

# Are African Americans Aging in Place? Geospatial Analysis of the Naturally Occurring Retirement African Americans' Communities in Chicagoland

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**Abstract** The population of aging African Americans is growing every year, and so is its ratio to the working population. The main issue concerning aging African Americans is their post-retirement economic security and finding locations suited for their quality retirement. Hence, this study assessed settlement patterns of older African Americans in Chicagoland and relations with the patterns of African Americans of all ages and older Americans of all races. Accordingly, the older African American population, 65 years and above, represent 11% of the older Americans of all races. Moreover, in 291 census tracts, found in 4 of the 6 Chicagoland counties, significant clustering (i.e., P-value <0.05) of the higher percent older African American population is observed. This distribution is positively associated with the population of African Americans of all ages and older Americans of all races (i.e., P-value <0.05). Therefore, the settlement patterns of aging African Americans in Chicagoland follow a few attributes of Aging in place as well as local relocation to attain a better-quality retirement in some suburban neighborhoods.

**Keywords:** aging American, retirement planning, naturally occurring retirement communities (norcs), geographical information system, Chicago metropolitan area

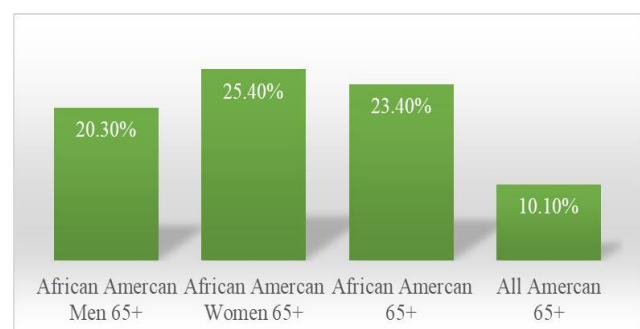
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## 1. Introduction

There is an eye-catching growing trend of retiring Americans both in number and its ratio to the working population. According to the 2016 estimate of the US Department of Health and Human Services (HHS), the US population aged 65 and older amounts to approximately 49.2 million (i.e., 14.5 % of the total population). This proportion of the population is projected to grow to become 98 million in 2060, almost doubling the amount in 2016. Currently, it is estimated that 10,000 baby boomers retire each day equating to 3.65 million every year. On the other hand, American retirees are increasingly becoming more diversified. Of aging Americans, the African American population constitutes 9%, while the Hispanic Americans represent 8% [1]. Additionally, American Indians and Native Alaskans, and Asian Americans comprise 5% and 4%, respectively; denoting the alluded diversity.

The main issue concerning aging Americans is post-retirement economic security. Only 18% of aging American workers have a savings amounts to \$200,000 ahead of retirement [2]. Approximately, 56% of American

workers retire with savings less than \$10,000, and 33% have exactly no savings for their retirement, the category that includes the majority of aging African Americans. According to the American Association of Retired Persons (AARP) Public Policy Institute (PPI), the poverty rate among older African Americans is more than twice that of older Americans of all races (Figure 1) [3]. The level would even jump to 60%, should social security benefits be not there; and even worse is the situation for the older African American women (Figure 1).



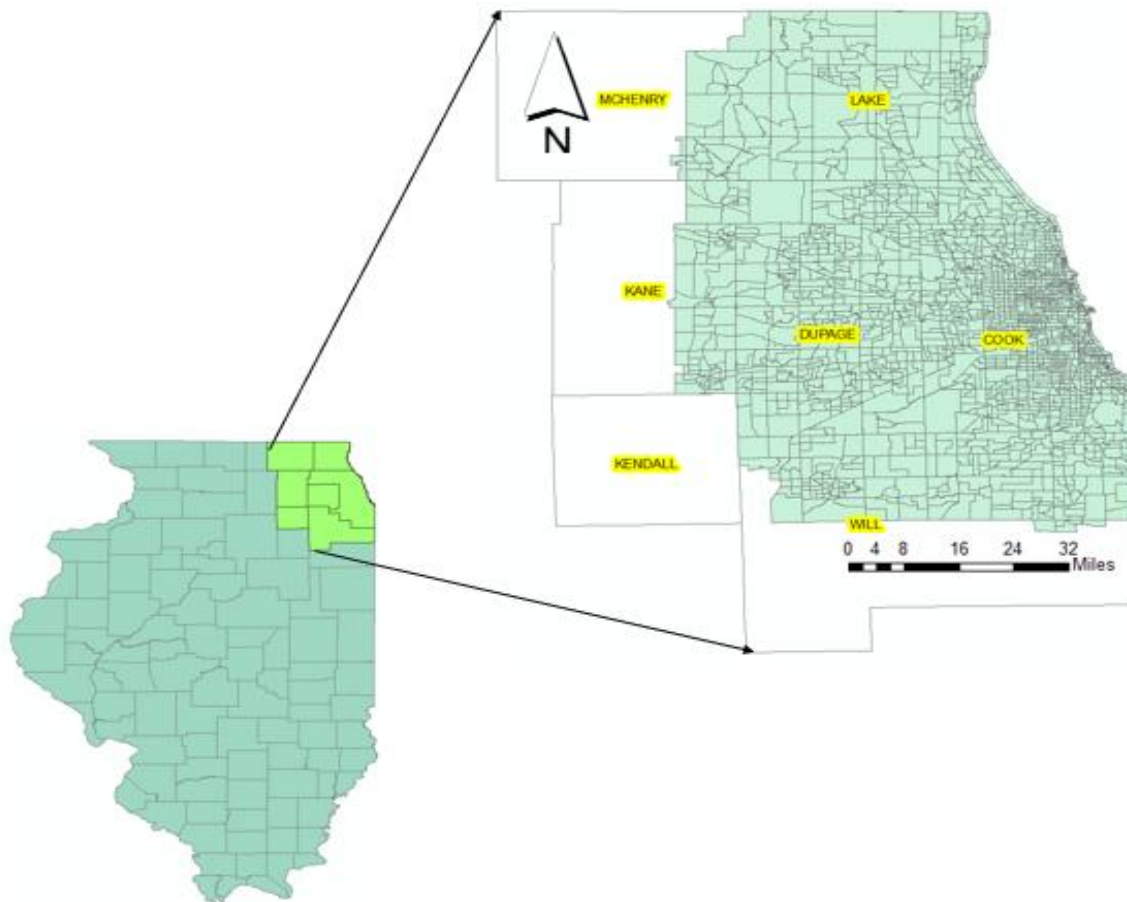
**Figure 1.** Percent Africa American Age 65 and older below poverty threshold. (Source: American Association of Retired Persons (AARP) Public Policy Institute)

Consequently, an increasing number of aging Americans (including African Americans) keep working after retirement. According to Pew Research Center, 18.8% of Americans ages 65 and older are either full- or part-time employed in 2016, which is a 46.8% increase from the rate in 2012 [4]. In 2050, the number of Americans 65 and older, in the workforce, is projected to grow by 75%, while during the same period, the number of working 25 – 54 age categories will grow only by 2%. And yet, aging African Americans are least eligible for post-retirement employment. It is older Asians (i.e., 20.2%) and Whites (i.e., 19%) that are more employed than the older African American population (i.e., 16.7%) [5].

Another way of maximizing the retirement economy is to take their pension and relocate to a new location with low living costs (i.e., not aging in place). Aging African Americans can simply save money by relocating to states that do not impose a tax on their pension income. In the state of Illinois, the pension income of the retirees is exempted [6]. Accordingly, an individual retiring in DC, whose pension income is \$47,632, can save approximately \$2,849 per year, in the form of tax benefit, by just relocating to Illinois state. Moreover, a tax benefit is a small fraction of the possible savings that aging Chicagoan Americans could make. A significant saving

from costs of housing and groceries can be made by just relocating from the city to the surrounding suburbs. For example, by moving from New York City Manhattan to the surrounding suburban areas, retirees save the housing cost by 49 – 62% and groceries by 15 – 25% [7]. This could be cost savings that amount to \$1,500 from groceries and \$8,000 from housing per annum.

Besides, with an in-state retirement, older African Americans would maintain social capital and avoid the additional travel cost to spend holidays with families, attending grandchildren's birthdays, and other social activities [7]. Therefore, the objective of this study is to assess if the Aging African American community in Chicagoland is aging in place or taking economic advantage of retirement relocation. To this effect, first, the settlement patterns of the older African American population in Chicagoland were investigated, and then relations with the African Americans of all ages and older Americans of all races are established. This study applies the principle of retirement geography, at the local levels, to detect neighborhoods and communities that are suitable or attractive for the quality retirement of the aging African Americans. In Chicagoland, neighborhoods are endowed with businesses that are tailored towards harnessing the accumulated experiences and wisdom of the aging population.



**Figure 2.** Study area: Chicago and its immediate suburbs

Several studies have used this concept for analyzing the spatial patterns of retirement for the older American population [8,9,10] and synthesizing spatial information from determinant variables that are critical in assisting retirement planning [11,12]. The analyses of retirement geography were based on the geo-visualization, spatial patterns, and spatial regression tools of ArcGIS. Geo-visualization capabilities are tested when examining the spatial distribution of Naturally occurring retirement communities (NORCs) in Ohio [10] or HIV/AIDS prevalence rates for Africa [13]. Similarly, the Global and Local Moran I detected significant geographical controls and clustering of aging Nebraskan (e.g., [8]) and the African American settlement patterns in Chicagoland [14]. Spatial regression and geographically weighted spatial regression (GWR) were also used during the modeling of the demographic, social-economic, environmental, behavioral determinants of adult cardiovascular mortality in Florida [11], HIV/AIDs for Sub-Saharan Africa [13,15], and obesity for the metropolitan of Phoenix, AZ. [16]. And yet, this study is unique in targeting the African American population, which represents approximately 17% of the Chicagoland population, which is the most vulnerable demographic group to post-retirement economic insecurity.

## 2. Materials and Methods

### 2.1. Description of Study Area

According to U.S Census Bureau 2017 [17], Chicago and its immediate suburbs are also known as Chicagoland is home to 9.5 million people (Figure 2). It is the largest metropolitan area in the Midwest and the third-largest in the nation after New York and Los Angeles. Chicagoland has a population density of 1,318 per square mile and racially consisted of 58.3% White, 22.0% Latino, and 16.8% African American and 6.4% Asian. Chicagoland's per capita income is \$40,144, while the median household income is \$75,379, about 10% higher than the national average. Thirteen percent of the population lives below the poverty line. Senior citizens represent 14.3% of the population in Chicagoland, i.e., 1,251,283 million; which is about 90% of the amount in Illinois state. The geographical mobility of the population in Chicagoland is rated as 12.3%, which is slightly less than the state and national average. Ninety-five percent of the population lived either in the same house or county as the previous year.

Chicagoland is endowed with myriad outdoor activities (i.e., both on land and water) to make it an attractive location for the retirement of aging African Americans. There is a presence of rich cultural museums, quality healthcare services, theater and concerts, arts and crafts, and educational training. Opportunities to engage and remain physically active such as boat riding, fishing, hiking and biking trails, golfing, and other sports activities are immense for seniors' quality of life. Moreover, the neighborhoods may have employers that are interested in hiring older Americans for their experiences age insensitive jobs or volunteers. Office administrative supports, management, sales, and related, transportation, and legal are the kinds of jobs where experiences are sought for employment. Additionally, community and

social services, education and teaching, and library services are jobs where age is the advantage and hence remain important considerations for retirement, especially for the aging African Americans.

### 2.2. Data Description and Acquisition

The data needed to conduct this study were: a) the percent older African American population; b) African American population of all ages; c) older Americans of all races; and d) census tract boundary base-map data. The census tract boundary base-map was obtained in the shapefile format from the U.S. Census Bureau GIS data portal (<https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-line-file.html>). On the other hand, data of African American population, older African Americans, and the older general population of 2017 was obtained from the U.S. census bureau data portal (<https://www.census.gov/programs-surveys/acs/data.html>). The required data was provided free of charge as per the freedom of information act (FOIA), 5 U.S.C. § 552. The data is acquired at the scale of census tract so that it remains concurrent with the geographic scale of the boundary base-map shapefile. The American Community Survey (ACS) collects the population and other demographic data. ACS presents these data for various uses such as, but not limited, to monitoring and conducting public services planning. Once the data was downloaded, the percent African Americans of all ages, older African Americans, and the older Americans of all races were prepared by quotients [18].

$$P_a = \frac{P_{ta}}{P_t} \quad (1)$$

$$P_{oa} = \frac{P_{toa}}{P_a} \quad (2)$$

$$P_o = \frac{P_{to}}{P_t} \quad (3)$$

Where:  $P_t$  is total population of the census tract;  $P_a$  is percent African American all ages;  $P_o$  is % Older population of all races;  $P_{ta}$  is total African American population of the Census Tract;  $P_{ta}$  is total African American population of the Census tract;  $P_{oa}$  is percent older African American population;  $P_{to}$  is total older population of the census tract; and  $P_{toa}$  is total older African American population of the census tract.

### 2.3. Methodology

#### 2.3.1. Geographical Analysis of the Spatial Patterns of Older Africa American Settlements in Chicagoland

The settlement patterns of the older African American population were conducted using a geo-visualization and spatial statistics toolbox of ArcGIS. Firstly, the geo-visualization was conducted by producing a map and exploratory spatial data analysis boxplot. Visual interpretations of the data of the percent older African American population, African American population of all ages, and older Americans of all races were conducted by displaying their maps in Arcmap. Additionally, the

Naturally Occurring African Americans Retirement Communities (NOAARCs), and the Naturally Occurring Retirement Communities (NORCs) were conducted after displaying them on Arcmap. The visual interpretation was to understand the patterns of the geographical distribution of these variables across Chicagoland. Usually, the variables were visualized after categorizing them into classes using iteratively defined thresholds. On the other hand, the boxplot map was used as a standard visual exploratory tool for summarizing the percent older African American population. It helped summarize the data into the minimum, first quartile (minimum), median, third quartile, and maximum values.

Secondly, geostatistical pattern analysis involved the estimation of the spatial arrangements of the percent older African American population in Chicagoland. The arrangements could be dispersion, assemblage, or randomness in the values of percent older African Americans in Chicagoland. Generally, the geostatistical tools used for characterizing these arrangements are global spatial autocorrelation. The global spatial autocorrelation is estimated by Moran's I index [19,20,21] as.

$$I = \frac{n}{S_o} \frac{\sum_{i=1}^n \sum_{j=1}^n W_{i,j} Z_i Z_j}{\sum_{i=1}^n Z_i^2} \quad (4)$$

Where: I is the Moran's I statistics,  $X_i$  is the values of the percent older African American population of a census tract i and  $X_j$  the values of the B the percent older African American population of a census tract j and,  $W_{i,j}$  is the spatial weight that determines the relationship between census tracts i and j, n is equal to the total number of the census tract., and  $S_o$  is the aggregate of all spatial weight:

$$S_o = \sum_{i=1}^n \sum_{j=1}^n W_{i,j} \quad (5)$$

The local spatial autocorrelation is an index of local indicators of the abovementioned spatial arrangement. It identifies the local variations and displays specific localities where significant patterns of the percent older African American population are detected. This index, in addition to global Moran's I, helps to detect pockets of localities that are hotspots (i.e., cluster of higher values) or cold-spots (i.e., cluster of lower values). The standard index used for examining the local spatial autocorrelation is Anselin Local Moran's (I) [21,22] and expressed as:

$$I_i = \frac{X_i - \bar{X}}{S_i^2} \sum_{j=1, j \neq i}^n W_{i,j} (X_j - \bar{X}) \quad (6)$$

Where:  $X_i$  is the values of the percent older African American population of a census tract i,  $\bar{X}$  is the mean of the percent older African American population,  $W_{i,j}$  is the spatial weight between the census tracts i and j and n is the number of census tracts in Chicagoland.

### 2.3.2. Modeling the Spatial Relationship of the Percent older African American Population, African American and total Population in Chicagoland

Both simple and geographically weighted spatial regression modeling is used for establishing relationships. The spatial relationships were established among the

percent Older African American Population, African Americans of all ages, and older Americans of all races in Chicagoland. The simple spatial regression is used for establishing a global relationship between these variables [13,20]. It involves a definition of spatial weight, which accounted for the dependency of the mean and variance on the locations of census tracts. The simple regression is given by:

$$Y = a_i + (\beta_1 \times x_1) + E \quad (7)$$

$$E = \lambda(W) \varepsilon + u \quad (8)$$

Y is predicted percent Older African American Population of census tracts,  $a_i$  is the intercept, X is explanatory variables (i.e., African Americans of all ages or older Americans of all races in Chicagoland), W spatial weight factor, E is spatially autocorrelated error terms explanatory variables,  $\varepsilon$  is the error term of the regression equation and  $\beta$  and  $\lambda$  are coefficients.

Similarly, the local relationships were established by the geographically weighted regression (GWR) [23,24]. The GWR establishes a relationship for the subset of the data defined based on moving window encompassing designated neighboring census tracts. The size of the moving window (i.e., Kernel type, Bandwidth method, Distance, and Number of neighbors' parameters) determines the number of census tracts considered for local regression analysis. This model also accounts for the non-stationary properties of the data by deploying a spatial weight structure. Adaptive spatial weight structure, which deploys Gaussian weight scheme is used. The Gaussian model assigns weights to the neighboring census tracts as a function of their distance.

### 2.3.3. Validation Methods

The global and local autocorrelations of the percent older African American Population were verified by the Moran's I Index and corresponding p-value. Generally, spatial clustering in the percent older African American population is designated by the Moran's Index value of + 1; whereas dispersion is designated by the index values near -1.0 indicate, and randomness by 0. A statistically significant clustering, randomness, and dispersion of the older African American population is established by the P-values (i.e.,  $\alpha < 0.05$ ). Similarly, the performances of the models to predict the spatial relationships of the percent older African American Population, African Americans of all ages, and older Americans of all races are measured by the coefficient of determination ( $R^2$ ),  $\beta$ -coefficient, and P-values.  $\beta$ -coefficient informs the direction of the relationships, while the coefficient of determination ( $R^2$ ) specifies the strength of the relationships and P-values denote the statistical significance of the relationships.

## 3. Results and Discussion

### 3.1. Spatial Patterns of Older African American Settlements in Chicagoland

Figure 3 shows the map and boxplot of the percent older African American population in Chicagoland areas, at the scale of the census tract. Accordingly, the census

tracts' percent older African American population range from 0% in certain census tracts to 100% in the others. Of the total 1,914 census tracts considered, 89 (i.e., 5%) of them have percent older African American population at the rate of 40% and above. Conversely, 824 census tracts (i.e., 43%) have the percent older African Americans at the rate of fewer than 4%. While 336 census tracts (i.e., 17%) have percent older African Americans at the rate of 5 – 10%, 453 census tracts (i.e., 24%) have at the rate of 10 – 20%, and 212 (i.e., 11%) have at the rate of 20 – 40%. In general, the median and mean of percent older African American population is 7% and 11%, respectively.

Although Figure 3 did not clearly show distinct patterns in the spatial distribution, Table 1 shows the opposite.

According to Table 1, percent older African American population have shown a statistically significant global pattern of spatial arrangement (i.e., P-value = 0.05 and Z-score 2.5). The results also show a significant global pattern for clustering of similar values of the percent older African American population (Moran's Index = 0.03). However, the spatial arrangements in percent older African Americans are not as strong as the distribution of the percent total African American population of all ages. The spatial arrangements of the percent total African American population of all ages are significant with a P-value of 0.05, Z-score of 195, and Moran's Index of 0.82, indicating a relative stronger clustering of the similar values of percent total African American population of all ages.

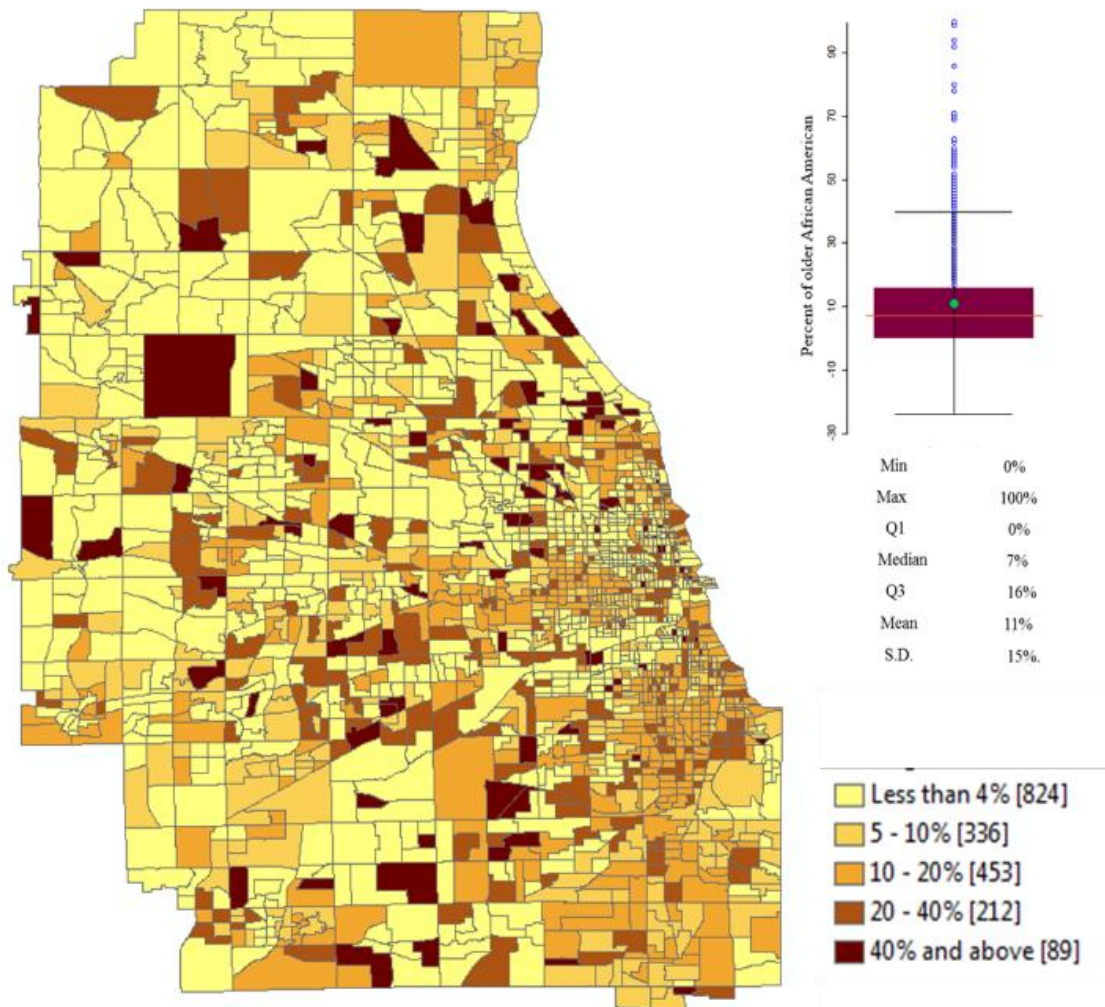
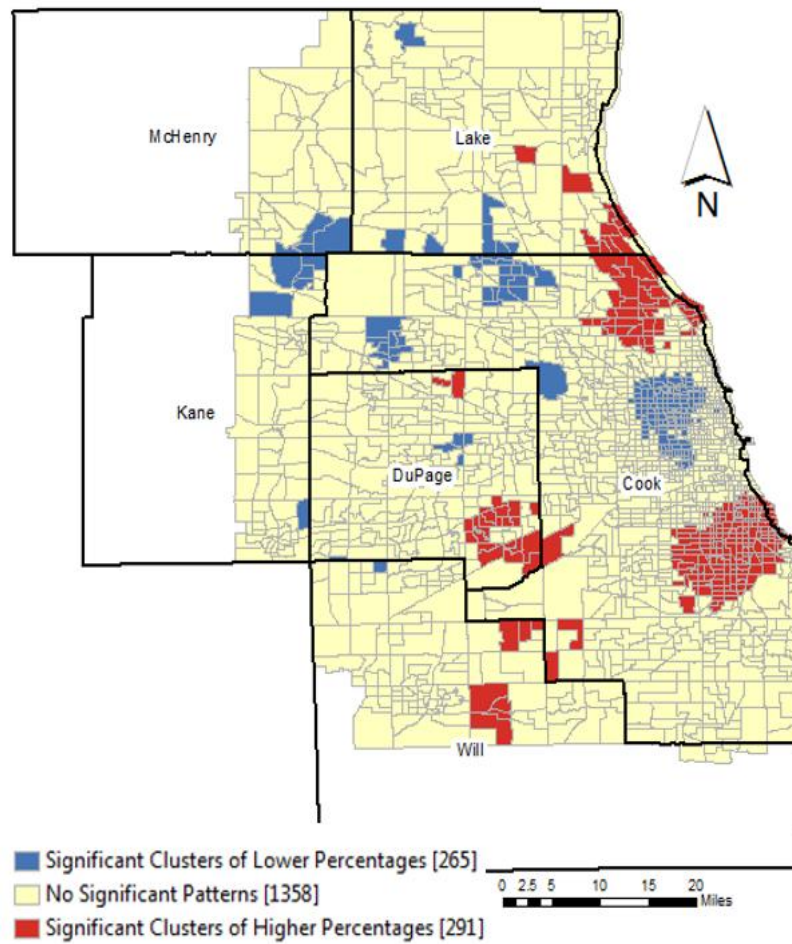


Figure 3. Map and Boxplot showing percentage residence of older African American, relative to total African American Population in Chicagoland, at geographical scale of census tracts. Source: American Community Survey, 2017

Table 1. Summary of Global Moran's i Analysis of the spatial dependencies of older African Americans and total African American population in Chicagoland

Statistical indices	Percent older African Americans (65 years and older)	Percent total African American Population
Moran's Index	0.03	0.82
Permutation	999	999
Z-score	7.8	195
P-Value	0.000	0.000



**Figure 4.** Map showing local spatial association of the distribution of older African American population, relative to total African American Population in Chicagoland. Source: American Community Survey, 2017

The local spatial autocorrelation of the values of the percent older African American population is shown in Figure 4. Accordingly, the map shows a significant clustering in the distribution of the values of the percent older African Americans. Two hundred sixty-five census tracts depict the clustering of the lower values, which is approximately 14% of the census tracts of Chicagoland counties (i.e., Lake, McHenry, Kane, DuPage, Cook, and Will) considered (Figure 4). On the other hand, the clustering of the values of higher percentages of the older African American population is found in 291 census tracts (i.e., 15%). These census tracts are found in 4 of the 6 metropolitan counties (i.e., Cook, Will, DuPage, and Lake). In general, no significant spatial patterns in the values of percent older African Americans were observed in the majority of the census tracts (i.e., 1358), which is 71% of the census tracts in Chicagoland (Figure 4).

The average percent older African American population in Chicagoland is 11%, higher than the national average (9%) (U.S. Census Bureau, 2017). This is understandable considering that the relative proportion of African Americans in Chicagoland. Additionally, the global as well as local spatial autocorrelation (i.e., geographical controls), of the distribution of the percent older African American population in Chicagoland is consistent with similar findings in Ohio [8,10] and Nebraska [25]. Rivera-Hernandez, et al., 2015 found the geographical controls of the older population in Ohio using census data of 2000 and 2010; and found significant clustering of

older Ohioans. Similarly, Lee [26] found similar spatial patterns in the census data of 2000, 2010, 2015, for the state of Nebraska.

### 3.2. Spatial Associations of the percent older African Americans with the Percent older African American of All Ages and the African American Population of all Races

Figure 5 and Table 2 show indices of these relationships of the spatial distribution of the percent older African American population and the overall older population of all races as well as the percent African American population of all ages. Accordingly, a significant association was found with overall older Chicagoans of all races and the African American population of all ages (i.e.,  $P$ -value  $< 0.05$ ). However, these associations were relatively weak for percent African Americans of all ages (i.e.,  $R^2 = 0.06$ ) and moderate for the older population of all races (i.e.,  $R^2 = 0.26$ ), respectively (Table 2).

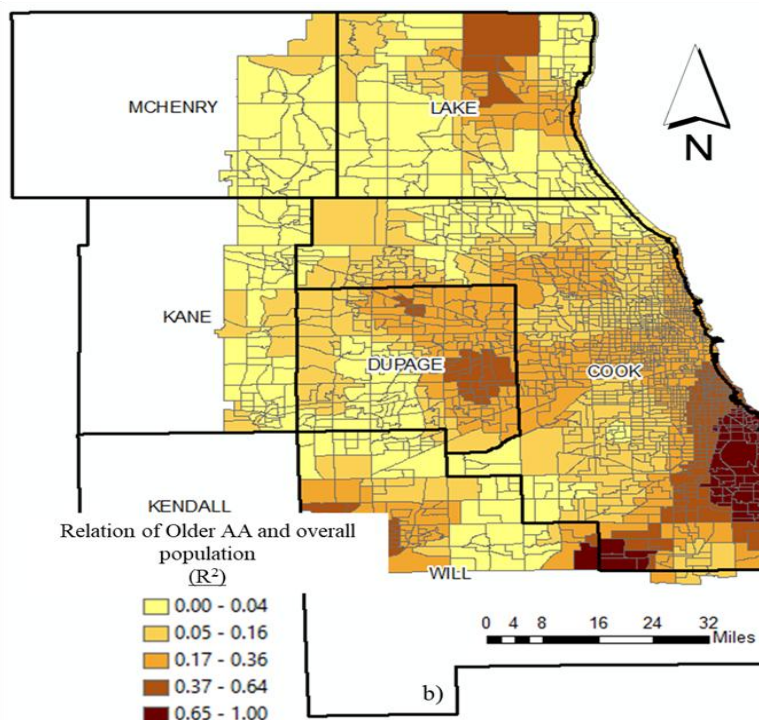
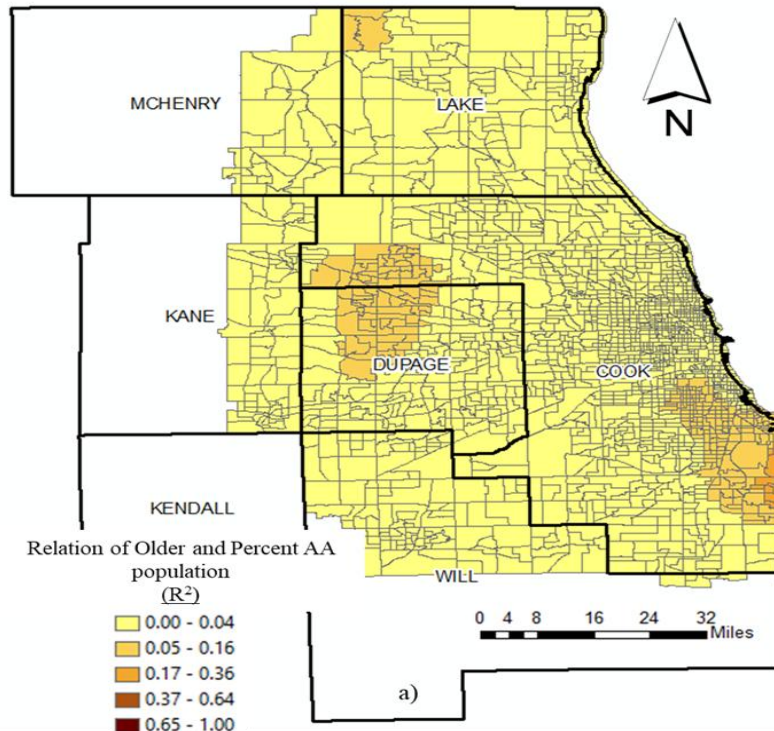
Conversely, the local associations among the census tracts ranged from the weak  $R^2$  of 0.0 to moderate  $R^2$  of 0.22 for the percent African American population of all ages. Only the pocket of areas in the far Southside and southern suburbs demonstrated moderate relationships. Whereas all corners of Chicagoland revealed the weak associations and mild associations were found in the south, southwest, and far south sides of Chicago and the southern

suburbs (Figure 5). Similarly, the local associations with the older Chicagoans of all races ranged from the weak (i.e.,  $R^2$  of 0.00) to very strong (i.e.,  $R^2$  of 0.86) associations. The associations were moderate to strong associations in the south and far south sides of Chicago,

and northern Lake, southern suburbs of Cook, and southwestern Will counties. The weak associations were observed in peripheral counties such as McHenry and Kane, western DuPage counties, and far northern and southwestern sides of the Chicago city (Figure 5).

**Table 2. Spatial Relationships of percent older African American population and percent African American and total population in Chicagoland**

Variables	Strength ( $R^2$ )	Direction of the relationship (B- coefficient)	Local Variability (Sigma)	Significance of the relationship (P-value)
Percent African American Population	0.06	0.05	4.2	0.00
Overall Population 65 and older	0.26	0.84	16.3	0.00



**Figure 5.** Map showing the local Spatial Relationships of African American Naturally Occurring Retired Communities and percent older population and percent African

In general, the observed relationships were both positive, which means that an increase in the percent older African American population is associated with concurrent increases in the older population of all ages and the African American population of all ages. The spatial association of the percent older African Americans and the African American population of all ages could be a result of aging in place. Several studies have documented similar findings [26,27,28,29]. According to Wagner [28], older populations tend to age in places where they have viable social and family contacts and supports. Additionally, aging in place may have provided the feeling of belongingness, security, familiarity, and presumed sense of independence [30,31]. On the other hand, the positive association with the older population of all races has to also do with age-dependent shared needs. Other studies have also reported similar findings [27,28]. Senior citizens are attracted to a safe environment [27], walkable neighborhoods, and access to public transportation [28].

### 3.3. Geographical Comparisons of the Naturally Occurring African Americans Retirement Communities (NOAARCs) and the Naturally Occurring Retirement Communities (NORCs) of the General Population

Figure 6a presented the NOAARCs and census tracts where African Americans predominately live (i.e., >40% of the African American population). Accordingly, 89 of 1914 census tracts (i.e., 5%) are shown to be NOAARCs in Chicagoland. These census tracts are found all over Chicagoland in Cook, Lake, Will, DuPage, Kane, and McHenry counties (See Figure 6c). This suggests that the NOAARCs, perhaps, suggest the movement of the older population into the suburbs. The majority of NOAARCs census tracts are found in Cook counties followed by DuPage and Will counties. The Kane and McHenry counties contained, relatively, fewer NOAARCs census tracts, indicating that maybe the older African American movements were restricted to counties in the immediate neighborhoods of the Chicago city than counties farther away. On the other hand, Figure 6b presented the NORCs and census tracts where older Americans (i.e., >40%) predominately live. The number of NORCs census tracts (i.e., 7) are not as many as NOAARCs (i.e., 89), and they are located only in 4 of the 6 counties of Chicagoland (i.e., Cook, Lake, Will, and DuPage). Three of the 7 NORCs census tracts (i.e., 43%) are found in DuPage, followed by Cook (i.e., 29%), and the remaining consisted of 1 NORCs tracts each (i.e., 14%). The NORCs and NOAARCs census tracts are spatially overlapped. Again three of the 7 NORCs (i.e., 43%) tracts completely overlapped and the remaining are also in close geographical proximity. Such spatial associations of the NORCs and NOAARCs perhaps indicate the unique suitability of the neighborhoods for Aging Chicagoans, regardless of their racial background.

The spatial patterns corroborate other studies [31,32]. According to Scommegna [32], rural America has higher concentrations of aging people than the urban population.

The median age for the rural population is 51 in comparison to the urban, which is 45 years of age. The NORCs are generally a good predictor of the local provisions of healthy aging in terms of the physical and social environment, which promotes or encourages seniors' quality of life [34]. It is also an indicator of the presence of the municipal government services that are ensuring healthier seniors by providing affordable housing [35], transportation [36], and health services [37]. Furthermore, NORCs signify the presence of social capital [38], landscape attributes (e.g., green spaces), and other socio-cultural amenities in the community neighborhoods.

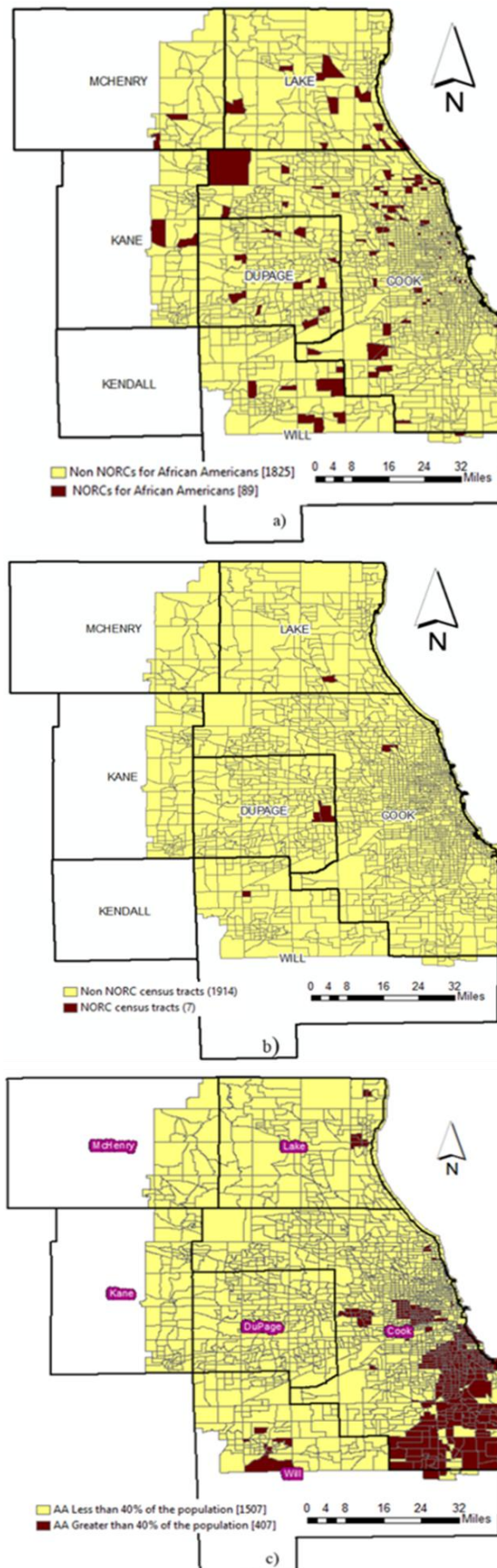
## 4. Conclusion

The proportion of aging America is increasing in recent years and the main issue is post-retirement economic security and quality of life for retirees. This study evaluated the settlement patterns of the older African Americans; established their associations with older Chicagoans of all races and the African American population of all ages. It also investigated the relationship between the NORCs and NOAARCs in Chicagoland. Accordingly, the older African American population, 65 years and above, represent 11% of the older Americans in Chicagoland. There are 89 census tracts out of the total 1,914, where the percent older African American population is at the rate of 40% and above. However, no distinct settlement patterns of these older African Americans were observed visually. The geostatistical analysis of the percent older African population, nonetheless, detected significant geographical control, although the degree of control is not as high as it is on the African American population of all ages. The significant clustering of the higher values of percent older African Americans was detected in 4 of the 6 Chicagoland counties (i.e., Cook, Will, DuPage, and Lake). Additionally, a significant relationship was established between the settlement patterns of the older African American population and the general older Americans in Chicagoland (i.e., P-value <0.05). Similarly, the association between the older African American population and the settlement patterns of blacks was also significant. The detected relationships were positive suggesting some attributes of Aging in place. However, the strength of the association is bigger with the settlement patterns of older Americans of all ages, indicating a common attraction of older Americans to geographical locations that provide quality of life for retirees, regardless of their racial background.

These findings are significant in helping government agencies tailor their community-based support services for healthy aging. Common support services are health care management, affordable housing, community living, recreational, educational services, mobility or transportation, amenities that facilitate physical activity, and volunteer opportunities. Additionally, it is also significant for tailoring the adjustments needed for community members that are aging in place. These aging African Americans want to remain in their houses, keep their social contacts (i.e., with friends and families), and maintain some level of independence. They would need assistance mainly



health care and improvement of the home environment so as the older adults can navigate through their homes.



**Figure 6.** Map showing Naturally Occurring Retirement Communities (NORCs) in Chicagoland; a) Older African American b) general population and b) overall dominant (>40%) African Americans population settlement patterns. Source: American Community Survey, 2017

Although significant, the findings also have some limitations. First, the study only established the spatial distribution of older African Americans in Chicagoland. It also determined the associations of this distribution with older Americans of all races and the African Americans of all aged populations. However, the socio-economic, environmental, or other causations as to why older African Americans are migrating to these particular neighborhoods are not clear. Future studies that examine the causations help understand the opportunities and needs of the support services needed. Secondly, it is focused on African Americans for obvious reasons and Chicagoland, in particular. Hence, future research of upscaling, the study, to include older Americans of all ages in Illinois and their spatiotemporal change trends over time can give a better understanding of spatially-resolved NORCs and the needs of community-based support services for seniors. Lastly, the Global and local Moran's statistics are robust indices of spatial autocorrelation. However, the indices are often limited by extreme values in the datasets, and the dimension of the kernel used. Additionally, spatial regression and GWR are both powerful techniques of establishing relationships between data having geographically varying regression coefficients, and yet, the results are not immune to multicollinearity and multiple hypothesis testing.

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## Conflict of Interest

The author declares that there is no conflict of interest regarding the publication of this manuscript. Besides, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancy have been completely observed by the authors.

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