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Department of Geography and the Environment

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This study analyzes the relationship between housing discrimination and equity within the City of Denver. This study creates a discrimination index by combining (1) historical Discrimination, (2) contemporary segregation, and (3) housing inequity data into an index to compare the Denver Department of Health and the Environment (DDPHE) 2020 equity index using a local bivariate analysis. This study found a negative linear relationship between the created and Denver equity indexes. The variables used for the discrimination index can explain some of the relationships, but future studies should use more variables for a discrimination index.

Introduction

The city of Denver was founded in 1858. Many American settlers had racist and hateful attitudes against people of different races, which affected the city's initial structure. In 1968 The federal government made housing discrimination illegal. Today, many diverse communities exist, but there is still inequity along socioeconomic and racial lines. This study will seek to create a discrimination index that utilizes contemporary and historical discriminatory metrics. This study will also compare the discrimination index to the modern-day equity index created by DDPHE in 2020. The study area for this project will include the census tracts for the entire city/county of Denver, CO. I hypothesize that there will be a statistically significant negative linear relationship between the discrimination index and the DDPHE Equity index for the majority of Denver's statistical neighborhoods. Where equity is high, discrimination will be low, and where equity is low, discrimination will be high.

Literature Review

A Short History of Segregation in the City of Denver

White immigrants arrived in the area of modern Denver when gold was found in the area in the 1858s (Landry 2013). Some native (indigenous peoples) elders ceded territory under the misleading circumstances of the Treaty of Fort Wise in 1861. In August 1864, Governor Evans proclaimed "to kill and destroy, as enemies of the country… all hostile Indians." (Landry 2013). Evans believed that any "good" Indians would be housed safely at the U.S. forts. Coloradoan's escalating actions eventually led to the Sand Creek Massacre in 1864, where U.S. soldiers killed hundreds of Arapaho and Cheyenne

women and children on lands they had lived in for hundreds of years. As Native/indigenous people were driven out of Colorado, many immigrants from Europe and Asia came to work in the mining towns. In 1880 a white mob was responsible for destroying a Chinese Neighborhood (Fulcher 2019). From this white riot, one hundred fifty insurance claims for damages totaling more than $30,000 were filed. However, no Chinese residents received compensation for their homes or business losses, and many were permanently driven out of the city (Fulcher 2019). As the 1900s approached, many black people moved to urban areas during a time known as the Great Migration (Rothstein 2017). As more immigrants moved to Denver, anger towards them grew. Due to ongoing civil conflicts in Europe, many immigrants from Italy, Ireland, and Germany also came to the city (Noel 2009). In the 1900s, Non-European and foreign-born Europeans often did not get the same opportunities that other American-born whites received. During the Prohibition era, the KKK became a major politically significant group in Denver, and hateful sentiment towards minorities grew. Germans, Irish, and Italians typically would drop aspects of their culture to assimilate within the city, while most black, indigenous people of color (BIPOC) could not. Acceptance of minorities by white neighbors was challenging due to their beliefs in their racial superiority.

As the town grew from 1910-1940, racial zoning adopted by Southern cities (Silver, 1991) became a prominent way to divide the city into racial and social classes. Zoning that created single-family homes and prohibited multi-family units prohibited minorities and immigrants from living in certain areas. The Home Owners' Loan Corporation (HOLC) was established in the 1930s. The HOLC established the famed redlining neighborhood ranking system during that period. Local real estate developers and appraisers assessed residential areas in over 200 cities. The company utilized these maps as a risk map for mortgage lending. Racial segregation increased substantially on spatial scales each decade between

1900 and 1940, partly due to HOLC and the Federal Housing Administration (FHA) practices (Fishback, 2021). 1938-1968 was another time Denver grew but still largely prohibited minorities and foreigners from living in some areas (the United States Census, 1952). Post-WW2 sentiment for many German immigrants remained negative (Noel 2009), but other foreign-born European immigrants succeeded in this period. By the 1960s census, many foreign Europeans had mixed children with "Native-born"(not indigenous peoples) white Americans. Zoning laws established throughout the 1950s- 1980s in Park and Capitol Hill prohibited people that did not have nuclear families from establishing housing (Cole 2014). In 1958 The Denver Urban Renewal Authority (DURA) was created by the City and County of Denver to go after blighted properties to raise their property values. Most of these areas existed in minority neighborhoods. In 1968, the Fair Housing Act prohibited discrimination based on race, color, national origin, religion, sex, familial status, and disability. Going forward, the federal government could not discriminate, but because of Denver's structure, zoning, and culture, many things stayed the same after the civil rights movement.

The area that is now the University of Colorado Auraria campus was once a thriving Hispanic community in the Late 1960s. The houses in the area were seized by DURA and destroyed (Page and Ross 2016). Hundreds of Latino people were displaced by 1973 (Gilbert 2021). That same year, Denver created a blight map in its "Condition of the City" report to show run-down and dilapidated places that need repair (Beaty 2021). Using 15 different factors, the city of Denver chose to pick areas based on their economic struggles. The areas marked "blighted" were occupied by black and brown people. In 1974 HUD created the Housing Choice Voucher (HCV, Section 8) program to allow partial payments to renters to afford rent. Private and public Landlords can deny HCV tenants from living in their high-income

neighborhoods. Zoning laws prohibited low-income public housing from being built in high-income neighborhoods. Landlords' zoning and legal practices cause most public housing and HCV tenants to live in previously redlined and segregated areas (Rothstein 2017, p.188). Denver urban renewal projects are more likely to have projects in previously segregated areas for highways, stadiums, and other public projects (Page and Ross 2016).

In the late 2000s, the U.S. housing crisis was caused partially by nationwide subprime mortgages. Many of these subprime mortgages were created through the process of reverse redlining. Reverse redlining provides loans under unfair terms to borrowers, typically based on poverty, race, ethnicity, or geographic boundaries (Brescia 2009). Today, previously redlined areas face the same issues they did when segregation was legal. In Richard Rothstein's *The Color of law*, his central thesis is that the government created explicit rules that made the issue of housing segregation in the creation of most U.S. cities. The Fair Housing Act removed racial discrimination but did little to remedy the long-term effects of previous segregation. In the City of Denver, patterns of inequity today line up with past discrimination and housing inequity.

Redlining

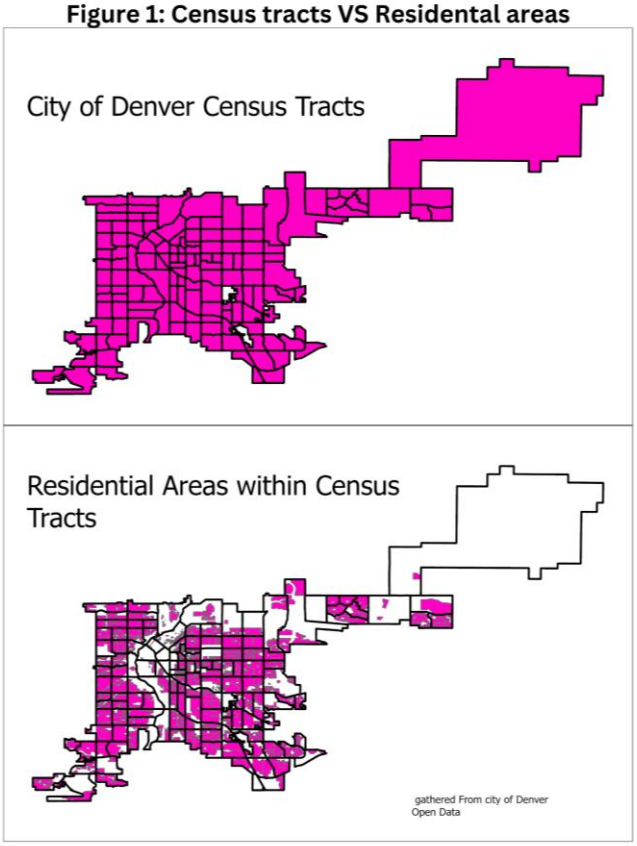
Housing segregation frequently occurred in Denver's past, but segregation is not always represented within publicly available maps. The HOLC maps are often used for redlining studies but only account for 4-20% of housing discrimination (Fishback, 2022). While visually appealing, HOLC mapping is not the best way to map segregation; many other studies look at creating redlining indexes from several data sources. The devaluation of minority properties had consistent explicit and implicit policies that continued after the 1930s. Redlining was only sometimes documented for two main reasons, (1) HOLC

maps show redlining based on private real estate investors. (2) These HOLC maps only show redlining for a short period in America's history (Hillier, 2003). Housing segregation legally occurred in Denver for 109 years between its founding and the 1968 Fair housing act. Denver is 163 years old, which means 67% of Denver's planning involved legal racial segregation. Most comparisons between housing inequity and housing segregation today are compared to the 1938 HOLC Map. Taking a map from 1 out of 110 years does not show the potential history of segregation. To show the history of segregation, maps from multiple years when segregation occurred need to be shown. Hillier looked at several types of discrimination data from Philadelphia in the 1940s and did four spatial regressions using GIS to find where nondocumented redlining might have occurred. The analyses resulted in several map layers that showed where lending occurred. Overall, this study provides an updated spatial view of redlining in Philadelphia and could be used as a framework to find redlining in other cities. (Lynch et al., 2021) Created a redlining index using the HOLC 1930 map of the town of Milwaukee. Areas rated A-D in the original maps were changed to a numerical index within the census tracts. Tracts that contained more than 50% of the 1930s redlining were ranked. These redlining zones are compared to modern Home Mortgage Disclosure Act (HMDA) data. The downside of this analysis is that the redlining data becomes less useful in city areas that were expanded after the 1930s. This analysis also used modern census tracts against historical zones. Census tracts are created for statistically significant areas, but the entire census tract is not residential.

While the overall relationship between the discrimination index and the Denver Equity is not statistically strong, there is still a relationship within some neighborhoods that suggest that aspects of discrimination affect equity. GIS analysis studies look at the geographic relationship between places in

space, but time is another critical factor in that study. Periods that are closer together measuring there might be more statistical relationships between 1950 and 1960 than between 2020 and 1938; looking at more variables from multiple periods in Denver's History could produce more significant results. There are differences between census tracts and residentially zoned areas. **Figure 1** shows the difference between Census tracts and the residential areas within census tracts. Census tracts and Statistical neighborhoods are not inhabited in different ways.

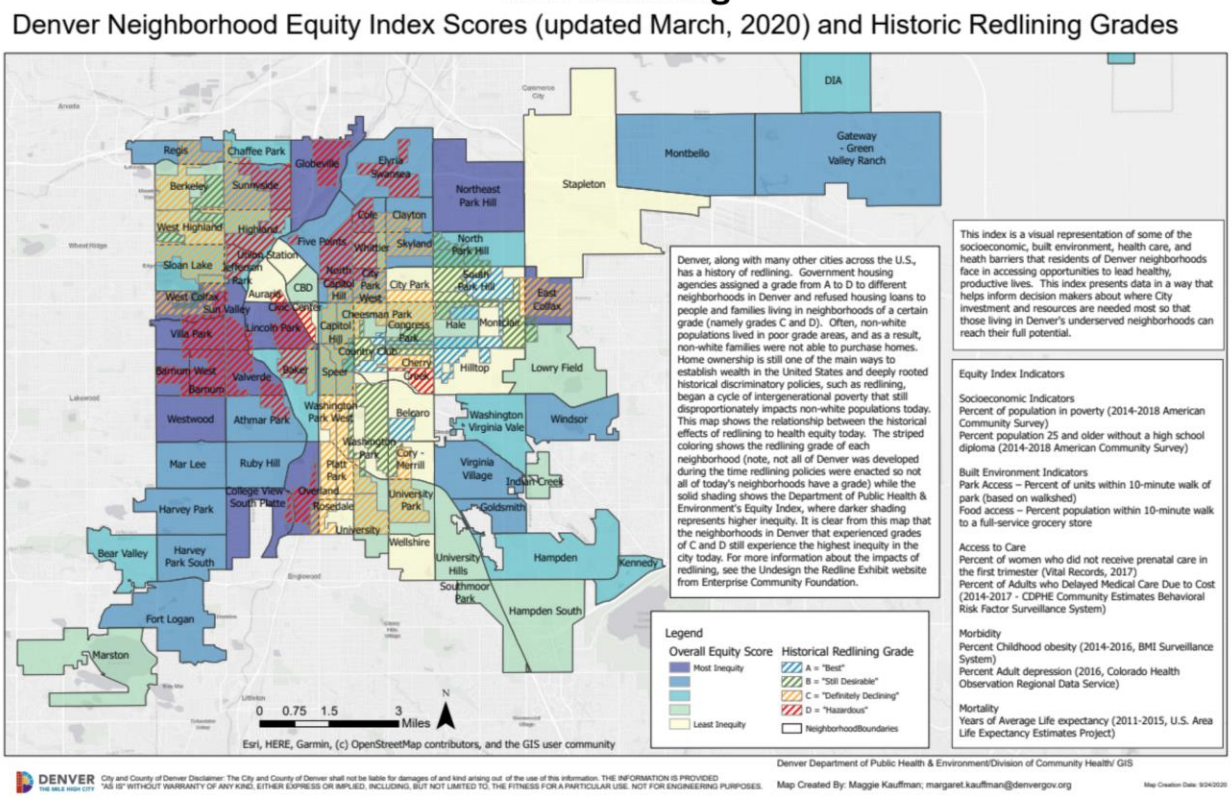
Figure 1: Census tracts VS Residental areas



Several metrics must accurately map where redlining exists in historical and contemporary settings. Currently, in the city of Denver, there have been several studies on equity using the following

indicators: socioeconomic, mortality, morbidity, and environmental factors (Kauffman & City of Denver, 2020). These indicators created an inequity index and performed an overlay visual analysis with HOLC redlining maps from the 1930s. These maps help visualize the area of need in Denver today, but they typically only show the secondary results that resulted from explicit housing discrimination from the 1930s.

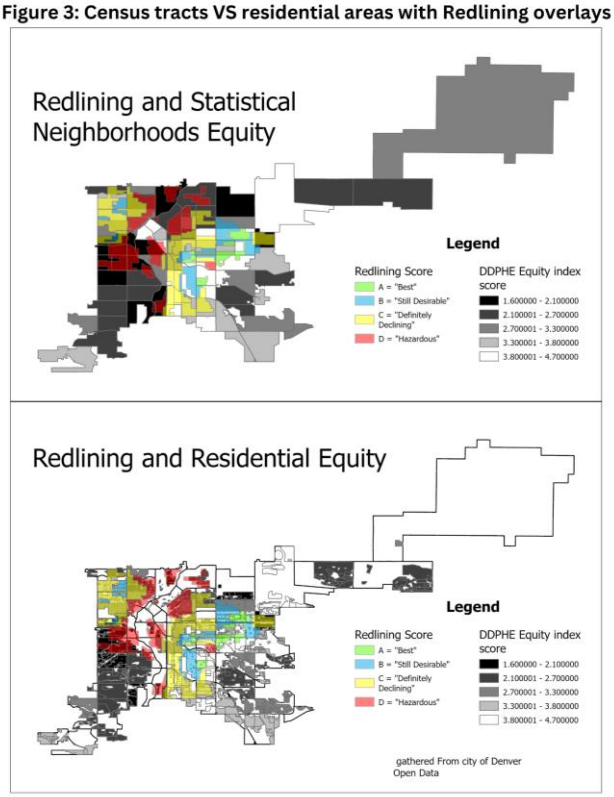
Figure 2: Kaufman's/DDPHE Equity map overlaid with redlining



In **Figure 2,** Kaufman's equity map redlining is overlaid over Denver's statistical neighborhoods, not the residential areas. In **Figure 3,** Redlining is overlaid over 2 versions of the DDPHE equity map. The first map has the original Statistical neighborhoods. The second map has an overlay of the equity study

Clipped to residential areas. Since the HOLC maps are residential maps, they should be compared to modern residential maps, rather than statistical neighborhoods or census tracts.

Figure 3: Census tracts VS residential areas with Redlining overlays



Several studies point out different methods of measuring and comparing historical redlining to contemporary issues in American cities. For the redlining mapping portion of this study, redlining index combines the residential areas with census tract areas to more accurately show where redlining and housing discrimination existed within the City of Denver.

Contemporary Segregation and Diversity

There are no current laws that allow for segregation in modern Denver, but there are ways of measuring segregation using demographic information. One way that segregation is measured is The Divergence

Index. (Mitchell 2018) The Divergence Index contrasts the proportions of different racial groups at different geographic scales, such as between a census tract and a county (Menendian 2021). Higher values indicate higher divergence and, therefore, higher segregation. For example, the index will be classified as highly divergent if Denver has 39% Hispanic residents but a census tract only has 1% Hispanic residents. When the demographics of minor geography do not differ, the divergent index level will be zero, indicating no segregation.

Another metric of modern Segregation is HUD'S racially and ethnically concentrated regions of poverty (R/ECAPs) index. The racial/ethnic concentration criteria are simple: R/ECAPs must have a population of at least 50% non-white and an exceptional poverty level where at least 40% of their residents live in poverty.

Reverse Redlining, Public housing, and housing inequity

One issue of housing inequity is the availability of loans for first-time houses. Real estate agents have historically given subprime loans to people who live in poorer or more inequitable areas. (Szto 2013) Subprime and predatory loans exploit buyers' lack of knowledge to give them a worse deal on their houses. (Hayes 2020) Because of the increased subprime loans within the last few years, there is also an increase in Foreclosures. Data on if someone was given a bad loan is not readily available, but foreclosure data is. Areas with higher foreclosure density potentially have more subprime loans. Public housing for LIHTC and HCV housing is typically not created or built-in socioeconomically equitable areas (Rothstein,2017). Housing programs were created to help people get out of poverty or afford a place to live, but because they exist in inequitable areas, things are more difficult for low-income people.

For this study, a different method will be used for three main metrics Historical Discrimination, Contemporary segregation, and Housing Inequity. Each metric quantifies how much effect it has on a scale from 1-5, with one being the least discriminatory and five being the most.

For example, the metric for calculating public housing (P.H.) and housing choice voucher density will use standard deviations from the mean housing density. Areas with densities significantly higher than the mean will be rated 4 and 5 for each variation, density lower than the mean will be ranked 1 and 2. The final Redlining index score will be calculated by averaging the combined metrics into one attribute column. Once the discrimination index is created and added to the census tract shapefiles, a Local Bivariate Relationships analysis will be done with the current DDPHE Equity data (Kauffman, 2020) to compare potentially statistically significant relationships between the two indexes.

Methodology

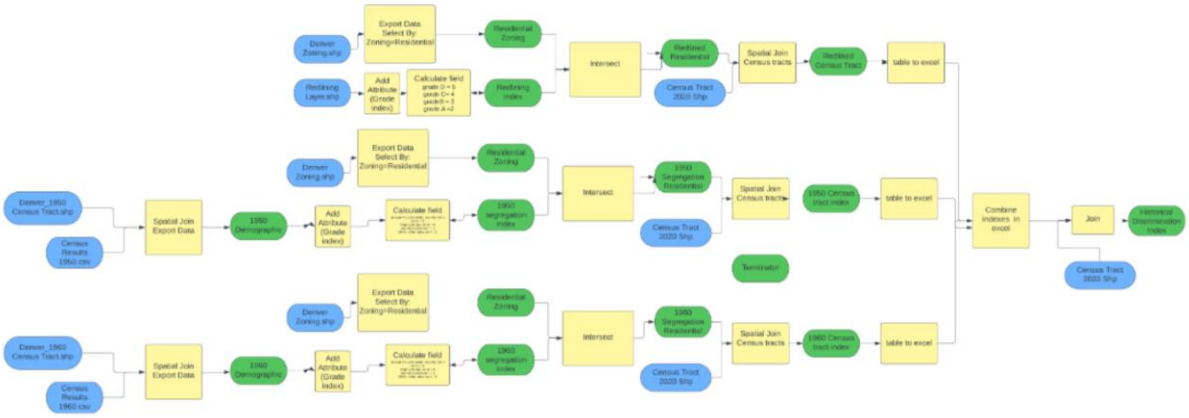
The housing discrimination indices were created along Denver Census tracts by looking at three key indicators of housing discrimination (1) Historical redlining/segregation, (2) Contemporary Racial Segregation (3) Contemporary Housing inequity. The three metrics were each calculated by a combination of attributes and valued at a range of 1 as the most and five as the most discriminatory. Once all the indexes are created, they will be combined into a singular discrimination index. Once the Three Indexes are combined into one index, the features were summarized within the 2020 DDPHE Equity index for the City of Denver. The Local bivariate analysis will be performed to detect if there are

any statistically significant relationships between the 2020 Denver equity index and the study's Discrimination index.

Historical Index

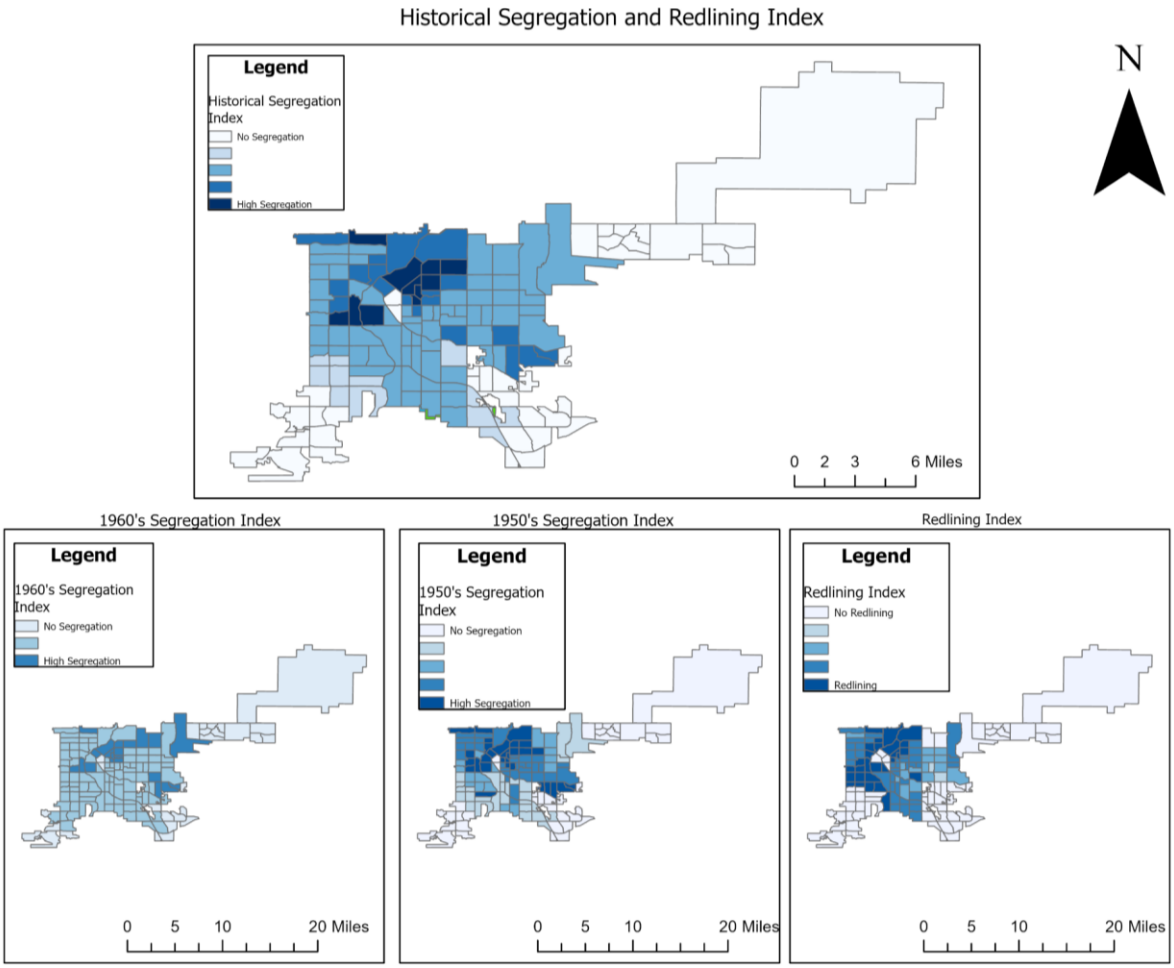
The index was created using the 1938 HOLC map, 1950s Census demographic maps, and 1960s U.S. Census demographic maps. (Manson et al. 2021). Each dataset was intersected with residentially zoned areas and then combined with census tracts. To create a redlining and segregation index, areas that the HOLC redlined as the poor condition were rated as a 5, areas with no HOLC boundary will be rated as a 1, and areas that did not exist during the HOLC maps will be rated as 1. For the 1950/1960 data, a designation was made to match the segregation of the HOLC map. Areas with higher-than-usual minorities were rated as 5, and areas that were Mostly native-born white were rated as 2. Areas that were not added after 1960 were rated as 1. The 1950s data had more significant differences between native white people and foreign white people. In 1960, more foreign-born Europeans were integrated with native-born white people, so there was more segregation based on white/European people and Black, Asian and Hispanic people. Figure 4 shows the workflow diagram for the historical indexes, and Figure 5 shows the resulting maps.

Figure 4: Historical Index Flow chart



This index took 1938 HOLC redlining data, 1950s Census data, and 1960's to create an index that shows the severity of negative legal segregation that occurred when Racial segregation was legal

Figure 5: Historical Index Mapss

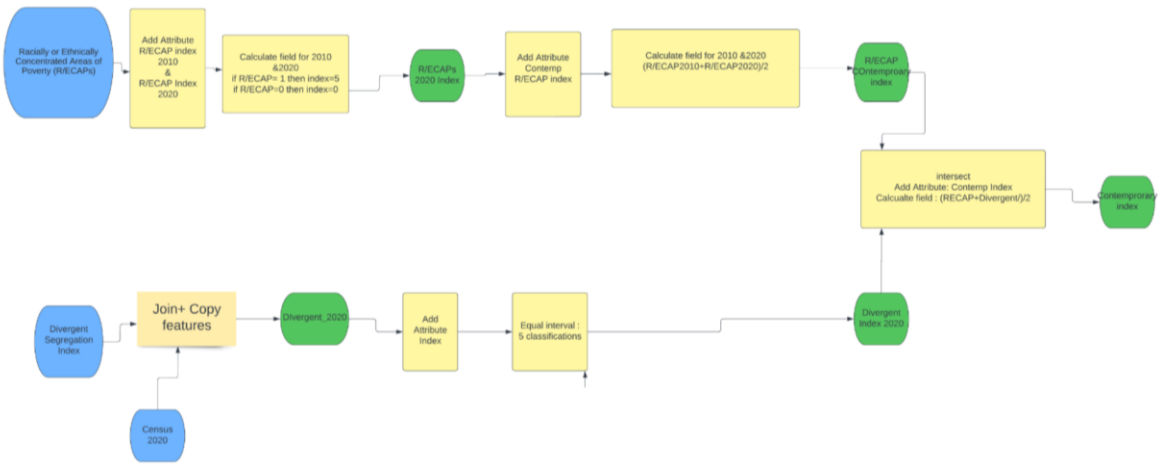


Each historical index was combined to create the Historical Segregation and Redlining map

Contemporary Segregation Index

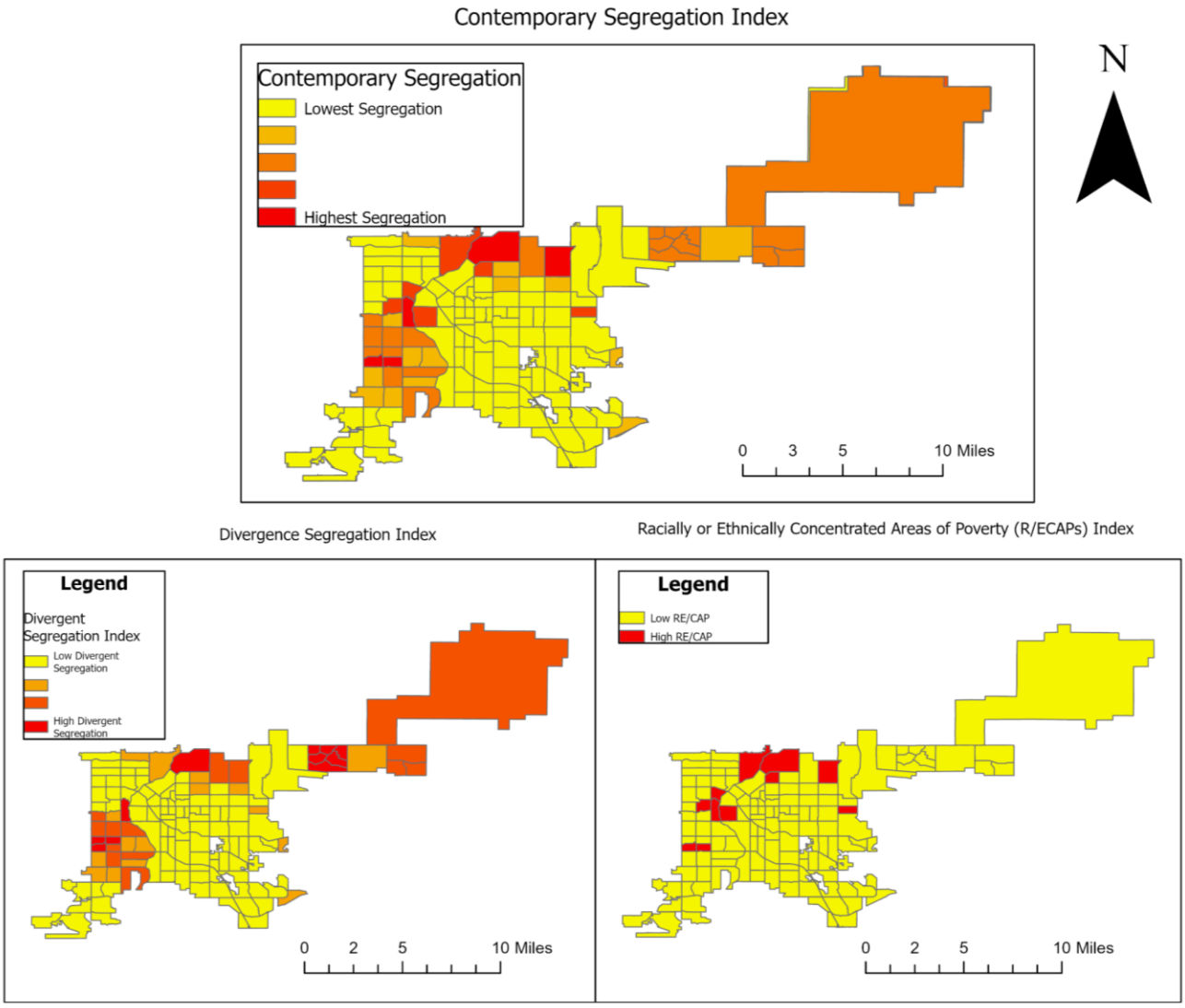
Two features were used for the contemporary segregation map to calculate contemporary segregation. The Divergence Segregation metric from (Menendian 2021) and Racially or Ethnically Concentrated Areas of Poverty (R/ECAPs) from HUD. R/ECAPs values of 1 were given, an index of 5 values of 0 was given For Divergence, and the fields were reclassified into equal intervals. The highest interval got an index rating of 5, while the lowest got an index of 1. **Figure 6** shows the workflow diagram for the Contemporary indexes, and **Figure 7** shows the resulting maps.

Figure 6: Contemporary Index Flow Chart



This index took the divergent segregation index from The Othering and Belonging Institute, and the HUD Racially or Ethnically Concentrated Areas of Poverty (R/ECAPs)

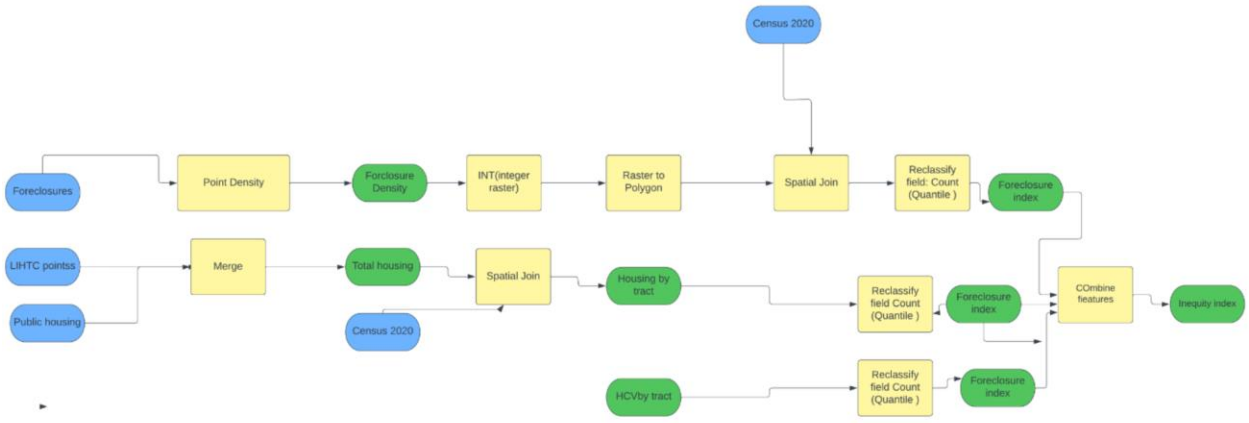
Figure 7: Contemporary Index Map



Housing Inequity Index

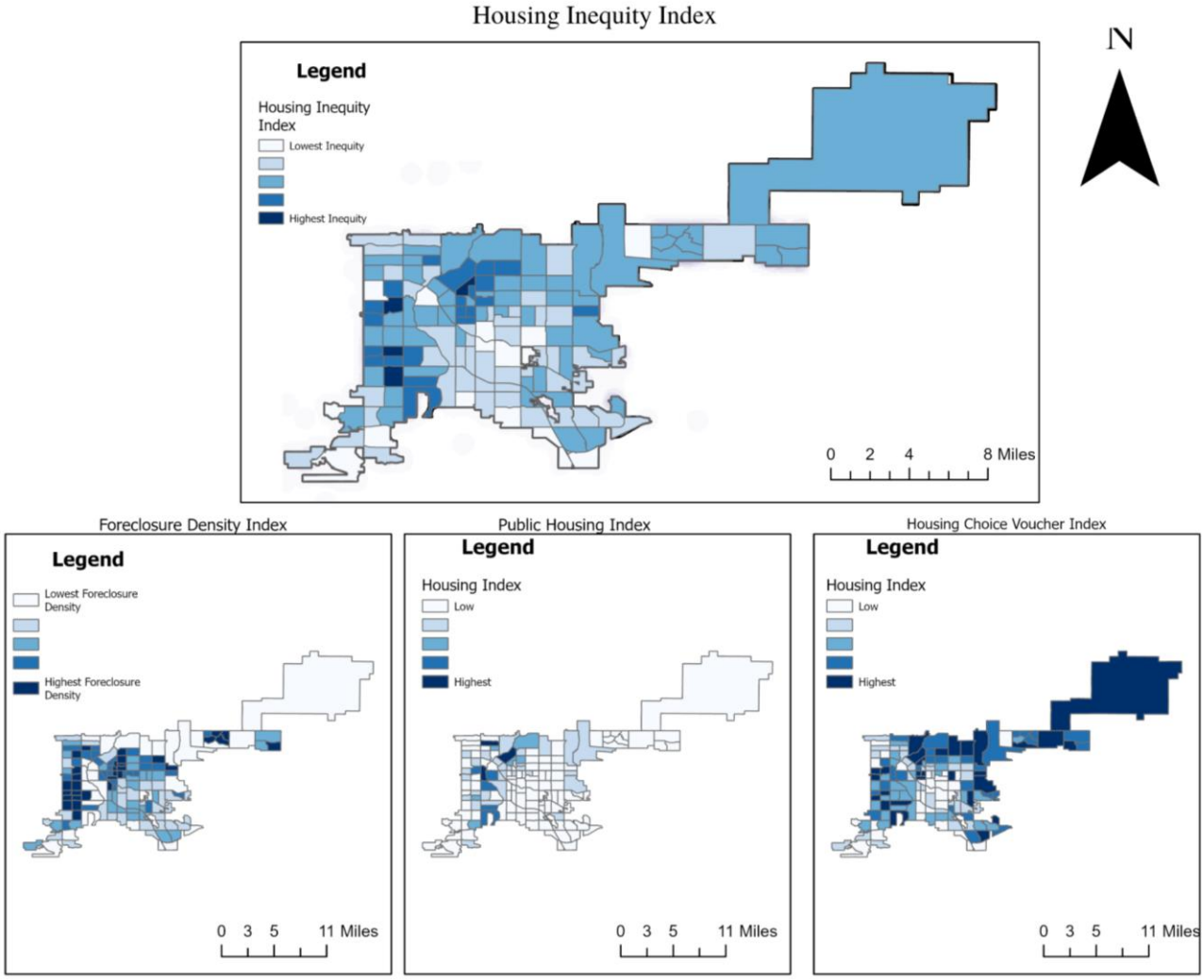
Housing Inequity metrics were used by Foreclosure hotspot density, Housing Choice Voucher (HCV) amount, and public housing amount. Foreclosure data was acquired from the City of Denver, and a Hot spot analysis was done. This data was converted to polygons and spatially joined to Denver Census tracts. For public housing, public housing points were spatially joined to Denver Census tracts, and HCV data already exists on census tracts. For HCV an P.H., Each field was reclassified to 5 quantiles. The highest quantiles were marked as five the lowest quantiles were rated as 1. **Figure 8 shows** the workflow diagram for the Housing inequity index, and **Figure 9** shows the resulting maps.

Figure 8: Housing Inequity Index



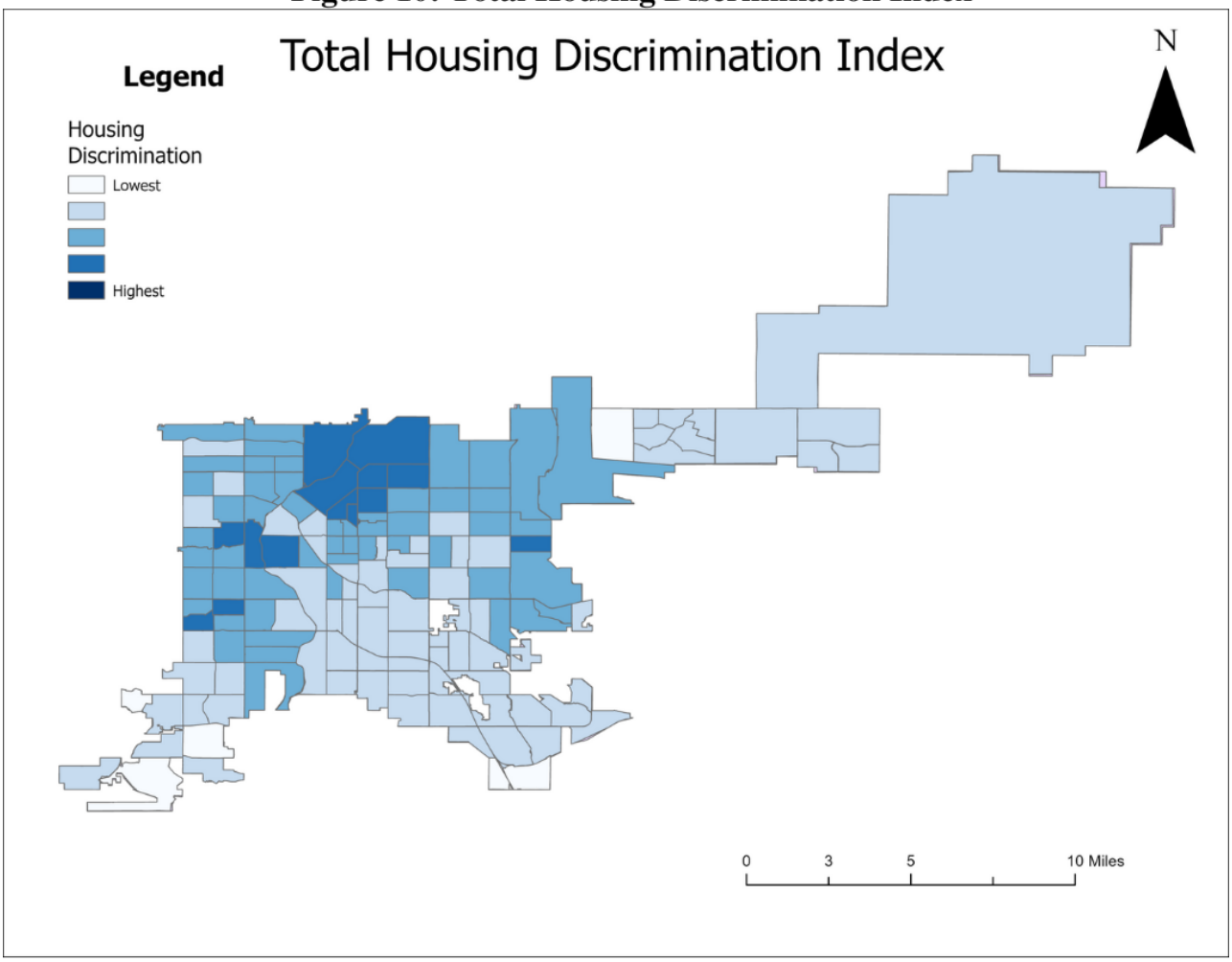
This index took Foreclosure data, LIHTC points, and Public housing that shows the severity of negative legal segregation that occurred when Racial segregation was legal

Figure 9: Housing Inequity Index



Once all indexes were created, they were combined into a singular discrimination index. The features were summarized in the 2020 DDPHE Equity index for the City of Denver. The Local bivariate analysis will be performed to detect if there are statistically significant relationships between the 2020 Denver equity index and the study's Discrimination index. **Figure 10** shows the completed index for Total Housing discrimination.

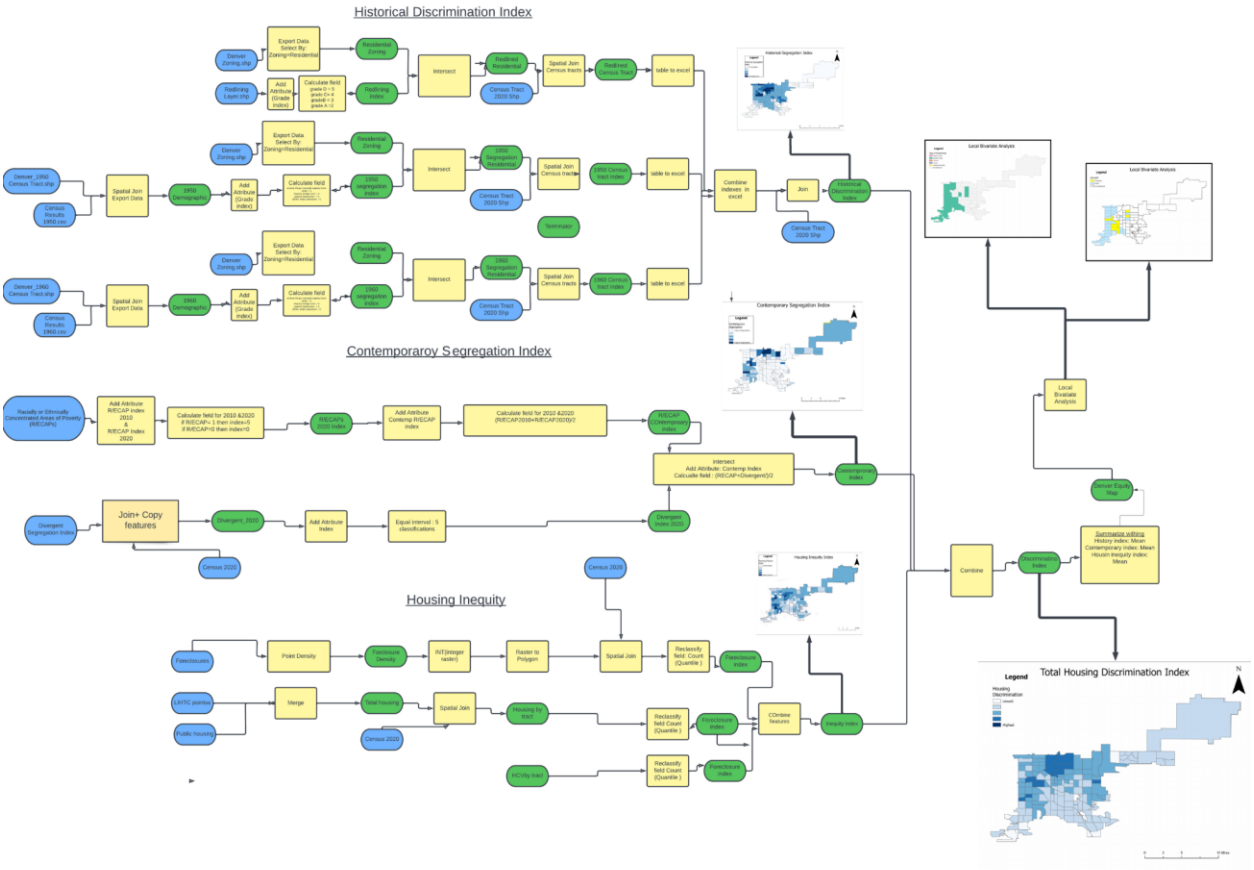
Figure 10: Total Housing Discrimination Index



This Discrimination index took all of the indexes and combined them to create the total discrimination index

Methods Flow Chart

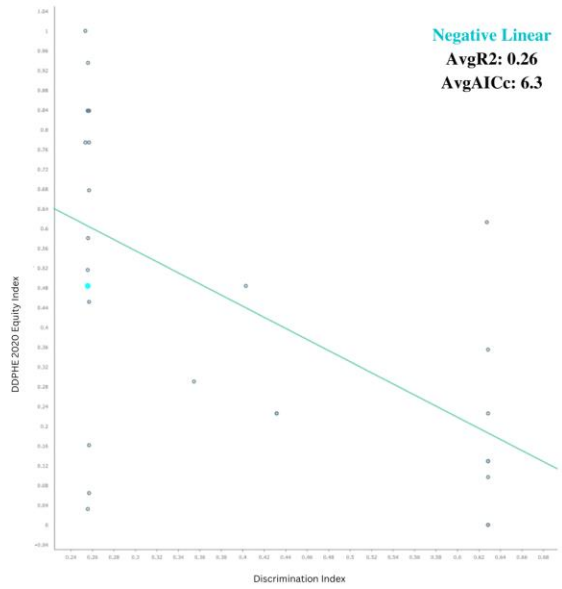
Figure 11: Flow Diagram



Results

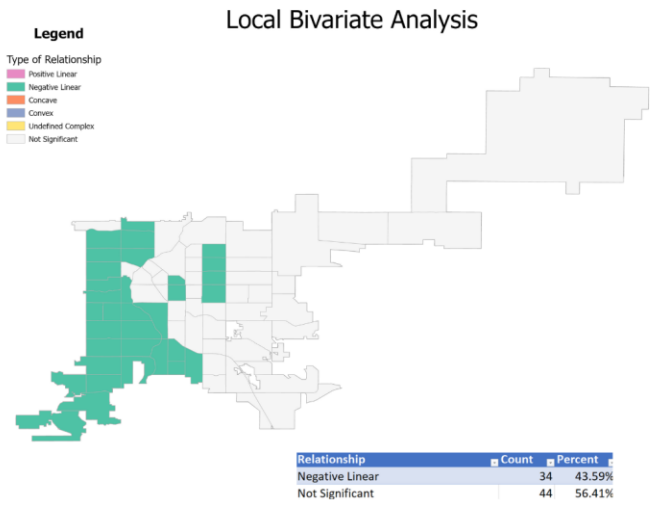
Denver census tracts are affected by housing inequity from 3 perspectives. Those generalized indexes were then compared to the Denver equity 2020 map using Local bivariate analysis. In **Figure 12**, the relationship between 34 Statistically significant data points showed. The Average R-squared value for the neighborhoods was 0.26, and the AvgAICc was 6.3 with a range of 4.4-14.1. 34 out of 78 neighborhoods had a Statistically significant negative relationship between the variables.

Figure 12: Bivariate Results



In F**igure 13**, the map of the neighborhoods showed a statistically significant negative linear relationship. The other 44 neighborhoods had no significant relationship.

Figure 13: Bivariate Maps



Relationship	Count	Percent
Negative Linear	34	43.59%
Not Significant	44	56.41%

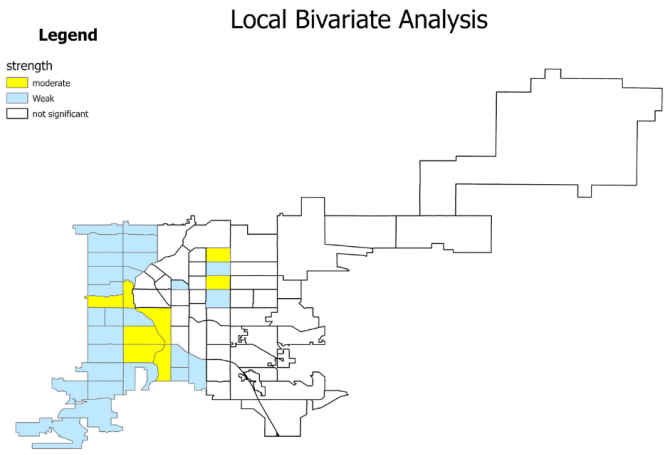
34 Neighborhoods Had a Statistically significant negative relationship

8 Neighborhoods had an R Squared value of 0.3-0.4, which suggests a moderate correlative relationship.

26 neighborhoods had an R Squared value of 0.1-0.3, which suggests a weak correlative relationship as

seen in **Figure 14** the neighborhoods that had weak and moderate relationships are labeled.

Figure 14: Bivariate Map Strength



26 neighborhoods had a weak correlative relationship
8 Neighborhood had a moderate correlative relationship

Discussion

These results show a relationship between historical, contemporary, and ongoing housing inequity. There is no significant relationship in areas with less severe discrimination or lower index scores. Most of the results (44/78) from the Local Bivariate analysis are not statistically significant. 34/78 neighborhoods had a negative relationship suggesting that where equity is less, the discrimination index is higher, but where equity is higher, the discrimination index is less. The negative relationship within the neighborhoods was statistically weak, with a low correlation. 8 of the 78 neighborhoods had a moderate correlative relationship between the equity and discrimination maps. While the overall relationship between the discrimination index and the Denver Equity is not statistically strong, there is still a relationship within some neighborhoods that suggest that aspects of discrimination affect equity.

The hypothesis is null because most of Denver's neighborhoods did not have a statistically significant relationship. The ones that did had a weak to moderate correlative relationship. There are (1) potentially more factors that cause inequity within Denver, and (2) only some of the variables that explain discrimination was included in the analysis. The analysis also combined several features into one singular index. Historical Segregation might have a higher correlation than contemporary Segregation, and combining them could have skewed both indices' results. Future studies should examine these various features separately before combining them into a singular index. GIS analysis studies look at the geographic relationship between places in space, but time is another critical factor in that study. Periods that are closer together measuring there might be more statistical relationships between 1950 and 1960 than between 2020 and 1938; looking at more variables from multiple periods in Denver's History could produce more significant results.

Areas for Further Research

Mapping Greenlining

Most studies addressing redlining seek to observe where the negative discrepancies connect with the redlining of the past. Very few studies look at the positive advantages of a greenlined area. Many previously greenlined areas remain heavily racially segregated and economically better off than the surrounding redlined areas. Studying the positives of Greenlining can help policymakers create better

solutions for all people. Future research should investigate the benefits of living in historically greenlined areas.

Mapping Segregation and Integration

This study primarily looked at the historical location of where people lived from 1938-1960 and the modern consequences of segregation and housing discrimination from 2000-2020. Future Studies can look at the entire period from 1968-2022. Did the Federal halting of segregation lead to less segregation, or did segregation worsen in that period? After the 1968 Fair housing act passed, there should have been an increase in the number of integrated neighborhoods. Mapping Denver's demographic from 1968-2022 would create a better image of how neighborhoods changed racially. Mapping Housing covenants, mapping demographic change over time, and mapping the price difference between majority white and black neighborhoods would provide insight into how things have positively and negatively changed for minority and white neighborhoods. This study also focused mainly on the urban areas within Denver, but the history of housing discrimination extends past cities. The suburban area of the '40s and '50s was segregated (Rothstein p.93) and often created to exclude minorities. Many marginalized people were prohibited from living within these areas.

LGBT and Non-traditional family Housing Discrimination

Racial segregation was common in Denver from the 1900s-1968, but there was also segregation against LGBTQ people and non-traditional families. People that did not have a wife or husband of the opposite

sex and an "appropriate" amount of “well-behaved" children were barred from purchasing a house and were forced to rent (FHA,1938). Single Unit houses were typically not given to minority families at the same rate as to white families. However, single-family homes were explicitly not given to people that did not have a heterosexual married relationship, even if they had the finances to afford the home. R-1 and R-0 zoning and modern single-family unit zoning still prohibit house ownership for many eligible applicants in Denver today. A geographic or historical study on where LGBTQ could live would give insight into discrimination.

Gentrification

This study focused on contemporary housing inequity, but an exciting area of study would be the gentrification of city neighborhoods today. Gentrification is when people from financially stable areas come to financially unstable areas and buy property (Rothstein, 2017). Gentrification typically has a negative connotation because when this happens on the block level, it drives low-income people from an area they could live in. A GIS study on whether areas of current gentrification have policies (public housing, inclusionary zoning, HCV options) protecting low-income individuals displaced from an area. If neighborhoods had policies or housing for low-income people (Rothstein, 2017), gentrification could have a positive connotation.

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Appendix

Bivariate analysis Table

Overall Equity index DDPH (2020	Discrimination Index	AICc (Linear)	r-squared (Linear)
3.5	1.999967972		
2.20000005	2.999994668	11.39854827	0.285839845
2.29999995	2.471598587	13.03328748	0.188393464
1.89999998	1.999996287		
3.0999999	2.394643422	3.484519339	0.267514274
2.70000005	2.999937913	3.708255754	0.257799797

4	2.002649192		
3.70000005	2.002649192		
4.19999981	2.002649192		
4.0999999	3.000076361		
2.29999995	2.972334358		
3.5	1.98443081		
2.70000005	1.678273864		
2.4000001	1.578909094	9.435048355	0.29160884
1.79999995	2.000068197	14.08021234	0.249011138
2.5	2.264997437		
2.0999999	2.002649192	2.554525406	0.3227039
1.60000002	2.999999998	10.71113924	0.273283593
1.60000002	2.999999998	1.933434585	0.355050519
2.4000001	2.998200244		
1.60000002	2.999853413		
3.29999995	1.578909094	10.13162396	0.223242158
2.5	1.999967972		

2.29999995	2.786355097		
4.19999981	2.002649192		
3.9000001	1.999967972		
4.5	1.999967972		
4.19999981	1.999967972		
4.19999981	1.999342847		
3.20000005	1.999342847		
4	1.993278745		
4.69999981	1.993278745		
3.5	2.996854147	1.188953144	0.214032758
3.9000001	2.264997437	4.38694313	0.317713955
3.5999999	1.313505095	9.435048355	0.29160884
2.70000005	1.313505095	9.435048355	0.29160884
3.20000005	1.98443081		
2	2.999999998	10.96300176	0.24144076
1.89999998	2.999999998	7.757270442	0.1539508
1.79999995	3.532105762	-3.216429444	0.283180638

3.79999995	2.496722897	-0.389234459	0.246933295
3.0999999	3.532105762	-0.467946697	0.238625817
3.5	2.496722897	-0.426340408	0.236661836
2.4000001	2.477825364		
3.0999999	2.477825364	0.255454554	0.233146167
3.0999999	2.002649192	-1.268613106	0.227949542
2.29999995	2.999999998	11.6685238	0.314665184
4.0999999	2		
3.5999999	1.999967972	10.47212326	0.145671585
3.9000001	1.999936183	9.964403811	0.213162034
3.4000001	2.000141113		
4.30000019	1.993278745		
4.19999981	1.98443081		
3.4000001	2.996854147		
3	2.999489001		
4	2.264997437		
3.70000005	1.999967972		

4.19999981	1.999342847	12.77429856	0.202816368
1.70000005	1.999423948	10.19132481	0.301830483
2.29999995	2.471598587	12.03343436	0.325823892
2.79999995	1.99996938		
3.0999999	1.99996938		
3.5999999	1.999973145		
3.5	1.999973145		
3.5	1.999279449		
2.5999999	1.999973145		
3	2.002649192		
2.0999999	3.000076361		
2.20000005	3.997225565		
3.0999999	1.999423948	8.883272731	0.369882601
2.29999995	3.000076361	-3.140159973	0.361009364
2.5999999	2.999489001	4.340435755	0.289910923
1.79999995	2.002649192		
2.9000001	2.999489001		

2.5	3.997225565		
2	2.999999998	13.44957415	0.235064478
2.4000001	2.496722897	0.476127895	0.233655725
3.0999999	2.000316582		

1950 Census background

1950's Designation				
Race	population	percent		
All	415786	100		
White	397534	95.61024181		
Negro	15059	3.621815068	Classification	Index Score
Non-White	3193	0.767943125	Greater than 4.39 nonwhite	5
Forein-White	22634	5.443665732	Greater than 5.44Foreiner and Non-white	4
Forein			99% Forein- White	3
			99% native white	2

1960 Census Index background

1960				
Race	population	percent		
All	493089	100		
White	458626	93.01079521		
Negro	30251	6.134997942	Classificaiton	Index Score
Non-White	5010	1.016043757	Greater than 7.15% nonwhite	5
			Mostly white	2

Redlining Index background

Redlining		
Race	Grade	Index score
White Native born	A	2
White native born 2nd gen	B	3
White Forein born	C	4
NonWHite	D	5

Divergence Segregation index background

Divergence segregation score -Equal interval	Index
0.0113-0.2129	2
0.21297-0.4146	3
0.41465-0.616325	4
0.616325-0.818	5

Racially or Ethnically Concentrated Areas of Poverty (R/ECAPs)	Index
1	5
0	1

Data Source Table

Name	Raw	Source	Use in project
HOLC redlining data	Shapefile/georectified image	the University of Richmond, Mapping inequality	Used this shapefile for 1938 redlining index
Zoning Data	Shapefile	City of Denver Open data	Modern Residential areas
1950/1960s census tracts			Steven Manson, Jonathan Schroeder, David Van Riper, Tracy Kugler, and Steven Ruggles. IPUMS National Historical Geographic Information System: Version 17.0 [dataset]. Minneapolis, MN: IPUMS. 2022. http://doi.org/10.18128/D050.V17.0 For policy briefs or articles in the popular press, we recommend that you cite the use of NHGIS data as follows: IPUMS NHGIS, University of Minnesota, www.nh

R/ECAPS Racially or ethnically concentration of poverty	Shapefile by census tract	HUD GIS Helpdesk	Used for contemporary index
Segregation index	Equation	The othering and Belonging institute	Used for contemporary index

Foreclosure data	Shapefile	City of Denver open Data	Used for Housing inequity
HCV Tracts	Shapefile -polygon	Housing and Urban Development	Used for Housing inequity
LIHTC	Shapefile -point	Housing and Urban Development	Used for Housing inequity
Census 2020		City of Denver	Used for Housing inequity