

Economic Disparity in Access to Trauma Centers in Philadelphia, PA

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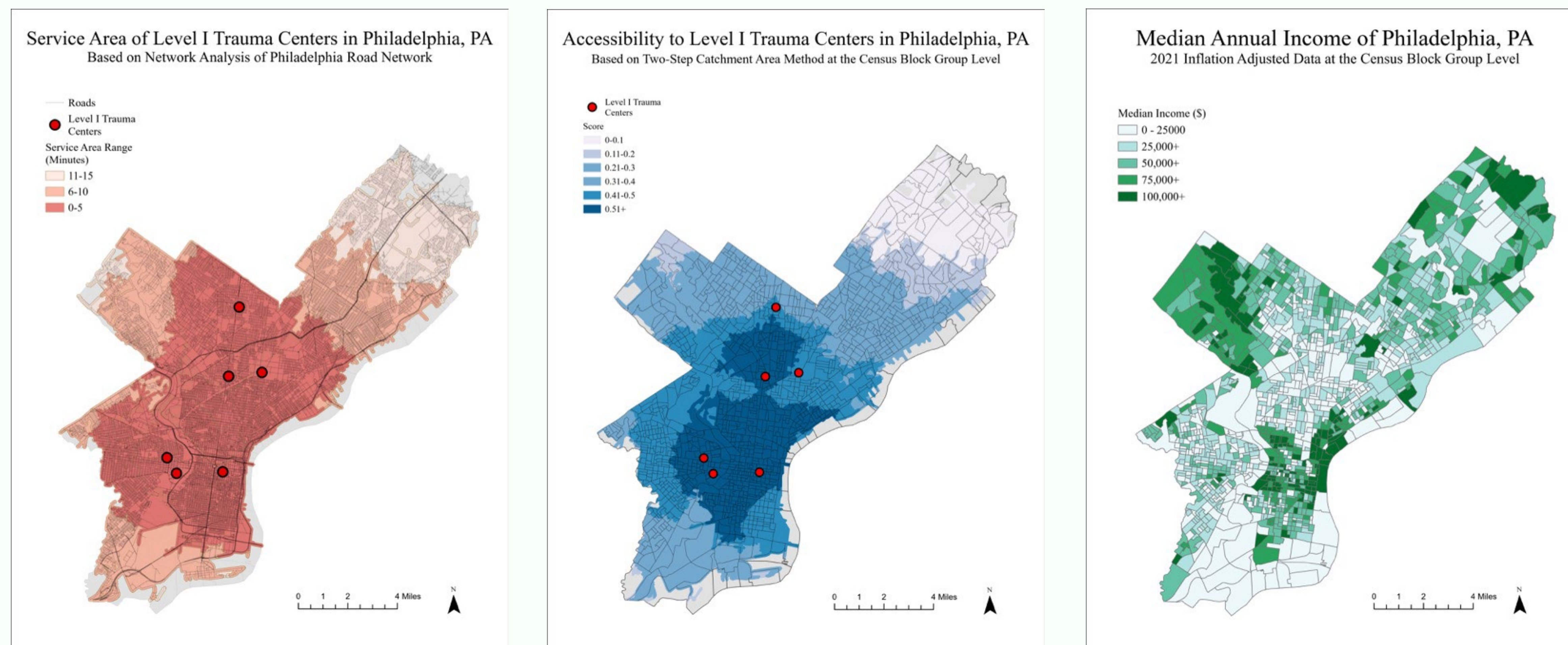
INTRODUCTION

In the event of a traumatic injury, a Level I Trauma Center is the hospital of choice for treatment. A hospital with a Level I Trauma center designation has multiple surgical specialties on call, is involved in research, has highly experienced staff, extensive trauma resources, and sees a large number of trauma patients (Celik). As such, access (based on travel time) to can directly impact chances of survival and/or recovery in the event such injury. Therefore, for this project we have decided to run a Two-Step Floating Catchment Area analysis in order to determine if there is a disparity in access to level one trauma centers based on income in Philadelphia, Pa.

The population and median income data for this analysis were established at the census block group level using the 2020 census data set. Level I trauma center identifications and locations were established through The Hospital & Healthsystem Association of Pennsylvania and Google Maps; and all data was set to be within the city of Philadelphia as defined by the Philadelphia County boarders.

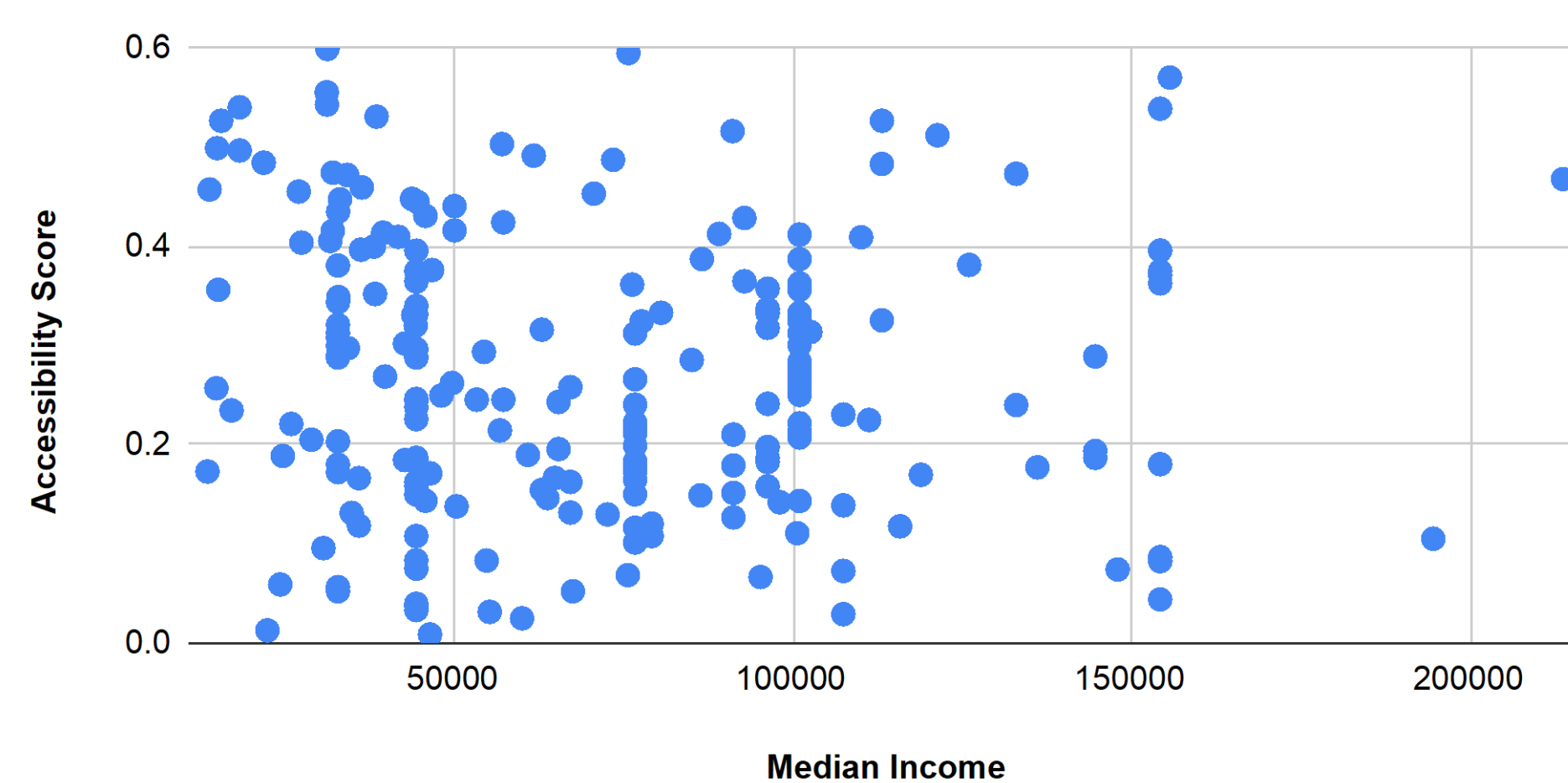
Hypothesis: Due to the associated costs of healthcare and the known inverse relationship between socioeconomic status and healthcare access, we hypothesize that areas of lower income will have lower overall potential access to trauma centers.

RESULTS



Correlation of Median Income and Accessibility Score

Taking into account Zero Inflation from data



Correlation: -0.0698

$R^2 : 0.004$

DISCUSSION AND CONCLUSION

In contrast with original predictions, there appears to be negative, albeit very weak, relationship between income and access, which indicates that higher income is correlated with slightly lower potential access.

Possible explanations for these results are:

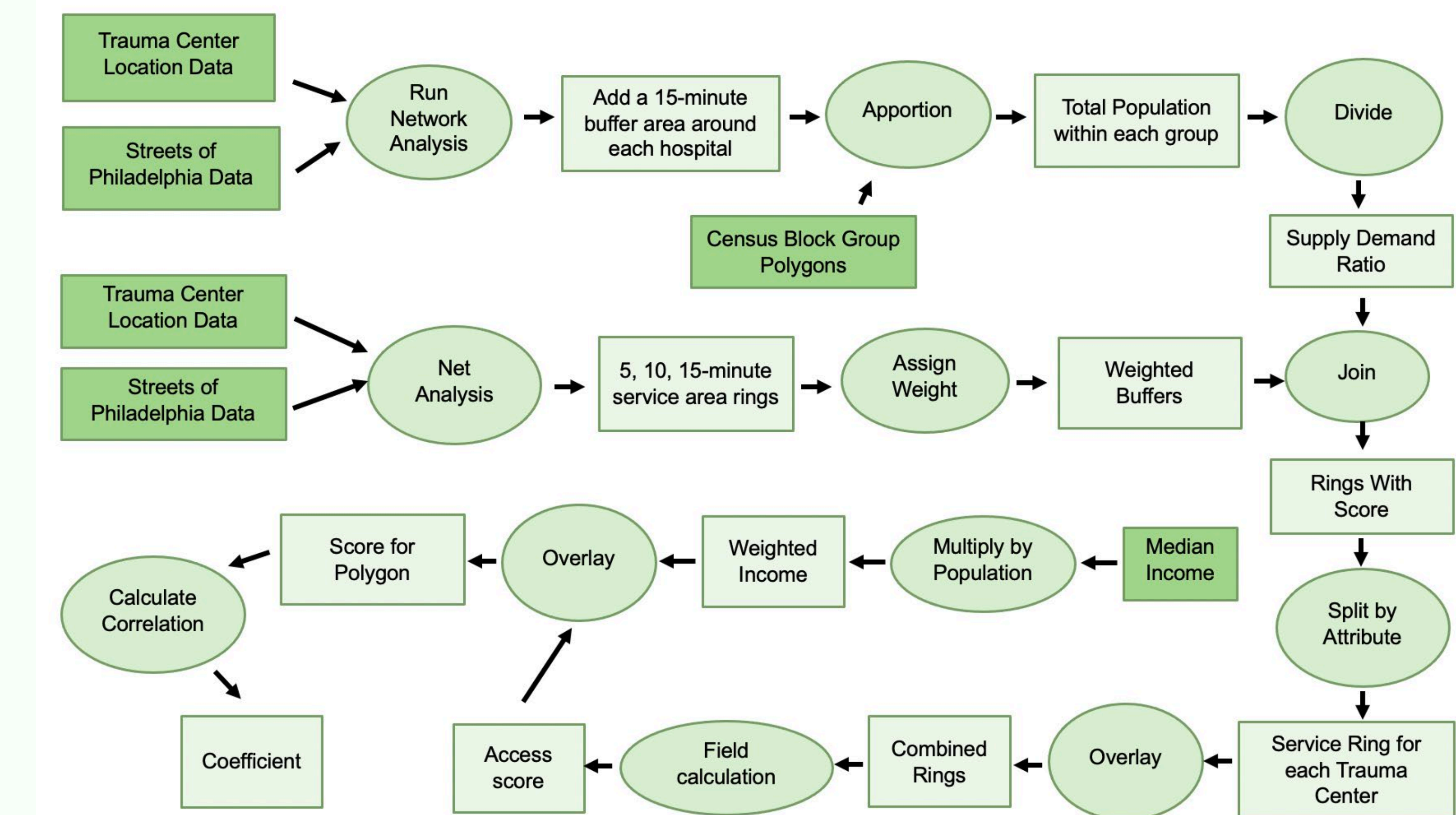
- Hospitals are generally located in heavily trafficked and often urban areas
- Hospitals are also associated with high levels of noise pollution from ambulances and potentially helicopters.

These factors may make living near hospitals, especially Level I Trauma Centers, undesirable for those with higher incomes.

METHODOLOGY

In this analysis, a 2SFCA was conducted using the Level I designated Hospitals in Philadelphia. The instructions for this analysis are as follows:

- 1). Calculate an individual's share in each healthcare facility (based on total population within service area)
- 2). Sum up each individual's share, taking into account distance decay. This gives an accessibility score.
- 3). Overlay these scores onto Census Block Group Data with Median Income
- 4). Calculate the correlation coefficient between Median Income and Accessibility Score.



LIMITATIONS

- First, the geographic weighting in the 2SFCA analysis does not take into account real-world scenarios and weights all potential hospital access. One reason is that that traffic is not factored into the time analysis. As solid data models could not be located, the time travel aspect of the analysis is guaranteed to be inaccurate. Given the tendency for urban areas to have increased amounts of traffic, the actual service area rings are likely to be significantly smaller than depicted here.
- Second, this analysis does not account for adult versus pediatric hospital designation. Due to the complicated nature of calculating the populations based on age and more importantly the blurry emergent treatment guidelines for older teenagers, adult versus pediatric designation was not considered in the analysis.
- Finally, this analysis does not take into account emergency service vehicle protocols, which may involve bypassing speed limits.

SOURCES

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