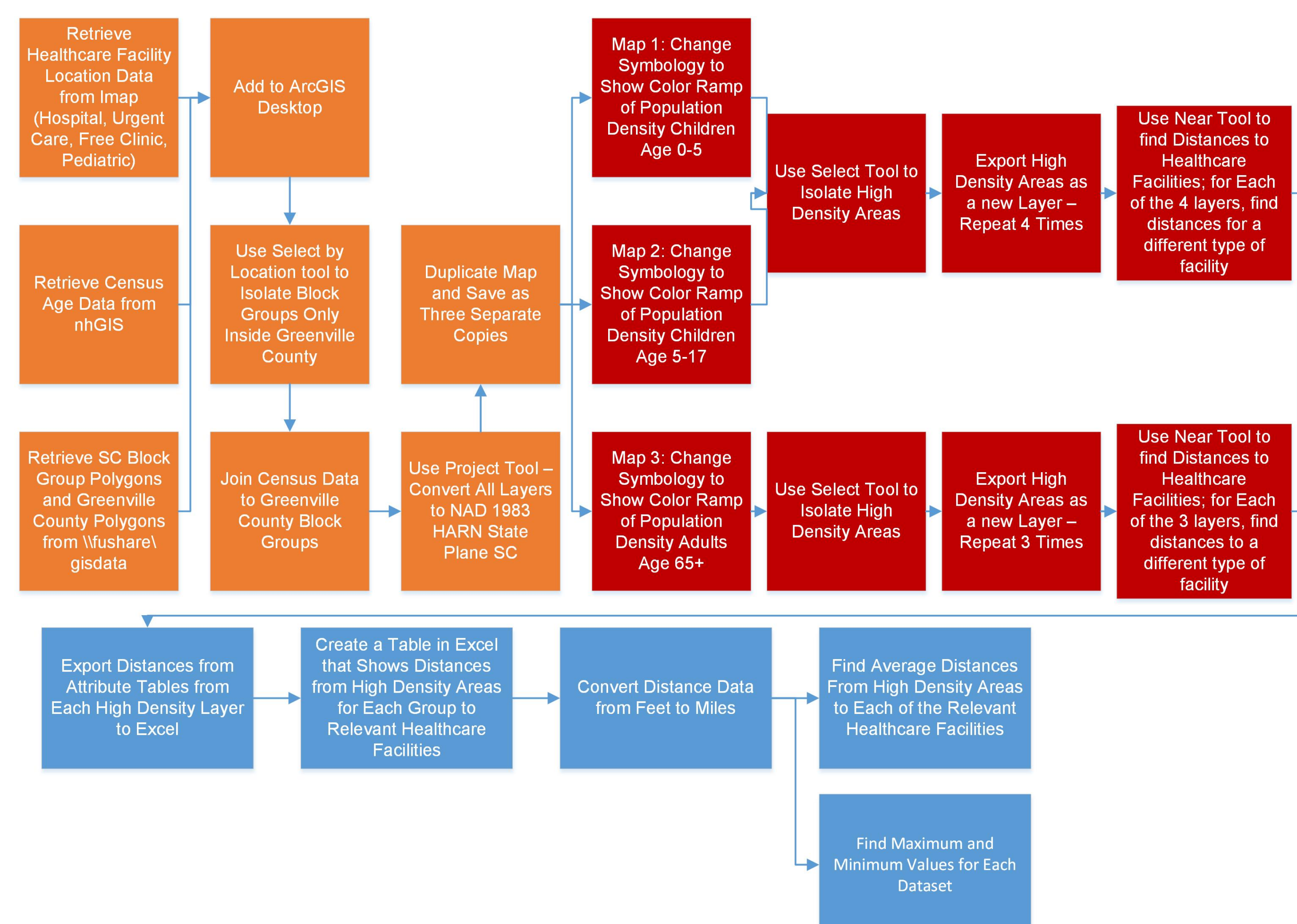
To begin this project, data had to be located. Census data was retrieved off of nhGIS.com (2015 census data) and healthcare facility location data was retrieved from Imap. South Carolina block group data and Greenville County boundary data were both retrieved from Furman University's GIS data folder. After these data were imported into ArcGIS desktop, Greenville country was isolated using the select by location tool. Census data was then joined to the Greenville County block groups. High density areas were isolated using the select tool, and new layers were added by exporting the selected features. The near tool was then used to determine distance, in feet, from the closest of each type of healthcare facility to the centroid of each high density polygon. The distance data was added to the attribute table of the layer in which the near tool was performed on. The attributes were then exported to excel to determine average distances in miles.
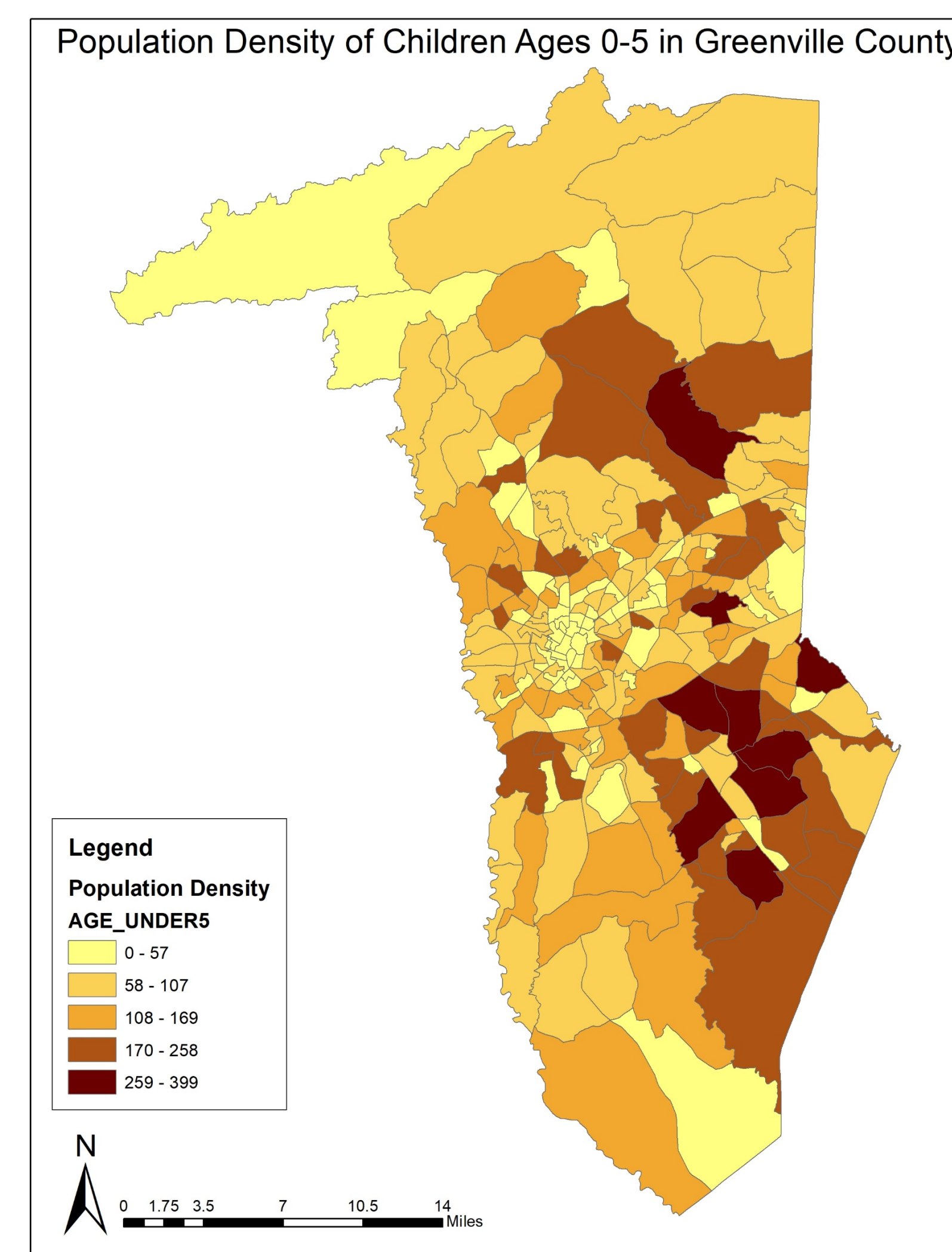
Results

Figure 1: Population densities of children ages 0-5 in Greenville County. High density areas are concentrated north and southeast of Greenville city limits. There are few high density block groups within the city
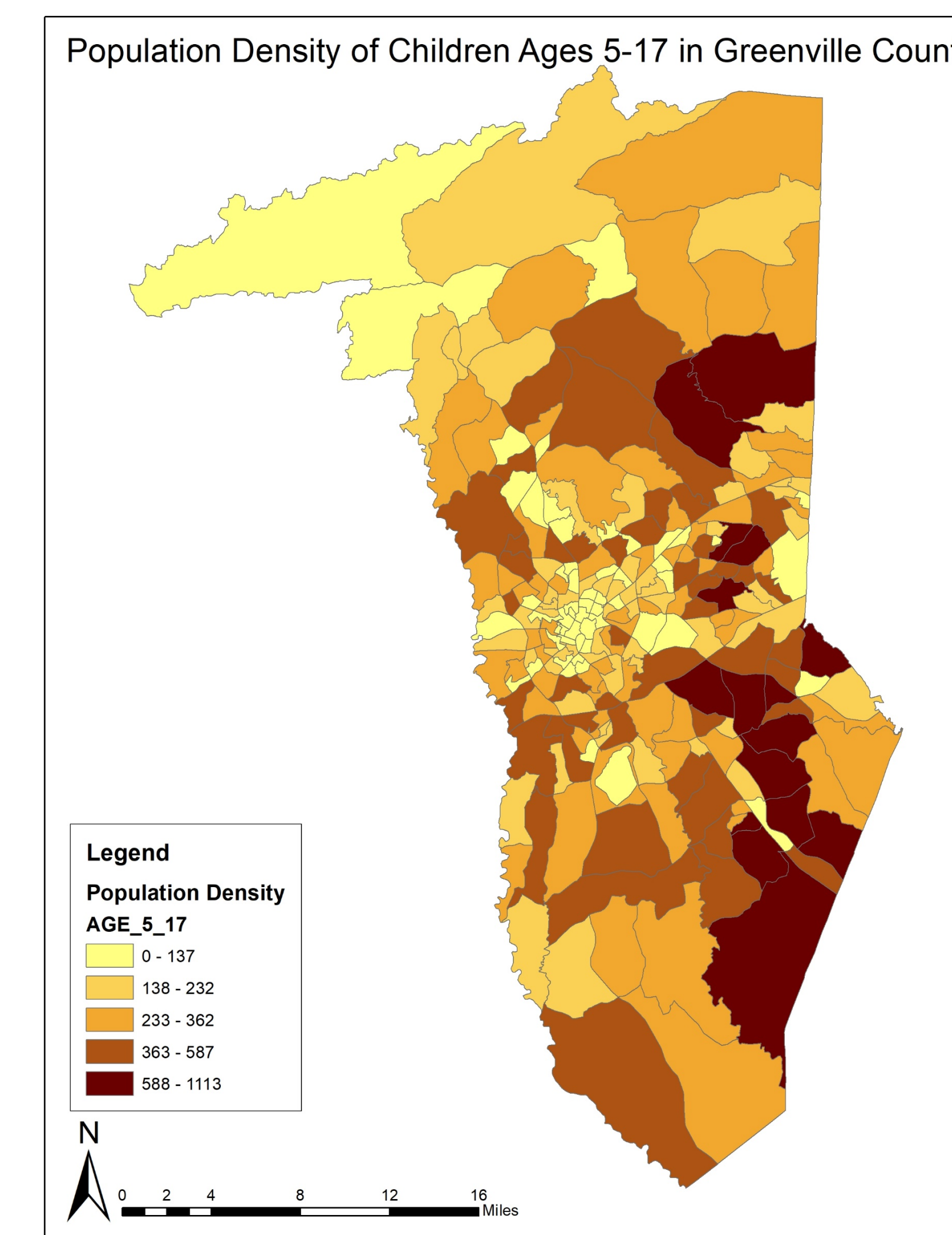

Figure 2: Population densities of children ages 5-17 in Greenville County. High density areas are concentrated around city limits. The highest density areas are concentrated to the northeast and southeast of the city. A medium density area is found at the southern tip of the county.
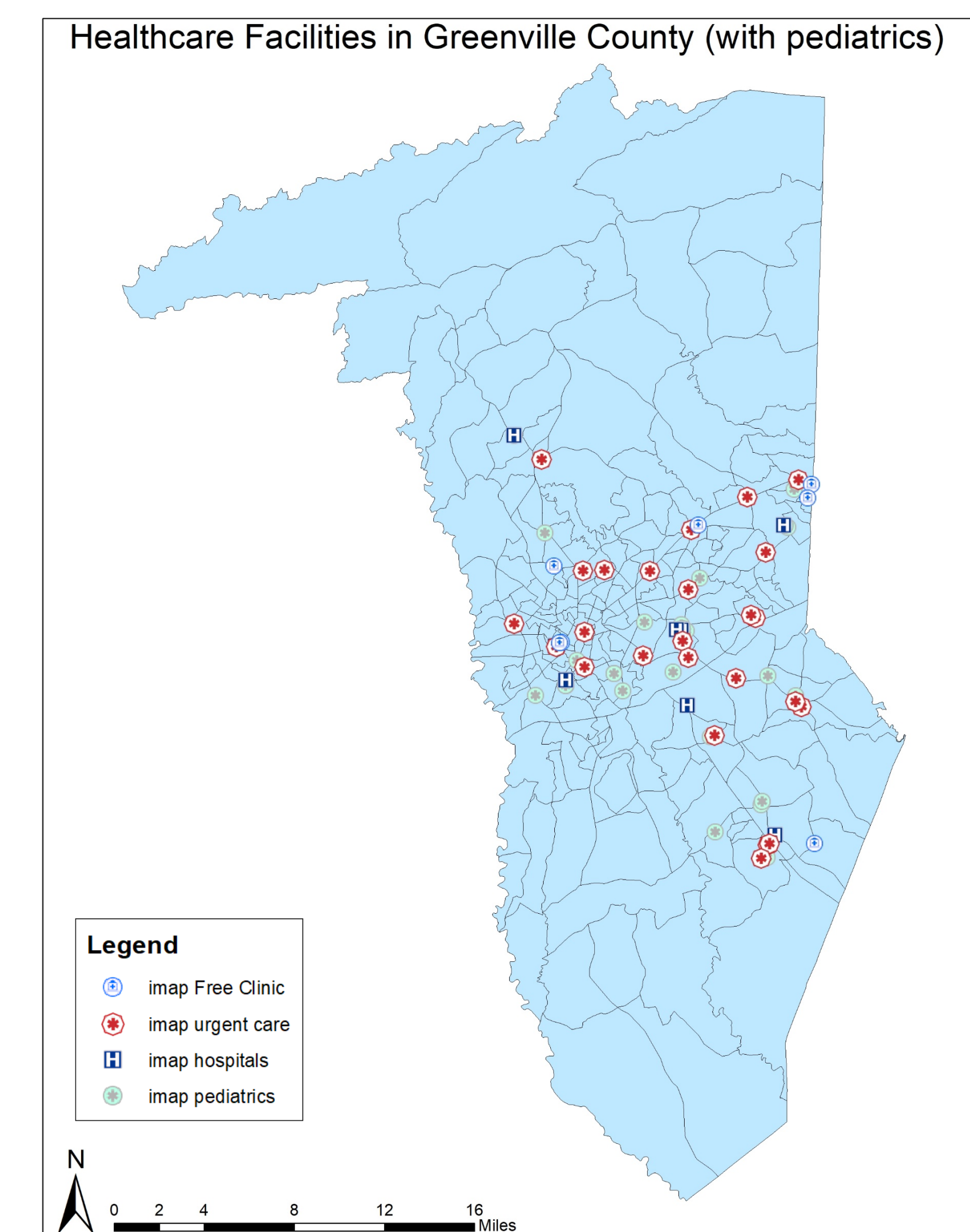

Figure 3: Locations of relevant healthcare facilities for children 0-17 in Greenville County. Healthcare facilities are concentrated in and around city limits, with no healthcare facilities to the far north or south of the county
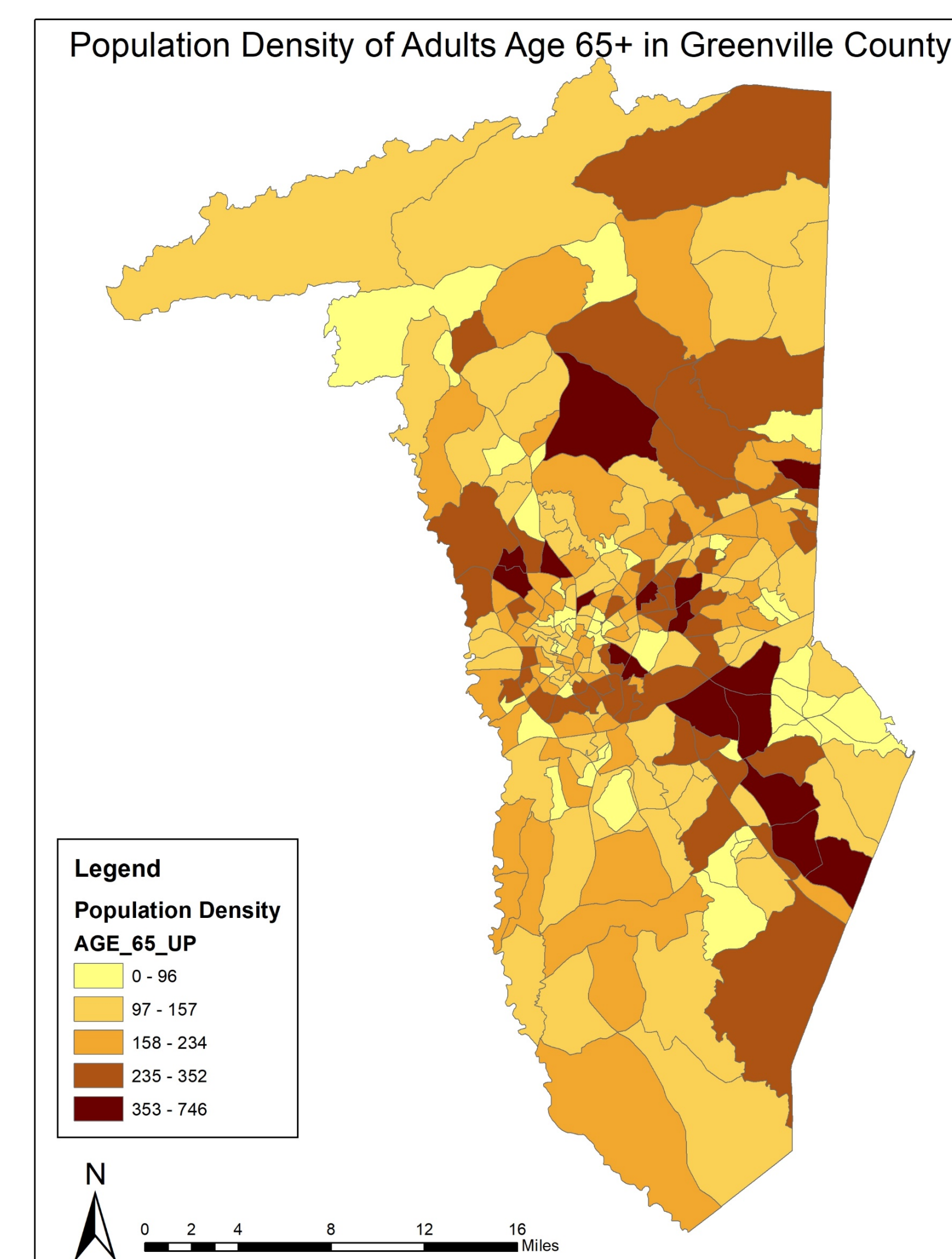

Figure 4: Population densities of adults age 65+ in Greenville County. High density areas are concentrated to the north and southeast of city limits.
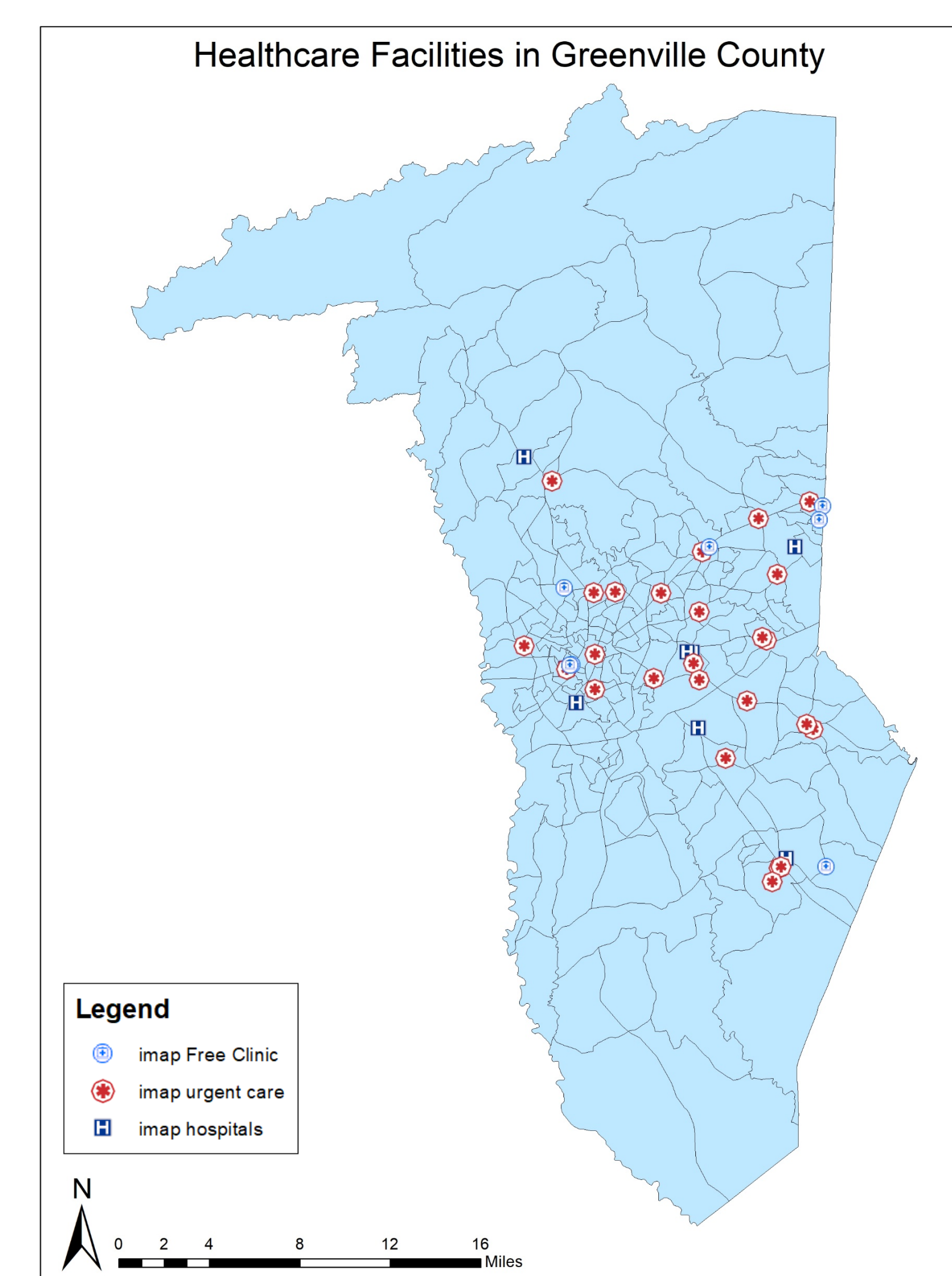

Figure 5: Locations of relevant healthcare facilities for adults age 65+. Healthcare facilities are concentrated in and around city limits, with no healthcare facilities to the far north or south of the county

	Children 0-5			Children 5-17			Adults 65+		
	min	max	mean	min	max	mean	min	max	mean
Urgent Care Facilities	0.03	4.89	1.96	0.02	9.07	1.25	0.02	11.22	0.988
Free Clinics	0.05	4.25	1.02	0.05	11.2	3.15	0.05	13.1	2.523
Hospitals	0.05	6.48	2.93	0.11	10.24	2.35	0.05	10.76	1.884
Pediatirc Hospitals	0.03	4.77	0.92	0.04	8.93	1.18	n/a	n/a	n/a

Table 1: Table showing minimum, maximum, and average distances to relevant healthcare facilities for each of the three age groups.

Conclusion

The near tool allowed for average, minimum, and maximum distances to be determined. These distances are recorded in table 1 above. The average distances indicate that the citizens of Greenville country have excellent access to healthcare. For all age groups, distances to all facilities were between .92 and 3.16 miles away. However, other analyses of the data show this to be untrue. For high density block groups across all age groups and healthcare facilities, maximum distances ranged from 4.25 to 13.1 miles away. Since healthcare facilities are concentrated around suburban areas, citizens living to the far north and south of Greenville county are isolated from healthcare access. Preliminary analysis of this data indicates that healthcare facilities should be more spread out across the county, especially in the far north and south of the county. Future analysis should include drive times from the high density block groups in order to get a better idea of the actual time it would take for a patient to reach a healthcare facility in an emergency.

References and Data Sources

Thank you to Joe Hiebert for assistance with GIS methodology

Census data retrieved from https://www.nhgis.org/
Healthcare facility location data retrieved from http://www.gcgis.org/apps/imap/
South Carolina block group and Greenville County boundary data retrieved from Furman's GIS data folder

Higgs, G., 2004, A Literature Review of the Use of GIS-Based Measures of Access to Health Care Services: Health Services and Outcomes Research Methodology, vol. 5, issue 2, pp. 119-139