Contents

Abstract	4
1. Introduction	5
1.1 Background of the Study	5
1.2 Rationale for the Research	6
1.3 Aim and Objectives of the Study	6
1.3.1 Main Aim	6
1.3.2 Objectives	7
1.4 Overview of the Dissertation Structure	7
2. Literature Review	7
2.1 Understanding Deprivation: Causality and Impact	8
2.2 Solutions for Breaking the Deprivation Cycle	9
2.3 Environmental Factors and Health Outcomes	.10
2.3.1 Health Domain Score and Health Outcomes	.10
2.3.2 Green/Bluespace Domain Score and Health Outcomes	.11
2.3.3 Air Quality Domain Score and Health Outcomes	.12
2.3.4 Retail Domain Score and Health Outcomes	.12
2.4 Importance of Small National-Level Data in Decision-Making	.13
2.5 Dr. Mark Green's Framework: Lifestyle and Environmental Influences on Health	.14
2.6 Hypothesis	.14
3. Methodology	.15
3.1 Research Design Explanation	.15
3.2 Justification for the Methods Used	.15
3.3 Data Source Description (AHAH Inputs/Components Dataset)	.16
3.4 Data Collection and Processing Procedures	.16
3.5 Analysis Methods for SPSS and Excel	.17
4. Results and Discussion	.17
4.1 Comparison of Key Information between LSOAs for England and Wales and DZs for Scotland	.18
4.1.1 Descriptive Statistics	.18
4.1.2 Tests of Normality	.19
4.1.3 Mann-Whitney U Test for Key Variables	.20
4.2 Examination of Prevailing Trends Impacting Perceived Healthiness Across Nations	.21
4.2.1 Regression Model for Access to Healthy Assets and Hazards Index Score	.21

4.3 Discussion of Findings	22
4.3.1 Relevance of Findings and Approach to Analysis	22
4.3.2 Link Between Research Results and Project Objectives	23
4.3.3 Business Implications	24
4.3.4 Relevant Literature	26
5. Conclusions and Recommendations	28
5.1 Relevance to Project Objectives	28
5.2 Organisational Context	29
5.3 Implications for Business	30
5.4 Personal Learning	31
References	32
Appendix	
Appendix 1	
Appendix 2	41



Exploring Neighborhood Health Disparities: A Comparative Analysis of AHAH Dataset Across England, Scotland, and Wales

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Abstract

This study investigates the case of England, Scotland, and Wales using the AHAH (Access to Healthy Assets and Hazards) dataset, aiming to present geographical factors that influence health problems within these areas. The AHAH dataset developed by CDRC examines health coefficients utilizing environmental factors such as air pollutant level and access to basic services as its determinants. The analysis of 61 variables and 41,729 observations, the Mann-Whitney U test, and the multiple regression analysis through Statistics are employed to compare the neighborhood health indicators and find generalized patterns. A Mann-Whitney U test was applied to compare AHAH scores between LSOAs in England and Wales and DZs in Scotland, as the data showed a non-normal distribution, and log transformation was used to solve the issue. Consequently, multiple regression analysis is a tool to identify trends in health inequities between these three countries. Evaluations show considerable disparities in health lines between areas, which implies that the individualized policy should be designed for each case. The survey's conclusion is not restricted to policy makers, but also urges healthcare experts and city planners to find the right location to allocate resources. Overall, this research enhances evidence-based decision-making, which emphasizes collaborative partnerships in addressing health disparities and promoting community wellness.

Keywords: Neighborhood Health Disparities, AHAH Dataset Analysis, Comparative Regional Health

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1. Introduction

The introduction chapter outlines why the AHAH dataset is the most appropriate tool to explore Britain's health community, having presented its significance in the first place. The research idea is outlined, describing the reason behind it: the association between community setting and public health. The chapter describes the purpose and objectives of the research, namely to find out if any indications could show whether the healthy condition of the neighborhood is deteriorating or improving in England, Scotland, and Wales. In the final part, the introduction foreshadows the dissertation structure, and most importantly, it focuses on the contribution to understanding health disparities, which will also be used in future research.

1.1 Background of the Study

This study seeks to define the health status of the British community with the AHAH (Access to Healthy Assets and Hazard) dataset, which assesses the situation using other important aspects. The CDRC was the maker of the AHAH concept. This universal tool can be used to evaluate the health levels of neighbourhoods based on several environmental conditions, among them air pollution and access to essential services such as health facilities. Furthermore, the index includes the accessibility of unhealthy commercial retail outlets, including fast food restaurants, among many other factors to facilitate the development of an overall understanding of neighbourhoods' health dynamics. Communities are certainly influenced by environmental factors on their health outcomes, which contribute to many different events that prove to be positive or negative (Adza et al., 2023). Problems display the existence of air pollution, juxtaposition to emergency health services, the presence of green zones, and the presence of fast food outlets in the community, complicating community health. Nevertheless, understanding the geographical distribution of these disparities and the coexistence of their effects is a great challenge, limiting the development of efficient public health policies (van Kamp et al., 2020). Concerning these setbacks, environmental health researchers have consistently strived for years to comprehend the complex linkage between features of the environment and health results. Dr Green and his team from Liverpool University have pinpointed four main classes of lifestyle and environmental factors that may directly impact health outcomes, a classification that can ease the analysis of these multidimensional causes. Within this framework, which includes proximity to retail outlets, availability of health services, air quality, and nature around our neighbourhoods, policymakers and researchers determine programmes that can promote better health (Samuel, 2023). Finally, the research aims to use minor national-level data in Great Britain to help decisionmaking and support health efforts at the expense of the public across the entire territory.

1.2 Rationale for the Research

The motivation behind the investigation titled "Access to Healthy Assets and Hazards (AHAH)" is the growing concern about the intricate relationship between the neighbourhood environment and public health in the United Kingdom. These several reasons determine whether this research should be carried out. Firstly, inequalities in the health status among different communities are evident: a particular location may suffer from a higher incidence of chronic diseases, premature deaths, and lousy quality of life, as a general picture. The cause of the roots of those disparities assessment is the key to developing the specific measures and interventions that help promote health equity. On the other hand, peculiar determinants like air quality, such as access to healthcare, the presence of green spaces, and the absence of unhealthy retail outlets, also affect the health outcomes in the community (Clark, Crumpler and Notley, 2020). Information about the differentiating value of these elements in adjoining regions can be extracted to clarify the causes of the health disparities and the possible mediation approach. Also, evidence-based policy-making provides an understanding of what factors drive public health. In this way, we can disentangle the complex relationship between the neighbourhood environment and its health effects for the sake of the policymakers and other stakeholders who steer suitable interventions to promote healthy communities and reduce health gaps. Additionally, the availability of districtlevel data, which often appears in analyses such as the AHAH database, allows for a more detailed assessment of the social profile of health. Applying these data, including identifying tiny patterns, trends, and connections that are otherwise perceived as irrelevant, provides essential information for the decision-makers in public health, ensuring appropriate decision-making strategies and intervention in public health planning (Samuel, 2023). Last, Dr. Green's framework serves as the fundamental base for exposing all health outcome tentacles and schematically outlines the entire health system. This approach aligns perfectly with the objectives of the AHAH. The study, done systematically, tries to know the different factors that affect the lifestyle and the environment; the aim is to reveal the hidden factors that are the determinants of health disparities all over England, Scotland, and Wales. This inference generally demonstrates the considerable role played by looking into environmental factors regarding how people behave regarding health outcomes, and the data-driven method is the best way of taking healthier policies and practices.

1.3 Aim and Objectives of the Study

1.3.1 Main Aim

The aim of looking into Access to Healthy Assets and Hazard data (AHAH) across the U.K. regions of England, Scotland, and Wales is to determine trends and disparities in neighbourhood health.

1.3.2 Objectives

1. Apply the SPSS, R, and Excel software to process this massive amount of data and dig down to the base of the AHAH dataset. Compare Lower Level Super Output Areas (LSOAs) indices in England and Wales and Data Zones (D.Z.) in Scotland.

2. Shed light on the trends prevalent across the three countries by employing all necessary wellestablished statistical analysis methods to uncover the variables influencing the rate of perceived healthiness and form bases of public health interventions.

1.4 Overview of the Dissertation Structure

The dissertation proposes a structured method logically followed by the Problem Definition section, in which backgrounds are organised, the rationale is given sensibly, and the aims, objectives, and hypotheses are set out. This lays the first stone in the research journey, drawing attention to the challenge of neighbourhood health inequalities across regions in England, Scotland, and Wales. To begin, the section on Problem Exploration and Analysis is where the discussion usually focuses on gathering organisational data and literature relevant to the academic setting, which is essential for a complete picture of the research environment. This means the study will be well-informed and based on available data about the supplied issue. This part of the research Methodology describes the research design, focuses on appropriateness and gives readers essential insights into the procedure. This part is paramount for attesting to the study's integrity and conformity to prescribed methodology standards. The section Findings Analysis and Discussion of a Study evaluates a reviewer of the outcomes and assesses their relevance to a project's objectives and the business landscape. This part ensues from the evaluation and reflection, providing a link between the outcomes of the research work and relevant texts, making it possible to appreciate the neighbourhood health disparities better. Last but not least, the Conclusions & Recommendations section pulls all the fundamental points made and gives relevant conclusions and recommendations that can be implemented. This part of the study corresponds to project objectives, organisational context and personal development, which, on the one hand, are posited as beneficial for future research and practice.

2. Literature Review

The literature review explores deprivation's impact on individuals and society, focusing on its causes and consequences in health, education, and the environment. It advocates for holistic solutions, integrating technology, healthcare, community involvement, and environmental stewardship. Additionally, it highlights the significance of small-scale data like the AHAH index and Dr. Mark Green's framework for guiding evidence-based interventions to address local health and environmental disparities.

2.1 Understanding Deprivation: Causality and Impact

Deprivation tends to be determined by its main signs, including lacking access to standardly required resources and opportunities (Rashid et al., 2021) necessary for a decent life. Different factors are involved, and there are consequences on the level of individuals, communities, and society overall. An understanding of deprivation, therefore, includes examining the reasons for and effects on overall life and socio-economic and environmental implications. Among those is the purpose of comprehending causality. Ascertaining the core of deprivation extracts the potential solutions needed to mitigate its impact and its existence successfully. For deprivation, there is a myriad of causes, resulting from the unequal distribution of income, social discrimination, a lack of means to self-improve, and inefficient provision of healthcare, housing and living environments that are not humane (Sawhney et al., 2023). These factors tend to influence one another harmoniously; thus, a cycle of deprivation may be complex to find a solution for. One of the main questions around inequality is whether it is triggered mainly by the system structure or individual lifestyles. According to structural theories, the main factors of the cyclic process of impoverishment are far more than individual problems; they also include the system's embedded inequalities and established discrimination (Nurse and Sykes, 2019). This is how these theories want to explain that poverty and inequality are not only the concomitants of individuals lacking skills and qualifications but are the result of the society-level structure, such as economics and politics. While collectivist approaches blame impoverishment on societal constraints, individualistic theories believe people use their limited resources due to personal choices, lack of motivation and behavioural issues. Although the role of the individual in determining the kind of results that are generated can be acknowledged, it cannot be excluded that there exist some structural factors that influence an individual's opportunities and choices. Indeed, this is a vicious cycle that ends up defending the status quo and inequalities (Wiśniowski et al., 2023).

Learning about the outcome of common deprivation is the key to seeing how different people react under the same condition. Multidimensional deprivation is one of the paramount factors affecting significant aspects of lives, such as health, education, job opportunities, and social well-being. Likewise, health-wise, poor people are likely to suffer from chronic illnesses, mental health issues, and lower life spans compared to people from wealthier income brackets. In addition, children living in poverty have other barriers to education, such as mental consequences of lives in such areas, which negatively impact learning and achievement. Also, it's a fundamental thing that poverty usually results in economic exclusion, where one can quickly get into unemployment or social exclusion, hence widening the divide among the population. Instead of affecting the behaviour of affected individuals, deprivation also influences the whole society and community (Bermudez et al., 2023). Underprivileged communities usually encounter situations like social disturbances, crimes, and political instability, but these things also make conditions worse. They typically represent poverty and deprivation cycles. Additionally, deprivation may result in various environmental issues, which relate to the fact that the highest levels of environmental pollution characterise disadvantaged communities and have only sparse exposure to clean air, water, and green zones (Agbonifo, 2022). Addressing the deprivation problem requires a multidimensional effort to identify the root causes of that social problem and diminish the negative consequences that create the social problem in question. Cures for poverty, social exclusion, and sustainability in environmental terms usually focus on balancing economic equality. These can be in several areas, including affordable education and healthcare solutions, designing inexpensive social welfare programs, favouring equality against discrimination, and promoting sustainable development for people (Abrahim et al., 2022). Investigating these phenomena to understand their origin, ramifications, and impacts on people and communities and their broader socio-economic and environmental outcomes is imperative. Either the systemic structuration of distribution inequities or the effects that will follow from this poverty consequently, societies have the duty of dealing with the core of these problems to guarantee a more egalitarian, accepting and eco-friendly future for every citizen (Raihan, 2023).

2.2 Solutions for Breaking the Deprivation Cycle

Overcoming the inescapable circle of poverty is a complicated challenge which calls for an approach based on numerous interrelated instruments to get rid of the roots of exclusiveness, health problems to which a person has no access and ambient dangers. Recent studies, especially in the context of the AHAH (Access to Healthy Assets and Hazards) dataset in England, Scotland, and Wales, play an instrumental role in motivating viable solutions for successfully managing this problem. Advancing technology to enhance user participation amongst economically deprived people is one promising technique for reversing the ills resulting from poverty. Li, Li and Carrington (2023) make a good bet that proves how helpful health technologies are in caretaking routines. The employment of such mechanisms is a source of action that provides the platform for individuals to take proactive measures in enhancing health outcomes, thus identifying the practicality of technology in the breaking of cycles of poverty by offering information and health services (Li, Li and Carrington, 2023). Likewise, retaining physicians and staff from underserved areas challenges persevering healthcare services throughout disadvantaged communities. Tompkins (2023) argues in favour of social support's relevance to preventing burnout in jobs with high-stress levels. This shows the crucial role of healthcare providers' support and training programs, ensuring that required services are provided

uninterruptedly and of good quality in poorer areas. Community institutions, e.g., religious organisations, can engage actively in bringing about the needed dialogue within the community and, hence, play an integral role in breaking the poverty cycle (Tompkins, 2023). While Jamir (2024) depicted reconciliation on the societal level, the deployment of community institutions can be done. Local organisations should be meaningfully incorporated into health education and service provision to fill these gaps and foster a more inclusive approach to health and well-being (Jamir, 2024).

Responding to environmental health hazards, concerns, and impediments is one of the strategic points for breaking the cycle of deprivation. According to McKeown (2017), healthcare professionals are responsible for pushing for action and implementing preventative measures against these diseases. Through the inmending of environmental determinants of health in the communities, the negative impelment of deprivation on health outcomes can be weakened. On the one hand, non-profit organisations, in their part, make efforts to help socially disadvantaged people but are recurrently challenged by resource deficiencies (McKeown, 2017). Tian, Hung, and Frumkin (2020) dwell on eliminating these shortcomings, including improving transparency and demonstrating effectiveness. Organisations of health and deprivation-oriented non-profit organisations can be more efficient, and they may gain more funding projects focused on primary causes. Improving the standard of living requires an integrated systematic plan where technology, support of healthcare professionals, involvement of community institutions, elimination of environmental health hazards and strengthening of non-profit organisations will be the core factors to break the cycle of poverty (Tian, Hung and Frumkin, 2020). Utilising these initiatives across England, Scotland, and Wales boundaries can lead to tremendous improvements in healthcare systems. It would, therefore, provide the best accessible health services to the people, consequently satisfying the aspiration of a fair social condition.

2.3 Environmental Factors and Health Outcomes

The connection between the health domain score and public health in the UK is paramount in the context of environmental factors and health outcomes. Access to healthcare services, including GP availability and hospital accessibility, significantly impacts health outcomes. Also, oral health services, meeting areas, sports, and relaxation are critical in ensuring good general wellness. Analysing the information in AHAH can provide insights into interventions and service diversity, allowing experts to determine and apply the best-suited policies for improvement.

2.3.1 Health Domain Score and Health Outcomes

Causal connect between health standing domain score and outcome in public health in the U.K. is critically researched considering the ready access of health care services and it's

impact on the society's health situation. The presence of G.P.s is a core unit of primary care since the studies suggest that better access makes their conditions more likely to be diagnosed promptly than patients with limited or poor access (Hargreaves et al., 2020). On the other hand, in case of serious illnesses that can only be treated in hospitals, it takes a long time for emergency services to reach the patients as they are located far away, and patients may die even before they get the proper treatment (Turner, Fielding and Murchie, 2017). The availability of dental services and pharmacies affects oral health maintenance and, traditional therapy and control of chronic diseases from the chronic disease management standpoint (Scholes-Robertson et al., 2020). Moreover, access to leisure facilities as well as physical activities are some of the most essential factors contributing to better health, either for physical or mental reasons. This raises the question of the need for better healthcare services and facilities in England, Scotland, and Wales to help promote a healthier life. The AHAH dataset can be used for further research on healthcare service accessibility and health outcomes within the U.K. This might help discover the specific and uniform patterns of healthcare service accessibility in the U.K. This will be very useful for policymakers and healthcare providers to design effective strategies to close the health gap to achieve an overall improvement in the population's health.

2.3.2 Green/Bluespace Domain Score and Health Outcomes

The green and blue spaces go hand in hand with individuals' wellness; this is more and more the case where public health is the subject. Extensive literature points to how green spaces contribute to physical and mental health outcomes. Thus, including natural assets in urban planning and public health is very important. Notably, Besser (2021) clarifies that environmental exposure is a winning formula for different cognitive domains across the lifespan. Such a review concluded that a positive relationship exists between greenness/green space and cognitive function, including memory. MRI outcomes, such as regional brain volume and cortical thickness, can also be attributed to regional greeneries (Besser, 2021). While Liberati et al. (2022) look at the effect green and blue spaces have on the quality of life, there is evidence showing that if the natural spaces are well looked after, they can increase the quality of life by contributing to physical activity, relaxation, and social interaction (Liberati et al., 2022). In this connection, evidence also shows that green spaces usually offer a protective shield against adverse behaviours in young children, such that suitable conditions for the children's emotional and mental development can be developed over time (Hazlehurst et al., 2024). Also, green space induces healthier living habits and benefits our mental health, leading to fitness and better overall health (Sun, Song and Lu, 2022). Besides, it is proposed that more comprehensive analyses are needed on natural settings' health benefits as they provide a unique and practical outlet for maintaining mental and bodily

recuperation (Marini *et al.*, 2022). This fact shows us a tremendous health aspect brought by parks and similar spaces, such as better mindfulness, cognitive development, physical activity, and overall quality of life. They keep underlining the necessity of policy and initiatives that advocate for a connection with nature within the confines of urban lifestyles. This is not only for environmental values, but it also consists of remarkable benefits for public health.

2.3.3 Air Quality Domain Score and Health Outcomes

Air pollution is among the leading public health concerns since this area of research is critical to understanding the effect of air quality on health. The latest research indicates the close association between air pollution and people's health; therefore, inaction on the issue may lead to worsening health and the need for strict pollution regulations. Kang et al. (2023) attempt to uncover the relationship between NO₂ and particle exposure in indoor areas and controllable asthma symptoms. The study results emphasise that people who breathe that air have worse asthma control and more emergency department visits to diagnose the disease. Thus, air pollution improvement will replace health issues related to asthma (Kang et al., 2023). Visa et al. (2023) provide an evidence-based review of the health advantages of using electric vehicles. It portrays a decrease in mean NO₂ and PM2.5 concentration, which may imply the cities are healthier, especially for communities of colour (Visa et al., 2023). Besides that, Hansel et al. (2022) stress the higher effectiveness of compact HEPA air purifiers for people with COPD. Evidence obtained in the study bares health spruces, pointing to the necessity of indoor air quality management in the already vulnerable populations (Hansel et al., 2022). Moreover, the studies show that the inside air is the second threat factor to the mental health of mothers during pregnancy, and improving the indoor air quality may be a strategy to prevent antenatal depression (Hu et al., 2022). Concludingly, creating the Air Quality Health Index (AQHI) to determine the health-related effects of air pollution is a significant step that indicates that these approaches should be customised to reflect the particular susceptibilities among various population types (Olstrup, 2020). These data appear to clearly show that pollution monitoring should be one of the vital activities that need to be on the agenda and that it should be one of these activities that should be done to improve air quality indoors and outdoors.

2.3.4 Retail Domain Score and Health Outcomes

Retail space has also been considered in the last few years; the connection between the place's operative conditions and employees' health has recently been one of the most discussed topics for research. The fact that many diseases and health conditions are linked to environmental conditions is now reflected in these new findings, and these connections could carry serious health outcomes. For example, an investigation on retail workers during the COVID-19 pandemic

offers essential knowledge of the mental health challenges that these workers faced. At the same time, the study suggested that the retail environment could largely determine the health state of the workers, especially in high-stress situations (Lan et al., 2021). Armendariz et al. (2022) evaluate the influence of retail food settings on health undertakings, for instance, blood pressure. It is related to the fact that the number of supermarkets is positively associated with blood pressure among people unaware that they have hypertension (Armendariz et al., 2022). Rinaldi et al. (2023) assess the consequences of reviving retail environments and their potential health benefits, which makes evident the impacts of such intervention on public health (Rinaldi et al., 2023). Besides, Smiley et al. (2021), the paper puts light on how the marketing of menthol cigarettes, which is mainly done in predominantly African-American neighbourhoods, impacts health equity. Research presented here demonstrates the power of retail marketing strategies that aggravate health disparities because of policy, including the need for policies that curb product selling or their package representation in the retail environment (Smiley et al., 2021). Fundamentally, the literature demonstrates a strong connection between the retail environment and health that influences mental health, the risk of chronic disease and health equity. Further studies are worth conducting to identify continuing relationships among these themes to possibly set evidence-based instructions toward better health results achieved through natural environment interventions and policies.

2.4 Importance of Small National-Level Data in Decision-Making

The small community-level data offered by the AHAH index are critical and hold crucial factors whose presence influences decisions by several parties in governance. The extensive survey reveals fine-grained details regarding health and environmental status in those small geographic areas for the U.K., like Lower Level Super Output Areas (LSOAs) for England and Wales and Data Zone (D.Z.) for Scotland (data.cdrc.ac.uk, n.d.). Through this detailed picture, policymakers and other key actors acquire a clear view of what is needed to help one community or another, and hence, they can allocate resources equally. Also, local health authorities and public agencies for health can utilise small-scale data to observe trends and trace the evolution of these trends concerning the area under their jurisdiction. Through continuous monitoring of AHAH index scores and selected indicators, policymakers can pinpoint areas of concern and areas that need interventions, thus guiding the design of a tailored strategy to promote health and environmental conditions. Furthermore, small datasets help in regional comparisons, making anchoring organisations against better practices possible. Analysing differing AHAH index scores in different areas will inform policymakers on which projects work and in which areas these projects might be transposed, adapting them to match the local context, thus driving innovation

and collaboration on the biosphere spherical threats. After all, decision-making at the national level would be incomplete without this data. The multidimensional AHAH index, with its comprehensive study across numerous concerns, would be helpful to policymakers, researchers, and practitioners working on raising health and well-being at the local level in Great Britain.

2.5 Dr. Mark Green's Framework: Lifestyle and Environmental Influences on Health

As described by Dr. Mark Green and his co-workers from the University of Liverpool, the framework conceptualises the health-risk environment and health-protective environment as the two grand categories that separate the lifestyle-related and the environmental factors from the health outcomes. These clusters help in captivating the numerous factors inherent in various people's health and well-being. The first category, Access to Retail Areas, deals with the issue of the availability and closeness of retail stores, such as grocery stores, fast food outlets, and other suppliers of health-related goods. One of the researchers' critical tasks is to assess whether such channels are available in an individual's place of residence since it is that fact that may be proof of the availability of healthy food options as well as other products that contribute to one's wellbeing. Besides, subjects about Hospitals, Clinics, Health Centers, and many more in primary healthcare facilities are examined under the Category of Access to Health Services (www.liverpool.ac.uk, n.d.). This facet includes geographical accessibility and medical costs; therefore, they are also described as important, influential factors determining receptiveness and the pursuit of health care services. As a support, the structure consists of air quality that deals with environmental pollutants from the mentioned nitrogen dioxide, particulate matter, and sulfur dioxide, which are connected to respiratory system problems, cardiovascular health risks, and overall well-being. Moreover, Access to Nature focuses on the supply and comfort of parks, sports complexes, and gardens. All people have partaken in many green spaces and can get invaluable health benefits as a result. Green's model is a potent tool to be used against the study under examination in the U.K. (England, Scotland, and Wales) on the relationship between amenities and the environment, where the researchers can investigate the connections between our lifestyle and the environment. The conclusion is to produce guided intervention schemes and policies with no other foundation but the knowledge of the unique health problems currently viewed within the communities in the country.

2.6 Hypothesis

The hypotheses for the study are as follows:

H1: There will be significant differences in the vital information derived from the AHAH dataset between Lower Level Super Output Areas (LSOAs) in England and Wales and Data Zones (D.Z.) in Scotland.

H2: Prevailing trends in neighbourhood health disparities and perceived healthiness will vary between England, Scotland, and Wales.

3. Methodology

3.1 Research Design Explanation

The research approach for the present study lies in positivism, considered the first philosophical approach based on the idea that science aims to establish objective reality through empirical evidence and rigorous scientific methods. This research uses the AHAH dataset to obtain a holistic picture of health disparity issues and trends in England, Scotland, and Wales (data.cdrc.ac.uk, n.d.). The postulation of the quantitative data analysis and the statistical techniques by the Positivism movement is demonstrated by the use of the SPSS, R, and Excel software applications for the data analysis and the comparisons between the regions (Sharma et al., 2023). This further implies the research tries to determine the ongoing trends among the three countries and the factors that affect the aspects concerned through suitable statistical analysis methods. It follows the positivistic way of explaining the truth statistically and based on the observational test results. Among other factors, the research design touches upon data quality concerning representation and potential biases, indicative of the magnitude of an investigation conducted to ensure accuracy and non-bias (McCarthy et al., 2023). This study paradigm represents a positivist approach using quantitative data analyses, empirical evidence, and stringent methodology to reveal the objective details concerning an unfavourable neighbourhood disparity and time trends in England, Scotland and Wales.

3.2 Justification for the Methods Used

The positivist principle of making certain deductions from an empirical ground proves the legitimacy of the emphasis on statistics. Engaging in a comparative study across the cities and further analysing factors as to the reason for healthy or unhealthy neighbourhoods, the study set the objective of coming up with holistic solutions that are well-informed and have real-life data. This approach sets the pace for investigation based on evidence data gathered through a scientific way of thinking and formulated policies and interventions resulting from said evidence (Sharma *et al.*, 2023). Moreover, this work has a highly qualitative and quantifiable accuracy that establishes the existence of a very transparent and credible methodology, supporting the reliability and validity of results. Subsequently, the paper strengthens its findings by reinforcing the assertions with the following information and ensuring the audience connects with the outcome; therefore, it guaranteeshe conclusions drawn (McCarthy *et al.*, 2023). Ultimately, this method's justification—which can be interpreted as the positivist method— provides room for a

more comprehensive exploration of health disparities and trends experienced in England, Scotland, and Wales, respectively.

3.3 Data Source Description (AHAH Inputs/Components Dataset)

This study uses the Access to Healthy Assets and Hazards (AHAH) Dataset, Version 3 of the data made by the Consumer Data Research Centre (CDRC) for Britain. This comprehensive index aims to evaluate the healthiness of urban landscapes by adopting a multi-aspectual approach that includes different accessibility domains. The 2022 (Last Update) dataset includes 61 variable data with 41,729 observations from the LSOAs in England and Wales and D.Z. in Scotland. The AHAH dataset combines indicators from four domains: the retail environment, equal access to health services, and the intersection of physical and air quality issues. These measurements represent a tool that not only measures but also tracks health inequities in neighbourhoods and sheds light on the problems that need attention (data.cdrc.ac.uk, n.d.). Apart from this, the dataset combines most indicators, i.e., access to retail services, green spaces, and air quality, which showcases the new and holistic dataset. To ensure that the data offered is valid and the representation is eyed on a broad spectrum and a small extent, the data was obtained from trustworthy sources and subjected to a thorough verification process. (Phaladi, 2022). The dataset covers accessibility variables shown by the distance from adjacent amenities and the atmospheric indicators, such as air quality, that are analysed. Besides, intermediate variables like the AHAH index, map sets, and categorical comparisons are provided, which ease interpretation and analysis of neighbourhood healthiness (Reed-Berendt, Dove and Pareek, 2022). AHAH data becomes an accurate basis for researching health disparities between the neighbourhoods of England, Scotland, and Wales and the trends in these regions. It uses the positivist approach when it employs empirical evidence and rigorous methods in searching for objective answers.

3.4 Data Collection and Processing Procedures-

Data collection and processing procedures for the AHAH dataset Version 3 involve not only the critical aim for precision, enough reliability, and faithful representativeness. This dataset (from the CDRC for Great Britain), which measures the healthiness of neighbourhoods in England, Wales, and Scotland - has combined several accessibility domains into a single health domain measure. The data collection implies sourcing the information from well-known providers and ensuring that this season's data is included as a maximum current date for 2022. The data set contains 61 variables and 41,729 observations for all English and Wales LSOAs and Scottish D.Z. This data set will be secured from the public, allowing individuals to gain access with the approval procedure outlined on data privacy and ethical principles (data.cdrc.ac.uk, n.d.). During the processing stage, the data is structured into a standard format such as the CSV format, making the data easily readable and, thus, the analysis and interpretation stages less complicated. The data set comprises measurement data and deciles for the overall index, four domains, and 15 inputs to comprehensively examine the extent of neighbourhood health gaps. The quality assurance actions are based on reducing biases and providing reliable data sets. There is a strict process of assessing data sources, so selecting good-quality sources and using low-biased sources are highly preferred. Furthermore, all the data sources and questionnaires also undergo bias checks using multiple local checks, with all external data sources being validated by their respective data producers (McCarthy *et al.*, 2023). AHAH Dataset Version 3 activities often follow good practices of quality controls, representativeness, and prison mitigation. Therefore, as a rather valuable instrument, it is used to reveal and examine health disparities and their trends in England, Scotland, and Wales.

3.5 Analysis Methods for SPSS and Excel

Concerning hypothesis H1, the Mann–Whitney U test was used to determine the average scores of AHAH between Lower Level Super Output Areas (LSOAs) in England and Wales and Data Zones (DZs) in Scotland, as the data had a non-parametric distribution. Log transformation was applied to address skewed data characteristic of the natural disaster (Hood et al., 2022). These procedures, making us confident in the validity of the health metric comparison between different regions despite the non-normal distribution of the dataset, were the basis of our research. In contrast, hypothesis H2 was explored by applying multiple regression analysis to find broadlevel patterns of health disparities among neighborhoods in England, Scotland, and Wales. These factors included but were not limited to location, critical service area, target population, transportation access, environmental issues, and retail presence (Scoggins, Khan and Dai, 2022). However, these analytical approaches created a unique situation to assess and evaluate geographical factors affecting health outcomes in various regions. The Mann-Whitney U test made it possible to directly compare AHAH scores between regions with the non-normal distribution of elements. At the same time, multiple regression analysis helps reveal generalized patterns and relationships between particular characteristics of neighborhoods and the perception of their healthiness. Thus, the study described how the spatial patterns analyzed illuminated geographical factors underpinning neighborhood health conditions, enriching the comprehension of spatial health disparities and providing a base to implement specific programs and projects to enhance community health (Ma et al., 2023).

4. Results and Discussion

Based on the AHAH data, this part of the analysis investigates the neighborhood health inequity across England, Scotland, and Wales. It emphasizes important variable variations,

checking normality departures, and identifying important regional disparities. The discussion section sets the findings within the context of existing literature and underscores evidence-driven decision-making and community partnerships for healthier communities.

4.1 Comparison of Key Information between LSOAs for England and Wales and DZs for Scotland

Descriptive statistics were initially conducted to summarise the key variables. Normality tests were then performed to assess the distribution of the data. Hypothesis H1 was tested using the Mann-Whitney U test to compare the differences between England and Wales's Lower Level Super Output Areas (LSOAs) and Data Zones (DZs) for Scotland.

4.1.1 Descriptive Statistics

	Ν	Min.	Max.	MeanSD	Skewness	Kurtosis
Component Variables						
Distance to nearest GP Practice	41729	.00	167.61	5.01 5.75	4.81	63.02
(minutes)	1	1 1.1	6			
Distance to nearest Dentist (minutes)	41729	.00	396.67	5.40 8.52	10.67	272.35
Distance to nearest Pharmacy	41729	.00	167.61	4.11 5.60	5.18	60.79
(minutes)			1.1 1			
Distance to nearest Hospital	41729	.00	400.04	6.43 9.90	8.18	160.55
(minutes)	1					
Distance to nearest Blue space	41729	.00	34.61	4.85 3.47	1.50	3.63
(minutes)						
NVDI value indicating Passive Green	41729	.00	.86	0.43 0.11	0.07	0.50
Space		r				
Distance to nearest Fast Food Outlet	41729	.00	528.11	6.25 12.57	13.72	366
(minutes)						
Distance to nearest Gambling Outlet	41729	.00	1170.30	8.30 31.30	24.95	754.79
(minutes)	7 Δ	A	SHI	AF		
Distance to nearest Leisure Centre	41729	.00	1764.10	13.1553.80	21.39	567.96
(minutes)	21.01	et. 1. 1. 24	19			
Distance to nearest	41729	.00	528.58	5.60 11.914	415.99	456.66
Pubs/Bars/Nightclubs (minutes)						
Distance to nearest	41729	.00	929.45	12.2032.12	15.99	325.24
Tobacconists/Vape Store (minutes)						
Annual mean Nitrogen Dioxide	41729	1.33	44.20	13.276.37	0.91	1.23
(µgm³)						
Annual mean Sulfur Dioxide (µgm³)	41729	.19	6.74	1.38 0.59	0.87	1.75
Annual mean Particulate Matter	41729	4.50	21.83	13.583.19	-0.19	-0.45
(µgm³)						
AHAH Index, Domains, and Intermo	ediate V	ariable	S			
Health Domain Score	41729	-3.38	3.58	00 0.84	0.19	0.16
Green/Bluespace Domain Score	41729	-3.48	2.24	00 0.63	-0.27	0.07
Air quality Domain Score	41729	-3.67	3.06	00 0.90	-0.14	0.16
Retail Domain Score	41729	-3.79	3.07	00 0.90	-0.14	0.11
Access to Healthy Assets	41729	2.04	73.55	21.698.99	1.18	1.83
and Hazards Index score						

Table 1. Descriptive Statistics

In the health domain, mean distances to GP practices (M = 5.01 minutes, SD = 5.75) and hospitals (M = 6.43 minutes, SD = 9.90) suggest relatively accessible healthcare services. However, distances to dentists (M = 5.40 minutes, SD = 8.52) and pharmacies (M = 4.11 minutes, SD = 5.60) indicate slightly shorter distances. Regarding the physical environment, mean distances to blue spaces (M = 4.85 minutes, SD = 3.47) are relatively short, potentially contributing to better mental well-being. The Normalised Difference Vegetation Index (NDVI) indicates moderate levels of passive green space (M = 0.43, SD = 0.11), supporting ecological balance. The retail environment appears accessible, with relatively short mean distances to fast food outlets (M = 6.25 minutes, SD = 12.57) and pubs/bars/nightclubs (M = 5.60 minutes, SD = 11.914). However, access to tobacconists/vape stores (M = 12.20 minutes, SD = 32.12) and gambling outlets (M = 8.30 minutes, SD = 31.30) is slightly farther away. Concerning air quality, mean annual nitrogen dioxide concentrations (M = 13.27 μ g/m³, SD = 6.37) and particulate matter (M = 13.58 μ g/m³, SD = 3.19) are within acceptable limits. In contrast, sulfur dioxide levels (M = $1.38 \,\mu g/m^3$, SD = 0.59) suggest minimal pollution. The Access to Healthy Assets and Hazards (AHAH) index scores (M = 21.69, SD = 8.99) reflect moderate access to various amenities, indicating potential opportunities for improving overall community well-being. Overall, the data on the indices are mixed, with healthcare and retail industries being pretty accessible, the level of green and blue space being moderate as well, and the air quality is decent. Yet, there may only be specific amenity types and environmental factors that need an overall focus to plan meant to help the community by tackling the health and well-being aspects.

4.1.2 Tests of Normality

DISSERIATI	DN HELP	Kolmogorov-Smirn		
Variables	LSOAs vs DZ	Statistic	df	Sig.
Health Domain Score	LSOAs	0.02	34753	.000
	DZ	0.04	6976	.000
Green/Bluespace Domain Score	LSOAs	0.01	34753	.000
	DZ	0.03	6976	.000
Air quality Domain Score	LSOAs	0.01	34753	.000
	DZ	0.05	6976	.000
Retail Domain Score	LSOAs	0.01	34753	.000
	DZ	0.03	6976	.000
Access to Healthy Assets and Hazards Index score	LSOAs	0.09	34753	.000
	DZ	0.09	6976	.000
a. Lilliefors Significance Correction				

Table 2. Tests of Normality for Key Variables

Table 2 reports the results of the Kolmogorov-Smirnov tests on the skewness of key variables across the LSOAs in England and Wales and the Data Zones in Scotland. The data in a table encompasses test statistics, degrees of freedom (df), and p-values for each variable. According to the Kolmogorov-Smirnov test, a departure from the normal distribution was obvious in all the investigated variables, LSOAs, and DZs (all p < .001). As regards statistics, for inequalities Health Domain Score, Green/Bluespace Domain Score, Air quality Domain Score, Retail Domain Score, and Access to Healthy Assets and Hazards index score, the tests detected from 0.01 to 0.09 in LSOAs and from 0.03 to 0.09 in DZs. Owing to the abnormal distribution of the dependent variables, the Mann-Whitney U test is based on the rank applied to compare these crucial factors between LSOAs in England and Wales and the DZs in Scotland. Mann-Whitney U test is a non-parametric test that can be applied to compare two independent groups with a violation of the normality assumption. It determines whether the distribution of two parties whose ranks are involved significantly differs. That is why non-parametric tests can examine the core variables that do not fall under probability distribution in different regions (See Appendix 1).

LSOAs vs.		Mean	Mann-		
DZ	N	Rank	Whitney U	Z	р
LSOAs	34753	19963.40	89885088	-34.12	.000
DZ	6976	25356.60			
LSOAs	34753	21550.80	97384974	-25.95	.000
DZ	6976	17448.50	_		
LSOAs	34753	23598.20	26231493	-103.45	.000
DZ	6976	7248.75			
LSOAs	34753	21396.52	102746594	-20.11	.000
DZ	6976	18217.08	RA		
LSOAs	34753	22160.92	76181198	-49.05	.000
DZ	6976	14408.97			
	LSOAs vs. DZ LSOAs DZ LSOAs DZ LSOAs DZ LSOAs DZ LSOAs DZ	LSOAs vs. DZ N LSOAs 34753 DZ 6976 LSOAs 34753 DZ 6976	LSOAs vs. Mean DZ N Rank LSOAs 34753 19963.40 DZ 6976 25356.60 LSOAs 34753 21550.80 DZ 6976 17448.50 LSOAs 34753 23598.20 DZ 6976 7248.75 LSOAs 34753 21396.52 DZ 6976 18217.08 LSOAs 34753 22160.92 DZ 6976 14408.97	LSOAs vs. Mean Mann- DZ N Rank Whitney U LSOAs 34753 19963.40 89885088 DZ 6976 25356.60 LSOAs 34753 21550.80 97384974 DZ 6976 17448.50 LSOAs 34753 23598.20 26231493 DZ 6976 7248.75 LSOAs 34753 21396.52 102746594 DZ 6976 18217.08 LSOAs 34753 22160.92 76181198 DZ 6976 14408.97	LSOAs vs. Mean Mann- DZ N Rank Whitney U Z LSOAs 34753 19963.40 89885088 -34.12 DZ 6976 25356.60 - - LSOAs 34753 21550.80 97384974 -25.95 DZ 6976 17448.50 - - LSOAs 34753 23598.20 26231493 -103.45 DZ 6976 7248.75 - - LSOAs 34753 21396.52 102746594 -20.11 DZ 6976 18217.08 - - LSOAs 34753 22160.92 76181198 -49.05 DZ 6976 14408.97 - -

4.1.3 Mann-Whitney U Test for Key Variables	11.
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Table 3. Mann-Whitney Test for Key Variables across LSOAs and DZ

Table 3 displays the outcomes of the Mann-Whitney U test for the main variables, which is being compared between Lower Level Super Output Areas (LSOA) in England and Wales and Data Zones (DZ) in Scotland. The table shows the N of observations, Mean Ranks, Mann-Whitney U statistics, Z-scores, and the p-values for every variable. Showing important differences between LSOAs and DZs within all variables (all p < .001). Specifically, for Health Domain Score, Green/Bluespace Domain Score, Air quality Domain Score, Retail Domain Score, and Access to Healthy Assets and Hazards index score, the mean ranks were higher in LSOAs than DZs. The Mann-Whitney U statistics ranged from 76181198 to 102746594, with corresponding Z-scores ranging from -103.45 to -20.11. These results support hypothesis H1, indicating significant

disparities in vital information derived from the AHAH dataset between LSOAs in England and Wales and DZs in Scotland.

4.2 Examination of Prevailing Trends Impacting Perceived Healthiness Across Nations

Multiple regression analysis was conducted to explore hypothesis H2. National variables were consolidated into three categories: England, Wales, and Scotland, with Wales as the reference. All factors determining the Access to Healthy Assets and Hazards (AHAH) index were included as covariates in the analysis.

Predictors	В		SE	t	р	
(Constant)	.799		.008	99.22	***	
England	014		.003	-5.35	***	
Scotland	.014	42-0	.003	5.22	***	
Health Domain Score	.806		.012	67.94	***	
Green/Bluespace Domain So	core .139		.001	151.65	***	
Air quality Domain Score	.096	1	.001	117.00	***	
Retail Domain Score	.069	1	.001	60.22	***	
R	0.79					
R ²	0.63					
F statistic	12174.	70 (6, 4	1722) ***			
***p<.001		74				

4.2.1 Regression Model for Access to Healthy Assets and Hazards Index Score

Table 4. Regression Model for Access to Healthy Assets and Hazards Index Score

The regression analysis involved several preparatory steps. Firstly, data were transformed to address skewness issues. Specifically, the Access to Healthy Assets and Hazards index score and Health Domain Score were log-transformed due to their positive skewness values of 1.18 and 0.19, respectively. Outlier detection and correction procedures were also applied to the Green/Bluespace Domain Score, Air Quality Domain Score, and Retail Domain Score (See Appendix 2). Following these preparations, a multiple regression analysis was conducted to test hypothesis H2, exploring the relationships between these transformed variables and the Access to Healthy Assets and Hazards index score. Several significant predictors emerged in the regression model predicting the Access to Healthy Assets and Hazards index score, with Wales as the reference category. Overall, the model was significant, F (6, 41722) = 12174.70, p < .001, accounting for approximately 63% of the variance in the Access to Healthy Assets and Hazards index score ($R^2 = 0.63$). After controlling for other variables in the model, residents of England showed a significant negative association with the Access to Healthy Assets and Hazards index score (B = -.014, SE = .003, t = -5.35, p < .001). In contrast, residents of Scotland exhibited a significant positive association (B = .014, SE = .003, t = 5.22, p < .001) compared to Wales. Additionally, significant positive associations were found between the Access to Healthy Assets

and Hazards index score and the log-transformed Health Domain Score (B = .806, SE = .012, t = 67.94, p < .001), Green/Bluespace Domain Score (B = .139, SE = .001, t = 151.65, p < .001), Air quality Domain Score (B = .096, SE = .001, t = 117.00, p < .001), and Retail Domain Score (B = .069, SE = .001, t = 60.22, p < .001). These findings support hypothesis H2, indicating variations in neighbourhood health disparities and perceived healthiness between England, Scotland, and Wales. Residents of England and Scotland demonstrated significant differences in their Access to Healthy Assets and Hazards index score compared to Wales, with England showing a negative association and Scotland showing a positive association. Moreover, the relationship between the Index of Access Healthy Assets and Hazards score and the scores in each domain, including the environmental factors, is very impressive. It reaffirms the great role of the environment in the community's health outcomes.

4.3 Discussion of Findings

The analysis of findings reveals seminal yet sobering discoveries relating to neighbourhood health inequalities between England, Scotland, and Wales using the AHAH dataset. Variation in how people access health care, air quality, and shopping in different regions confirms the need for targeted interventions, reflecting the complexity of neighborhood health determinants. In addition, the superimposition of the research work with the objectives of the project and the consequences of the data for policy-making, healthcare delivery, and health policies are highlighted and accepted as the predominant part of a data-driven approach and the partnership in creating healthier, happier communities.

4.3.1 Relevance of Findings and Approach to Analysis

The study sought to describe and compare medical health disparities between England, Scotland, and Wales based on the AHAH data collection. The study thus draws attention to elements crucially important for any community's health and welfare and inspires actions for government officers, doctors, and urbanists. As shown in descriptive statistics, the select groups of the main variables were unevenly distributed between Lower Level Super Output Areas (LSOAs) and Data Zones (DZs) for England and Wales and data zones for Scotland, respectively. Two main parameters tested were distances from healthcare facilities, blue spaces, shopping outlets, and air quality indicators, which showed significant differentiation among the regions. These results suggest that small-scale interventions tailored to meet the needs of local community members exactly may maximise the health of any society. With the normality tests, the tests have manifestly shown abnormalities with each variable, calling for the implementation of alternative hypothesis testing processes. The Mann-Whitney U test reinforced that the data derived from the AHAH dataset concerning vital information amongst LSOAS in England and Wales differed from that of Scotland in the DZs. That is why aligned strategies are needed, especially when observing the role the environment and health in the different regions play (Seaman *et al.*, 2024).

The subsequent multiple regression analysis went further than that to reveal deeper insights into what factors played a small or a big role in determining the healthiness that prevailed across England, Wales, and Scotland. The three nationally representative indicators highlighted the relationships between local attributes/characteristics with the Healthy Assets and Hazards index score, with the national reference category being Wales. Importantly, the residents of England encountered a negative association with the AHAH index score, while the residents of Scotland portrayed a positive pattern in contrast to the residents of Wales. Consequently, it raises the issue of assorted health disparities and environmental influences for the three countries. Additionally, the strong positive correlation between the AHAH index score and subscores (Health, Green/Bluespace, Air Quality, and Retail) highlights the multidimensionality of the neighbourhood health determinants. This highlights the need for the whole approach to be employed for community well-being by including environmental, social, and economic factors while designing health interventions and urban planning approaches (Sadler, 2016). The study results are of particular importance for preventive medicine strategies and efforts. Through a thorough examination of health inequities across national lines and territorial borders, this research study will benefit policymakers when implementing proof-based decision processes and area-specific program interventions for better community health outcomes. Going ahead, we must increase our search to ensure that interventions are localised and suited to each zone's specific demands and challenges. This will bring together a cohesive and steady community in the end.

4.3.2 Link Between Research Results and Project Objectives

This research aimed to apply modern analytical statistics methods to study health trends and disparities of the neighbourhood following the spatial given dataset (AHAH dataset). The research was conducted to obtain the most obvious parameters regarding the formation of healthy eating behaviour and the right intervention mechanism, applying descriptive statistics, normality tests, and hypothesis tests as approaches. The investigation aimed to preprocess the AHAH dataset and compare it to the indices for lower-level Super Output Areas (LSOAs) in England and Wales and for Data Zones (DZs) in Scotland. Utilizing descriptive statistics along with the Mann-Whitney U test, as was our purpose, the target of this investigation was successfully achieved. Distances between providing health care facilities, water features, retail units, and air quality were figured out, and a comprehensive picture of their important attributes was given with the help of descriptive statistics. The report shows that the characteristics are unbalanced throughout LSOAs and DZ. It has also been confirmed that inequality goes beyond the neighbourhood borders and occurs more within different regions at a much higher level. However, one of the main distinctions is that the average distance from a healthcare center differed between countries such as England and Wales, which had much more accessible services than Scotland. Furthermore, increased shop and green space passing by was indicated, along with enhanced air quality, which stresses the need for cause-specific interventions in line with the health needs of the communities. The Mann-Whitney U-test hypothesis was accepted as there were significant differences in the information provided on the project-specific information across the LSOAs of England and Wales and DZs in Scotland. Statistical test was used to study this phenomenon and thus build on the empirical data to prove that health and living standards varied across the dissociated geographic areas, which assessed the variation across indices between regions (Halder *et al.*, 2023).

The second purpose of the analysis sought to bring to light several prominent trends across England, Scotland, and Wales and to examine the factors that remained relevant in the health assessment. This focused task was enabled by using multiple regression analysis in the study. It was explored using the regression analysis of the relationships between the composite score and a series of domain scores (Health, Green/Bluespace, Air Quality, and Retail) and the AHAH index score, which has national variables as predictors. These data show people's perception of community health and help them understand which factors influence community health effects. Exclusively for England residents, the AHAH index score had a strong negative association; meanwhile, Scotland residents had a strongly positive association compared to Wales. Moreover, many links were discovered between the AHAH total score and scores in the domains, which means that environmental factors may greatly impact the perception of health. Overall, the regression analysis brought into light the intricate interactions between area attributes and wellness proportion and achieved the main objective: to analyse the tendencies and variables that influence the area under study (Graetz, Boen and Esposito, 2022). The study met all its objectives by analysing the AHAH dataset, comparing indices between LSOAs and DZs, and exploring patterns, determinants, and poor health in England, Scotland, and Wales. The results yield important imperatives for public choices regarding health disparities, redressal, and enhancement of community health wealth. What follows is the need for ongoing research and targeted interventions to address the previously outlined disparities and to promote good health for all populations, which are correlated with different geographical locations.

4.3.3 Business Implications

The analysis highlights the key points that the study's recommendations bear on the health system for the policymakers, healthcare personnel, urban planners, and public health experts. The outcomes will be the basis of targeted health differences in these region's statistics, opening

possibilities for regional efforts and co-working to better the health of these communities. The findings offer substantial assistance to policymakers and urban planners, who can implement specific and targeted programs to reduce health disparities pertinent to particular territorial divisions. By finding the differing neighbourhood health criteria between England, Scotland, and Wales, policymakers can form specific strategies in each country to solve these different problems. For example, areas without direct healthcare facilities can benefit from infrastructure budgets, which will improve accessibility, and the places where pollution status is degraded could afford to launch such programs, which will help to reduce the pollutant levels. Urban planners can access the data to calculate distances to necessities and environmental factors. As a result, landuse planning and zoning regulations can be established from this information to provide equal access to amenities and encourage a healthier built-up environment (Downward, Hallmann and Rasciute, 2018). Healthcare professionals may apply the research results to re-plan and implement resources for their use in services. This analysis can help healthcare providers prioritise resources in areas where the need for effective healthcare services is higher so that every person underprivileged will be served. Also, environmental data such as air quality and green spaces can be utilised to plan programs aimed at enhancing public health, including those targeting the lessening of pollutants and improving access to green areas to improve the mental and physical health of the residents.

Public health officials could use research results to form just interventions that are targeted at resolving the non-existent needs of specific communities. Besides, the zones with all-purpose food stocks but limited options for healthy food can be helped through programs promoting healthy diets and education on nutrition. For instance, regions with poor air quality must also make provisions that minimise pollution levels and protect residents from air-related health issues. Public health practitioners can help eliminate health disparities and procure better health outcomes by tailoring interventions specifically targeting problems in every community. The report presents the fundamental role of data-driven decisions in confronting health disparity on a community level and serving the people's well-being. Health authorities can use this dataset, which collects comprehensive data on healthy assets and hazards (AHAH), to learn about the factors contributing to health outcomes and invest in prioritising scientifically evidenced-based interventions. Besides, continuous data collection, analysis, and evaluation should be implemented to evaluate progress, determine intervention success, and, if needed, adapt policies to attain the desired health outcomes. The research highlights the necessity of collaborating with organizations operating at all levels, mainly the healthcare area, the public sector, and academia. On the collective level, all real players should capitalize on their competence and resources to

design strategies for dealing with health disparity and providing good health in the community. The network of collaborations among the lineup of the social determinants of health services presents a multi-disciplinary approach that is sustainable and equitable for the residents (Mueller *et al.*, 2018). These measures will lead to implementing different hard measures that will impact health policy-making, healthcare delivery, public health interventions, data-driven decision-making, and collaborative partnerships, among others. The success of the analytical process comes from engaging different relevant stakeholders in it to find the best possible solutions that can be used to suggest actions that lead to the improvement of healthcare inequalities and the promotion of healthy and resilient communities in England, Scotland, and Wales levels.

4.3.4 Relevant Literature

The literature brings the pressing contextual dimensions of deprivation as causes, as well as the diverse manifestations of deprivation and its downsides for communities, for the interpretation of our research findings. The term "deprivation" is used to denote a situation when there is no access to necessary resources and opportunities. This issue also influences people at the community level and eventually results in societal disturbances (Rashid et al., 2021). Structural theories pin down systemic inequalities and discrimination as major factors that lead people through poverty and inequality by specifying the structures in society that impose further poverty and inequality (Nurse and Sykes, 2019). On the contrary, individualistic theories maintain that deprivation stems from personal choices like mismanagement of financial resources and even behaviours that might potentially be problematic. However, these same models also accentuate that these choices and behaviours are primarily determined by the system's availability of resources and opportunities (Wiśniowski et al., 2023). These findings raise concerns about the differences in neighbourhood characteristics and health outcomes among England, Scotland, and Wales. This reflects the literature that largely emphasises structural inequalities. The stark contrast in demographic features of neighbourhoods and the existing disparities in access to healthcare facilities, green spaces, retail outlets, and air quality indicators were observed, genuinely reflecting what these studies highlighted by Rashid et al. (2021) and Sawhney et al. (2023). The cutback of the AHAH index score association with the residents of England rather than Wales, like the system in health inequality rules by Nurse and Sykes (2020), was agreeable in that it reinforced the theoretical framework of structural inequality in health care. Literature suggested integrating various innovations to curtail deprivation, which may incorporate information and developmental technologies, community engagement, and environmental interventions (Li, Li and Carrington, 2023; Tompkins, 2023). In line with this view, our study

underscores the need for healthcare interventions customised to address specific health problems within communities, as stressed by James (2024).

The literature notes the centrality of environmental factors, like green spaces and fresh air, affecting health statuses (Besser, 2021; Kang et al., 2023). This tracks the previous ideas, suggesting additional correlations of the AHAH index score with domain scores, especially in green/blue and air quality. Here, we see the weight of the place of the environment in realising community good (Besser, 2021; Kang et al., 2023). The Health Domain Score comprises healthcare-related factors like GP availability, road connectivity to hospitals, oral healthcare, leisure centres, and physical activities. The positive correlation between the AHAH index score and the logarithm of the Health Domain Score implies that areas providing improvement in the medical services and components of physical activities are expected to have high AHAH index scores, which are indicative of better overall place health (Hargreaves et al., 2020; Scholes-Robertson et al., 2020). At the same time, the Green/Bluespace Development Score assesses the accessibility and the suitability of natural areas such as parks or water reservoirs. By observing the highly positive relationship between the AHAH index score and the Green/Bluespace Domain Score, we can conclude that gaining access to nature is an important factor for achieving good physical health and mental well-being within communities (Besser, 2021; Liberati et al., 2022; Hazlehurst et al., 2024; Sun, Song and Lu, 2022). On the other hand, the Air Quality Domain Score evaluates the area's air quality, which is related to significant harm to people's health when the value is high. The AHAH index score coinciding with a positive association with the Air Quality Domain Score suggests that better air quality is indicative of higher AHAH index score values that, in turn, translate to better community health outcomes (Kang et al., 2023; Visa et al., 2023; Hansel et al., 2022; Hu et al., 2022; Olstrup, 2020). Eventually, the Retail Domain Score dwells on the impact of the retail environment on health outcomes by considering stress levels and access to healthy options. The significant positive relationship between the AHAH and Retail Domain Score is paramount for creating healthier retail environments that can, in turn, enlarge community well-being and health (Lan et al., 2021; Armendariz et al., 2022; Rinaldi et al., 2023; Smiley et al., 2021). Therefore, findings stress the importance of environmental determinants in moulding community health indicators that require policies and actions in which the decisionmakers promote accessibility of healthcare, green spaces, clean air, and stores that promote health to the whole community. The AHAH index that gives out small-scale data is one of the vital sources of data used in local decision-making. Our study forwards such discussions by underlining the necessity of place-specific localised preferences and being attuned to the different needs of various geographical areas, as proposed by Raihan (2023). Dr. Green's

conceptualisation presents an all-inclusive picture of how lifestyle choices and ecological determinants are bound to shape health outcomes (www.liverpool.ac.uk, n.d.). With a close resembling this paradigm, our study investigates the nature of the connections formed between the characteristics of neighbourhoods and cognitively perceived healthiness, highlighting the intricate connections between the factors of environment and community well-being.

5. Conclusions and Recommendations

The research study is focused on exploring disparities in the health of the population living across England, Scotland, and Wales based on the AHAH dataset, which aligns with the mega city initiative. The significant components that impact community health were uncovered, and it was realised that each intervention should be targeted to achieve maximum effects. Through these investigations, policymakers, healthcare providers, town planners, and businesses will be more informed about how they can shape a healthier society.

5.1 Relevance to Project Objectives

The results of the study are strongly related to the aims of the project of investigating the health inequalities between the major nations of the UK and using the datasets of the healthy physical and environmental (AHAH) to reinforce these objectives jointly. This comprehensive analytical approach, consisting of descriptive statistics, normality tests, hypothesis testing, and multiple regression analysis, aims to discover key factors that affect the community's state of wellbeing, thereby providing evidence-based governance that can be used to suggest rational policies. On the other hand, the descriptive data gathered helped us understand the critical variables' distribution. This included attributes like LSOAs (Lower Level Super Output Areas) in England and Wales and DZs (Data Zones) in Scotland. It was found that specific metrics, including those related to distances from healthcare units, blue spaces, retail outlets, and air quality indicators, were in drastic contrast between districts. Hence, they highlight the importance of local projects targeted to deliver the best possible solution to community-specific health problems and environmental pursuits. On the other hand, the normality tests drawn from this study showed the presence of significant departures from normality for the mentioned variables. Therefore, alternative tests related to these non-parametric tests have to be used. The results of the Whitney U test, which was performed as a comparative analysis, were significant and showed differences in the information of a vital nature obtained from the AHAH dataset for LSOAs in England and Wales with DZs in Scotland, highlighting the need for the adoption of different healthcare and environmental solutions to tackle unique challenges that might vary in at different places (Moreno-Agostino et al., 2024). The multiple regression analysis added new details to the factors discussed behind the differences in the perception of healthiness in the three societies. National-level

variables were consolidated into three groups; the reference country was Wales. The analysis demonstrated the existence of crucial relationships between the AHAH index and the features of neighbourhoods. English residents displayed a negative correlation, while Scottish residents showed a positive association, which was contrasted to Welsh residents, thus revealing dissimilar health disparities and environmental impacts among the three countries. Besides that, the AHAH index score with the domain scores(Health, Green/Bluespace, Air Quality, and Retail) showed us the multiple factors that make up neighbourhood health. This data emphasises the need to be systemic when discussing community welfare; therefore, applying the wholeness approach when developing health interventions and urban planning projects, which incorporate environmental, social, and economic factors, is integral. Therefore, the results of this research will serve as a strong basis for the people making decisions at policy, healthcare, and urban level agencies, making informed decision making and executing intervention plans that have a huge positive impact on the overall health outcomes in England, Scotland, and Wales (Lee et al., 2023). The awareness and engagement of stakeholders on the health disparities and environmental problems within their locality can lead to the establishment of a healthier and more capable community, thereby increasing the wellness status of the population conserved in diverse geographical areas.

5.2 Organisational Context

At the organisational level, the study findings imply the stakeholders' attitudes across relevant public health sectors, urban planning, and policy-making. First, find the foundation for healthcare institutions and service providers to lean on valuable experiences obtained from the result of this study via improving resource allocation and service delivery. Once the uneven distribution of healthcare accessibility and environmental factors are studied, healthcare providers can design their resource allocation plans in a way that most prioritises need-identified areas. This will help ensure that residents in underserved communities receive sufficient healthcare services. Moreover, the data relating to the environmental factors, including the air quality and green spaces, has immense potential for the development of interventions targeted to promote public health and may include, for instance, projects to reduce air pollution as well as to create more opportunities for physical activity and mental recovery in the urban areas. Urban planners and policymakers will be able to use the findings as a basis for creating highly targeted strategies that will reduce health disparities and promote sustainable communities. Through the ability to distinguish certain disparities in health indicators of England, Scotland, and Wales at the neighbourhood level, policymakers will cultivate targeted programs and methods to satisfy each community's needs (Lignou et al., 2024). Such areas may include those lacking healthcare sites;

therefore, the necessary infrastructure should be established for universal accessibility. There are areas with poor air quality. Thus, it would then be necessary to improve pollution levels through programs. Urban planners can get a striking insight into the commuting patterns to essential services (such as schools, hospitals, food stores, clean air, etc.) along with natural and environmental factors, which can inform the planning process and zoning to generate equitable access to amenities and healthy urban areas. Some recommendations include localised interventions sensitive to each region's institutionally and environmentally specific challenges. These interventions should concentrate on reducing the obstacles to healthcare, enhancing general environmental quality, and encouraging healthy ways of life among communities. Forming multisectoral partnerships among key stakeholders, such as governmental departments, healthcare organisations, community-oriented groups, and academic institutions, impacts the successful delivery of such initiatives (Ordu et al., 2021). As stakeholders harness their knowledge and resources, they can collectively design holistic approaches that encompass the various social, economic, and environmental factors connected to better health and, thus, create stronger and healthier communities in England, Scotland, and Wales. A continuous data collection and analysis mechanism is key in assessing progress, evaluating implementation results, and improving strategies to achieve health goals.

5.3 Implications for Business

The study has significant implications for businesses, notably the healthcare, retail, and real estate sectors. Knowing the vital component of the community's well-being, which was discovered in this research and encompassed the multifaceted analysis, can support the making of high-level decisions and operations in the business. One of the prime utilisation of the knowledge gained from it would be the ability of healthcare organisations to fine-tune or even devise more effective services and intervention systems to aid in meeting the disease prevalence challenges within communities. This will allow them to identify and address the inequalities in healthcare delivery and environmental factors between population groups in different geographical areas. To optimise the use of available resources and service delivery, healthcare providers have the opportunity to better align with the needs of these communities. Companies in the health sector can also think about partnerships with other actors, such as government agencies and community organisations, to create programs that target health improvement interventions for different categories in the community. In the second place, retailers may gain from becoming familiar with internal features and community health associations. Through acknowledging the meaningfulness of accessibility, green spaces, and stress-free, retail businesses can cater to the health-related needs of the community by having flexible strategies.

These initiatives could range from marketing products with fewer preservatives or artificial colours to promoting initiatives such as using sustainable materials. On top of that, urban projects and plans can be developed using the findings of this investigation by businesses dealing with urban development and planning. Through the idea that succinctly sums up the main characteristics of community health factors, developers carefully line up created urban structures to support community prosperity (Wildman and Wildman, 2021). It could entail judging paths to improve how people get the healthcare they need or seeking to decrease air pollution and improve overall environmental conditions. Companies can be key players in uplifting health in the community by joining hands in achieving the recommendations of this paper. By focusing on evidence-based interventions and strong collaboration with other stakeholders, businesses can act as key players in healthier and more resilient communities around England, Scotland, and Wales.

5.4 Personal Learning

This experience not only holds great significance in academic research, but it also involves a lot of useful details with which to acquaint a researcher. The times I learned to clean data, log transformation of data, and outliers removal can be named first. Such tools turned out to be of great help in escaping the risk of inaccuracies and the inadequacy of the results from the Access to Healthy Assets and Hazards (AHAH) set. This realisation made the analysis more faultless and improved my skills, which can be applied transferably to different research settings and beyond. Additionally, carrying out running graphics, normality tests, hypothesis testing, and multiple regression analysis were very helpful in improving my comprehension of statistical tools and methods and, therefore, more efficiently resolving research questions. During my work with these analytical procedures, I attained the self-confidence to decode statistical procedure results and use complex datasets to draw results. In addition to that, this study contributed to my understanding that social sciences is also a part of public health research. By considering the self-sufficiency of the health status of neighbourhoods across England, Scotland, and Wales, I observed the interplay of environmental, social, and economic factors in shaping the level of wellbeing of the community. This holistic approach also reiterates the significance of these partnerships between policymakers, health experts, urban planning experts, and researchers in fighting health disparities and caring for the populace's health. Finally, the professional skills achieved from this task are not confined only to the technical ones, as the entire course produces firm research findings and the overall implications of such research to the public (Togo and Yonemoto, 2022). As I entirely progress and attain the upcoming academic and career milestones, these experiences will be a significant foundation for the novel practices I will use to end up with evidence-based decision-making and positive change in community health results.

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Figure 2. Histogram for Green/Bluespace Domain Score



Figure 3. Histogram for Air Quality Domain Score



Figure 4. Histogram for Retail Domain Score

Appendix 2









Regression Standardized Predicted Value



Appendix 3

