SEPARATE AND NOT EQUAL

THE IMPACT OF RESIDENTIAL DISCRIMINATION ON HEALTH IN RICHMOND, VIRGINIA

by

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ABSTRACT

Historical residential segregation policies have affected many cities in the United States. This case study will focus on Richmond, Virginia. This research aims to examine the redlining policy introduced by the Home Owner's Loan Corporation (HOLC) in 1935 and gauge how and if it impacted health conditions in 2021. The importance of this research is to use a methodology to understand if there is a statistically significant relationship between former HOLC graded areas and health conditions in 2021.

To answer this question, I analyzed 29 HOLC Richmond graded areas according to the HOLC grade. A total of 14 dependent variables were analyzed using descriptive statistical analysis. My results showed a statically significant relationship between the former HOLC graded areas and the health conditions in 2021. Furthermore, most dependent variables had a relationship with the independent variable. This study emphasizes the need to use this research method in many other urban areas, which were redlined by the Home Owner's Loan Corporation and health conditions in these cities. In addition, this research can be used to inform and educate the public and policymakers about the impact of the former HOLC policies on health conditions.

Chapter 1

INTRODUCTION

The United States has many differences in socioeconomic statuses as a result of specific public policies. That reality is perhaps most evident when it comes to residential housing policy. The term place is the most critical factor in the American experience. Where people reside predisposes them to the advantages and disadvantages, they face. We learned this with the Covid 19 pandemic. During the pandemic, communities with the most access to testing and vaccines were more resilient to the virus.

The data shows that lower-income places suffer more illnesses than those higher-income places. Stanford Health Policy's Maria Polyakova, and Lynn Hua, a graduate student at the University of Pennsylvania, found that older, low-income Americans tend to be healthier if they live in more affluent areas of the country (Duff-Brown 2019). Covid-19 exposed the lack of infrastructure and equity in the American health system.

Beyond the pandemic, place affects education. Effect interaction refers to a causal process whereby the effects of school quality on academic achievement are dampened or amplified by residence in advantaged versus disadvantaged neighborhoods (Wodtke 2020). Crime rates are also affected by place. Within cities, gun violence is concentrated in a small set of disinvested neighborhoods, and within these neighborhoods, such violence is even more concentrated within a small set of "micro-geographic places," like particular streets (Love 2021).

Access to healthy food options is also related to place. Food deserts exist throughout the United States. These food deserts lack access to healthy food options but contain many fast-food chains that are affordable for the population. This phenomenon

can lead to pulmonary disease, obesity, and other health conditions. How close a person or family lives to a store where healthy foods are sold is only one of many factors that influences their ability to eat healthy (Correll 2022). Many other aspects of life are often affected by where one resides.

Throughout history in the United States, where people live or, more precisely, where they are allowed to live has been influenced by public policies. This research focuses on a set of policies implemented in Richmond, Virginia. The assessment of the desirability for potential homeownership in specific geographic areas was performed by the Home Owner's Loan Corporation (HOLC). This was one of the lesser-known programs of the New Deal established by President Franklin Delano Roosevelt in 1933. The government bought out mortgages nationwide and worked with buyers to refinance them with lower interest rates. Unfortunately, not all American citizens received the opportunity for home ownership due to the policy.

Other policies that predated the HOLC were ordinances and racial covenants. Ordinances were passed in American cities from 1909 to 1917. These ordinances were designed to segregate neighborhoods by prohibiting white residents from selling or renting property to African Americans. The landmark case (Buchanan v. Warley 1917) outlawed such practices in 1917. Racial covenants were restrictive and embedded in deeds that were part of real estate transactions. Most were designed to prevent people who were not white from buying or occupying the land. Public officials embraced many of these practices to relocate African Americans into smaller segregated sections in American cities. Many lenders proclaimed that such policies provided insurance for investments in residential property. This practice became very popular after (Corrigan v.

Buckley 1926) as the U.S. Supreme Court validated its use. Even though subsequent court decisions struck down these practices, a new policy was implemented to circumvent the law.

In 1935, the HOLC assessed and graded 29 geographic areas in Richmond using four levels of desirability. The areas that received the highest grade were considered "Best" for home ownership. The areas that received the next highest grade were considered "Still Desirable." The lower grades were identified as "definitely declining" and Hazardous." While the HOLC did not specifically announce it, the critical variable for the grading system was based on the racial makeup of the areas. In all cases, areas with a high population of African American residents were graded "definitely declining" or hazardous. In each description of the areas, the HOLC documented if there were a "high infiltration of negros". While the first three graded terms speak to the level of desirability, the term "hazardous" is very glaring. The question of hazardous to whom should be asked.

This research looks at health conditions because they are socially determined. The term “social determinants” often evokes factors such as health-related features of neighborhoods (e.g., walkability, recreational areas, and accessibility of healthful foods), which can influence health-related behaviors (Gottlieb 2014). However, the literature is clear, the social determinants of health are affected by access to resources such as primary care physicians, pharmacies, education, health insurance, and employment opportunities. Therefore, I chose to look at health in Richmond, Virginia. This research examines the health conditions in 2021 for each of the 29 areas graded b in 1935.

Chapter 2

HISTORY

The Impact of Plessy v. Ferguson

Richmond has a long history of using residential segregation tactics to deprive African Americans of equal opportunities such as housing. However, the impact of residential segregation goes far beyond housing policies. When looking at the practice of such policies, it is important to also analyze the effect in other areas such as job opportunities, education, and health. The result of the 1897 case (Plessy v. Ferguson 1896) introduced the doctrine of "Separate but Equal." This ruling would enforce discriminatory policies in many public services besides public transportation. As the result of this Supreme Court decision, lawmakers had full ability to create policies that resulted in segregation residentially and educationally.

This landmark court ruling would only bolster Jim Crow laws in the south. Jim Crow was a racial caste system prevalent in the southern and border states. Jim Crow existed between 1877 and the mid-1960s. Jim Crow normalized racism by establishing laws that forbid African Americans from a series of norms. For example, in Virginia, public theaters designated specific seating for African Americans. The same was true for public railroads. In addition, African Americans and whites were not allowed to eat together, and if the two races did, whites were supposed to be served first.

The Plessy decision allowed the "Separate but Equal" doctrine to segregate schools, public areas, and residential areas. As a result, states now instituted openly discriminatory policies that infringed on African Americans' civil rights (The Making of the Modern U.S. 2022).

One of the most glaring impacts of the *Plessy v. Ferguson* decision was the practice

of home lending to minorities in America. This ruling gave states the legal jurisdiction to create segregationist housing policies. This was very prevalent in the southern states. The Supreme Court's decision provided the legal foundation for an elaborate system of subordination and exclusion (Ware 2021).

Zoning Ordinances

One of these methods was exclusionary zoning policies and city zoning ordinances. Common examples include minimum lot size requirements, minimum square footage requirements, prohibitions on multi-family homes, and limits on the height of buildings (Chair Cecilia Rouse 2021). The Supreme Court case (Buchanan v. Warley 1917) outlawed these racially zoning practices. The case was based on the fact that Caucasian residents in Louisville, Kentucky, owned 8 out of 10 houses. As a result, Warley, an African American resident, was not allowed to own a residence on the same block. The court stated that Louisville's racial zoning ordinance violated the 14th Amendment's due protection clause. In doing so, these ordinances would deny African Americans the enjoyment of all civil rights. In addition, the court ruled that the ordinance marked an infringement of contractual freedom because it interfered with private property sales between whites and blacks (The Fair Housing Center of Greater Boston, 2021). The decision came down on November 5, 1917.

Racial Covenants

Once the exclusionary zoning laws were outlawed, property owners used other techniques to manipulate the system. An example of this was the usage of racial covenants. These restrictive covenants served as mutual agreements between property owners to ban the sale of specific properties to certain racial groups. The covenants were

very restrictive and embedded in deeds which can still be seen today. Unfortunately, public officials embraced many of these practices to relocate African Americans into smaller segregated sections in Richmond.

Using its charter powers, Richmond adopted the first ordinance dividing the city into separate blocks for white and "colored" in April 1911 (McGuireWoods Zoning and Segregation Work Group 2022). Many lenders proclaimed that such policies provided insurance for investments in residential property. In the case of (Shelly v. Kraemer 1948) the Supreme Court overturned such practices in 1948. The Supreme Court found that while racially based restrictive covenants were not unconstitutional, the enforcement of the covenant is. By the time the Supreme Court found racially restrictive covenants themselves unconstitutional in 1948, the practice was so widespread that these agreements were challenging to invalidate and almost impossible to reverse (Lockwood 2020).

Home Owner's Loan Corporation

As efforts to combat such segregation tactics resumed, we must start with the National Housing Act of 1934. As a result of The Great Depression, public housing legislation was at the forefront of discriminatory efforts. Signed into legislation on June 27, 1934, President Franklin D. Roosevelt aimed to improve public housing as part of his New Deal programs. Such legislation aimed to improve housing conditions, make housing lending more accessible, and reduce foreclosures. While, on the surface, this legislation sounds like a step in the right direction, it would not be offered to all citizens in America. The government's efforts were primarily designed to provide housing to white middle-class Americans. The method of doing such involves the practice called

redlining. In 1934 the Home Owner's Loan Coalition (HOLC) introduced "residential security maps". The premise of redlining was for the government to use a color-coded system to classify areas across the urban United States in over 200 cities. This practice was banned due to the U.S. Supreme Court decision (Jones v. Mayer 1968).

These maps served as a tool for the government to decide which areas were eligible for federal funding. For the white population, securing a loan in a highly desirable area with high property values was relatively easy. On the contrary, those "hazardous" areas where African American residents resided were ineligible for federal loans. This policy continues to have a long-term effect on African Americans as it was difficult for families to accrue long-term wealth.

As the popularity of the middle class moved to the suburbs, the surrounding counties were graded by the HOLC's residential security maps. Categories of the security map directly correlated with the area's racial makeup. Those areas outlined in red or graded type D by the HOLC (figure1) were predominantly African American and were found in the inner city. Areas labeled type C were classified as 'working class' and contained a more significant number of whites. The vast majority of areas graded types A and B, green and blue, were populated solely by whites. The underlying racism of the HOLC grading system and the resulting lack of investment in predominantly African American neighborhoods is still prevalent today (Virginia Memory Library of Virginia, 2022).

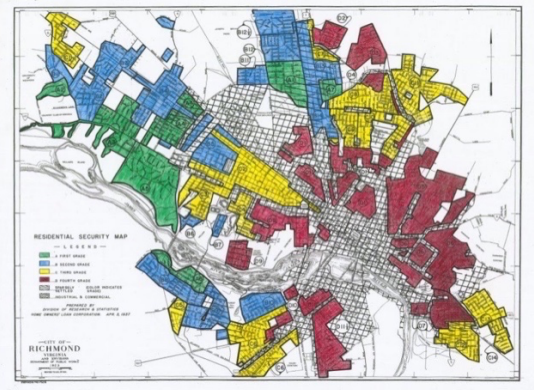
The inner city of Richmond is located in Henrico County. Henrico County is surrounded by six other counties: Charles City, New Kent, King William, Hanover, Goochland, and Powhattan counties. When analyzing the 1937 HOLC map of Richmond, most of the "D" hazardous labeled areas were located in the inner city of Richmond,

Henrico County, Chesterfield County, and New Kent County. On the contrary, most of the best and still desirable areas (A and B) were located outside the city, where most of the white flight occurred in the late 1800s and early 1900s. Below, Table 1 shows the HOLC grades and the color-coded system. Furthermore, the lowest grade of hazardous is colored red hence the term redlining.

Table 1: HOLC Area Grade

Home Owner's Loan Corporation Areas
"Best" (A)
"Still Desirable" (B)
"Definitely Declining" (C)
"Hazardous" (D)

Figure 1: 1937 Home Owner's Loan Corporation Residential Security Map



Home Owners' Loan Corporation, "Home Owners' Loan Corporation (HOLC) Map of Richmond, 1937.," *Online Exhibitions*, accessed April 6, 2022, https://www.virginiamemory.com/online-exhibitions/items/show/32.

The Federal Highway Act

The passing of the Federal Highway Act in 1956 sparked a period of innovation in the United States. Post-World War II, America saw a steep incline in the economy. The economic uptick in the economy directly affected the increased home ownership and employment rate. Suburbs were expanding rapidly, and more people were moving out of

the cities and into residential neighborhoods. This had a direct impact on the creation of the federal highway system. This also led to more commuter traffic, which required new roads. The Federal Bureau of Public Roads was tasked to determine the most inexpensive methods of building new roads. This process had a significantly negative impact on African American neighborhoods.

Interstates were regularly used to destroy black neighborhoods and to keep black and white neighborhoods apart. The interstate highway system changed the physical, social, and economic characteristics of urban communities. Those who built it targeted neighborhoods that were already struggling with racial discrimination and segregation, economic disinvestment, inadequate schools, and deteriorating property values, further entrenching those challenges (Archer 2020). The placement of the interstate highways secluded African American neighborhoods from the main central cities. The areas cut off by interstate roads were those that received a hazardous grade from the HOLC. This legislation also resulted in the white middle class leaving the urban areas resulting in low white populations in urban areas.

Chapter 3

METHODOLOGY

This chapter will focus on the methodology used to gather information and compare and contrast data. The primary tools used to analyze such data are statistical and map analysis. This methodology aims to test a relationship between the HOLC's grading of the desirability of areas of Richmond and their social vulnerability and health conditions in 2021.

Research Question: What is the difference, if any, in health conditions of the 29 Richmond areas graded in 1935 by the Home Owner's Loan Corporation in 2021?

Social Vulnerability

Using the Social Vulnerability Index (SVI) is to link informal and formal practices of racial residential segregation to gauge if such policies have helped shape health hazards to residents in Richmond. The hypothesis suggests that residents in Richmond may be more vulnerable to positive and negative health conditions due to residential policies.

Factors that may influence such health conditions are poor housing, disparities in educational and employment opportunities, inadequate transportation infrastructure, access to healthcare, and economic instability (The Digital Scholarship Lab and the National Community Reinvestment Coalition 2022). Other variables that affect

residential health conditions are access to quality food, green spaces, pollution, and recreational opportunities.

The SVI predicts how communities can respond to such natural events. Events include weather conditions, virus outbreaks, disease outbreaks, and health risks. Using the interactive maps provided by the University of Richmond's Digital Scholarship Lab and the National Community Reinvestment Coalition, data is used to compare the HOLC graded areas in Richmond and United States Census tracts. The Center for Disease Control and Prevention also provided health statistics by each census tract for 2021. The minority data is from 2011-2015 and comes from the Federal Financial Institutions Examination Council’s Census Information Sheets. The data for contemporary age and poverty comes from the U.S. Census's American Community Survey 2018 Data Release. Life Expectancy data is provided by the CDC's U.S. Small-area Life Expectancy Estimates Project. In addition, the CDC provides recent health data.

The data was imputed into the Statistical Package for Social Sciences (SPSS) for each of the 29 graded areas in Richmond. The research identified 14 dependent variables that represented the health and social conditions of the graded areas in 2021. Given that the number of HOLC graded areas in Richmond was 29, the most appropriate analytical approach was Chi-Square. Therefore, each of the values of the dependent variables had to be converted into a nominal category.

That was accomplished by determining the mean for each dependent variable. Table 2 shows that calculation. Using the mean, each of the dependent variables for the 29 areas was given a "1" if the value of the variable was below or equal to the mean and a

"2" if the value was above the mean. For example, the mean for the percentage of the population that were minorities was 52.7% across all 29 areas (see Table 2). Area A5 had a minority population of 5.2%. Therefore, it was assigned a “1” for Chi-square analysis. Area D6 had a minority population of 55.9%; it was assigned a "2" for Chi-square analysis. This calculation was applied to all of the dependent variables in each of the graded areas.

Table 2: Means of the 29 Richmond Graded Areas

Categories	Mean
Social Vulnerability Index	.45
Percent Minority	52.7%
Life Expectancy	75.6 years old
Median Age	37.6 years old
Over 65	14.0%
Poverty	19.5%
Asthma	10.7%
Cancer	5.9%
Diabetes	13.0%
High Blood Pressure	35.1%
Kidney Disease	3.4%
Mental Health Problems	13.9%
Obesity	33.9%
Pulmonary Disease	7.1%

Research hypotheses were established to examine the possible effect of the HOLC grading system. This statistical test also determined if a significant statistical relationship existed between the independent variable (29 HOLC graded areas) and dependent variables. First, the null and alternative hypotheses were defined.

Social Vulnerability Index

(H.O.): There is no relationship between the former graded areas and social vulnerability score in Richmond, Virginia.

(H1): There is a relationship between the former graded areas and the social vulnerability score in Richmond, Virginia.

Percent Minority

(H.O.): There is no relationship between the former graded areas and Percent Minority in Richmond, Virginia.

(H1): There is a relationship between the former graded areas and in Percent Minority Richmond, Virginia.

Life Expectancy

(H.O.): There is no relationship between the former graded areas and Life Expectancy in Richmond, Virginia.

(H1): There is a relationship between the former graded areas and Life Expectancy in Richmond, Virginia.

Median Age

(H.O.): There is no relationship between the former graded areas and Median Age in Richmond, Virginia.

(H1): There is a relationship between the former graded areas and Median Age in Richmond, Virginia.

Over 65

(H.O.): There is no relationship between the former graded areas and the population over 65 in Richmond, Virginia.

(H1): There is a relationship between the former graded areas and the population over 65 years old in Richmond, Virginia.

Poverty

(H.O.): There is no relationship between the former graded areas and Poverty in Richmond, Virginia.

(H1): There is a relationship between the former graded areas and Poverty in Richmond, Virginia.

Asthma

(H.O.): There is no relationship between the former graded areas and asthma in Richmond, Virginia.

(H1): There is a relationship between the former graded areas and asthma in Richmond, Virginia.

Cancer

(H.O.): There is no relationship between the former graded areas and cancer in Richmond, Virginia.

(H1): There is a relationship between the former graded areas and cancer in Richmond, Virginia.

Diabetes

(H.O.): There is no relationship between the former graded areas and diabetes in Richmond, Virginia.

(H1): There is a relationship between the former graded areas and diabetes in Richmond, Virginia.

High Blood Pressure

(H.O.): There is no relationship between the former graded areas and high blood pressure in Richmond, Virginia.

(H1): There is a relationship between the former graded areas and high blood pressure in Richmond, Virginia.

Kidney Disease

(H.O.): There is no relationship between the former graded areas and kidney disease in

Richmond, Virginia.

(H1): There is a relationship between the former graded areas and kidney disease in Richmond, Virginia.

Mental Health Problems

(H.O.): There is no relationship between the former graded areas and mental health in Richmond, Virginia.

(H1): There is a relationship between the former graded areas and mental health in Richmond, Virginia.

Obesity

(H.O.): There is no relationship between the former graded areas and obesity in Richmond, Virginia.

(H1): There is a relationship between the former graded areas and obesity in Richmond, Virginia.

Pulmonary Disease

(H.O.): There is no relationship between the former graded areas and pulmonary disease in Richmond, Virginia.

(H1): There is a relationship between the former graded areas and pulmonary disease in Richmond, Virginia.

As a result of the test, the research will either support the alternative hypothesis and reject the null hypothesis or reject the alternative hypothesis and support the null hypothesis.

Chapter 4

FINDINGS

The following chapter will report the findings. This is done by presenting the results of statistical analysis for each of the 14 dependent variables and analyzing each relationship with the grades that the Home Owner's Loan Association applied to each area. A table for each of the 14 dependent variables shows the HOLC grades and the total of the 29 areas that were either less than or equal to the mean or those areas above the mean. Each chi-square test result is also listed using a significance level of .05 for the test. The tables are color coded according to the same grades as the Home Owner's Loan Corporation used when they surveyed the 29 areas in Richmond, Virginia.

Social Vulnerability Index

(H.O.): There is no relationship between the former graded areas and social vulnerability score in Richmond, Virginia.

(H1): There is a relationship between the former graded areas and the social vulnerability score in Richmond, Virginia.

Table 3: Richmond HOLC Graded Areas and 2021 Social Vulnerability Index

HOLC Graded Areas	Less than or Equal to the Mean	Greater than the Mean
Best	5	0
Still Desirable	7	1
Definitely Declining	2	6
Hazardous	1	7
Total Areas	*15*	*14*

The mean for the social vulnerability index is .45. Table 3 shows that 12 areas that were graded Best or Still Desirable had a social vulnerability score that was less than or equal to the mean. The opposite finding occurred for the Definitely Declining and Hazardous areas, whereas 13 areas had a social vulnerability score greater than the mean. The relationship is significant at p = .001

Percent Minority

(H.O.): There is no relationship between the former graded areas and Percent Minority in Richmond, Virginia.

(H1): There is a relationship between the former graded areas and in Percent Minority Richmond, Virginia.

Table 4: Richmond HOLC Graded Areas and Percent Minority

HOLC Graded Areas	Less than or Equal to the Mean	Greater than the Mean
Best	4	1
Still Desirable	7	1
Definitely Declining	2	6
Hazardous	1	7
Total Areas	*14*	*15*

The mean for the percent minority is 52.7% in the 29 graded areas. Table 4 shows that 11 areas that were graded Best or Still Desirable by the HOLC in 1935 had proportions of minorities that were less than or equal to the mean. The opposite occurred for the graded areas that were either Definitely Declining or Hazardous. A total of 13 areas were above the mean. The relationship is statistically significant at P =.05.

Life Expectancy

(H.O.): There is no relationship between the former graded areas and Life Expectancy in Richmond, Virginia.

(H1): There is a relationship between the former graded areas and Life Expectancy in Richmond, Virginia.

Table 5: Richmond HOLC Graded Areas and Life Expectancy

HOLC Graded Areas	Less than or Equal to the Mean	Greater than the Mean
Best	1	4
Still Desirable	1	7
Definitely Declining	6	2
Hazardous	8	0
Total Areas	*16*	*13*

The mean for life expectancy in the 29 graded areas is 75.6 years of age. Table 5 shows that two areas graded Best or Still Desirable were less than or equal to the mean. The opposite occurred in the graded areas that were graded Defiantly Declining or Hazardous areas, where 2 areas were above the mean. The Hazardous grades were the only areas that had 0 areas above the Life Expectancy mean. There is a relationship that is statistically significant at $p = .001$.

Median Age

(H.O.): There is no relationship between the former graded areas and Median Age in Richmond, Virginia.

(H1): There is a relationship between the former graded areas and Median Age in Richmond, Virginia.

Table 6: Richmond HOLC Graded Areas and Median Age

HOLC Graded Areas	Less than or Equal to the Mean	Greater than the Mean
Best	1	4
Still Desirable	3	5
Definitely Declining	4	4
Hazardous	6	2
Total Areas	*14*	*15*

The mean for median age is 37.6 years old in the 29 graded areas. Table 6 shows that four areas that were graded Best or Still Desirable were less than or equal to the mean. A mild difference occurred for the graded areas that were either Definitely Declining or Hazardous, whereas 6 areas were above the mean. There is not a significant relationship at p = .234

Over 65

(H.O.): There is no relationship between the former graded areas and Median Age in Richmond, Virginia.

(H1): There is a relationship between the former graded areas and Median Age in Richmond, Virginia.

Table 7: Richmond HOLC Graded Areas and Over 65

HOLC Graded Areas	Less than or Equal to the Mean	Greater than the Mean
Best	0	5
Still Desirable	2	6
Definitely Declining	5	3
Hazardous	5	3
Total Areas	*12*	*17*

The mean for the population over 65 in the 29 graded areas is 14%. Table 7 shows that two areas had a population less than or equal to the mean. The Best graded area had 0 areas less than or equal to the mean. The areas that were graded Definitely Declining or Hazardous had 6 areas above the mean. There is not a significant statistical relationship at $p = .061$.

Poverty

(H.O.): There is no relationship between the former graded areas and Poverty in Richmond, Virginia.

(H1): There is a relationship between the former graded areas and Poverty in Richmond, Virginia.

Table 8: Richmond HOLC Graded Areas and Poverty

HOLC Graded Areas	Less than or Equal to the Mean	Greater than the Mean
Best	5	0
Still Desirable	8	0
Definitely Declining	1	7
Hazardous	2	6
Total Areas	*16*	*13*

The mean for poverty is 19.5% in the 29 graded areas. Table 8 shows that the areas that were graded Best or Still Desirable had 13 areas less than or equal to the mean of poverty. The opposite finding occurred for the graded areas that were Definitely Declining or Hazardous, whereas 13 areas were above the mean. Furthermore, the Best and Still Desirable had 0 areas that were above the mean. There is a significant statistical relationship at $p = .001$.

Health Vulnerabilities

The following data will focus on the health disparities in Richmond. Using the same methodology, the research will test a relationship with the percentage of asthma, cancer, diabetes, high blood pressure, kidney disease, mental health problems, obesity, and pulmonary disease. In Richmond, a 2016 study by Virginia Commonwealth University's Center on Society and Health found that African-Americans from the East End show a greater risk of developing several preventable diseases including high blood pressure, cardiovascular disease, and diabetes. They also exhibit higher rates of obesity and smoking and lower access to health coverage and health services (Willis 2017).

In Richmond, there are pockets of wealth along with pockets of poverty. The data shows that these wealth gaps and health statuses result from what neighborhoods in which residents currently reside. This section will show there are health inequities in Richmond. This section also seeks to create awareness about how residential segregation has impacted minorities' health status. For example, access to mental health professionals in some U.S. neighborhoods seems to be impacted by redlining policies implemented nearly 100 years ago and deemed illegal in the 1960s, according to new research by George Washington University's Milken Institute School of Public Health (Roos 2022).

Asthma

(H.O.): There is no relationship between the former graded areas and Poverty in Richmond, Virginia.

(H1): There is a relationship between the former graded areas and Poverty in Richmond, Virginia.

Table 9: Richmond HOLC Graded Areas and Asthma

HOLC Graded Areas	Less than or Equal to the Mean	Greater than the Mean
Best	5	0
Still Desirable	8	0
Definitely Declining	2	6
Hazardous	2	6
Total Areas	*17*	*12*

The mean for asthma is 10.7% in the 29 graded areas. Table 9 shows that 13 areas graded Best or Still Desirable were less than or equal to the mean for asthma percentage. A different finding occurred for the graded areas that were either Definitely Declining or Hazardous whereas 12 areas were above the mean. The lower 2 graded areas had 4 areas less than or equal to the mean and 16 greater than 10.7% with asthma. The Best and Still Desirable graded areas had 0 above the mean. There is a significant statistical relationship at less than $p = .001$.

Cancer

(H.O.): There is no relationship between the former graded areas and Cancer in Richmond, Virginia.

(H1): There is a relationship between the former graded areas and Cancer in Richmond,
Virginia.

Table 10: Richmond HOLC Graded Areas and Cancer

HOLC Graded Areas	Less than or Equal to the Mean	Greater than the Mean
Best	0	5
Still Desirable	3	5
Definitely Declining	4	4
Hazardous	6	2
Total Areas	*13*	*16*

The mean percentage of people with cancer in the 29 graded areas is 5.9%. Table 10 shows that 3 areas that were graded Best or Still Desirable were less than or equal to the mean. The opposite occurred for the graded areas that were graded Definitely Declining or Hazardous whereas 10 areas were less than or equal to the mean. There was a total of 10 areas graded Best or Still Desirable above the mean. There is no significant statistical relationship at p = .064.

Diabetes

(H.O.): There is no relationship between the former graded areas and Diabetes in Richmond, Virginia.

(H1): There is a relationship between the former graded areas and Diabetes in Richmond, Virginia.

Table 11: Richmond HOLC Graded Areas and Diabetes

HOLC Graded Areas	Less than or Equal to the Mean	Greater than the Mean
Best	4	1
Still Desirable	7	1
Definitely Declining	2	6
Hazardous	1	7
Total Areas	*14*	*15*

The mean for the percentage of diabetes is 13% in the 29 graded areas. Table 11 shows that 11 areas that were graded Best and Still Desirable were less than or equal to the mean. A different finding occurred for the graded areas that were either Definitely declining or Hazardous whereas 13 areas were above the mean. Only 2 areas that were graded Best or Still Desirable were above the mean. The relationship is statically significant at $p = .005$.

High Blood Pressure

(H.O.): There is no relationship between the former graded areas and High Blood Pressure in Richmond, Virginia.

(H1): There is a relationship between the former graded areas and High Blood Pressure in Richmond, Virginia.

Table 12: Richmond HOLC Graded Areas and High Blood Pressure

HOLC Graded Areas	Less than or Equal to the Mean	Greater than the Mean
Best	3	2
Still Desirable	6	2
Definitely Declining	2	6
Hazardous	1	7
Total Areas	*12*	*17*

The mean for the 29 graded areas with high blood pressure is 35.1%. Table 12 shows that the areas graded Best or Still Desirable had 9 areas less than or equal to the mean. The findings are different for the areas graded Still Desirable or Hazardous, whereas there were 13 areas above the mean. There is a significant statistical relationship at $p = .044$.

Kidney Disease

(H.O.): There is no relationship between the former graded areas and Kidney Disease in Richmond, Virginia.

(H1): There is a relationship between the former graded areas and Kidney Disease in Richmond, Virginia.

Table 13: Richmond HOLC Graded Areas and Kidney Disease

HOLC Graded Areas	Less than or Equal to the Mean	Greater than the Mean
Best	4	1
Still Desirable	7	1
Definitely Declining	2	6
Hazardous	1	7
Total Areas	*14*	*15*

The mean for kidney disease is 3.4% in the 29 graded areas. Table 13 shows that the areas graded Best and Still Desirable had 11 areas less than or equal to the mean. The opposite finding occurred for the graded areas that were either Definitely Declining or Hazardous, whereas 13 areas were above the mean. There is a significant statistical relationship at $p = .005$.

Mental Health Problems

(H.O.): There is no relationship between the former graded areas and Mental Health Problems in Richmond, Virginia.

(H1): There is a relationship between the former graded areas and Mental Health Problems in Richmond, Virginia.

Table 14: Richmond HOLC Graded Areas and Mental Health Problems

HOLC Graded Areas	Less than or Equal to the Mean	Greater than the Mean
Best	5	0
Still Desirable	8	0
Definitely Declining	2	6
Hazardous	0	8
Total Areas	*15*	*14*

The mean for mental health problems in the 29 graded areas is 13.9%. Table 14 shows that 13 areas graded Best or Still Desirable is less than or equal to the mean. A different finding occurred for the graded areas that were either Definitely Declining or Hazardous, whereas 14 areas were above the mean. The Best and Still Desirable areas had 0 areas above the mean. The relationship is statistically significant at less than $p = .001$.

Obesity

(H.O.): There is no relationship between the former graded areas and Obesity in Richmond, Virginia.

(H1): There is a relationship between the former graded areas and Obesity in Richmond, Virginia.

Table 15: Richmond HOLC Areas and Obesity

HOLC Graded Areas	Less than or Equal to the Mean	Above the Mean
Best	4	1
Still Desirable	7	1
Definitely Declining	2	6
Hazardous	1	7
Total Areas	*14*	*15*

The mean for obesity is 33.9% in the 29 graded areas. Table 15 shows a total of 11 areas that were graded Best or Still Desirable were less than or equal to the mean. The opposite finding occurred for the graded areas that were either Definitely Declining or Hazardous, whereas 13 areas were above the mean. The relationship is statistically significant at p = .005.

Pulmonary Disease

(H.O.): There is no relationship between the former graded areas and Pulmonary Disease in Richmond, Virginia.

(H1): There is a relationship between the former graded areas and Pulmonary Disease in Richmond, Virginia.

Table 16: Richmond HOLC Graded Areas and Pulmonary Disease

HOLC Graded Areas	Less than or Equal to the Mean	Above the Mean
Best	5	0
Still Desirable	8	0
Definitely Declining	2	6
Hazardous	1	7
Total Areas	*16*	*13*

The mean for the percentage of pulmonary disease is 7.1% in the 29 graded areas. Table 16 shows that 13 areas graded Best or Still Desirable had a mean less than or equal to the mean. The opposite finding occurred for the graded areas that were either Definitely Declining or Hazardous, whereas 13 areas were above the mean. There was a total of 0 areas that were graded Best or Still Desirable above the mean. The relationship is statistically significant at $p = .001$.

Chapter 5

ANALYSIS

This chapter analyzes the findings by looking at the data results for each of the 14 dependent variables. The analysis will state the research and null hypothesis, and a recommendation will be made to support one or the other based on the findings. Ultimately, this decision is based upon the data suggesting a relationship between each of the 14 dependent variables and the independent variable, the 29 graded areas.

Social Vulnerability Index

When examining the findings, there is a clear relationship between the level of social vulnerability and the former HOLC-graded areas. The cross-tabulation table produced data that shows the Definitely Declining and Hazardous graded areas have the most social vulnerability. Furthermore, when testing the relationship with chi-square with a significance level of .05, there is a significant relationship at p = 0001. As a result, the data supports the alternative hypothesis, which suggests a relationship, and rejects the null hypothesis, which states there is no relationship between the level of social vulnerability and the former HOLC policies in Richmond, Virginia.

Percent Minority

When analyzing the findings for the dependent variable percent minority, the cross-tabulation table shows that the Definitely Declining areas and Hazardous graded areas have a higher population of a minority than the Best and Still Desirable graded areas. Furthermore, there is a significant statistical relationship when using a significance level of .05 for the Chi-Square test at p = .005. As a result, the data supports the

alternative hypothesis, which suggests a relationship between the HOLC graded areas and percentage of minority in Richmond, Virginia.

Life Expectancy

The findings show a relationship between the dependent variable of life expectancy and the 29 graded areas. The cross-tabulation table shows the Definitely Declining and Hazardous graded areas have fewer residents over the mean of life expectancy of 75.6 years old. When using a significance level of .05, a significant relationship is evident between the independent and dependent variables at $p = .001$. This data supports the alternative hypothesis which states there is a relationship between the HOLC graded areas and life expectancy in Richmond, Virginia.

Median Age

The findings for the dependent variable median age show data in which there is a higher median age in the top graded Best and Still Desirable areas than in the lower graded areas, Definitely Declining and Hazardous. However, when using a significance level of .05, there is no significant statistical relationship at $p = .234$. As a result, the data suggest there is no significant relationship established. Therefore, the research supports the null hypothesis, which states there is no relationship between the HOLC graded areas and median age.

Over 65

The findings for the dependent variable Over 65 show there are fewer people in the Definitely Declining and Hazardous graded areas over the age of 65. When using a significance level of .05, the Chi-Square test results show no significant relationship

between the dependent and independent variables at p = .061. Therefore, the data supports the null hypothesis which shows there is no relationship between the HOLC graded areas and the population of people over 65 in Richmond, Virginia.

Poverty

The findings for the dependent variable poverty produced results that clearly show much less poverty in the top graded areas of Best and Still Desirable than in the lower graded areas Definitely Declining. In addition, there were zero areas above the mean of poverty in Richmond, Virginia. When analyzing the Chi-Square Test results, there is a significant relationship at .001 when using a significance level of .05. As a result, the research supports the alternative hypothesis showing there is a relationship between the former HOLC graded areas and the percentage of poverty in Richmond, Virginia.

Asthma

The findings for the dependent variable of asthma resulted in a much higher concentration of residents with asthma in the lower graded areas of Definitely Declining and Hazardous. There were 0 Best and Still Desirable areas above the mean percentage of residents with asthma. When using a significance level of .05 the is a significant relationship between the dependent variable asthma and the independent variable of the HOLC graded areas at p =.001. The data supports the alternative hypothesis that there is a relationship between the population with asthma and the HOLC graded areas in Richmond, Virginia.

Cancer

The findings for cancer in Richmond showed a higher level of cancer in the Best and Still Desirable graded areas. In the top graded areas, a total of 10 areas were above the mean. The results showed no significant relationship between cancer and the 29 graded areas at p=.65. The research rejects the alternative hypothesis and supports the null hypothesis which states there is no relationship between the population with cancer and the former HOLC graded areas in Richmond, Virginia.

Diabetes

The findings show that fewer people currently have diabetes in the top graded areas. There was a total of only 2 Best and Still Desirable areas that were greater than the mean percentage of diabetes. On the contrary, the Definitely and Hazardous graded areas have 13 areas are above the mean percentage of residents with diabetes. When using a significance level of .05, the Chi-Square research suggests a significant statistical relationship between the dependent and independent variables at p = .005. The data supports the alternative hypothesis which states there is a relationship between the population with diabetes and the HOLC graded areas.

High Blood Pressure

The findings show a higher percentage of residents who suffer from high blood pressure reside in the Definitely Declining and Hazardous graded areas. The Hazardous graded areas have 7 areas with a higher percentage than the mean. The Chi-Square test shows a significant relationship between the percentage of residents with high blood pressure and the 29 graded areas at p = .044. The research rejects the null hypothesis and supports the alternative, which states there is a relationship between the population with

high blood pressure and the HOLC graded areas.

Kidney Disease

The findings show a much higher concentration of Richmond residents with kidney disease in the Definitely Declining and Hazardous graded areas. In the Best and Still Desirable graded areas, only 2 areas had a higher percentage than the mean of kidney disease percentage. When using a significance level of .05, the Chi-Square test shows a significant relationship between the dependent variable kidney disease and the independent variable of the former Home Owner's Loan Corporation graded areas at $p = .005$. The result is to reject the null hypothesis and support the alternative hypothesis which states there is a relationship between the population with kidney disease and the HOLC graded areas.

Mental Health Problems

When analyzing the findings for mental health in Richmond, the top graded areas have a much less population with mental health problems. A total of 14 Definitely Declining and Hazardous graded areas were above the mean, while zero Best and Still Desirable were above the mean. The data shows a significant statistical relationship at $p = .001$. The result is to support the alternative hypothesis which states there is a relationship between the population with mental health problems and the HOLC graded areas in Richmond, Virginia.

Obesity

The findings show a much larger population of residents in the lower graded areas that suffer from obesity. A total of 13 Definitely Declining and Hazardous graded areas currently have a higher percentage of obesity than the mean average. Furthermore, the Chi-Square test shows a significant statistical relationship between the dependent variable obesity and the independent at $p = .005$. As a result, the data supports the alternative hypothesis which states there is a relationship between the population with obesity and the HOLC graded areas.

Pulmonary Disease

The findings for the dependent variable of the pulmonary disease show a much higher percentage in the Definitely Declining and Hazardous graded areas. There are 13 lower graded areas with a more significant percentage of pulmonary disease than the mean average. The Best and Still Desirable graded areas had 0 areas with a higher percentage than the mean average. The Chi-Square test showed a significant statistical relationship between the dependent and independent variables at $p =.001$. The result supports the alternative hypothesis which states there is a relationship between the population with pulmonary disease and the HOLC graded areas.

Final Analysis

A total of 11 dependent variables had data that supported a significant relationship between them and the independent variable. Median Age, Cancer, and Over 65 were the only dependent variables in which the research showed no significant relationship. While the chi-square test suggested no relationship for these three dependent variables, the cross-tabulation produced different results. When answering the research question, there are glaring differences regarding social vulnerabilities in Richmond, Virginia.

The Definitely Declining and Hazardous have more significant percentages in poverty, minority percentage, asthma, diabetes, high blood pressure, kidney disease, mental health problems, obesity, and pulmonary disease. The number of people living longer is concentrated in the top grades of Best and Still Desirable. For this research purpose, the data strongly rejects the thesis null hypothesis and supports the alternative hypothesis, which states there is a relationship between the former HOLC graded areas and social vulnerabilities in Richmond, Virginia.

CONCLUSION

Out of 14 variables, only 3 failed to show a significant relationship to the independent variable using a significance level of .05. Those 3 dependent variables which the data did not show a significant statistical relationship are Median Age, Over 65, and Cancer. A total of 13 out of 14 dependent variables showed data that suggested the majority of high percentages of each social vulnerability and health problems are mostly concentrated in the lower graded HOLC areas. In the lower graded areas, there is a higher poverty percentage and more health problems such as high blood pressure, mental health, percentage minority, asthma, and life expectancy. In most cases, those dependent variables in the lower graded areas had more health problems and social vulnerabilities.

This research does not come without limitations. The research was performed only on one HOLC-graded city that being Richmond. Applying the research to multiple American cities would give a better indication of the effects of the HOLC policy on health in America. Another limitation is the small number of areas. The limitation of using a nominal category does not give the entire story. For example, when comparing two graded areas (A5) and (D6), the social vulnerability index score for both was below the mean, receiving a nominal category of 1. Even though they both fell below the mean, there was a significant difference between the SVI score. If a larger pool of areas were examined, linear regression could be applied, giving a more specific outcome. The methodology used for this research could also be applied in other public programs such as education. The quality of education could be analyzed in each HOLC-graded area in

other cities to test if there is a significant statistical relationship between HOLC-graded areas and the quality of the schools in those areas.

In many ways, the ruling of Plessy v. Ferguson paved the way for future housing policies to become a reality. The result of the Plessy decision was the legal separation of races in all daily life, including residential areas. Plessy did not directly cause residential segregation, but it did legitimize the laws, customs, and practices that established the Jim Crow regime (Ware 2021). The Supreme Court's decision created the platform for whites and African Americans to be treated in separate hospitals, educated in separate schools, and separated from public transportation. Other effects of the Plessy decision included unequal quality of education, job opportunities, and housing. This is important as having quality health insurance typically involves access to quality education which can result in acquiring a quality job.

The Plessy case also set the table for exclusionary zoning ordinances. Now separation between whites and African Americans was a legal norm as it was illegal in many areas to sell homes to African Americans in the majority-white neighborhoods. While the Supreme Court's decision of (Buchanan v. Warley 1917) may seem like a victory, it actually had a reverse effect for African Americans. Buchanan v. Warley did not eradicate racist land use practices. Instead, it led state and local governments to find alternative ways to maintain segregation (Newcombe 2022). These alternative ways included the establishment of racial covenants, redlining, and the federal highway system. Due to these alternative policies implemented by the federal government, the social determinants of health have been vastly affected. What public health researchers refer to

as the “social determinants of health” are the conditions in which people live, learn, work, and play. Communities experience health burdens grounded in inequities in these social determinants (Ware 2021). Housing is a social determinant of health. There is a clear relationship between housing and well-being. Housing determines access to critical necessities such as safe drinking water, adequate sanitation, protection from natural elements, and access to recreation. Without access to these things, specific populations are at a clear disadvantage regarding health and social vulnerabilities.

Residential areas determine health outcomes. Both diabetes and self-reported health, reported at the tract level by the CDC (2019), show linear trends with HOLC scores and segregation. This means as segregation increases or HOLC grade worsens, health outcomes worsen (Townsley 2021). Historical policies, such as redlining and restrictive covenants, have reinforced inequities. Richmond is no exception. Residents of affluent, majority-white neighborhoods, such as Westover Hills, have more than a 20-year increased lifespan over members of majority Black communities, such as Gilpin. Yet, they are separated by no more than 7 miles (VCU Office of Health Equity 2022).

The paper's focus on historic housing policies tells a straightforward story of why specific populations in Richmond are disadvantaged in 2021. It shows a history of judicial decisions that paved the way for residential discrimination and created many poor health conditions in specific areas in Richmond. These historic policies should inspire policymakers and the public to examine current housing practices. Many Americans assume that populations, specifically African Americans, bring these conditions on themselves. The research suggests otherwise.

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