GEOGRAPHY OF HISTORICAL RACIAL-ETHNIC SEGREGATION:
COMPARING CHARLESTON, SC AND BUFFALO, NY IN 1940

An Undergraduate Research Scholars Thesis

by

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TABLE OF CONTENTS

Page

ABSTRACT ................................................................................................................. 2

DEDICATION ............................................................................................................. 4

ACKNOWLEDGMENTS ............................................................................................... 5

KEY TERMS ............................................................................................................... 6

CHAPTER

I. INTRODUCTION ..................................................................................................... 8

Creating Shapefiles for Demographic Analysis ......................................................... 8
Using the 1940 IPUMS Restricted Data ................................................................. 8
Foundation Work: A Pilot Study of Houston, Texas in 1940 ............................... 9

II. METHODS ............................................................................................................. 11

Using QGIS to Georeference a Historic Map ......................................................... 12
Using QGIS to Digitize and Create Shapefiles ....................................................... 16
Reconciling Contained Enumeration Districts ......................................................... 19
Using STATA to Run Statistical Analysis .............................................................. 21
Creating Joins to Visualize Data with Shapefiles ................................................. 21

III. RESULTS ............................................................................................................ 24

Charleston, South Carolina’s Racial-Ethnic Segregation Trends in 1940 ........... 24
Comparison of Racial-Ethnic Segregation Trends in Buffalo and Charleston ... 29
Buffalo, New York’s Immigrant Segregation Trends in 1940 ............................ 29
Charleston, South Carolina’s Immigrant Segregation in 1940 ......................... 35
Comparison of Immigrant Segregation Trends in Buffalo and Charleston ....... 36

IV. CONCLUSION ...................................................................................................... 38

REFERENCES ......................................................................................................... 40
Spatial distribution patterns of social groups can be studied through the use of digital “boundary” files, or “shapefiles,” and data from the U.S. Census. Shapefiles are readily available for recent decades but they are not available for 1940 and earlier. QGIS, an open-source Geographic Information System, has been utilized to create shapefiles that represent enumeration districts of Charleston, South Carolina, and Buffalo, New York using archived photos of enumeration district maps used in the 1940 U.S. Census. Through work with Dr. Mark Fossett, a professor in Texas A&M’s Sociology department, the shapefiles have been analyzed in combination with newly released historical census data from 1940 to examine racial-ethnic segregation and patterns of foreign-born populations. This work contributes to a larger project investigating residential distributions of racial and ethnic subpopulations within these, and other, cities. As comparable maps do not currently exist, the shapefiles and maps constitute new and valuable resources for the study of ethnic segregation and urban population distributions in major US cities in 1940 and will permit comparisons of segregation patterns in other decades. These maps will be especially valuable tools in this area of study as maps reveal patterns that cannot be easily identified via statistical analysis and they also communicate patterns effectively to broad
audiences that are not trained in using technical summary measures of segregation. In addition to contributing to Dr. Fossett’s project, the shapefiles will be available for several other research projects that are underway using the 1940 data at the Texas Federal Statistical Research Data Center at Texas A&M University.
DEDICATION

This work is dedicated to my parents for their endless support throughout my life - to my father, with his unparalleled patience, for serving as an unwavering moral compass and to my mother, with her unsurpassed robust work ethic, for inspiring me to go after everything I could want in life with enthusiasm and dedication. Thank you both for providing me with a perfect childhood and all the tools to achieve success in adulthood.
ACKNOWLEDGEMENTS

I would like to thank my advisor, Dr. Mark Fossett, and Nicole Jones for their guidance, insightful ideas, and encouragement throughout the course of this research. I have benefitted greatly from their expertise in the subject and the time that they have committed to supporting my academic growth.

I would also like to extend my appreciation for faculty members, peers, and friends within the Geography Department and College of Geoscience who have fostered my passion for geography, given me constant support, and promoted a high standard in my work.

Finally, I would like to express my sincere gratitude to my loving family, for their endless encouragement in everything that I pursue. I would also like to thank my boyfriend, Jacob, for supporting me through every setback and encouraging me to put forth my best effort every step of the way.
KEY TERMS

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tr>
<td>ED</td>
<td>The common abbreviation for an enumeration district, a numbered portion of a city or town that has been divided for census purposes.</td>
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<tr>
<td>Georeference</td>
<td>The process of associating points on an image of a map, or other raster data, with physical spatial locations.</td>
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<td>GIS</td>
<td>A geographic information system that can be utilized to house digital spatial data.</td>
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<td>Join</td>
<td>An action within QGIS, and other GIS software, that allows for a .csv (comma-separated values) file of data to be associated with a particular attribute of the same name within a shapefile.</td>
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<tr>
<td>QGIS</td>
<td>An open-source desktop geographic information system application that works across multiple platforms and enables spatial data to be viewed, manipulated, and analyzed. Shapefiles can be created through QGIS.</td>
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<tr>
<td>Raster</td>
<td>A data format that is ideal for continuous entities, such as images.</td>
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<tr>
<td>Shapefile</td>
<td>A digital formatted file that stores spatial information, often in the form of points, lines, or polygons.</td>
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<tr>
<td>Sliver</td>
<td>The accidental and undesirable space remaining between polygons that remains when feature vertices do not perfectly align. Slivers are usually small enough to go undetected from a distance, but can present significant issues in ensuring accuracy, particularly when using the data for statistical analysis.</td>
</tr>
<tr>
<td>Snap</td>
<td>A procedure within QGIS, and similar software, that enables the creation of new points, lines, or polygons to perfectly align with the vertices and boundary lines of previously created data to ensure seamless coordination and reduce slivers. A</td>
</tr>
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“snapping tolerance” can be set to define a distance between points that will automatically ensure the two points are in the same location.

Vector A data format that is ideal for discrete entities, consisting of points, lines, and polygons to represent real-world features.
Creating Shapefiles for Demographic Analysis

Geographic Information Systems (GIS) open doors for demographic analysis by allowing shapefiles to represent enumeration districts and other spatial boundaries. Shapefiles are essentially versatile digital GIS files that consist of points, lines, and polygons. For demographic analysis purposes, shapefiles are ideal for denoting boundaries of enumeration districts and housing separated spatial metadata for each enumeration district. Spatial-statistical analysis can then be conducted to examine this metadata to find trends within each enumeration district or across a city. With demographic research, the shapefiles are particularly useful for visually representing the socio-economic, racial, and ethnic trends across a city or metropolitan area. By manipulating symbolization preferences, each enumeration district within the city can have striking, bold boundary lines and can be filled with sharp, contrasting colors and patterns to enable visual analysis of differences in the ethnic, racial, and socioeconomic makeup of each part of the city. This allows demographers to see patterns of ethnic, racial, and socioeconomic segregation across a metropolitan area and to identify and compare trends in different cities.

Using the 1940 IPUMs Restricted Data

The Minnesota Population Center at the University of Minnesota has released digital data representing previous U.S. census records at the individual-level through their Integrated Public Use Microdata Samples (IPUMS) Project. The 1940 100% IPUMS file contains an unprecedented level of micro-data that covers all individuals and households that took part in the
1940 U.S. Census of Population. A fine-grained, restricted version of this file shows the geography of cities down to their enumeration districts (EDs). Gaining access to these files allows demographers, sociologists, and geographers to investigate and analyze spatial residential distribution patterns of within cities of urban populations. Access to this microdata allows innovative research and analysis that was previously impossible. Thus, using the newly released IPUMs Restricted Data to analyze both Charleston, NC and Buffalo, NY at the ED-level provides new knowledge of spatial residential demographic distribution and how these cities compared, despite their geographic distance, in 1940.

**Foundational Work: A Pilot Study of Houston, Texas in 1940**

A pilot study of this process was conducted at the Texas Research Data Center in the summer of 2016 using 1940 U.S. Census data and enumeration districts in Houston, Texas. The labor-intensive work resulted in the creation a unique shapefile for Houston’s 1940 enumeration districts that served as a foundational study in the methodology implemented while creating shapefiles for Charleston and Buffalo.

Within this study, a shapefile of Houston’s enumeration districts was produced to show that the western portion of Houston consisted of predominately higher-status Whites while the northwest and southeast areas of Houston tended to have lower-status Whites when basing socioeconomic status on high school education levels (Everett). Black and Latino populations in Houston in 1940 are shown to have an overall lower socioeconomic status (Everett). While these trends changed drastically by the 2000s, this pilot study of Houston in 1940 served as a means to create the methodology and research framework that would be implemented for the production
of this sequence of maps examining Charleston, South Carolina and Buffalo, New York. The race-socioeconomic findings can be further examined with the shapefile shown in Figure 1.

Figure 1: Reconstructing Socio-Demographic Residential Distribution, Houston 1940.

The shapefile of enumeration districts in Houston, Texas during the 1940 U.S. Census shows concentrations of residents by racial-ethnic group and percentage of individuals with high school education (Everett). The creation of this shapefile served as a pilot study into the methodology that would be employed for analyzing Buffalo, New York and Charleston, South Carolina.
CHAPTER II

METHODS

The open-source geographic information system software, QGIS, was used to create shapefiles representing the enumeration districts within Buffalo, New York and Charleston, South Carolina. Although other geographic information system software is available, QGIS was chosen for its ease of access across multiple platforms. Through the processes of georeferencing and digitizing, the images of the 1940 U.S. Census maps were associated with geographic locations and the corresponding IPUMS microdata was statistically analyzed based on the corresponding enumeration district represented on the digitized map. This extensive, labor-intensive process accounted for the bulk of the research project and resulted in unique shapefiles that could also be used as resources in future projects.

Using QGIS to Georeference a Historic Map

The visual data acquired for the production of the shapefiles consisted of the historic U.S. Census maps from 1940. These images consisted of a series of fragmented portions of larger maps, with the fragments represented overlapping portions of the cities. Charleston consisted of four map images, while Buffalo consisted of eighteen individual map fragments. These map fragments could be combined using graphic design editing software, such as Adobe Illustrator, but must be done so with great care to maintain the integrity of the scale and spatial relationship between features within the images. As the digital images are scanned, or possibly even photographed, copies of original printed maps, it is possible that the maps contain slight distortions. Thus, the process of georeferencing is essential to manipulate the original digital
images to correspond with reality. An example of the original digital images of the 1940 U.S. Census map of Buffalo’s enumeration districts can be seen in Figure 2.

Figure 2: Fragments of the 1940 U.S. Census map of Buffalo, New York. The historic 1940 U.S. Census maps consist of a series of fragmented, overlapping pieces. Enumeration district boundaries and labels were added into these maps by hand.

When creating shapefiles based on these images of historic maps, it is important to begin with georeferencing the map images so that the resulting shapefile will have a spatial connection to reality. The process of georeferencing allows for these map fragments to be manipulated so
that the features within the images more accurately represent the real world despite initial distortions. Georeferencing allows the map images and subsequent shapefiles to be overlaid on a wide variety of contemporary and other historic maps. As these newly created shapefiles are intended to serve as a resource for future research, this is important because it allows the resulting shapefile to be compatible with any map or spatial data that is in the same projection and datum.

To begin the georeferencing process for each city, a new QGIS project was created and the OpenStreet extension was activated to project a contemporary map of the city's roads, bodies of water, and other features. This map would be used as the “reference” layer that the georeferenced historic map would be associated with. Then, QGIS’s “Georeferencer” tool was used. After the raster image of the map had been selected, transformation settings were implemented to ensure that the image was appropriately manipulated to best-fit reality. For these maps, a Polynomial 2 Transformation was performed using the Nearest Neighbor sampling method. The coordinate system used was selected to be compatible with the OpenStreet reference map layer.

Once the transformation settings are determined, the process of georeferencing can begin by associating points on the image with corresponding true spatial locations from the OpenStreets map. These points, known as ground control points, are used to create a link between the image to be georeferenced with reality. Ground control points are selected by choosing a point on the image and then inputting either the relevant geographic coordinate for that location or choosing that exact point on the reference map. Using the exact geographic
coordinate value would be useful when georeferencing images that include surveyed geographic markers and other points with known geographic locations. However, in this setting, using common long-withstanding features, such as street intersections that are easily identifiable on both the image of the 1940 U.S. Census map and the digital street map within QGIS, allows for a sufficiently accurate georeferenced image, as shown in Figure 3. While the urban landscapes in Buffalo and Charleston have evolved since 1940, there were enough common roads in the 1940 map and the OpenStreets map to be able to choose a sufficient number of ground control points.

Figure 3: Selecting Ground Control Points While Georeferencing. The process of georeferencing entails selected ground control points on the historic map image and then choosing corresponding coordinates on the OpenStreets map. Numerous ground control points should be selected to indicate how the image should be manipulated to reflect reality. When using a contemporary map to georeference a historic map, it is important to have a high confidence level when selecting features to ensure that potential areas of change in the urban landscape do not skew the resulting image.
While there is not a consensus on the number of ground control points to use, it is considered “typically best to strive for the widest distribution of points” (Bolstad, 2012). A large breadth of point distribution allows for the subsequent manipulated georeferenced image to more accurately reflect reality. After an appropriate number of points have been selected for each individual image, the resulting image will be slightly skewed and stretched to allow its features to more closely resemble their real-world counterparts, as shown in Figure 4. After all of the original 1940 U.S. Census map images have been georeferenced, the images appear to be arranged in a mosaic-like fashion so that boundary lines extending across multiple fragments of the original map align and the comprehensive map corresponds with the appropriate physical spatial locations that are represented within the map.

Figure 4: A Georeferenced Map Image of Buffalo, New York. If an appropriate selection of
ground control points have been used, the resulting georeferenced image will align with real-world features in the city’s landscape.

**Using QGIS to Digitize and Create Shapefiles**

Once the map images have been georeferenced, the digitizing process can begin by first manipulating certain settings to enable the most efficient digitizing of the map. In particular, within the “Snapping Options” dialog box, several settings were altered from their default state. The “snapping mode” was set to “all layers,” to ensure that any new point, line, or polygon created would “snap to” all other points, lines, and polygons. Since enumeration districts “touch” and share common boundary lines with other enumeration districts and bodies of water, this allows the polygons created in each layer to easily share vertices and boundary lines with other polygons, which drastically reduces the likelihood of slivers. Slivers occur when an unintended small space remains between polygons, which can cause problems with spatial statistical analyses, as data that is geographically associated with locations that fall into a sliver will be compromised. Thus, it is imperative that slivers are avoided by ensuring that each enumeration district shares a boundary line with the adjacent enumeration district.

Once the appropriate preferences have been set to optimize the accuracy of the digitization process, the polygons can be created. To begin, a new shapefile layer is created using the project’s coordinate reference system, as determined through the process of georeferencing the historic map images, attribute fields are created to represent a unique identifier for each polygon and the enumeration district that the polygon will represent, and a name is selected that is indicative of the shapefile that will be created. When initially determining the attribute fields,
it is imperative to ensure that one of the attribute fields will align with the enumeration district identifier used in the IPUMS data so that the data can eventually be displayed correctly. While the length of the enumeration district identifier may vary between maps, this field must remain consistent for each city to ensure accurate portrayal of data in the final map.

After the shapefile has been created in QGIS, the actual process of digitizing can begin. As specified when creating the shapefile, polygons will be drawn to represent each enumeration district in the city. To begin, the shapefile must be in editing mode through the “Toggle Editing” button. Then, the zooming functions can be utilized to locate an enumeration district on the historic census map image. Each enumeration district is marked by faint hand-drawn lines on the historic map, making this process labor-intensive, which can be further complicated, at times, as these boundary lines may prove difficult to decipher due to the age of the maps. The “Add Feature” option is then selected and points are selected to represent the vertices of the enumeration district. As the vertice points are selected, a polygon begins to take shape over the enumeration district. Upon a complete traverse of the enumeration district, the polygon is finalized by right clicking the mouse. The Feature Attributes input table will appear, prompting values to be added for each of the attributes previously determined when creating the shapefile. It is essential that these values are accurately representative of the enumeration district that the polygon represents.

As polygons are created for each enumeration district, the common boundary lines between each enumeration district should be shared by selecting the common vertices. This is where the “snapping tolerance” selected previously comes into play to ensure that these
boundaries align perfectly to reduce the chance of slivers between enumeration districts.

Throughout the digitizing process, the shapefile’s display preferences can be manipulated through the “Style” tab of the “Layer Properties” table. Any display preferences set at this stage will only be used temporarily while creating the shapefiles, so a semi-transparent fill can be used to show progression as the polygons are created. This allows any gaps indicating overlooked enumeration districts to be easily identified.

While the process of creating these shapefiles is relatively straightforward, it is labor-intensive and requires care to ensure that each polygon’s attributes are input appropriately. By opening the shapefile’s attribute table, these features can be analyzed further. Any duplicate enumeration districts will immediately show human input error and must be reconciled by consulting the original historic map.

Once the enumeration districts have been digitized, the creation of water body features will allow for a better visual representation of trends within the city. As water is often a driving factor in determining settlement patterns, highlighting rivers ultimately creates a more valuable resource in demographic research. This should be done as a separate shapefile, with a polygon created for each river. This water feature shapefile will then have the option to be displayed with the enumeration data as needed. While Charleston and Buffalo both have a coastline, only Buffalo had a river that needed to be digitized during this project.
Reconciling Contained Enumeration Districts

Buffalo's original census maps contain several indices of enumeration districts housed entirely within larger enumeration districts. These are depicted by a handwritten number and circled letter, but do not include precise boundary lines to represent the size of the contained enumeration district. While it is possible to create a polygon contained within a large polygon, this was not particularly feasible without specified boundary lines as accuracy would have been compromised. Thus, to maintain consistency, a new point shapefile was created and a single point was placed in the center of the circled letter. In total, 31 contained enumeration districts in Buffalo were discovered throughout the digitizing process, but there were no instances of contained enumeration districts in Charleston in 1940.

Figure 5: A Point Shapefile to Reconciling Contained Enumeration Districts. Numerous enumeration districts contained within larger enumeration districts are shown. These contained enumeration districts do not have any boundary line, so a single point has been added to represent their geographic location, as shown by the yellow points.
The contained enumeration districts indicate a multi-family residential facility that is given a unique enumeration district. These typically could be apartment buildings, hospitals, orphanages, and other similar facilities and institutions. The IPUMS data can be queried to reveal the facility that each of these points represent. While this research does not deal further with these points, creating the separate shapefile for this series of points will prove useful in future research conducted using this dataset. These points could, in theory, be symbolized and analyzed as the polygons are to enhance future demographic analysis pursuits.

Figure 6A (left): Consolidated 1940 U.S. Census map of Charleston’s Enumeration Districts. The U.S. Census Map of Charleston included hand-drawn lines for each enumeration district.

Figure 6B (right): Shapefile of Charleston’s 1940 Enumeration Districts. The resulting shapefile can be displayed with contemporary maps, such as the OpenStreets map shown here.
Figures 7A, 7B, and 7C (left): Consolidated 1940 U.S. Census Maps of Buffalo’s Enumeration Districts. The fragmented portions of the original census map of Buffalo were consolidated into three individual maps, as shown here.

Figure 7D (right): Shapefiles of Buffalo’s 1940 Enumeration Districts. The resulting shapefiles for Buffalo included a polygon shapefile representing the major enumeration districts, a point shapefile represented the contained enumeration districts, and a water feature polygon shapefile to show the Buffalo River, which meanders through and across several enumeration districts.
Using STATA to Run Statistical Analyses

The statistical software STATA was used to format and tabulate the U.S. Census data so that it could be exported and associated with the enumeration districts in the shapefile. This process included ensuring that the naming scheme for enumeration districts was consistent in the IPUMS data and in the shapefile attribute table for seamless integration.

Creating Joins to Visualize Data with Shapefiles

Once the data has been effectively tabulated and organized within STATA, it is saved as a .csv (comma-separated values) file, as this file type is compatible with QGIS and other GIS software. Once the .csv file has been imported into the appropriate QGIS project, a “join” is conducted to associate the data within the .csv file to the shapefile. This is done through the “Layer Properties” window. Within the “Joins” tab, the “Add Vector Join” option allows for the selection of the .csv data file as the “Join Layer.” Then, a common attribute is selected from both the files to be joined. In this case, the common attribute is the unique enumeration district identifier that is formatted consistently in both the shapefile’s attribute table and the .csv file. Once this join has been established, the data housed within the .csv file will be associated with the shapefile with the enumeration districts as the common link between the two.

After this join has been created, the IPUMS data that is housed in the .csv file will appear in the shapefile’s attribute table alongside the corresponding enumeration district. Then, the “Style Tab” within the “Layer Properties” window will allow for the shapefile to be symbolized to represent the newly joined data. These styles are dependent on what configuration of data is to be displayed. For example, displaying the racial-ethnic segregation trends across the city of
Charleston required the “Rule-based” style to represent percentages of white, black, latino, and asian majorities. A “rule” for the style of each of these categories was based on the joined .csv file, specifying how each attribute and corresponding value in the dataset was to be coded. This can be seen in Figure 8, where the “rules” allow QGIS to understand which “irace” value is to be associated with each racial-ethnic percentage shown in the “label” column.

Figure 8: Selecting Layer Properties in QGIS. The “Style” tab within the “Layer Properties” window allows for specification of how the shapefile will be symbolized based on the joined .csv file containing the IPUMS data.
At this point, the “layer transparency” and any style changes were made to best visualize the data. These styles can be saved and reloaded into new projects to minimize future work as other cities are analyzed. The result is the symbolized shapefile representing various trends in the data. Cartographic skills can then be employed to create a series of maps to further visualize the geographic context of the IPUMS data.
CHAPTER III

RESULTS

The process of creating these original shapefiles and using the newly released microdata from the 1940 U.S. Census enabled spatial analysis of historic Buffalo and Charleston. Each city has unique trends in socio-ethnic segregation patterns and demographic distribution.

Charleston, South Carolina’s Racial-Ethnic Segregation Trends in 1940

When 1940 U.S. Census data is displayed by enumeration district in Charleston, South Carolina, geographic socio-ethnic and other demographic distribution trends can be evaluated.

Figure 9: Majority Race Distribution in Charleston in 1940. This map shows the majority race in
The segregation of White and Black populations in Charleston, South Carolina in 1940 is immediately evident when the IPUMS data is displayed in the enumeration district shapefile. A selection of enumeration districts in the northeast and southern portions of the city show dense White populations, with White residents comprising eighty percent or more of the residential population. Conversely, the western coast along Cooper River is has a fifty percent or greater majority of Black residents. There are eight centrally located enumeration districts in Charleston that have more than eighty percent Black residents.

While demographers can analyze the racial composition of Charleston in 1940 based on this data configuration, education levels can also be taken into account to investigate the role of socioeconomic status in residential segregation patterns. Here, socioeconomic status is measured by the percentage of the population that has received a high school education.
Figure 10: Race and Education Distribution in Charleston in 1940. This map shows the relationship between race and high school education in Charleston, South Carolina during the 1940 U.S. Census.

Figure 10 shows how the relationship between race and education impacts levels of segregation. Preliminary analysis shows that the highest portions of high school educated residents in Charleston tend to live in the southern tip of the city. All but one of the enumeration districts with significant Black populations have high school education levels below twenty percent. Thus, the preliminary analysis of this map indicates that the Black population in Charleston in 1940 was disproportionately uneducated compared to Whites in the city.
Buffalo, New York’s Racial-Ethnic Segregation Trends in 1940

By displaying 1940 U.S. Census data by enumeration district in Buffalo, New York, geographic trends in demographic distribution can be assessed. After acquiring the data, georeferencing the original census map images, creating shapefiles, and displaying the recently released microdata by enumeration district, the resulting series of maps are able to provide insight into socio-ethnic segregation trends found in 1940.

Figure 11: Majority race Distribution in Buffalo in 1940. This map shows the majority race in each enumeration district in Buffalo, New York during the 1940 U.S. Census.

Preliminary analysis of Figure 11 shows a significant White majority in Buffalo during the 1940 U.S. Census. There is a small cluster of enumeration districts with slightly lower
percentages of Whites and a small number with Black majorities. This shows a significantly different segregation pattern with a far less prevalent Black population than that of the southern city of Charleston.

Figure 12: Race and Education Distribution in Buffalo, New York in 1940. This map shows the relationship between race and high school education in Buffalo, New York during the 1940 U.S. Census.

When accounting for socioeconomic status, based on high school education, in preliminary analyses, the enumeration districts in Buffalo with a significant Black population do not show high levels of high school education. Instead, only a few enumeration districts of White plurality show significant majorities with high school education.
Comparison of Racial-Ethnic Segregation Trends in Buffalo and Charleston

Buffalo, New York, and Charleston, South Carolina were explicitly chosen for this analysis due to their differences as northern and southern cities, respectively, which are immediately apparent when conducting preliminary spatial analysis on census records in these cities. Charleston is shown to have a much more significant Black population. However, it is important to note that Buffalo’s diversity, while having a majority White population across the city, is largely due to European-born immigrants.

Buffalo, New York’s Immigrant Segregation Trends in 1940

Buffalo’s diversity is largely dependent on foreign-born immigrants from Europe. Many of these immigrants were born in Germany, Poland, Ireland, and Italy, among other countries. A preliminary analysis was conducted to see how German, Polish, Irish, and Italian born immigrants fit into the segregation patterns in Buffalo in 1940.
Figure 13: German-Born Immigrants in Buffalo, New York in 1940. This map shows the German-born residents in Buffalo, New York during the 1940 U.S. Census.

Buffalo in 1940 had ninety-one enumeration districts with German-born residents comprising more than five percent of the population. Figure 13 shows that these enumeration districts are primarily concentrated in the mid-northeast portion of the city, as represented by the darker portions of the map.
Figure 14: Irish-Born Immigrants in Buffalo, New York in 1940. This map shows the Irish-born residents in Buffalo, New York during the 1940 U.S. Census.

While there is a significant portion of the city with a strong German influence, these maps do not suggest the same to be true of immigrants born in Ireland. Figure 14 shows a much smaller geographic area of ten enumeration districts within Buffalo to have a Irish-born population between five and ten percent, located predominantly in the mid-southwest along the coast of Lake Erie and the Buffalo River.
Figure 15: Italian-Born Immigrants in Buffalo, New York in 1940. This map shows the Italian-born residents in Buffalo, New York during the 1940 U.S. Census.

Based on the 1940 U.S. Census data, sixty-nine enumeration districts in Buffalo have an Italian-born immigrant population comprising five to twenty-nine percent of the population and an additional twenty-seven enumeration districts are made up of thirty to forty-nine percent Italian-born residents. Figure 15 shows that these enumeration districts with significant quantities of Italian-born immigrants are primarily along Lake Erie’s coast on the eastern side of the city. These Italian-born immigrants to Buffalo were likely to be dock workers, which accounts for these segregation patterns where Italians live along the coast.
Figure 16: Polish-Born Immigrants in Buffalo, New York in 1940. This map shows the Polish-born residents in Buffalo, New York during the 1940 U.S. Census.

U.S. Census data accounts for a total of 121 enumeration districts to have Polish-born residents accounting for five to twenty-nine percent of the population. An additional ten enumeration districts had an even higher concentration, with Polish-born residents making up thirty to forty-nine percent of the population, as shown in Figure 16.

Overall, this series of maps show an overall trend in Buffalo in 1940 where the selected immigrant populations are included in areas that are deemed to have a majority white population when analyzing ethnic-racial segregation patterns. Individual immigrant populations do not appear to mix with immigrants from other countries, as the maps show distinctions between
enumeration districts that are dominated by particular immigrant groups. Buffalo’s immigrant populations are segregated by their country of origin, with Polish immigrants living south of German immigrants, Italian immigrants living on the eastern side of the city, along the coast of Lake Erie, and Irish immigrants living farther south on the eastern coast and along the eastern portion of the Buffalo River. Through preliminary comparative, the lack of overlap suggests that immigrant populations did not live in close proximity to one another. Instead, these maps show distinct immigrant segregation in Buffalo during the 1940 U.S. Census. The most predominate exception occurs in the enumeration districts on the northeast coast of the Buffalo River, with both Polish-born and Irish-born residents, which can be seen in the inset map in Figure 17.

Figure 17: Foreign-Born Population in Buffalo, New York in 1940. This map shows segregation patterns between different groups of European immigrants.
Charleston, South Carolina’s Immigrant Segregation Trends in 1940

As a city in a southern state in 1940, Charleston has a much less prevalent foreign-born population than Buffalo. Visualization of 1940 U.S. Census data shows no single district to have a population of more than four percent of that enumeration district’s population. While it is possible that foreign-born immigrants lived in Charleston in 1940, the preliminary visualization of Charleston does not indicate any notable concentrated population of any one foreign-born group. The map sequence shown in Figures 18A, 18B, 18C, and 18D show that the 1940 U.S. Census did not report any significant levels of immigrants born in Germany, Italy, Ireland, or Poland in Charleston.

Figure 18A (top left): Immigrants from Germany to Charleston, South Carolina in 1940. This map shows that no enumeration districts in Charleston in 1940 had a notable portion of
German-born immigrants.

Figure 18B (top right): Immigrants from Ireland to Charleston, South Carolina in 1940. This map shows that no enumeration districts in Charleston in 1940 had a considerable portion of Irish-born immigrants.

Figure 18C (bottom left): Immigrants from Italy to Charleston, South Carolina in 1940. This map shows no enumeration districts in Charleston with a significant amount of Italian-born immigrants.

Figure 18D (bottom right): Immigrants from Poland to Charleston, South Carolina in 1940. This map shows that no enumeration districts had a notable presence of Polish-born immigrants.

Although Charleston’s foreign-born population from Germany, Italy, Ireland, and Poland is seemingly insignificant, this preliminary analysis serves as a stark contrast to the trends shown in Buffalo during the same time period.

Comparison of Immigrant Segregation Trends in Buffalo and Charleston

The map sequences for Buffalo and Charleston in 1940 show significantly different immigrant segregation trends. The northern city of Buffalo has a notable and diverse foreign-born population. In the preliminary analysis of foreign-born residents in Buffalo from Germany, Italy, Ireland, and Poland, each group had a rather concentrated population. While these groups tended to remain separate from one another geographically, there was a much greater presence of foreign-born residents overall in Buffalo than Charleston. The lack of foreign-born residents in Charleston shows a stark contrast from the multi-national hub of activity and immigration occurring in the northern city of Buffalo.
Quantitative analyses of segregation that have been studied with this data as part of the larger research project confirm these visual impressions presented in the sequence of maps. In particular, Buffalo quantitative segregation index scores show that levels of segregation of immigrant populations from native-born whites are lower for early immigrant populations from the United Kingdom, Canada, and Northern and Western Europe, with the peak immigration occurring prior to 1820 and primarily consisting of protestant and skilled individuals. This quantitative analysis of the data also accounts for the levels of segregation of early immigrant populations from native-born whites as being higher for later immigrant populations, such as the German and Irish between 1820 and 1860, consisting of catholic and less-skilled individuals. Finally, the quantitative analysis also accounted for these levels of segregation to be even higher for the last wave of European immigrant groups that arrived to the United States from Central, Eastern, and Southern Europe, including Polish, Russian, Italian, and Greek immigrants between 1880 and 1920 that were mostly non-protestant and unskilled individuals. Overall, the quantitative index scores that were created from this data show that segregation among European immigrant groups are higher than their segregation from native-born whites.

The segregation between White and Black populations differs largely from the segregation of European immigrant groups. This is due to a large fraction of Blacks residing in predominately Blacks enclaves. This is not true for any European immigrant group, although the Italians are a distant second in comparison.
CHAPTER IV

CONCLUSION

This project aimed to examine racial and ethnic distribution patterns using newly available historic census data with a focus on the creation of unique shapefiles that would aid in this and future research. Through the creation of these shapefiles, over 620 polygons were created to represent enumeration districts in Buffalo, New York and Charleston, South Carolina.

When this historical census data was originally collected in 1940, this level of spatial and demographic analysis was not possible. Now, with the use of GIS and shapefiles, geographic analysis can be conducted to examine patterns in racial-ethnic segregation and the distribution of foreign-born immigrants.

The patterns shown in these sequences of maps are representative of general theories addressing racial and ethnic relations, particularly in the concept that segregation is lower for Whites compared to Non-Whites. Segregation is generally lower for groups that have a similar culture, such as a common language and religion, to the early Anglo-Saxon settlers. Also, settlers who arrived earlier and have more time for group assimilation to occur will have lower levels of segregation, as these populations tend to spread out as time passes. Finally, a greater number of skills and a higher-class social background result in lower levels of segregation for these immigrant populations.

The contrast shown between Charleston and Buffalo is very dramatic. Buffalo represents
a northern urban area where semi- and un-skilled European immigrants have been absorbed into industrial urban economic centers. Conversely, Charleston portrays a southern urban area that developed through the agriculture-oriented slave economy of the South. The presence of slavery resulted in low levels of European immigration compared to northern urban areas, making foreign-born groups only a small portion of the population.

These findings represent a selection of preliminary results that will contribute to a larger project analyzing historic racial-ethnic demographic trends. The project’s future direction includes the extensive analysis of a series of index scores for various racial-ethnic segregation patterns based on quantitative tabulations of the census data. The series of maps created throughout this portion of the project will allow for a greater understanding of these tabulated index scores by providing a visualization of the spatial relationships between scores.
REFERENCES


