A Spatial Analysis of Race and Poverty in Springfield, Missouri

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Abstract

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Keywords:

**Introduction**

Racial segregation has colored the social fabric of the United States since before the founding of the republic. Sociologists have studied the topic extensively and illuminated its effects on various populations. Many of these effects persist to the present day. However, most research seems to have focused on the largest or most prominent cities in the nation such as Chicago, Illinois; Detroit, Michigan; Los Angeles, California; and St. Louis, Missouri. There seems to have been few, if any, spatial studies of race and poverty in Springfield, Missouri.

The Springfield, Missouri metropolitan statistical area (MSA) is a worthwhile area to study for several reasons. Springfield, Missouri is the third largest city in the state of Missouri (CITATION). It is the seat of government for Greene County (CITATION). The Springfield Public Schools System is the largest school district in Missouri (“Missouri school districts,” 2020). Moreover, Springfield has played an important role in the development of the current social order for both the state of Missouri and the nation going back to the American Civil War.

Like politics, all social dynamics are local. It’s likely that each locale has experienced its own distinct flavor of racial segregation resulting in variations of the social effects that are currently manifested within each region. This study seeks to answer two questions as they pertain to Springfield, Missouri. First, is there evidence that there are spatial processes associated with poverty and race in Springfield, Missouri? Second, are there statistically significant associations between poverty, race, and other social indicators when potential spatial processes are considered in the analysis?

**Literature Review**

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**Data and Methods**

**Data Sources**

I obtained the data for this analysis from two primary sources. I downloaded shapefiles for the state of Missouri and metropolitan and micropolitan statistical areas (MSAs) for the United States from the TIGER/line shapefile database of the U.S. Census Bureau. I downloaded demographic and social data at the census tract level from SocialExplorer.com in two batches in formats suitable for manipulation in STATA. The first included sex, age, and race. The second comprised educational attainment, household income, median household income, Gini index, poverty, and health insurance (Table 1).

**Data Modifications**

I used STATA to create several interval-ratio variables in two batches (Table 2) using code that was provided by Dr. J. S. Onésiemo Sandoval. As part of the output, the code created Microsoft Excel spreadsheets with the interval-ratio variable data.

I used ESRI ArcMap 10.6.1 to merge the interval-ratio variable with the shapefile for the study area. To begin, I clipped the census tracts for the state of Missouri to the Springfield, Missouri MSA. I then used the Join function to merge each of the Microsoft Excel spreadsheets with the interval-ratio variable data to the shapefile for the Springfield, Missouri MSA using the GEOID and FIPS fields as the unique identifiers to match the data with the correct census tracts.

I inspected the Attribute Table to identify census tracts that should be removed to avoid skewing the analysis results. To do this, I sorted the total population field from low to high and inspected it for census tracts with values that were abnormally low relative to the other census tracts (i.e., census tracts with total populations less than 100 persons). I found no census tracts that warranted removal from the analysis.

As I performed the tasks necessary to modify the data, I periodically saved the results at strategic points to permanent shapefiles in a file geodatabase I created using ArcMap. I did this as a precaution to save time in case I made an error. In such an eventuality, I would not have to repeat the entire data preparation process. I projected the final shapefile to the North American Datum (NAD) 1983 Universal Transverse Mercator (UTM) zone 15 projection coordinate system.

Because administrative boundaries (e.g., census tracts) change over time and generally don’t align with social boundaries, I also used ArcMap to create a shapefile of the study area with a one square kilometer grids rather than census tracts as a point of comparison. I interpolated the total population, total Black population, total Latino population, and total White population at the census tract level to the grid. I then added variables for the percent Black population, percent Latino population, and percent White population to the Attribute Table for the shapefile and calculated them for each grid square. I saved the result as a new shapefile with the NAD 1983 UTM zone 15 projection.

**Analysis and Findings**

I used ESRI ArcMap 10.6.1 and GeoDa to analyze the data. I used ArcMap to create thematic maps of several variables (Figures 1 through 4).

I used the Measuring Geographic Distributions function in ArcMap to calculate the mean center and standard deviational ellipses for poverty and the percent Black and percent White populations in the study area (Figures 5 and 6).

I used GeoDa to analyze the global spatial autocorrelation at the census tract level for the variables I intended to use in the analysis. I used the queen method first order for contiguity weights for all calculations. I chose this method because it seemed to best represent the possible social interactions in the study area.

I calculated univariate Moran’s I statistics for all variables (Table 3). I calculated bivariate Moran’s I statistics for poverty, which I planned to use as the dependent variable, and the percent Black and percent White populations, which I planned to use as two of several independent variables (Tables 4).

I also used GeoDa to examine Local Indicators of Spatial Association (LISA) for the top three variables that had statistically significant global univariate Moran’s I statistics (Figures 7 through 9).

Based on these initial results, I created bivariate LISA maps for the percent Black population with poverty and the percent White population with poverty (Figures 10 and 11).

Additionally, I calculated global univariate Moran’s I statistics for the percent Black population and percent White population based on grid polygons. I compared these results with those based on census tracts (Table 5).

**Discussion**

**Policy Implications**

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**Limitations of the Analysis**

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**Possible Extensions**

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**Conclusion**

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References

*Missouri school districts*. (2020). School Districts. Retrieved March 14, 2020 from https://schooldistricts.us/missouri-districts.html

Appendix A. [Enter Title]