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RACIAL DIFFERENCES IN LIFE EXPECTANCY AMONG SHELBY COUNTY,  
TENNESSEE RESIDENTS

by

Sarah Ashley Nicole Collins

A Thesis

Submitted in Partial Fulfillment of the

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## ABSTRACT

Life expectancy is a key measure in population health. Although there have been significant gains in the past decades, deep disparities still persist along racial lines. The aim of this paper is to analyze the disparate life chances of racial and ethnic minorities within Shelby County, Tennessee. OLS regression is used to investigate the association between life expectancy and various sociodemographic variables. The overall life expectancy of Shelby County is years below the national average, and the results of this project find that there are stark differences across census tracts.

## TABLE OF CONTENTS

Chapter		
1.	Introduction	1
2.	Literature Review	
	Multidimensionality of Racial Health Disparities	2
	Place-Based Factors	4
3.	Methods	
	Data	6
	Measures	8
	Analytic Approach	9
4.	Results	10
5.	Discussion	17
	Limitations	18
	Conclusion	19
	References	20

## **Introduction**

One key measurement in population health is life expectancy. Research continues to show deep, persistent disparities in health and life expectancy across large geographic areas, such as states and counties (Chetty et al. 2016). Less work has addressed these same disparities in small areas. In a single city, life expectancy can vary up to twenty years; this can be attributed to a number of factors such as housing, environmental toxins, quality of public transportation, and racial residential segregation (Virginia Commonwealth University 2016). Smaller scale research, such as at the census tract level, allows for a greater understanding of the heterogeneity present. Within Shelby County, Tennessee life expectancy varies up to 17.9 years. Some of the most pressing issues in the county relate to economic status, segregation, and the inequality resulting from the two.

Health and mortality are patterned by race and ethnicity, with certain minority groups exhibiting shorter lives and worse health than non-Hispanic whites (Hummer and Chinn 2011; Williams and Sternthal 2010; Williams 2012). Racial residential segregation, the physical separation of racial and ethnic groups, is thought to account for a portion of these health disparities (Sewell 2016; Williams and Collins 2001); and like many metropolitan areas, Shelby County is segregated by race. Shelby County boasts a modest population of nearly one million residents and is predominately comprised of racial and ethnic minorities. With one overarching question, this project seeks to investigate the association of life expectancy at birth and various sociodemographic factors. More specifically, my research question asks: how does life expectancy differ in census tracts with high concentrations of racial and ethnic minorities in Shelby County, Tennessee?

## Literature Review

### *Multidimensionality of Racial Health Disparities*

The interconnection of race and health has been studied for quite some time. Throughout the 19th century, the prevalent belief was one of biological determinism and racial essentialism. These are the notions that one's behavior is motivated through genetics or other biological factors, and the belief that racial groups act as a monolith in regard to their social behavior. During this era, these two purported ideologies served as an explanation for the radically different life outcomes of racial groups (Byrd and Hughey 2015; Zuberi 2001). Du Bois, a pioneer of modern sociology, conducted rigorous research throughout Philadelphia which challenged that dominant perspective. Citing the social conditions of the Black residents, his work provided the foundation for research concerning racial inequality and its relationship to health (1899). After his seminal work, sociologists slowly moved away from their theorizations of race as biological. Theories of race have shifted greatly over the last century. One of the most heavily cited racial theories include Omi and Winant's work concerning racial formation. Their work presents race as a sociohistorical concept that is fluid in nature, and that racial categorizations are unstable and political (2015). In sociology, race is now considered to be a social and political categorization rather than a biological one (Winant 2000).

Just as race has evolved theoretically, theories concerning racism have progressed as well. Some research engages with the notions of covert and overt racism; the latter being a form of racism that was especially prevalent in American history and throughout the Civil War and Jim Crow Eras. Overt racism is characterized by violence. Inequality in this form is upheld by de jure discrimination and seldom questioned to be true form of racism. Covert racism is a far more insidious form of oppression. The shift from overt to covert racism has inspired the discussion of

racial progress (Bonilla-Silva 2014; Ray and Seamster 2015; Wimmer 2015). However, racial discrimination can be seen clearly in hiring practices (Bertrand and Mullainathan 2004; Pager, Western, and Bonikowski 2009) and real estate practices, including zoning, loans, and redistricting (Schulz et al 2002). Additionally, the social structures responsible for the unequal distribution of social and economic resources are racialized and operate within the rule of the law (Ray 2019). Systemic racism theory offers explanations of race relations in the US through structural analysis. It informs us of the ways in which racism is deeply rooted in all levels of society and is normative (Jones 2000; Feagin and Elias 2013). Though this project is primarily focused on the ways in which the physical separation of racial and ethnic groups has persisted after the outlawing of legal segregation and the ways in which this may be seen in the health of racial and ethnic minorities.

Researchers concerned with race and health in particular have also added to the literature that disentangles original formulations of race as a biological phenomenon. They offer novel frameworks for understanding how racial and ethnic minorities face multiple forms of racism, discrimination, income inequality, and residential segregation, which all contribute to the varying health outcomes of racial minorities (Hummer 1995; Kwate 2008; Phelan and Link 2015; Sewell 2016; Hess et al 2019). In the fundamental cause conceptual model, Phelan and Link offer possible explanations of health inequalities through multiple mechanisms. Beginning with systemic racism, their work evaluates the persistent health inequalities independent of socioeconomic status (SES); resources such as occupational prestige, social capital, and freedom are also interconnected with race (as race influences one's ability to attain the aforementioned resources). Lacking these resources is associated with poorer health outcomes.

Opting to focus on economic factors, Farmer and Ferraro (2005) juxtapose two hypotheses—the minority poverty hypothesis and the diminishing returns hypothesis. The first hypothesis suggests impoverished Black individuals are cumulatively disadvantaged and by both their race and economic status leading to poor overall health. The diminishing returns hypothesis states there are differing returns for gains in SES among minority groups, especially Black individuals. Socioeconomic status is a key influence of health behaviors and health outcomes (Pampel, Krueger, and Denney 2010; Link and Phelan 1995), and the differences in mortality among Black and White Americans can largely be attributed to the striking differences in their socioeconomic positions (Williams and Collins 1995). However, when juxtaposed to their white counterparts, NH-Black and Hispanic populations have similar SES. Despite this, within the United States, Hispanic residents have the lowest rates of mortality (Lariscy, Hummer, and Hayward 2015; Markides and Eschbach 2005).

The Hispanic Mortality Paradox complicates prior research concerning SES and health, which contributes to the growing interest in the subject. Explanations have been offered for this paradox including immigrant selectivity, cultural buffering, and errors in death records (Lariscy, Hummer, and Hayward 2015; Lariscy 2011). While this project is only concerned with life expectancy at birth, Hispanic mortality rates are even more favorable among older adults (Hummer and Chinn 2011; Lariscy, Tasmin, and Collins 2019). Shelby County has a small Hispanic population, roughly six percent, with sixty-eight percent of the Hispanic people in Shelby County being Mexican American.

#### *Place-Based Factors*

Place also contributes to variation in life expectancy. Both large and small-scale analyses inform us of the ways in which health is influenced by one's location. Globally, life expectancy

at birth is 72 years, while in the United States it is 78.6 years. However, nations that are comparable to the United States in terms of being highly developed, such as Canada and the United Kingdom, have life expectancies of 82.3 and 80.9 years, respectively. This is even more troubling when considering the high proportion of GDP spent on health care expenditures in the United States. Within any individual country deep disparities within its borders are possible, as is the case within the United States. Research attributes these national disparities to the high levels of income inequality present. Studies in rural health find that nonmetropolitan areas have significantly higher mortality rates than metropolitan areas and are more often persistently unhealthy. The rural mortality penalty presents an argument stating if urban and rural spaces experienced the same rates of mortality, the unnecessary deaths of roughly forty thousand rural residents would not occur (James 2014; James, Wolf, and Cossman 2018; Cossman et al. 2010). Much of this work attributes the poor health of rural populations to limited physician supply, larger aging populations, and low levels of education. Additionally, poverty in rural areas is often far more concentrated than in urban spaces.

In addition to the disparities in rural and urban areas, there are also regional differences. Young (2011) did not utilize the traditional urban-rural distinction in their research across Georgia counties, opting to define counties by their community types: urban, suburban, town, and military bases. The study found that whites had more favorable mortality rates in relation to other minority groups across all community types, excluding military areas.

The structural conditions that influence health are also analyzed at the neighborhood level, and these neighborhood conditions are thought to be more indicative of health outcomes than some individual factors. Sewell (2016) provides an analysis of the political and economic processes that aid in the targeting of these communities. They analyze the role of mortgage

lending companies as the institutional gatekeeper that fuels residential segregation and the poor health of minorities that results from it. Additionally, Hall et al. (2020) also investigate housing discrimination. Their study takes an experimental approach, exploring the role of steering in the homebuying process. Though legally segregation has been outlawed for quite some time, their study highlights the ways in which Black home buyers, predominately Black women, were steered away from white neighborhoods.

This project presents an argument concerning the disparate life chances of racial and ethnic groups in a single southern, urban county and adds to the existing literature regarding race and place-based factors. It takes into account the role of residential segregation and employs a quantitative methodology to examine the association of life expectancy and density of racial and ethnic minorities.

## **Data and Methods**

### *Data*

This project utilizes data from multiple sources to investigate the association between life expectancy and social factors within Shelby County, Tennessee. The core life expectancy data were obtained from the United States Small-Area Life Expectancy Project (USALEEP) (Arias et al. 2018). USALEEP data is optimal for this project as it is the first public health data source to provide the life expectancy at birth for nearly every census tract within the United States, excluding tracts in Maine and Wisconsin. Census tracts are comparable in size to a typical neighborhood and have an average population of 4,000 people per tract; though the population in a single tract can range from 1,200 to 8,000 people. Seventy percent of these tracts have a population below 5,000 people.

Previously, counties acted as the smallest geographic area for such estimates, because of the limited geographic information included in mortality data. The availability of census tract data allows for a greater understanding of health in small areas. Shelby County has a total of 221 census tracts and 194 with available life expectancy data. Tracts excluded in this analysis include areas with large bodies of water or green space with few residents; these areas include Shelby Forrest State Park, Shelby Farms Park, Naval Support Activity Mid-South, and the Memphis International Airport. While the average life expectancy in the county is 74.8 years, there are vast disparities across the county both inside and outside of its largest city, Memphis.

With small areas come small populations. To increase the reliability of these measures, the USALEEP employed a rigorous three-part methodology to create abridged, period life tables and subsequent life expectancy data. The mortality data was reported to the NCHS by the National Vital Statistics System (NVSS). Then, that data was geocoded in collaboration with the US Department of Housing and Urban Development and their Geocode Service Center. Only records with corresponding street addresses or nine-digit zip codes are included in the abridged life tables. The full methodology of the USALEEP can be found at <https://www.naphsis.org/usaleep>.

The demographic data for this project is drawn from 2016 American Community Survey five-year (ACS) estimates. The ACS collects information nationwide regarding various demographic, economic, social, and housing data to provide data for communities which are often dynamic in nature. The survey collects data on a monthly basis to produce information regarding census tracts and similar small areas. This is also the only population estimate available during the years between the decennial censuses. A more detailed overview of the ACS can be found at [census.gov/programs-surveys/acs](https://www.census.gov/programs-surveys/acs).

To further elucidate the importance of place, data are also drawn from the United States Department of Agriculture Economic Research Service. These data provide information regarding proximity to the nearest supermarket. Access to supermarkets is vital to ensuring individuals consume healthful foods. Additionally, impoverished areas and/or areas with high concentrations of racial and ethnic minorities are most often underserved in regard to food access.

### *Measures*

This paper analyzes the association between life expectancy and percent of racial and ethnic minorities in a given census tract. Additional sociodemographic measures also serve as independent variables for this project including: median household income, food access, health insurance status, and educational attainment. The measures in the project represent the entire Census tract and are depicted in percentages excluding median household income. Rather than the oft used income categories in the ACS, I opt to use a continuous variable for median income of each Census tract. After recoding, this variable is measured in tens of thousands.

In the American Community Survey, race is categorized into six major categories: white, Black or African American, American Indian and Alaska Native, Asian, Native Hawaiian and other Pacific Islander, and two or more races. Each major category excluding Black and white have a number of subcategories and a separate survey item measures Hispanic ethnicity. As stated previously, Shelby County is majority minority. While there is a great deal of diversity within the county, the largest demographics being non-Hispanic Black and non-Hispanic White, there are categories with little to no representation. To elucidate the significance of race and ethnicity along with segregation, the measures used are non-Hispanic white, non-Hispanic Black,

non-Hispanic other, and one all-encompassing Hispanic or Latino variable. All of these variables are measured in percentages.

To measure the relevant association of educational attainment and life expectancy, I use the variable representing individuals holding a bachelor's degree or higher. Again, this variable is recoded to represent the percent of the tract exhibiting this trait. In the American Community Survey, the measures for health insurance fall in the same topic as employment. The categories include health insurance coverage (and clarifying categories of public or private coverage) and no health insurance coverage; the latter being the variable used in this paper. The variable for food access provides insight into the proximity to supermarkets. In this project, I utilize the variable indicating Census tracts with low access at the half mile for urban areas.

#### *Analytic Plan*

The unit of analysis is the Census tract. USALEEP provides life expectancy for Census tracts, and ACS data is used to produce aggregate-level measures of racial composition and socioeconomic status for tracts. The statistical analysis for this project was completed through SPSS 26. To begin, several variables were recoded. Following the recoding process, elaboration models were used to evaluate the existing interactions between the outcome variable and the demographics of a given census tract. Then, a number of regression models were produced. The first model measures the association between race/ethnicity and life expectancy. The second model controls food access at the half mile; model three introduces the percent receiving SNAP benefits variable. The fourth model introduces the variable for median household income (measured in tens of thousands), and the final variable introduces the variable for percentage holding a bachelor's degree or higher.

## Results

Table 1 provides the descriptive statistics for the variables used in this project.

The life expectancy of those born in Shelby County, Tennessee is 74.8 years on average. The census tract exhibiting the lowest of life expectancy 65.3 years is a South Memphis neighborhood comprised of entirely non-Hispanic Black residents. Conversely the census tract with the highest life expectancy, 84.6 years, is in a predominately non-Hispanic white neighborhood in the town of Collierville. Some of the core independent variables for race and ethnicity have far larger standard deviations than the other. This is due to the highly segregated nature of the county. Of the 194 tracts analyzed in this project, seventy-two are comprised of eighty percent or more Black residents.

Table 1. Descriptive statistics

Variable	Mean	Std. deviation	Minimum	Maximum
Life expectancy at birth	74.8	4.6	65.3	84.6
Percent non-Hispanic black	56.1	34.8	.39	99.85
Percent Hispanic	5.5	8.6	.00	54.90
Percent non-Hispanic other race	3.6	3.6	.00	23.07
Percent non-Hispanic white	34.7	32.3	.00	96.53
Percent SNAP	23.82	17.4	.41	61.5
Percent uninsured	14.7	8	1.24	46.32
Percent bachelor's degree or higher	26.9	20	2.6	84.1
Median Household Income*	4.87	2.88	1.10	15.49

N=194

\*Median Household Income is measured in tens of thousands of dollars.

This project has five regression models, all of which can be seen in Table 2. Each model includes the unstandardized coefficients and R-squared values. The associated significance levels range from  $p < .05$  to  $p < .001$ . The constant in each model is the life expectancy for a wholly non-Hispanic white census tract and the reference group of control variables. Model 1 controls for race and ethnicity. In model 1 there is a statistically significant association of these factors.

For both the non-Hispanic Black and Hispanic population there is a negative and significant relationship at the .001 level. For the variable other percent, there is a positive relationship at the .01 level. Most noteworthy from this model is that as the non-Hispanic Black variable rises by one percent, the life expectancy of the corresponding census tract decreases .097 years. This is important to note as there are tracts within Shelby County with nearly 100% Black residents.

The second model introduces the variable for food access, there is a negative, statistically significant relationship at the .001 level. The slope for low food access indicates that life expectancy is 3.5 years lower in these tracts with low food access, compared with tracts that do not experience low food access. In this model significance of race and ethnicity diminishes slightly. While the variable non-Hispanic Black percent remains significant at the .001 level, the variables for Hispanic and other race percent drop to the .01 and .05 levels, respectively. After introducing the variables for percent of households receiving SNAP benefits and percent of households lacking health insurance, only the non-Hispanic Black percent remains significant for the racial and ethnic variables. Food access and percent uninsured have a negative and statistically significant relationship at the .01 level. The variable for households receiving SNAP benefits is significant at the .001 level in Model 3 and remains significant at this level for the remaining two models.

Model 4 continues to control for the previous variables and also controls for median household income for an individual census tract. In this model, the variables for race and ethnicity along with percent uninsured are reduced to non-significance. Median household income however has a positive and significant relationship. The fifth and final model introduces the variable for percent holding a bachelor's degree or higher. While many studies highlight the importance of educational attainment, there is no significant relationship in this project, net of

racial/ethnic percentage, food insecurity, and income. Additionally, in the final model after controlling for all of the sociodemographic variables, the only variables with a statistically significant relationship are food access, percent receiving SNAP benefits, and median household income.

Table 2. OLS regression of a Census tract's life expectancy at birth on racial/ethnic and socioeconomic composition

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Constant	80.215 ***	80.021 ***	80.721***	77.365***	76.833***
NH Black Percent	-.097 ***	-.063 ***	-.021*	-.014	-.011
Hispanic Percent	-.119***	-.066 **	.032	.025	.033
Other Percent	.179 **	.124 *	.070	.040	.029
Low Food Access		-3.511 ***	-1.672**	-1.508**	-1.523**
Percent SNAP			-.119***	-.097***	-.094***
Percent Uninsured			-.105**	-.058	-.057
Median Household Income				.382***	.352**
% Bachelor's degree or higher					.015
R-Square	0.629	0.699	0.772	0.785	0.785

\*  $p < .05$  level, \*\*  $p < .01$  level, \*\*\*  $p < .001$  level

Source: USALEEP data

Figure 1 provides the spatial representation of life expectancy rates by census tract within Shelby County, Tennessee. A darker shading indicates higher life expectancy and a lighter shading indicates lower life expectancy. Tracts with higher life expectancy rates can be found along the Poplar corridor and on the outskirts of the county. Poplar Avenue is a thirty mile stretch of road dotted with grocery stores, restaurants, banks, a hospital, funeral homes, and other amenities. This stretch of road also leads to the more affluent, white neighborhoods.

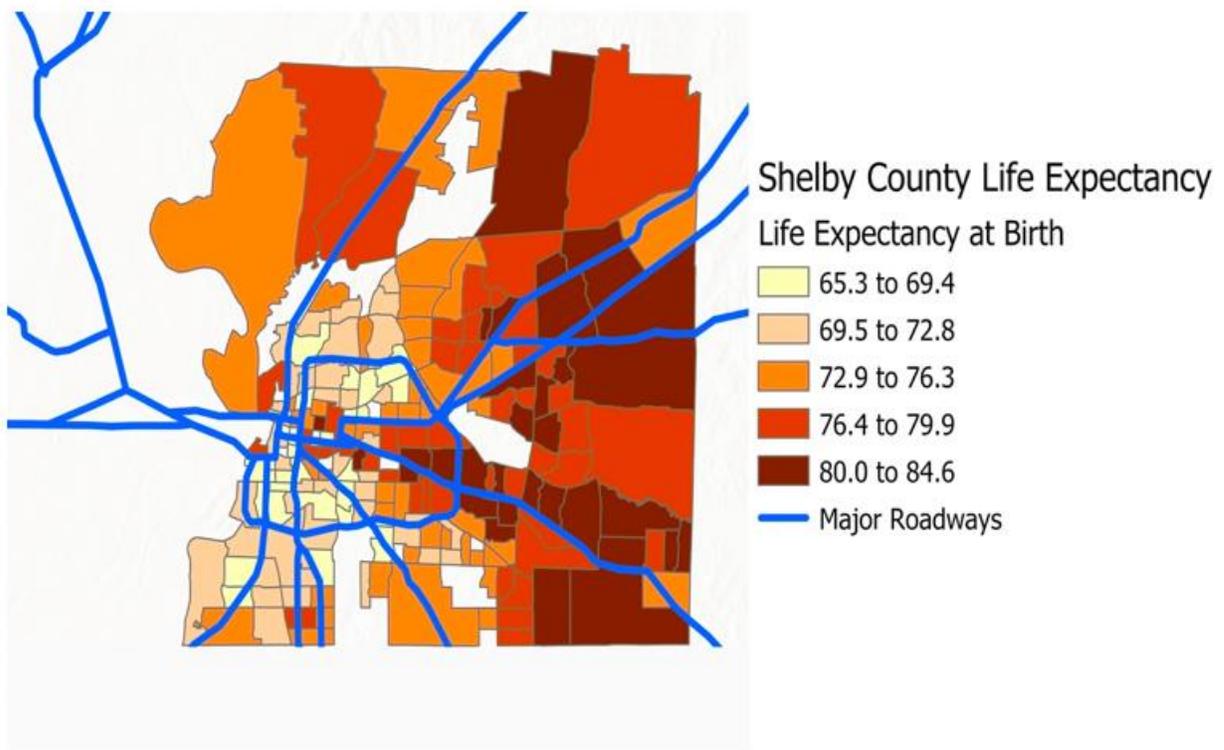


Figure 1. Life Expectancy at Birth by Census tract

Figures 2 and 3 depict the segregated nature of Shelby County. The two largest racial groups in Shelby County are non-Hispanic Black and non-Hispanic white. These figures aid in elucidating in the clustering of racial groups. Just as those with higher life expectancy can be

found along the Poplar corridor, clusters of non-Hispanic whites can be found in these tracts as well. Figure 4 shows the residential patterns of the small but rapidly growing Hispanic population. In this map, the darker shades indicate tracts with 35-55% Hispanic residents. Though the Hispanic population in Shelby County is small, the fourth figure highlights that this group is very heavily concentrated in the Berclair area, a highly segregated neighborhood.

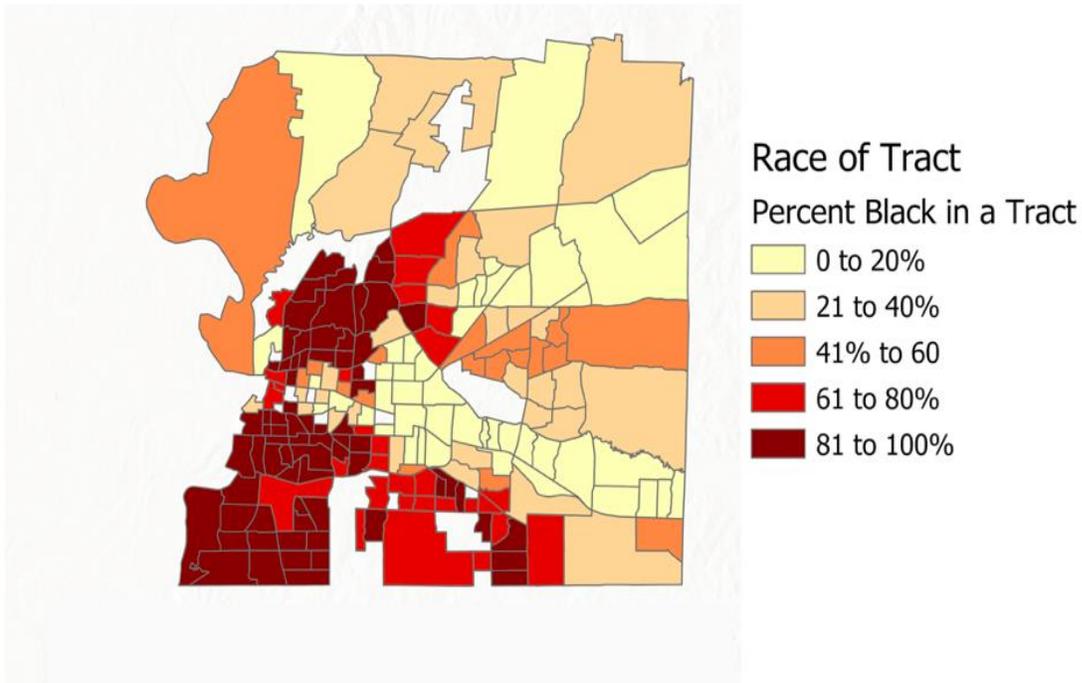


Figure 2 Non-Hispanic Black Percent

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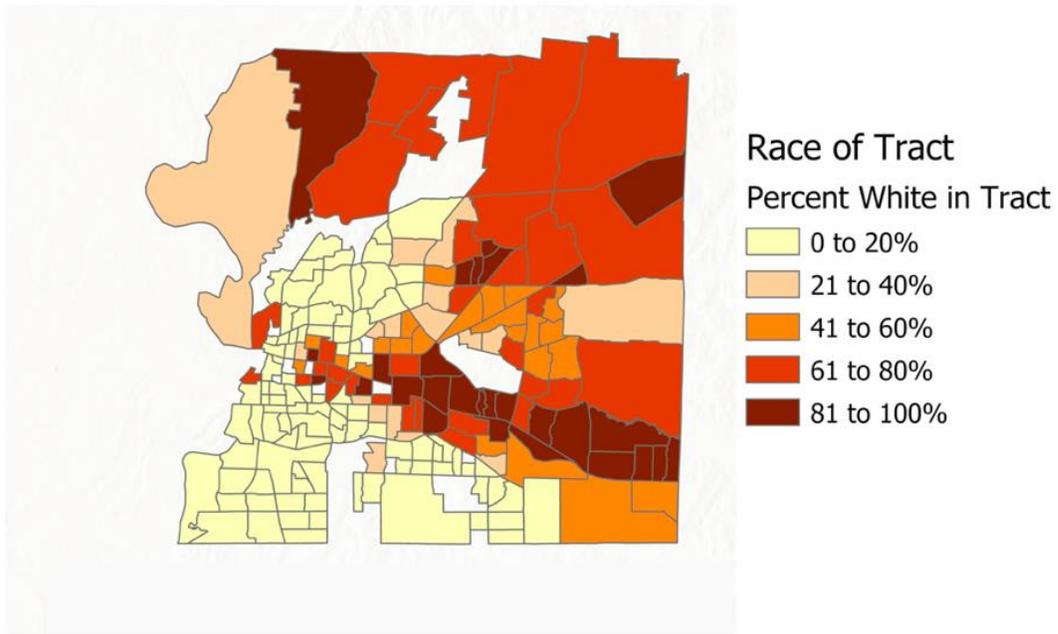


Figure 3. Non-Hispanic White Percent

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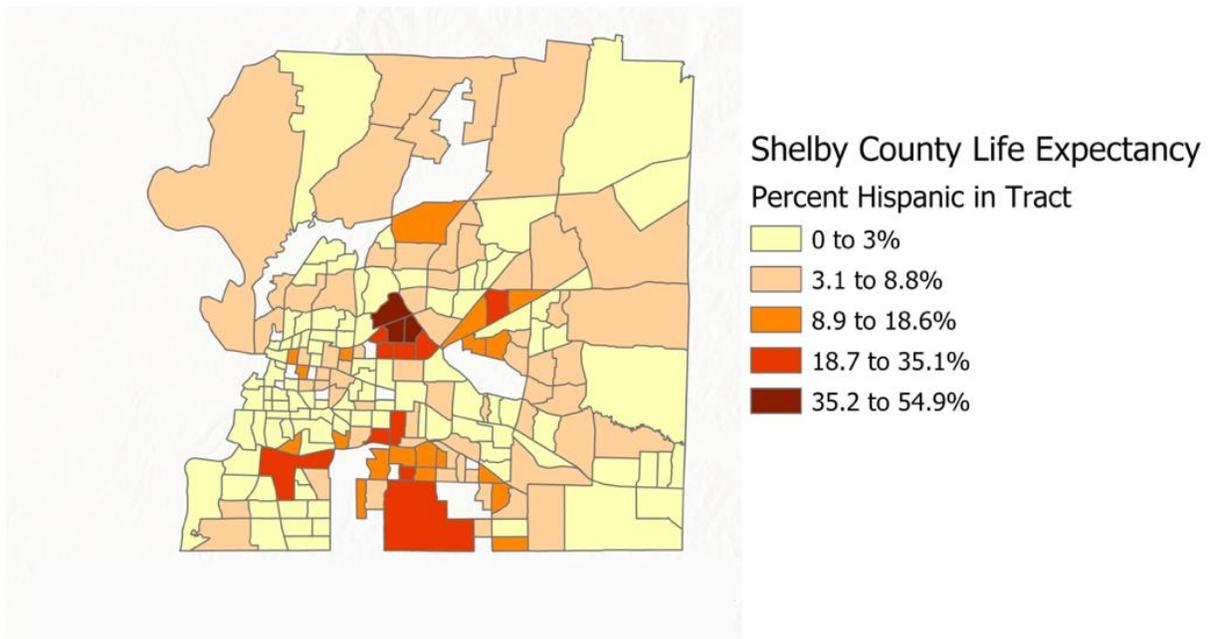


Figure 4. Hispanic Percent

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## Discussion

This goal of this project was to examine the association of various sociodemographic variables with life expectancy at birth. The results of this project are consistent with the plethora of research on Black-White health disparities. Insofar as Black Americans fare far worse than their white counterparts. This is especially worrying as the average life expectancy in Shelby County, Tennessee is roughly four years below the national average. Hummer and Hamilton open their recent work with the following evocative example: “African Americans continue to live nearly four fewer years than Whites, on average, which equates to the premature death of approximately 83,000 African American lives each year. That number equates to a large airplane full of African American residents of the United States crashing without survivors every single day, day in and day out. That is an American tragedy” (Hummer and Hamilton 2019).

The utility of this specific project is twofold. First, its approach to life expectancy research at the tract level is essential to understanding deep intra-county disparities. Given the rampant segregation in the United States, tract level data provides a clearer picture that in urban areas proximity and access are still major barriers to positive life outcomes. Second, this project examines the role of food access on life expectancy. Food access remained statistically significant throughout the analysis. In Models 4 and 5 there is no statistically significant relationship for the variables measuring the percentage of racial and ethnic groups. However, throughout each model, after being introduced, food access has a significant, negative relationship with life expectancy.

The results followed logical pattern, without proper access to healthful foods, one’s life expectancy is negatively impacted. However, it does raise the question on the role of community. Shelby County has a small Hispanic community and it is densely concentrated in the middle of

the county. In this area there are several food markets catering to the local residents. Future analysis may investigate the role of culturally specific grocers.

### *Limitations*

The scope of this project was intentionally limited to the disparities in a single urban county. This county was chosen specifically due to the high levels of residential segregation and concentrated poverty. However, with any research project, it is not all-encompassing. This project does not concern itself with the numerous environmental issues present in Shelby County. Communities of color are more often subjected to toxic dumping grounds (Bullard 1990). While there are a number of parties responsible for emitting toxins into the Memphis community, five facilities in Shelby County have been placed on the United States Environmental Protection Agency's (EPA) National Priorities List (NPL). This list contains sites that are known to produce hazardous materials that are harmful to human life and/or the environment. Memphis, the largest city in Shelby County, serves as a major transportation hub and several manufacturing plants are in and around the city. Not only do Shelby County residents live near these sites that emit dangerous toxins, many are also employed in these same environments.

In addition to the exclusion of environmental concerns, this project also does not use any of the oft used dissimilarity indices. The dissimilarity index measures the level in which individual groups are disbursed within cities or metropolitan areas. Shelby County overall has a dissimilarity index of 61, which is considered to be highly segregated. While this project does attempt to measure the level of segregation present, through the use of percentage of racial and ethnic groups in a given census tract, the dissimilarity index provides a standardized measure.

### *Conclusion*

I find that there are disparities in life expectancy that are patterned by socioeconomic status. This is not novel information; the utility of this project stems from the applicability. This research is of interest to sociologists because of the vast differences in small spaces and serves an illuminating parallel to county-level analysis; and as the number of racial and ethnic minorities grow exponentially, this project would also prove useful for policy makers, public health scholars, and community leaders. As funding for communities of color ebb and flow, studies like this one can aid in presenting the reality of monetary support and health outcomes. This project highlights the fact that where one lives can have significant effects on one's life trajectory. The Southern United States has consistently poorer health outcomes, future research might further investigate these troubling patterns. As the country grows increasingly diverse, the health of racial and ethnic minorities in the South should be given consideration.

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