

Greenery And Inequality: Racial Disparities in London's Parks and Health Outcomes

Yinuo Chen *

The Wardlaw Hartridge School, New Jersey, USA

* Corresponding Author Email: cyn_0403@outlook.com

Abstract. This study explores the intersection of racial demographics, green space distribution, and health outcomes across London wards using 2021 census data. Motivated by observed disparities in urban greenery and public well-being, the research applies linear regression to examine how racial composition—specifically White, Black, and Asian population shares—relates to green space coverage and self-reported “very bad health.” Findings show that wards with higher White populations tend to have more green space and report better health, while Black-majority wards have significantly less greenery and worse health outcomes. Asian-majority wards fall in between, showing moderate deficits. These disparities reflect historical patterns of urban planning, racial segregation, and uneven investment. The study highlights how racialized access to urban nature contributes to health inequality, advocating for targeted green infrastructure and planning reforms. By aligning environmental justice with public health policy, this research provides a framework for more equitable urban development.

Keywords: Environmental justice, Urban green space, Health disparities, Racial inequality.

1. Introduction

A few years ago, I visited London and noticed that the amount of green space varied greatly between areas, and people who used those spaces appeared to be rather separated. At first, I saw that wards with more lawns and trees reported better health, while wards with less green had higher rates of depressed mood and persistent illnesses. This caught my interest in the connection between socioeconomic differences and green space. I want to build an organized understanding of the relationship between socioeconomic structure and the built environment by researching the function of green space in city development and social well-being. This could provide policy and practical recommendations for land use planning that reduces social inequalities. I use current epidemiological research with 2021 ward-level census data to comprehend this pattern. I study how wellbeing is shaped by the combination of social factors and urban architecture. Through a comparison of racial and environmental fairness, this study investigates whether neighborhood color might predict not just the environment we see but also our health.

2. Background

Early ecological research led to the clear conclusion that spending time in natural environments helps people refocus their attention and reduce stress hormones. Subsequently, large epidemiological research linked the availability of green space in the area to decreased risks of depression, diabetes, and cardiovascular disease. Even after controlling for smoking and wealth, a 2021 cohort in England found that every additional acre of green space within 300 meters of a home was associated to a quantifiable decrease in deaths from every cause.

In British towns, access to city green space differs by neighborhood. According to analyses, low-income and minority-ethnic neighborhoods tend to have fewer street trees, smaller parks, and less accessible and useful green spaces. These trends correspond with the historical legacies of market-oriented development, unequal public investment, and residential segregation, which have rewarded areas with higher incomes and a higher proportion of white residents. According to a 2022 policy

review, compared to roughly 14% of White residents, approximately 40% of Black, Asian, and other minority-ethnic citizens in England lived in wards with the least amount of green space.

Mixed-methods research explores the health effects of this. According to interviews conducted in a number of English cities, people who live in green-poor areas report feeling more stressed, having trouble sleeping, and having less opportunities to exercise. This is proven by quantitative models: The relationship between socioeconomic disadvantage and poor health outcomes can be partly explained by a lack of green space. There are two obvious ways. First, adding additional green space has little but significant benefits, such as lowering air pollution, encouraging regular physical activity, and promoting social cohesiveness. Second, racial settlement patterns contribute to health inequities in urban settings by creating unequal access. Nature is helpful, but not everyone has equal access to it.

Overall, this research emphasizes the advantages of urban nature as well as the ways that unequal health benefits result from racial and economic disparities in the distribution of green spaces. These concepts are used in London's 2021 ward statistics in this analysis.

3. Research Question

How do self-reported "very bad health" and the availability of green spaces connect to cultural demographics in London wards. The question examines whether environmental factors and social composition combine to produce geographic disparities in health across the city. It examines two relationships: the correlation between green space coverage and racial composition, and whether the relationship between greenery and "very bad health" varies in intensity or direction based on the residents. [1,2] Simply, do a neighborhood's "color" and "greenness" work together to influence health, and not in the same manner for everyone?

To qualify the correlations between London's ward-level racial composition (the proportions of White, Black, and Asian population), green space coverage, and the prevalence of self-reported "very bad health." The study examines whether the relationship between greenery and poor health varies by racial structure by comparing these population shares to the percentage of green space.

4. Methodology

4.1. Indicator System

To capture London's ethnic composition and distribution of green space, I collected public government sources from the London Datastore (Greater London Authority) under the Open Government License. The first is a ward-level census dataset that shows the counts of all usual residents by ethnic group in 2011 and 2021. This is a category crosswalk that connects the two years, and each group is represented as a percentage of the ward population. The second is a borough-level dataset of green space in hectares. I convey hectares to the proportion of total land areas in each borough were useful. These indicators use publicly accessible, government-curated sources to quantify green cover at the borough level and ethnic structure at the ward level in 2011 and 2021.

4.2. Definition

Linear regression analysis is used to predict the value of a variable based on the value of another variable. This is a statistical method that has been used in finance, investing, and other disciplines that attempts to determine the strength and character of the relationship between one dependent variable (usually denoted by Y) and a series of other variables (known as independent variables).

$$y=a+bx+u \tag{1}$$

Linear Regression has been used in research such as predictive modeling, relationship analysis, identifying influential factors, and controlling for confounding variables. Examples of research include medical research, social sciences, business and economics, and environmental science. It also

assumes an approximately linear relationship between variables, independent residuals, constant error variance, and normally distributed errors.

4.3. Application

This study tests the relationship between green space and health using 2021 London ward-level data, in accordance with the descriptive plots. The rate of inhabitants who report really poor health is the result of converting raw counts into proportions, and the percentage of green space in each ward serves as the primary predictor. The White proportion, Black proportion, and Asian proportion are the three distinct models through which racial composition is represented. In order to prevent very small wards from overwhelming the pattern, scatter plots use loess smoothing with optional population weights. Basic social indicators from the same dataset are included in an additional stage. These include the percentage of housing owned outright, the proportion of residents sixteen years of age or older who can speak English, and the rate of economic activity.

5. Result

5.1. Majority & Green percentage

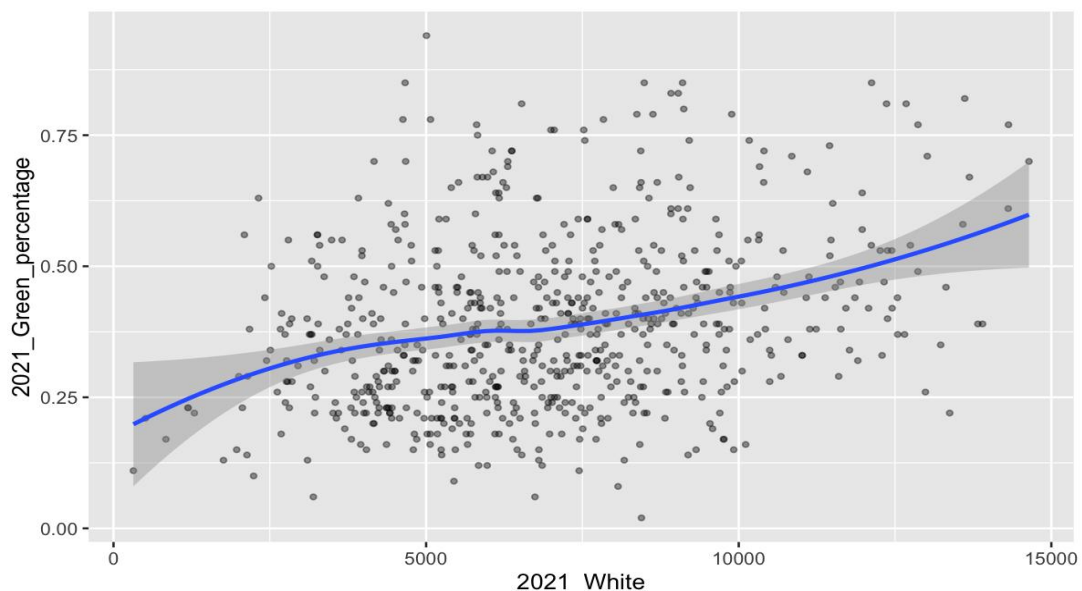


Fig. 1 Relationship between White & Green Percentage

The distribution of green space in London wards constantly changes with the racial composition of the population. There is typically more green space in wards with a higher proportion of White population, and the linear regression indicates a positive slope for White share versus green cover. This spatial advantage is consistent with longer-term development trends, particularly in suburbs, where wealthy, mostly white neighborhoods profited from favorable urban planning and environmental conditions. According to a 2020 UK survey, minority-ethnic families are less likely than white households to be close to public green space. Approximately 40% of people of minority ethnic groups lived in the wards with the least amount of green space, compared to 14% of White residents, according to complementary data. These numbers give the ward-level association seen in London a more comprehensive perspective.

5.2. Minority & Green percentage

5.2.1 Black

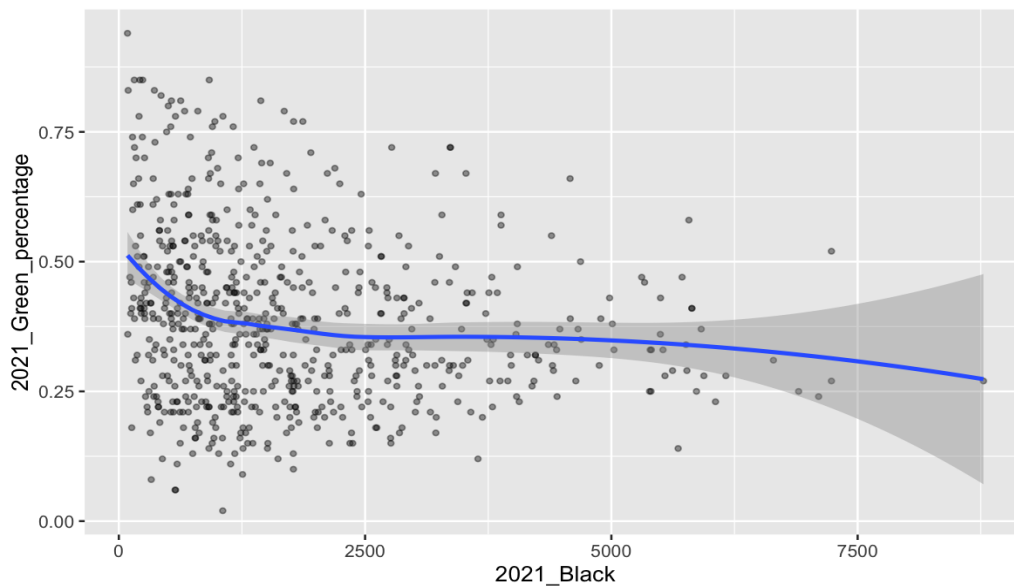


Fig. 2 Relationship between Black & Green Percentage

In contrast, the corresponding regression line is negative for wards with a higher percentage of Black people, which often have less green space. This trend is in line with past lack of investment and structural injustices, whereby communities with a significant number of Black residents were given a lower priority when it came to city development and natural resources. The ward-level gradient is reflected in national estimates that roughly 40% of Black, Asian, and other minority-ethnic inhabitants lived in England's most green-deprived districts, which is more than twice as likely for White residents. [3]

5.2.2 Asian

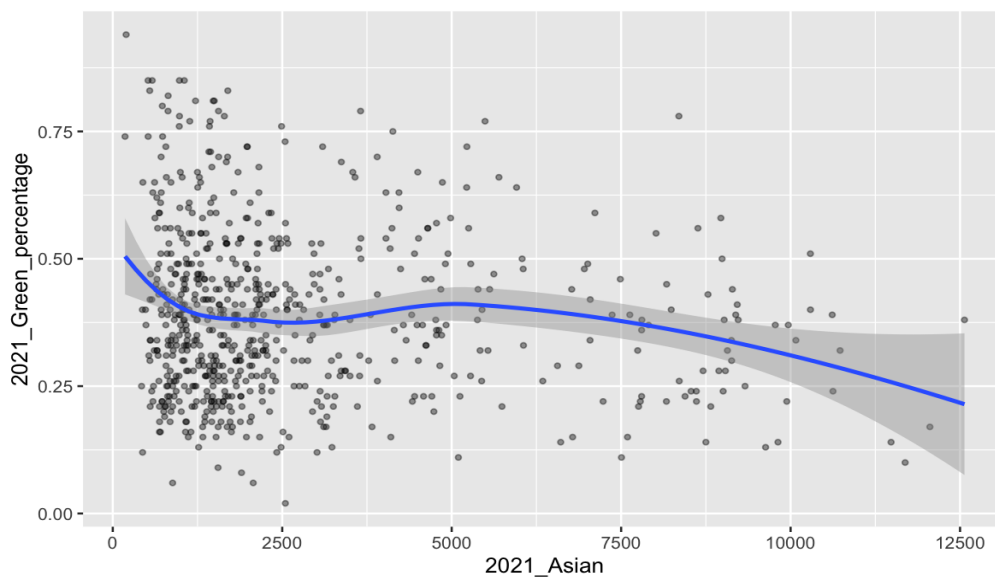


Fig.3 Relationship between Asian & Green Percentage

The correlation between green space and wards with higher Asian population proportions is negative, albeit not very strong. The lesser slope likely reflects a combination of economic and structural barriers that many South Asian populations face, such as areas with high density and a lack of parks that can be developed. [4] Compared to only 14 percent of White inhabitants, this disparity

is further supported by national standards, which show that 40 percent of minority-ethnic groups, including Asian people, lived in the most green-deprived neighborhoods.

5.3. Majority & Very Bad Health

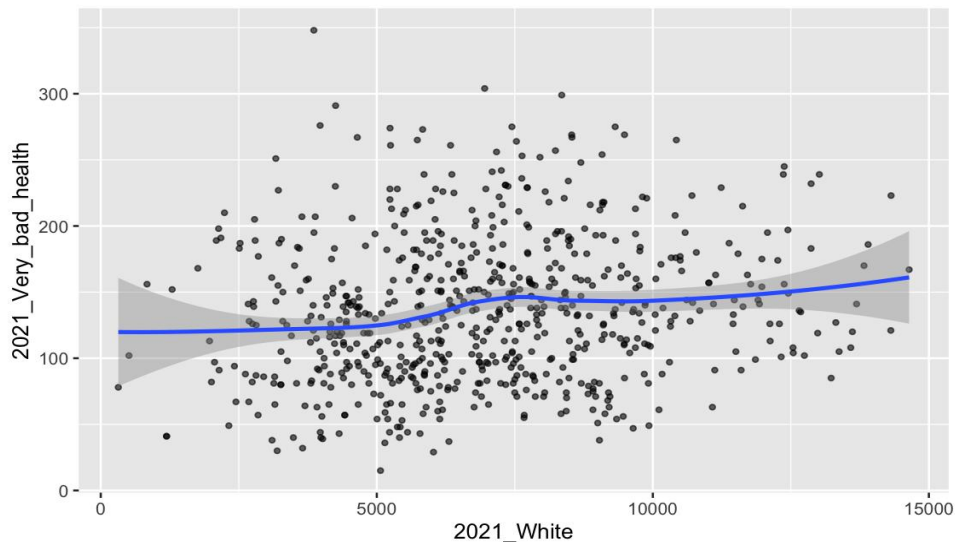


Fig.4 Relationship between White & Very Bad Health

Health patterns are consistent with these disparities in distribution. Wards that have a higher proportion of White residents report lower rates of the worst health, according to a scatterplot of White share vs self-reported "very bad health." Parks and streets with trees are frequently associated with lower blood pressure and better mental health, which is in line with the protective relationship that is frequently found between increased access to green spaces and improved health. Previous observational research also shows that lower rates of illness and death across populations are typically associated with increases in neighborhood green cover.

5.4. Minority & Very Bad Health

5.4.1 Black

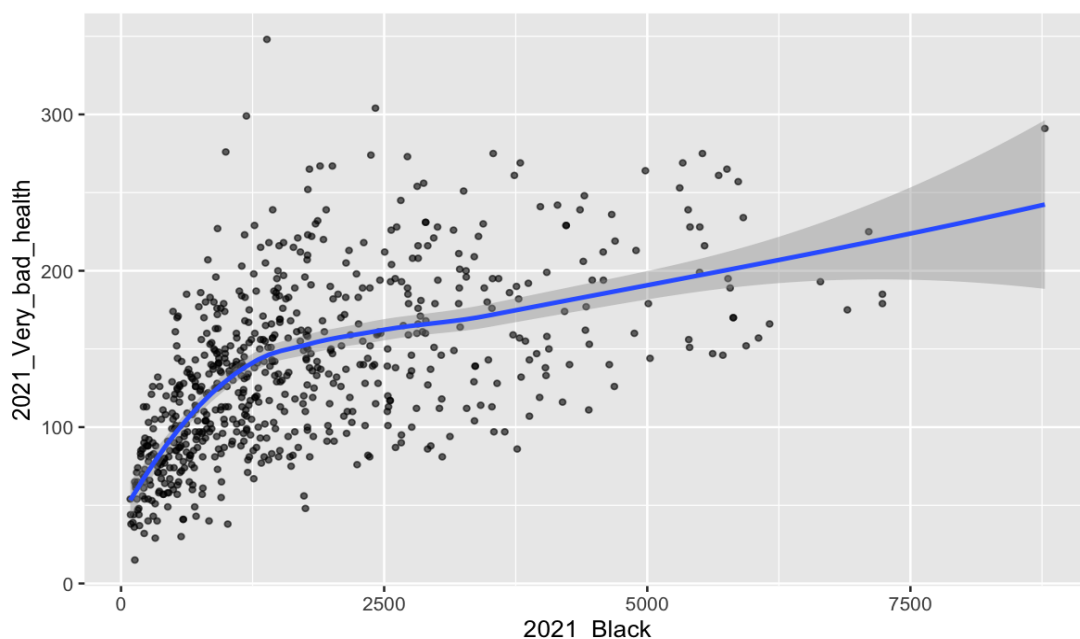


Fig.5 Relationship between Black & Very Bad Health

The relationship changes for Black share, however, with a positive regression line for Black population proportion versus self-reported “very bad health” indicating higher rates of poor health in wards with larger Black population shares. This pattern is consistent with documented disparities in access to green spaces. Reviews also show that even after controlling for income and other socioeconomic factors, communities with limited nearby greenery. Such as fewer parks, lower tree cover, and poorer access, they face higher burdens of mental health issues and chronic disease.[5]

5.4.2 Asian

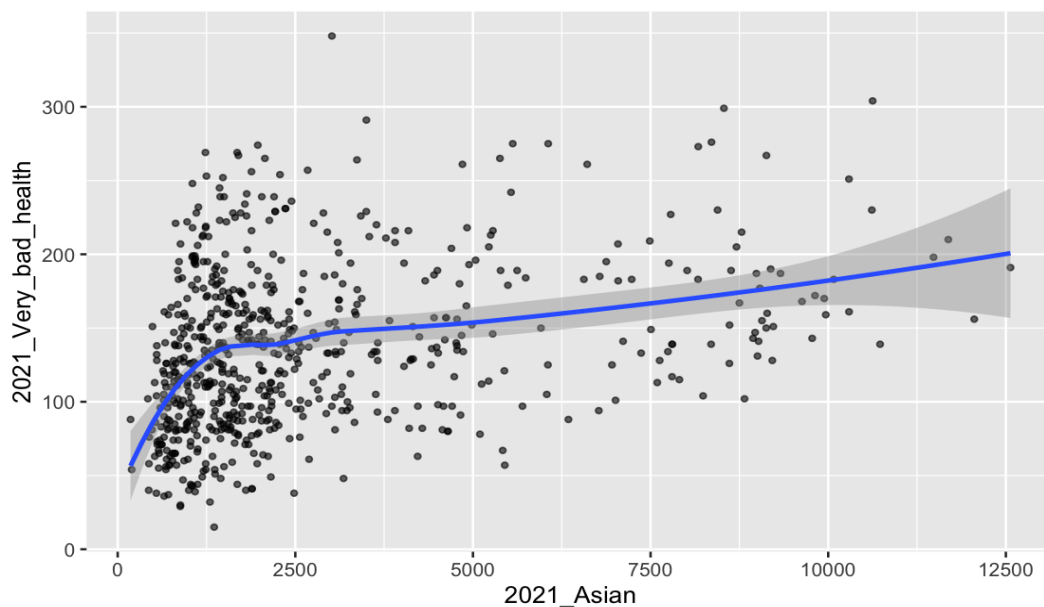


Fig.6 Relationship between Asian & Very Bad Health

Asian-majority wards have slightly higher rates of poor health, which is in line with obstacles to accessing the local green space. Everyday activities and socializing may be restricted by crowded housing, a lack of parks within walking distance, and safety concerns. When combined, these group-specific gradients show the known disparities in the availability of green space throughout London. This indicates that even after controlling for income in a number of studies, unequal environmental provision may have an impact in ward-level variations in reported health.[6]

6. Discussion

In general, Greater green space coverage is usually associated with lower self-reported “very bad health” rates throughout London wards, and the slope seems to be steeper in minority-majority districts. According to our statistics, there is a smaller deficit in wards with higher Asian populations, and green space tends to be higher where the White population proportion is higher and lower where the Black population share is larger. These trends resemble well-known disparities in the availability of green spaces and are presumably caused by environmental pathways like heat exposure and air quality, chances for physical exercise and social interaction, etc.

As a novelty, we use a single citywide, small-area framework to connect standardized ward-level ethnic composition with green-cover measure and a direct health outcome (“very bad health”). On the other hand, we have limitations as the associations are observational and cross-sectional, sensitive to the choice of spatial units and aggregation (wards vs borough), vulnerable to confounding (income, age structure, housing, pollution), and possibly unbalanced by self-rated health reporting bias.

6.1. Policy Implications

Increase Investment in Green Spaces in Minority-Majority Wards: Prioritize capital investment for parks and street greening in areas where deficits and health costs are concentrated. Also apply funding to an equality index rather than per-capita averages.

Enhance Accessibility to Existing Green Spaces: Improve safe paths, lighting, sport/amusement facilities, and culturally relevant programming to ensure that nearby parks are really used.

Incorporate Green Space Metrics into Health Policy: Incorporate ward-specific green-coverage and park access statistics into routine public health planning and commissioning. Prioritize preventative resources for wards with inadequate coverage and high illness rates.

Integrate Green Spaces into Social Housing Projects: Require net-gain greening (canopies, courtyards, etc.) in restorations and new construction. And together with maintenance funding and resident collaborative design, to ensure sustainability.

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