UNIVERSITY OF CAPE COAST

URBAN GREENING AND ITS RELATED DISEASES IN SUB-SAHARAN AFRICA

YOUFEGAN PRINCILLIA DORIA JAEL

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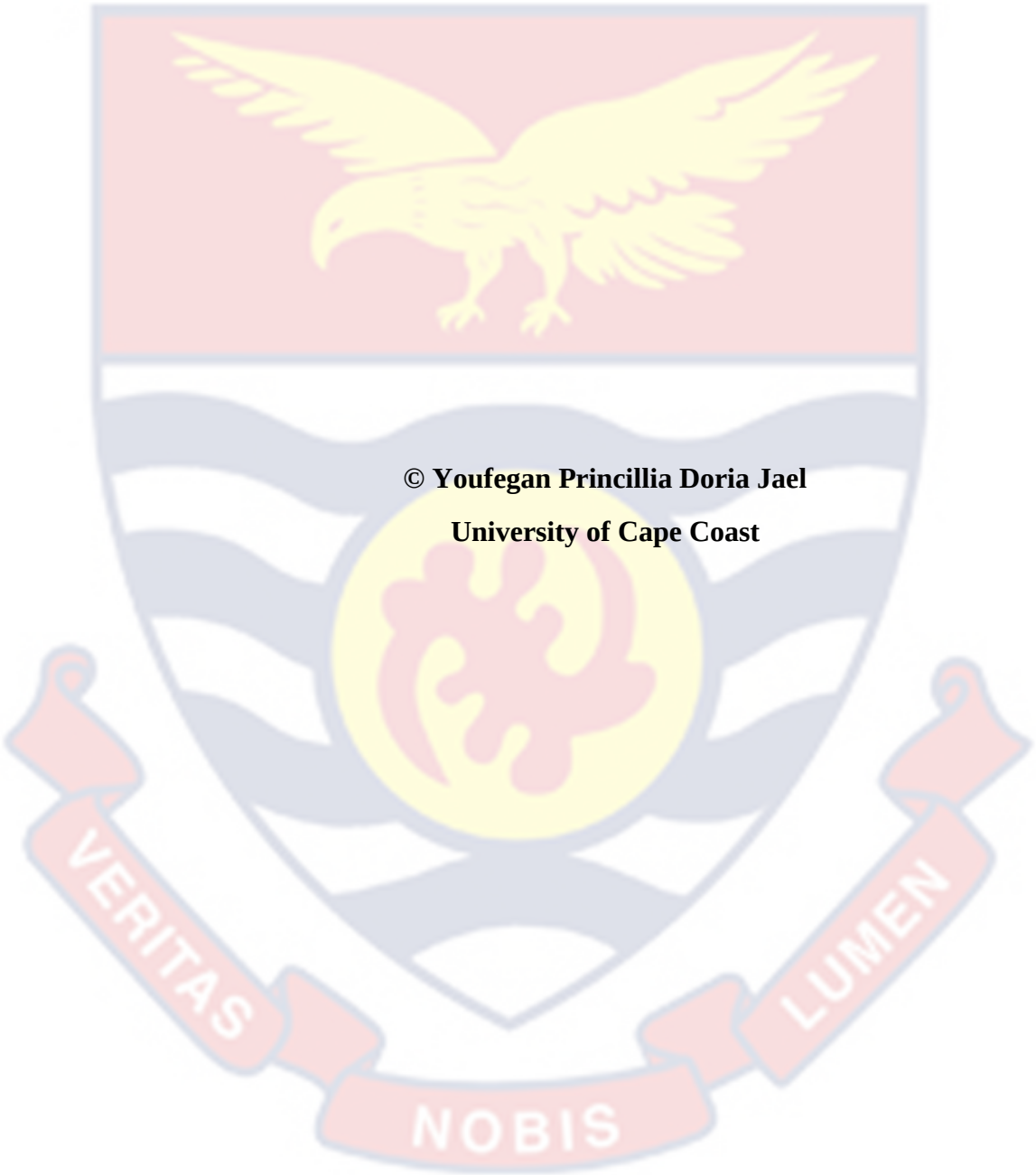

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URBAN GREENING AND ITS RELATED DISEASES IN SUB-SAHARAN AFRICA

BY

YOUFEGAN PRINCILLIA DORIA JAEL

This Dissertation is Submitted to the Department of Geography and Regional Planning of the Faculty of Social Sciences, College of Humanities and Legal Studies, University of Cape Coast, as part of the requirements for the award of a Master of Arts degree in Geography and Regional Planning

JULY 2023

DECLARATION

Candidate's Declaration

I hereby declare that this dissertation is the result of my original research and that no part of it has been previously presented for another degree at this university or elsewhere. It contains no material which has been accepted for the award of any other degree in any university, except where due acknowledgment has been made in the text.

Signature: …… Date: …….

Name: Princillia Doria Jael Youfegan

Supervisor's Declaration

I hereby declare that the dissertation preparation and presentation were supervised in accordance with the dissertation supervision guidelines of the University of Cape Coast.

Supervisor's signature: …… Date: …….

Name: Prof. Benjamin Kofi Nyarko

ABSTRACT

Climate change is widely acknowledged to be a key contributor to most environmental problems (flooding, sea level rise, air quality decline, biodiversity changes, water scarcity, and an increase in forest fires), thus the need for green spaces. As well as promoting health, economic well-being, and environmental sustainability, green spaces in urban areas contribute to the functioning of our ecosystems. Although several studies have been conducted globally regarding green spaces and ecosystem services, there are still a lot of unexplored areas related to the topic in Africa, Latin America, and Russia. The various studies conducted in these and other sub-Saharan countries focused more on the loss of green spaces and their environmental impacts, with little mention of the diseases associated with these urban green spaces. This study explored the relationship between urban green spaces and health within the sub-Saharan African countries, emphasizing West Africa. The study looked at the nature of urban green spaces, the diseases that occur due to inadequate green spaces, and the usefulness of green spaces to health. Using a systematic review with the help of the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) standards, the review found that there has been a drastic reduction in the size of urban green spaces, and adequate green spaces in urban areas can reduce and/or slow down the occurrence of non-communicable diseases (NCDs) such as cancer and cardiovascular diseases. The study recommends that Sub-Saharan African researchers should be encouraged to conduct more research on how urban greening impacts the health of urban dwellers. Also, national governments, city authorities, and urban dwellers should work together to safeguard these open spaces.

KEYWORDS

Diseases

Sub-Saharan Africa

Urban Green Spaces (UGS)

Urban greening

Attention Restoration Theory (ART)

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My heartfelt gratitude goes to my parents and siblings for their care, love, support, and encouragement.

DEDICATION

I dedicate this dissertation to my beloved parents and to my supervisor.

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CHAPTER ONE

INTRODUCTION

Background to the Study

Research has shown that a lot of people have migrated to urban areas (Qiu et al., 2011) in search of white-collar jobs, and stable and well-planned environments. This movement brings about rapid urbanization. Nevertheless, long after cities appeared, the majority of people continued to live and work in rural areas. The eighteenth century saw the beginning of widespread industrialization, which was when cities started sprawling. Currently, cities house nearly half of the world's population. Manufacturing and professional occupations, and more learning and entertainment opportunities, all attract people to cities (Urbanization | National Geographic Society, n.d.). In many nations, cities are the focal point of technical development and economic growth, but they are also breeding grounds for environmental risks, communicable diseases, poverty, and inequality. When large populations concentrate in cities, the middle and lower classes are disproportionately affected by the difficulties that occur.

Many rural migrants who relocate to urban slums, for instance, bring their families, pets, and livestock with them. This flood of people and animals makes all migrants more susceptible to infectious diseases in circulation, and an urban transmission cycle is feasible. Nonetheless, most of the impoverished residents in urban areas live in unregulated slums which are tightly packed, in close proximity to open sewage, and situated in physically dangerous locations such as steep inclines, riverbanks, and water basins prone to flooding, landslides, or industrial dangers. Infectious and non-infectious diseases are

spread by these causes, as well as pollution, insufficient nutrition, and other factors. According to Kuddus (2020), inadequate nutrition, communicable diseases and health conditions related to pollution, as well as filthy living conditions, are among the most significant health challenges caused by urbanization.

Even though cities already house more than half of the world's population, that number is projected to increase to two-thirds by 2050, very few evaluations have cited research that specifically relates to urban green space as opposed to any type of nature. An earlier assessment that almost solely used cross-sectional data to give a broad perspective of how urban green space is related to health has left many concerns unanswered about whether there are any potential causal links between nature and health in urban contexts (Kondo et al., 2018).

The volume of green space in a city, how the urban environment is designed, and how easily people can access it all impact how happy, healthy, secure, and comfortable urban dwellers are. In both developing and developed countries, the lack of green space in compact cities can be addressed through urban greening initiatives, according to a study by Jim (2012). The distinguishing features of a naturalistic design include urban green spaces (UGS) that are well-connected and form a green network to cover the metropolis. Natural regions with abundant biodiversity can be preserved and created, adding a new dimension to UGS design. To supplement the traditional emphasis on the environment and ecology, greening advantages could be expressed in economic terms. In addition to improving the health and wellbeing of urban residents, urban greening can provide numerous essential ecosystem

services (ES) to assist address issues like biodiversity loss and climate change. Assessing the local ES needs and potential constraints to ES provision is the first stage in optimizing urban green infrastructure (UGI) for a given metropolis (Buffam et al., 2022). Therefore, any factor (such as climate change) that has an impact on the urban environment will either directly or indirectly alter people's way of life.

Today, it is commonly acknowledged that climate change is causing global warming, making it one of the most critical environmental concerns. Most environmental problems we face today, including water scarcity, flooding, rising sea levels, biodiversity changes, declining air quality, an increase in the size and frequency of forest fires as well as distribution of landscape-scale vegetation, are strongly correlated with climatic changes (Saalu et al., 2020). With regard to that, green spaces in cities can give residents and visitors with social, economic, cultural, and psychological benefits. Since almost half of the world's population now lives in cities, where the percentage of rural-to-urban migration and strain from international migration are still high because most immigrants in developed countries live in the country's hubs or major cities, it is important to create urban green spaces and promote sustainable urban development (Haq, 2011). Also, recreation grounds and parks can be places to relax, enjoy Mother Nature, and meet a variety of social and cultural needs in cities where the number of people living in cities is growing (Battisti et al, 2019).

Battisti et al. (2019) further noticed that depending on their age, gender, level of education, or way of life, people use green spaces in different ways. These green spaces could be regarded as areas that have been planned, built,

and maintained with a sizable quantity of flora (trees, shrubs, and herbaceous species) and artistic aspects. Exposure to green spaces in urban areas have been linked to health either positively or negatively.

Environmental exposures and the prevalence of cancer could be linked, according to studies. For instance, lung cancer has been connected to prolonged exposure to air pollution (including, but not limited to, pollution from combustion and pesticides). By adjusting air pollution levels, green space may moderate this link (Kondo et al., 2018). The link between exposure to green spaces and cancer was only evaluated in few studies of which Demoury et a. (2017) is one. Demoury et al. (2017) used a population-based case-control analysis to investigate if exposure to residential green space was connected to prostate cancer incidence. They discovered that more residential greenness was associated with a decreased risk of cancer after adjusting for individual characteristics (demographic background, family and medical history, smoking, alcohol, food, and physical activity-related behaviors). The same could be said for cardiovascular diseases. The cardiovascular system may be impacted by exposure to green space as a way of reducing harm (such as heat, air pollution, and noise pollution) (Kondo et al., 2018).

In a cohort of Kaunas City, Lithuanian inhabitants (aged 45-72), Tamošiūnas et al. (2014) evaluated the relationship between green space exposure (distance from residence to nearest park, and self-reported park use). Both individual-level demographics and health habits (smoking and physical activity) could be controlled for in this study. Participants (especially men) who lived farther away from green spaces had an increased risk of both fatal and non-fatal CVD, while non-park users who lived farther away from green spaces

had an increased risk of non-fatal CVD. The relationship between interventions based on urban nature and changes in cardiovascular outcomes was investigated in two quasi-experimental studies (Kondo et al., 2018).

In a quasi-experimental study, Branas et al. (2011) compared changes in neighborhood crime rates and health outcomes, such as rates of hypertension and high cholesterol, that happened near clean-and-green treatments to vacant lots to those that occurred near vacant lots that were not treated. Near treated lots, they saw some notable drops in the prevalence of elevated cholesterol throughout the city. On the other hand, Kondo et al. (2018) observed no differences in the prevalence of high blood pressure and high cholesterol in their study comparing the areas near green stormwater infrastructure sites to the areas around control sites. Exposure to urban green spaces could influence weight status or other metabolic system parameters via pathways related to the heart, the mind, and physical activity.

In China, cancer, cardiovascular disease (CVD), and mental health problems are examples of non-communicable diseases (NCDs) and are now the main contributors to early mortality and disability. The top four risk factors for death and disabilities included high blood pressure, unhealthy habits, and air pollution. According to research, risk factor levels are rising, with the risk factors that have increased the most over the past three decades being ambient particulate matter (PM) and body mass index (BMI). The Chinese National Health Commission intends to back the WHO (World Health Organisation)'s goal of lowering premature mortality from NCDs by one-third from the current level by 2030 (Rahimi-Ardabili et al., 2021). China intends to implement health policies or plans over the next 15 years to improve the general health of the

Chinese population, with a focus on NCD control and prevention. The Chinese government regarded urban greening as a useful approach to assist in achieving its goal (Rahimi-Ardabili et al., 2021).

Green areas have been associated to a boost in social capital, physical activity, and ecosystem services including, among others, improved air quality, less traffic noise, heat island effects, and more biodiversity. Moreover, they are linked to healing and stress reduction. Green spaces have been linked to improved immunological, metabolic, and reproductive results, a decline in cardiovascular problems (CVDs), and a reduction in premature mortality, however the evidence is weak. Urban greening and blue infrastructures, particularly those with water features, trees, and permeable soils, have been shown to be effective at lowering ambient temperatures by absorbing solar radiation that strikes urban surfaces and reducing hot spots through radiative cooling ("Urban Services to Ecosystems," 2021).

On the other hand, green areas have been linked to a wide range of health problems, such as exposure to allergens, pesticides, herbicides, vector-borne diseases spread by arthropods (like Lyme disease or dengue), accidental injuries from activities done in green spaces, and too much exposure to UV radiation (Rojas-Rueda et al., 2021). Current epidemiological research on the advantages of exposure to green areas has been backed by four American literature studies. Rapid urbanisation and population growth are occurring in Latin America, and there is an increasing need for measures to improve public health and limit climate change. According to a study, supplying stakeholders with health information regarding the region's green spaces will strengthen public health programmes and climate mitigation measures (Rojas-Rueda et al., 2021). The

United Nations' Agenda 2030 set up seventeen Sustainable Development Goals (SDGs) that should be reached in the next ten years.

The development of cities sustainably depends on urban green spaces. Establishing animal habitats safeguards biodiversity and promotes active lives and outdoor leisure. Additionally, urban green spaces may minimize the urban heat island effect, act as carbon sinks, boost access to shade, increase water penetration, and enhance human well-being (*Urban Green Spaces: Combining Goals for Sustainability and Placemaking*, 2021). Larcher et al. (2021) say that Goal 11, "Sustainable Cities and Communities", is especially important for everyone to have access to public green spaces. To reach this goal, urban planning must take into account how public green spaces are put together. The health of the populace in America has been found to benefit from green spaces. The natural spaces found in cities are conducive to activities like dog walking, running, cycling, and community gardening. There are 3.2 million fatalities worldwide each year as a result of inactivity, which costs the US economy $117 billion in health care costs annually (*These Are the Human Benefits of Building Nature Into Our Cities*, 2023). The emotional and physical health of citizens can be improved by creating additional green places.

Some of the Sustainable Development Goals, like the one about making communities and cities more sustainable, cannot be met if Sub-Saharan African (SSA) cities do not plan for and deal with the accelerated rise in urban population. Typically, economic growth precedes urbanisation because cities provide the necessary population, products, infrastructure, and services density (World Bank, 2009). Sub-Saharan Africa's urbanisation, according to Turok and

McGranahan (2013), has resulted in stagnating economic growth rather than supporting it.

Some development measures, such as the rate of literacy, are lower on the African continent. Several African states depend on the exploitation of natural resources for economic growth (Freire, Lall, & Leipziger, 2014). All of this is attributable to the constant rise in rural-urban migration in these African nations, and it is notable that the majority of migrants reside in slums and disadvantaged communities. Given the enormous benefits that green spaces offer, it is assumed that many spaces in metropolitan areas will be set aside for similar purposes, but this has not been the case. Statistics show that in the past, the loss of urban green space in urban areas around the world occurred more quickly, but this is not the case today. For instance, there has been a "green improvement" in nearly 400 of the 500 American communities that have been studied, up from just 350 in 2010, indicating that there has been a positive change in the urban environment (Michellehavich, 2021). Even with climate change and everything else wrong with the environment, there is still hope that the upward trend will continue. Researches regarding urban green spaces were also conducted in Africa, which emphasized more on Sub-Saharan African countries.

The publications examined by Du Toit et al. (2018) covered 74 urban regions in 20 different nations. However, there are 53 Sub-Saharan Africa countries in total, and these 20 countries only make up 38% of them. The country with the greatest research was South Africa (37 papers), followed by Ghana (8 papers), Nigeria (6 papers), and Tanzania (6 papers). Eleven of the top 17 urban areas were found in South Africa, with Durban having the highest

number of papers published there, Ghana came second with 8 papers and Nigeria published 6 papers. Dar es Salaam, Tanzania (6) and Addis Ababa, Ethiopia (5) were the cities outside of South Africa that underwent the most research.

Although several studies have been conducted globally regarding green spaces, ecosystem services, there are still a lot of unexplored regions regarding the link between urban green spaces and health in Africa, Latin America, and Russia. Those studies' focus was on the developed western world (Haase et al., 2014). This research seeks to address that gap but focuses more on sub-Saharan African countries such as Ghana, Togo and Burkina Faso.

Problem Statement

The European Environment Agency estimates that every 10% increase in green space is linked to a reduction in diseases that is equivalent to a five-year improvement in life expectancy. There is proof that having more open and green places leads to better general physical health results (Impacts of Green Spaces on Physical and Mental Health, 2020). By encouraging social cohesion, fostering psychological relaxation and stress reduction, promoting physical activity, and lowering exposure to air pollutants, noise, and extreme heat, urban green spaces like parks, playgrounds, and residential greenery can promote mental and physical health and reduce morbidity and mortality in urban residents (Braubach et al., 2017).

Urban greening is of great importance worldwide, and the African continent is no exception. According to a study by the UN-Habitat (2014), there will be 1.26 billion urban dwellers in Africa by 2050, which is more than three times the 400 million urban dwellers there are now. Sub-Saharan Africa simply

refers to all African countries that are in the south of the Sahara Desert. It comprises all countries found in Central Africa (Gabon, Central Africa Republic, and Democratic Republic of Congo among others), West Africa (Ghana, Togo, Burkina Faso, Ivory Coast, Senegal among others), East Africa (Kenya, Ethiopia, Tanzania, among others), and the South African (South Africa, Zimbabwe, Mozambique among others) parts of the continent.

Urban Green Spaces (UGS) continue to be an important part of maintaining the functionality of the entire urban ecosystem due to their role in promoting health, social and economic well-being, and environmental quality. The 12-acre Efua Sutherland Children's Park and the Achimota Forest, two of the city's largest UGS, are among the notable UGS in Accra, the capital and largest city of Ghana. They further stated that Urban Green Spaces in Accra have significantly decreased during the last 20 years, despite their undeniable importance to the city. UGS, for instance, makes up just 0.4 percent of Accra, Ghana's capital city, out of its total land area of 175,491 hectares as of 2014. With the Executive Instrument (E.I 144) in operation in 2022, the Forest Reserve's initial 495 hectares of land since 1927 have been reduced to 214 hectares, posing an imminent threat to Accra's ecological security and integrity (Asibey et al., 2022).

According to a study by Mensah (2014), Kumasi has experienced a rapid loss of urban green area. In addition to urbanization, he identified six additional causes for the decline of green places in the city of Kumasi. Planning schemes, layouts, or master plans were used by city officials in Kumasi to guide the physical development of the city. These plans had a number of provisions about green spaces that did not exist in reality. These included: the question of who

owned green space lands; the lack of cooperation from the general public when it came to the preservation urban green spaces; the fact that city officials were giving green spaces less attention; poor maintenance of green spaces; and the fact that green spaces were not being used to their full potential (Mensah, 2014).

Burkina Faso and Togo are two additional sub-Saharan West African nations with comparable characteristics. Burkina Faso, for example, has seen desertification and drought over the previous several years. According to Burkinabe politician Simeon Sawadogo, Burkina Faso's pledge to repair 5.16 million hectares of damaged land by 2030 as part of its Land Degradation Neutrality (LDN) project will allow it to create green jobs for economic recovery (Bonny, 2021). This demonstrates that Burkina Faso has lost urban green spaces. As reported by the United States Geological Survey (n.d), the Atacora Forest in Togo, which was essentially unmodified in 1975, has witnessed a considerable encroachment of cropland, particularly in the vicinity of the communities of Kpalimé and Atakpamé. In 1975, dense tropical forest constituted 5.9 percent of Togo's land area; this has now been cut in half. It can be discovered that the rate of deforestation has not decreased during the past decade.

The various research conducted in these countries and the other sub-Saharan countries concentrated more on the loss of green spaces and its impact on the environment. Not much research has been conducted juxtaposing the diseases with urban green spaces. Therefore, the purpose of this study is to systematically review researches that evaluate urban greening and its associated diseases in Sub-Saharan Africa with emphasis on West Africa.

To attain this research's goal, the following research questions will be addressed:

1. What is the current state of green spaces in the urban cities of Ghana, Togo and Burkina Faso?
2. What diseases occur due to inadequate green spaces?
3. How useful are green spaces to urban dwellers' health?

Objectives of the Study

The main objective is to examine the relationship between urban greening and diseases within sub-Saharan West African countries by reviewing literature.

Specific Objectives

The specific objectives are to:

1. Explore the current state of urban greening in urban cities of Ghana, Togo and Burkina Faso.
2. Examine human diseases caused by inadequate green spaces.
3. Present the usefulness of green spaces to the health of urban dwellers.

Significance of the Study

As a consequence of this, the findings of this review will contribute to the existing body of knowledge on the topics of healthy environments and green spaces. Most importantly, the findings of this study will be of tremendous use to researchers in the future who are investigating the connection between urban greening and the lower incidence of diseases in urban areas.

Limitations

Since it is a review of online works or research done, which is a form of secondary data, some of the journal articles were out of bounds. That is to say that access to the full documents was locked and the abstract was the only information made available. This was challenging because they are relevant to the study.

Organization of the Study

This research is divided into five chapters. The first chapter, which is chapter one, introduces the entire dissertation, and includes the background, problem statement, research objectives, and questions that the research seeks to answer. The chapter also describes the study's scope, significance, and limitations.

The second chapter connects and reviews the various theories, concepts, and literature related to the study.

The third chapter describes the study's methodology. It discusses the study area, search strategy, study selection, data collection process, data extraction, and the selection of relevant articles, as well as ethical considerations.

The fourth chapter contains a discussion and analysis of the research.

The fifth chapter, which is also the last chapter, contains the summary, conclusions, recommendations, contribution to knowledge, and areas for future research.

CHAPTER TWO

LITERATURE REVIEW

Introduction

The previous chapter highlighted the research gap as well as the issue that needed to be evaluated, the specific objectives, and the importance or significance of the study. Selected research on urban greening and diseases associated with it is covered in this chapter and is relevant to the study's objectives. This was determined after researching several articles on the topic. This looks at concepts of green areas and the illnesses associated with them. The theoretical framework is presented in order to lay the theoretical groundwork for the dissertation. The creation of a conceptual framework for evaluating the impact of urban greening on diseases marks the conclusion of this chapter.

Urban Greening

There is a need to green these metropolitan areas because studies have demonstrated that urban cities are major contributors to climatic change (Simonis, 2011). It is vital to evaluate the impact of urban expansion on the environment. Once grassy or forested regions have been covered with concrete. According to an article published on Ansgroupglobal.com in 2022, the goals of urban greening are numerous but successful; they improve the quality of life for local residents and wildlife, as well as make our cities more aesthetically pleasing and environmentally beneficial. Particularly affected by heavy pollution are urban areas, with Beijing's smog acting as an extreme example (Ansgroupglobal.com, 2022). Greening a city is one technique to enhance its microclimate. Urban air is warmer than rural air due to heat created by traffic,

industrial activity, and heat retention by concrete. In order to adapt to hotter temperatures, people had to choose air conditioners to stay cool. (Wessels, 2022).

Urban greening has been described in many different ways. Haq (2011) says that urban green spaces are "public and private open spaces that are mostly covered by vegetation and are made available to people directly (for active or passive enjoyment) or indirectly through transportation, commerce, or other means" (to have a positive impact on the urban environment). This definition has been agreed upon by ecologists, economists, social scientists, and planners. Researchers from many fields offer some suggestions for assessing the character of green spaces based on their investigations in various cities. The quantity of green areas in a city is one of the key elements in determining their nature. Second, the use of green spaces is determined by current attributes like activities and experiences as well as anticipated user advantages. Thirdly, those green areas' distribution and location within the city have an equal impact on how well they work (Haq, 2011).

While Swanwick et al. (2003) defined "green spaces" as a "umbrella" term for any land areas that are mostly made up of "soft" surfaces like soil, grass, bushes, and trees, regardless of whether they are open to the public or not. It includes all recreation-designated areas of parks, playgrounds, and other green spaces, as well as additional green spaces with varied origins. The quality of life and ecosystem services in cities are significantly improved by urban greening. Some of these essential ecosystem services are provided in urban settings through city parks, backyard gardens, and green spaces on the streets. Environmental characteristics, such as water and air purification, noise and

wind filtration, and microclimate stability, are influenced by the presence of green spaces.

Global (2022) described it as public landscaping and urban forestry programmes that help people in cities get along with their environments in a good way. All of these definitions of urban greening recognise that greening focuses on vegetation-covered open spaces that are accessible to the public. Urban greening is considered a remedy for a variety of urban environmental issues, including the loss of vegetation, harsh weather conditions, and health.

Urban green space, as a vital component of urban ecosystems, offers essential ecosystem services (Young, 2010) for human well-being, including improved air quality (Selmi et al.,2016) through noise reduction and pollution removal, water and soil conservation, microclimate regulation (Buyadi et al.,2013), mitigation of Urban Heat Islands (UHI) (Park et al.,2017), conservation of biodiversity (Aronson et al., 2017), among others. Additionally, urban green spaces have social and economic advantages, such as energy savings, fostering community cohesion, and outdoor leisure. The most typical types of urban greening involve planting trees, parks, and designed green spaces in newly constructed metropolitan projects. Other benefits of urban greening include: it fights against noise and air pollution; absorbs precipitation that may otherwise result in flooding; establishes a habitat for nearby wildlife; compensates for local carbon emissions; it has been demonstrated that it improves people's moods, has positive effects on physical as well as mental health (Global, 2022).

Types of Urban Green Spaces

Urban green spaces are classed into a variety of kinds to reflect the diverse functions they serve, which may also have an impact on the delivery of various ecosystem services. Depending on their form and scale, diverse green spaces have varying capacities to deliver ecosystem services (Holt et al., 2015). Vegetation communities and diversities in wetlands, public parks, road belt green space, and private gardens represent a wide range of social demands and individual preferences, which in turn determines the provision of eco-function value in these and other types of urban green space (Song et al., 2020). Other types include urban parks and gardens, green roofs, landscapes encircling buildings, and community forests. Five types of city parks and other green areas will be discussed in the following paragraphs.

Woodlands

Urban woodland includes any type of woodland found within the boundaries of a town or city, from huge tree and shrub-covered landscapes to little patches of street trees. Peri-urban woodland is located between urban and rural areas, on the outskirts of towns and cities (Forest Research, 2022).

According to the Community Woodlands Association (2019), which is a Scottish company, a community woodland can range in size from less than a hectare to more than a thousand hectares, and it can include any type of woodland, including large conifer plantations and ancient semi-natural woods. With reference to the National Geographic Society (2022), forests are frequently simply referred to as "woodlands". When geographers use the term woodland, they usually mean a forest with an open canopy. The canopy is the topmost layer of forest vegetation. This structure is made up of the tree crowns,

or tops. Because open canopy woods allow full sunlight to enter, they have less shade and moisture. Woodlands frequently serve as transitional zones between various ecosystems, including grasslands, true forests, and deserts. (National Geographic Society, 2022).

The National Geographic Society (2022) explained that woodlands that transition into true forests are larger, denser, and have closed canopies. Eucalyptus woodlands frequently surround eucalyptus forests, which are made up of Australia's most common type of tree. Although the trees look similar, woodland eucalyptus trees are smaller and have fewer branches than their forest counterparts.

On the other hand, there are scattered woodlands lead to grasslands. Grasslands, also known as prairies or savannas, are grass-dominated ecosystems with few trees. The National Geographic Society (2022) added that, in the Horn of Africa highlands, Ethiopia's forests border grasslands and that some of the best agricultural fields in Ethiopia are found in the heavily inhabited woodlands. Ethiopian woodland organisms must be able to survive in both open grassland and partially shady woodland. Such a creature is the Walia ibex (Capra walie), a breed of small mountain goat (National Geographic Society, 2022).

Furthermore, xeric (dry) woodlands are woodlands that border desert ecosystems. Succulent woodlands, which are the xeric woodlands, can be found in Madagascar, an island off the coast of southeast Africa. Cactus-like plants that can survive in hot, dry temperatures are abundant in these succulent woodlands (National Geographic Society, 2022).

Wetlands

According to the National Geographic Society (2022), a wetland is an area of land that contains water or is heavily saturated with it. The majority of the liquid is escaping groundwater from a spring or aquifer. A wetland may also receive water from a nearby lake or river. At least a portion of the year, a wetland is entirely submerged in water. How wet the soil is around a marsh determines the surrounding vegetation. The adaptations of wetland plants to their hydric (watery) soil are distinctive. Vegetation that thrives in wetlands are called Hydrophytes. Wetlands occassionally experience seasonal dryness or have slow-moving water typically sustain trees and other hardy plant life (National Geographic Society, 2022). In flooded wetland areas, mosses or grasses are the major hydrophytes.

Wetland ecosystems, according to the National Geographic Society (2022), can be found in a variety of temperatures on every continent excluding Antarctica. They vary in size from expansive salt marshes to isolated prairie potholes. They inhabit both inland and coastal regions. In certain instances, swamps are densely forested, submerged forests. Some resemble flatter, wet grasslands. According to the majority of experts, the three primary forms of wetland are swamps, marshes, and bogs (National Geographic Society, 2022).

According to Alikhani et al. (2021), wetlands are one of the best types of natural resources in urban areas. They are among the most vital green-blue infrastructure components due to the broad array of services they provide. Wetlands, particularly those found in metropolitan settings, are a vital component of urban ecosystems. Wetlands improve urban water quality and carbon sequestration, provide habitat for wildlife, mitigate the effects of urban

heat islands, and offer recreational opportunities. These measures help make cities more inhabitable (Alikhani et al., 2021).

According to Alikhani et al. (2021), wetlands are regions with shallow water depths (less than 6 metres) that might be natural or manufactured (that is built). Moreover, they can be permanent or transitory.

Public parks and private gardens

They are both urban green spaces. The public parks are owned and managed by either a state or a municipality. They are open to the whole public, that is, anyone at all can make use of them. The private gardens on the other hand are owned and managed by private owners or individuals and are not accessible to the public. These urban green spaces promote biodiversity while also providing cultural ecosystem services (Hanson et al., 2021). Public parks are mostly used for recreation and relaxation by residents.

Green roofs

According to study conducted by the West Virginia Department of Environmental Protection (2022), a green roof is a waterproof membrane-equipped roof that is partially or entirely covered with growing material and vegetation. Additionally, it may include root barriers, drainage, and irrigation systems as additional layers. Depending on the depth of their growing media, green roofs are divided into several categories. The growing media depth of extensive green roofs ranges from two to six inches. These are more common in the North American continent and benefit society in many ways. The West Virginia Department of Environmental Protection (2022) further added that the advantages of green roofs include improvement in air quality (The vegetation

that is grown on green roofs in the area catches particle matter and absorbs air pollutants).

The West Virginia Department of Environmental Protection (2022), adds that the cooling impact of vegetation reduces smog creation by decreasing the reaction rate of nitrogen oxides and volatile organic compounds. The presence of green roofs minimize the air pollution brought on by the production of power by using less energy); improvement in community livability (Green roofs enhance the neighborhood beauty of a neighborhood. Soil and vegetation aid in decreasing sound transmission, hence lowering levels of local noise pollution. By creating outdoor spaces for people to use and enjoy, green roofs can expand the options for recreation. Additionally, they may promote enhanced neighborhood interactions that contribute to social capital. Urban agriculture may be possible with the help of green roofs), and the reduction in atmospheric Cardon dioxide (CO_2) by lowering carbon dioxide emissions among others (West Virginia Department of Environmental Protection, 2022).

The difference between urban forestry, green spaces and green infrastructure

The same thing is referred to by the terms "urban forestry", "urban greening", and "green infrastructure": the plants and vegetation that make up our urban and city environments, such as urban parks, public squares and thoroughfares, street trees, green walls and roofs, water-sensitive urban gardens, residential gardens, and even remnant bushland. There are some variances between them, though. The management of trees in urban settings for their environmental, social, and economic advantages is known as urban forestry. Urban greening is the process of incorporating green space into our cities' design, construction, and administration. A carefully planned and managed

network of green spaces, conservation areas, working lands, and water bodies is known as "green infrastructure," and it may provide both people and ecosystems with a variety of benefits (Difference Between Urban Forestry, Urban Greening and Green Infrastructure - Bing, n.d.).

Benefits of Urban Greening

Urban green spaces, which include parks, playgrounds, residential greenery, and botanical gardens, are fundamental to contemporary urban design. (Lafortezza et al., 2013). Urban greening has various benefits. Not only does it assist residents, but also the entire environment. By reducing exposure to air pollution, noise, and excessive heat, stress reduction and promoting psychological relaxation, building social cohesion, and encouraging physical activity, urban green spaces improve both physical and mental health (World Health Organisation, 2016). Regulation of the urban heat island effect, environmental awareness and carbon dioxide sequestration are further advantages (Man Rai et al., 2022).

Social

Urban green areas can foster good social interactions and social cohesion, which can improve people's health and well-being. Increased social engagement and physical activity have both been related to urban green spaces as well as other favorable health practices (Jennings & Bamkole, 2019). Trust, belonging, acceptance, and a sense of togetherness are further components of social cohesion that are frequently related to satisfying interpersonal interactions (Hartig et al., 2014). In their study, Francis et al. (2012) discovered that a sense of community was positively connected with park accessibility and quality. Walking, cycling, having a barbecue (BBQ), and holding meetings are

activities that can encourage social contact and social cohesion, according to Peters et al.'s study on urban parks (2010).

It has been demonstrated that urban greening, or the addition of greenery and plants to urban areas, has several positive social effects. They include, among others: it provides better mental health and well-being, and research done by Bowler et al. (2010) has shown that being exposed to natural areas, such as parks and green spaces, can be beneficial for well-being as well as mental health.

Economic

The presence of trees in urban settings is also of great benefit to urban areas. Reduced energy expenditures, lower stormwater treatment costs, higher property values, higher retail spending, higher employee satisfaction, and lower health care costs due to improved air quality and more recreational possibilities are all associated with the presence of trees (Conservationtools.org, n.d). Additionally, it promotes local business growth, creates and secures jobs, promotes volunteerism, learning, and development, and shields residences and commercial establishments from flood risk. There are many ways that urban greening may generate employment. For instance, the creation of green spaces like parks, gardens, and green roofs through planning and design, may present career prospects for architects, landscape designers, and construction workers. Horticulturists, arborists, and park staff can all find employment through the continuing upkeep and administration of green spaces. Through the production and distribution of plants, trees, and other materials needed in greening initiatives, urban greening can also generate indirect job possibilities (King & Shackleton, 2020).

Additionally, enterprises that provide services for the upkeep and administration of green spaces, such as nurseries, plant suppliers, and irrigation system manufacturers, can also generate employment. Urban greening can also lead to creating “green” jobs, which emphasize preserving and improving the natural environment. Jobs in sectors like conservation, sustainability, and environmental education may fall under this category. In short, urban greening can boost the local economy by fostering the expansion of "green" enterprises and by generating both direct and indirect employment opportunities.

Cultural

The term "cultural benefits" describes the favorable effects that a specific practice or activity has on the culture of a community or society. The ways in which green areas and other types of urban vegetation enhance a city's and its citizens' cultural life might be considered among the cultural benefits of urban greening. Urban green space may promote tourism by offering areas for recreation and play, sports, wildlife viewing, events, and celebrations (Forest Research, 2022).

Psychological

Exposure to natural habitats, for example, can have physiologically healing effects (Conniff & Graig, 2016). This suggests that the physiological changes induced by being outside in nature can positively impact one's mental health (Nesbitt, 2022). A Japanese study discovered that watching and moving through forests reduced blood pressure, pulse rates, and cortisol levels more than doing so in cities (Park et al., 2010). These physiological reactions all occur when a person relaxes and are a reaction to the physiological consequences stress has on the body. A recent study discovered that persons who had access

to natural places during the COVID-19 lockdowns experienced reduced stress and psychological suffering (Ribeiro et al., 2021).

Natural green areas have a wide range of additional advantages. The importance of green spaces, especially in urban settings, has been highlighted by research linking greener environments to a sustained improvement in mental health (Nesbitt, 2022). They offer a habitat for wildlife and long-term advantages for public health (Alcock et al., 2014). Numerous studies have demonstrated that spending more time in nature encourages physical activity and is linked to greater mental health, regardless of culture or climatic conditions (Nesbitt, 2022).

Characteristics of Urban Greening

The various characteristics of urban green spaces offer several benefits to all those who use them, be it human beings, fauna and flora. The characteristics mainly include size, proximity or accessibility, and availability. Wider open areas may be utilised regularly for physical activity, whilst smaller rooms may be utilised frequently for social interaction and leisure. This is because the size of an urban green area impacts how it is utilised (Peschardt & Stigsdotter, 2013). Additional qualities may include diversity, adaptability, and variety.

Urban Greening in relation to the variety and size

The diversity of urban green spaces supports a diverse range of species based on patch quality, patch size, quantity in the landscape, and variance both within and between green spaces (Lepczyk et al., 2017). A study conducted by Gozalo et al. (2019) shows that the size of a green space is highly associated with how often people walk, exercise, and relax. Numerous habitat types that

supply the whole range of resources needed for their life cycles are frequently needed by animal species. A crucial element of these criteria might be provided by a variety of green places (Lepczyk et al., 2017).

Urban Greening in relation to availability and accessibility

Accessibility is the ease with which people can use a specific facility or resource. Since it might affect the benefits that green spaces offer to residents, accessibility is a crucial factor in the context of urban greening. Accessibility is a key component of engaging in physical activity in a green space and includes factors like how easy it is to get there, how far it is from where the residents live, and how long it takes to get there (Tamosiunas et al., 2014). Residents are more likely to visit green open space for personal activity when it is more easily accessible (Wang et al., 2019). Three factors influence the accessibility of urban green spaces: location, physical accessibility, and transportation.

Commonly agreed-upon criteria, such as availability and ease of access, are used to classify and rate urban green spaces (Kabisch et al., 2016). Laan and Piersma (2021) say that the availability of green urban space is a measure of green spaces in relation to land use in terms of area (m2), in relation to the size of the city (percent), or in relation to the size of the population (m2/citizen). Green space accessibility is how close a green area is to a public group or group of people. How easy it is to get to urban green spaces depends on how well demand for those spaces is met in the area around them (Laan & Piersma, 2021).

Urban Greening in relation to biodiversity

The impact of urban green space on species richness has been thoroughly studied for numerous species (Goddard et al., 2010), as well as the amount of urban green space in cities is now widely recognised as a fundamental driver of biodiversity (Beninde et al., 2015). Depending on the quality of their environment, smaller urban green spaces may also support biodiversity in addition to bigger urban green spaces (Holtman et al., 2017). Modelling studies indicate that adding 150 square metres of green space to little neighbourhood parks can significantly boost the number of bird species (Strohbach et al. 2013). An increasing body of research indicates that landscape connectedness improves biodiversity in fragmented urban settings (Shanahan et al., 2011).

According to landscape genetic techniques, fragmentation weakens genetic ties between isolated urban habitat patches, whereas connectedness can promote genetic differences among urban green spaces (Delaney et al., 2010). Hence, urban green space networks may operate as passageways through the urban matrix, and when many and contiguous, they may also reduce the risk of sink habitats in cities (Lepczyk et al. 2017).

Effects of Urban Greening

Urban greening can have a variety of positive consequences on cities and their residents, such as improving mental and physical health and well-being, increasing physical activity, and elevating overall living standards. The relationships between urban greening and the environment will be discussed in the following paragraphs along with the significance of incorporating green areas within the built environment.

The link between Trees and Urban Greening

Urban greening may have a negative or good effect on pests. In a 2014 edition of this journal, researchers in urban and landscape planning, public health and natural science issued a "call to action" to perform multidisciplinary studies on the benefits of green spaces on people's health (Eisenman et al., 2019). This was motivated by the American Public Health Association's (APHA) "Improving Health and Wellbeing Through Access to Nature" programme, as well as a growing understanding of the health advantages of interaction with nature (Louise Chawla, 2014). A high species diversity across host groups can make it easier for pests to invade new areas, but it can also reduce the success of invasions by making it harder for pests to establish themselves in new areas (Guo et al., 2019).

Facilitation is a term used when talking about cross-trophic aspects of invasion processes. It means that more host species give herbivores or diseases, especially specialists, more places to live such as the "host diversity begets parasite diversity" hypothesis proposed (Johnson et al., 2016). The second is the relationship between a host and a parasite or a plant and a pest (LIN et al., 2015). The dilution effect, on the other hand, says that the number and accessibility of hosts are lower in groups with more types of plants. This makes it harder for pests to take hold (Huang et al., 2015). Guo et al. (2019) said that facilitation and dilution can happen at the same time in the same forest ecosystem, even though their relative strengths are different.

Insects merit special consideration since they are not only our greatest competitors for resources and the vectors of diseases that impact humans and cattle, but also key eco-process regulators that contribute to the supply of

services (Schowalter et al., 2018). Insects are crucial to the operation of numerous ecosystems, and natural ecosystems provide humans with a vast array of benefits. In healthy ecosystems, insects perform auxiliary functions such as pollination by bees, flies, and butterflies and waste removal and decomposition by beetles and flies; and regulatory services (such as biological control of insect pest populations - true bugs - and plant diversity regulation via density-dependent herbivory - beetles and true bugs) (Lequerica Tamara et al., 2021). According to von Dohren and Haase (2015), ecosystems also provide negative services such as pests, zoonotic diseases (infectious diseases transmitted from animals to humans), allergic chemicals, poisonous species, and animal attacks (such as mosquito bites that cause malaria).

Urban Greening and Climate

Due to its strong interaction with its local environment, the physiology and condition of a tree are influenced by the climate of its habitat. Storms and waterlogging or flooding, both of which can inflict physical damage to trees, are examples of abiotic disturbances that are anticipated to be affected by climate change in terms of both type and frequency (Tubby & Webber, 2010). By modifying the physiology of the host plant, one of the most intriguing effects of climate change is its propensity to turn normally harmless species into hazardous creatures.

According to Gomez-Baggethun and Barton (2013), urban green spaces provide a variety of ecosystem services that assist cities in adapting to climate change, including moderating metropolitan temperature, water flow, runoff mitigation, and limiting environmental extremes. Many ecological functions rely on the density and composition of urban vegetation. The size, shape,

density, and condition of plants, in addition to a variety of other characteristics, affect the extent to which flora can impact the microclimate through evapotranspiration and shading, intercept rainfall, adjust airflow, and exchange heat with the environment (Graca et al., 2018).

Examples of how the composition and diversity of plants may have an impact on the provision of cooling include the photosynthetic metabolism criteria that affects the cooling potency of vegetation (Gunawardena et al. 2017), summer roof temperatures, storm water capture in green roofs (Lundholm et al., 2010), and significant canopy and leaf characteristics that affect street trees' capacity to modify local microclimate (Sanusi et al. 2017).

Water bodies have an effect on the temperature regulation of urban green areas because of their role as thermal buffers and their ability to convert sensible heat to latent heat through the process of evaporative cooling (Gunawardena et al., 2017). In addition to natural elements, urban green spaces also comprise inanimate human-made components that have an impact on the weather in the surrounding area (Graca et al., 2022). Pavements made using materials that are light in colour, permeable, have a low thermal resistance, and extremely porous, for example, have the potential to lower the surface temperature and modify the thermal environment of their immediate surroundings. Pergolas and other shade structures can assist lower surface and air temperatures by deflecting direct solar radiation (Shooshtarian et al. 2018).

Urban Green Spaces and Physical Health

Green spaces have been linked to health and psychological benefits due to their alleged effects on physical activity. Physical activity has been related to an assortment of positive health outcomes, including a lower risk of heart and

cerebrovascular disease, diabetes, colorectal cancer (also known as colon cancer), osteoporosis (a silent chronic disease that weakens the bone and can lead to bone fractures), depression, and fall injuries (Graça et al., 2022). The presence of urban green spaces is also linked to a lower risk of becoming overweight or obese, possibly because green spaces in cities encourage active lifestyles (Lee et al., 2015). Opportunities for healthy "green exercise" like walking and jogging, among others, are provided by modifying the built environment to include green space. Furthermore, it improves mental health and well-being and may have long-term psychological benefits.

Urban Greening and Mental Health

Urban vacant land that is planted with flora significantly reduces symptoms of depression and improves the neighborhood's mental health. According to studies from the University of Pennsylvania, people who lived near the clean and greened-up lots had a 41.5 percent lower rate of depression than those who did not (Jewell, 2018). Lee et al. (2015) state that the existence of urban green space may enable citizens to interact with nature. This form of relationship enhances mental health and well-being and may provide a buffer against stressful life situations. Participation in various activities, such as social engagement and physical activity, may enhance mental health and well-being. These advantages include reduced stress and anxiety, as well as enhanced mood and concentration.

Green spaces and urban social stratification

In urban settings, social stratification is frequently linked to green spaces. In many cities, wealthy areas have more access to green space than do impoverished ones. This is so that those who are affluent may afford to live in

neighborhoods with more green space and have the political influence to demand that they be maintained. In order to draw in businesses and tourists, green spaces are frequently exploited, which can raise local real estate values and promote gentrification (Haq et al., 2021). Green spaces, though, can also help reduce socioeconomic stratification. They can offer chances for interpersonal communication and community development, which helps lessen socioeconomic disparity (Jennings & Bamkole, 2019).

Causes of vandalism to urban green spaces

A study by Forest Research (2022) indicated that the visual appeal of green space can have an impact on the neighborhood and that neglected open spaces have a negative effect by fostering the emergence of crime and vandalism. However, maintaining urban greenspace to a high standard can help to lessen crime and vandalism while also enhancing the visual appeal of a location. Additionally, it has been demonstrated that well-maintained green space decreases crime and violence, promotes social engagement, and strengthens community ties.

Theoretical Framework

Several theories exist that explain the relationship between urban green spaces (UGS) and health. Three of these theories are: The Attention Restoration Theory, which contends that exposure to natural settings might alleviate attentional fatigue and enhance cognitive function; the Stress Reduction theory (SRT) by Ulrich et al. (1991) suggests that exposure to natural settings can lower stress and enhance mental health, and according to the third theory which is the Sense of Place Framework theory, exposure to natural settings can increase social cohesiveness and a sense of community. Two of the above-mentioned theories are discussed in the following paragraphs.

The Attention Restoration Theory

In contrast to busy, crowded urban environments, which are frequently seen as attention and energy drains, the natural world is frequently portrayed as a restorative environment that replenishes one's resources (although this is not always the case; busy cities can be excellent places to find inspiration and energy when in the right frame of mind) (Ackerman, 2023). According to Ohly et al. (2016), the Attention Restoration Theory (ART), being in nature is delightful and can also increase our capacity to focus. In the late 1980s and early 1990s, a time of tremendous technological innovation and rising indoor entertainment, Stephen and Rachel Kaplan devised and promoted this theory. Concerns about not spending enough time in nature developed as people, particularly children, spent more and more time indoors (Ackerman, 2023). Stephen and Rachel Kaplan explain the theory and the supporting data in ART's introduction to general knowledge. Their 20-year investigation into the value

of nature and its effects on mood, state of mind, and health is detailed in the book (Ackerman, 2023).

According to Stephen and Rachel Kaplan (1989), the path to restoration involves four cognitive states, or states of attention: a clearer mind or greater focus; healing from mental tiredness; soft interest or fascination; and restoration and introspection. A mental clean slate characterizes the initial stage. The thoughts, fears, and other lingering details from whatever was vying for attention are now permitted to travel through the mind and fade away. This is accomplished by just allowing the thoughts to freely flow through and out of the mind rather than "pushing" them away.

After a task or activity that takes concentrated and directed attention, it is easy to feel exhausted and spent. In the second stage, the true restoration starts. This concentrated attention can recover and return to normal levels throughout the mental fatigue recovery period. In the third stage, the person is given the opportunity to be gently diverted and involved in a low-stimulation activity, which lessens internal noise and creates a peaceful internal environment in which to unwind (The Experience of Nature: A Psychological Perspective: Kaplan, Rachel: Free Download, Borrow, and Streaming: Internet Archive, 1989).

The individual is able to unwind, regain their concentration, and reflect on their life, priorities, activities, and aspirations during the last stage, which is triggered by spending a significant amount of time in a setting that satisfies all four criteria for a restorative environment (Han, 2003). The most profound and

restorative stage is the last one; this is when the most significant restoration occurs (Ackerman, 2023).

According to Ackerman (2023), the Attention Restoration Theory's prediction that nature can restore attention has been supported by studies based on this theory with some strong evidence. For instance, whether simply having a better view of nature might increase one's focus and boost restoration was examined by researchers Carolyn M. Tennessen and Bernardine Cimprich in 1995. Based on how much nature could be seen from the dormitory windows, they compared how well university students performed on focused attention tests. The results of the tests showed that individuals who could see more of the outdoors through their windows fared better than those who could not, adding credence to the notion.

The Sense of Place Framework Theory

David Seamon and Robert Mugerauer first proposed the Sense of Place framework theory in 1985 (Masterson et al., 2019), and this theory is based on the idea that people acquire a sense of place through their interactions and experiences with the surroundings. It is a means of comprehending how people interact with and derive meaning from their environment. People's motivation to take action on behalf of their local surroundings has been demonstrated to be significantly influenced by their sense of place, which has been shown to be a vital element in adaptability to ecosystem changes and transformations (Adger et al., 2012). The links between people, place, and nature make understanding social motives and identifying and creating sustainable pathways possible (Jones et al., 2016).

Understanding the aspects of a place that people appreciate and may want to protect can be aided by including a place meanings analysis (Brehm et al., 2013). By assessing how measures of place attachment and meaning vary across different groups, environments, and/or points in the landscape, Sense of Place conceptual tools can be used to map and assess patterns of variation in how, for example, populations respond to social-ecological changes such as climate change (Brown & Raymond, 2007). Sense of place provides a method for assessing the subjective and relational components of stewardship and ecosystem management priorities; for example, assessments of sense of place have been employed as indicators of ecosystem services (Hausmann et al., 2015) or how ecosystem services influence the well-being of different socioeconomic groups.

The conceptual framework chosen was informed by the two theories presented in the preceding paragraphs. The reasons include:

- Urban greening can be made more effective and impactful using the Sense of Place Framework theory, making cities healthier, more sustainable, and more pleasurable to live in. Urban greening transcends merely making physical improvements to the landscape by encouraging emotional connections between people and their surroundings. As a result, it becomes a vital component of the city's character and improves the quality of life for its citizens.
- Urban greening can contribute to the development of healthier, more livable cities by embracing the Attention Restoration Theory. Urban green spaces contribute to the general well-being of people by offering possibilities for cognitive restoration, stress reduction, physical activity,

and social connection. They can also play a significant part in reducing the harmful health effects of urban living.

Conceptual Framework

It is important to provide a conceptual framework in this study because it may be used to organize and clarify the connections between many concepts and ideas within a certain field of study and in this case, the relationship between Urban Green Spaces (UGS) and Health.

During the years, numerous researchers, such as Hegetschweiler et al. (2017), James et al. (2015), Kuo (2015), Villanueva et al. (2015), Lachowycz and Hartig et al. (2014) and Jones (2013), have established frameworks to relate green spaces and health. Lachowycz and Jones (2013) idealized a comprehensive framework to better comprehend the mechanisms underlying the health consequences of green space exposure. The framework's processes included access to green spaces, human incentives and drivers, and usability.

James et al. (2015) and Hartig et al. (2014) established frameworks that emphasize multiple mechanisms underpinning how green spaces affect health by promoting physical activity, social interaction and enhancing air quality, as well as reducing stress and noise, and regulating humidity and temperature. In contrast, Hegetschweiler et al. (2017) constructed a streamlined framework using a "supply-demand" paradigm. The "Supply" referred to the ecosystem's cultural services, which are defined by the ecosystem's physical features, while "demand" referred to the public's need for the ecosystem services, which is influenced by demography and public values. Although these frameworks assist us comprehend how UGS affects health, they lack specificity. In their approach,

the authors (Zhang et al., 2017) developed the "dose-response" idea, which sheds further light on the health consequences of urban green areas.

Dose

The dose simply refers to the number of green spaces (Jiang et al., 2014). Shanahan et al. (2015) on the other hand defined the dose as a "nature exposure" which looks at the quantity and quality as well as the frequency of exposure, and duration of exposure. Barton and Pretty (2010) added that a dose consists of the type of green space, exposure duration, and exercise intensity. The authors (Zhang et al., 2017) used a causal chain that links urban green spaces dose to health responses.

Urban Green Spaces (UGS) provision looks at whether there is a presence of green spaces or not and the amount of urban green space present. It also looks at the availability (basically answers the question: Is there a green space or not) and accessibility (looks at the proximity of green spaces from the residents, residents would likely visit green spaces that are easily accessible to them and includes factors such as how far are they? The UGS exposure (how often residents use the UGS, time spent in these green spaces, and how intense is the interaction) is the temporal characteristic. The UGS provision and UGS exposure are the "Dose".

Health Response

Exposure to urban green spaces, which is connected with health benefits and has for outcome health response, is the result of UGS provision. Simply put, the Health Response is the consequence of the dose. Morbidity, mortality, and life expectancy are only a few of the various health outcomes associated with UGS. The health outcomes can be organised from proximal to distal, with each

proximal consequence leading to the next more distal outcome via a causal pathway (Brenner et al. 1995). The existence of clinical indications is a proximal health result, but longevity and life gratification are distal well-being outcomes (Zhang et al., 2017).

Mediators

Moderators discuss the consequences of the relationship between green areas and health. These impacts may be beneficial or detrimental. The first type of mediator is the effect that the flora and fauna of the UGS have on the ecosystem, or the environmental effects. For example, the microbes and flora in UGS can release negative air ions that can boost immune function, reduce blood pressure, and even treat depression (Lowry et al. 2007; Li et al. 2006; Goel et al. 2005). According to James et al. (2015), vegetation in UGS can lower health risks by reducing air pollution, the urban heat island effect, and other microclimate variables including humidity and wind. On the other side, flora and wildlife could be damaging to one's health. Certain trees and plants are capable of emitting volatile organic compounds, which can degrade air quality by boosting greenhouse gas emissions (von Dohren and Haase, 2015; Hartig et al., 2014). Additional adverse health impacts of UGS comprise allergic reactions caused by pollen from particular species, plant poisoning, infections transmitted by animals such as mosquitoes, and tree death (Escobedo et al. 2011).

The second category of mediators consists of the transient psychological effects induced by the natural components of UGS, which are associated with improved health. These impacts include awe, revitalised focus, and improved vigour (Kuo 2015). Urban Green Spaces can be harmful to one's health by

creating negative emotions, such as those caused by the feeling of danger and anxiety caused by overgrown or neglected vegetation (Sreetheran and Van Den Bosch 2014). Other UGS characteristics, such as playgrounds and open spaces, can foster healthy behaviours through social interaction and physical activity, which have all been shown to have a positive effect on health (Dadvand et al. 2016). Sadly, Green spaces can also be a shelter for unlawful and criminal activity, such as illegal dumping, drug selling, and gang warfare, which are all detrimental to one's health (Bogar and Beyer, 2016).

Moderators

Moderators are factors that can change the strength or direction of the UGS-health link, distinguishing the optimal health benefits from the highest possible dose from the health impacts of the actual dose. Both environmental and individualized factors have the potential to moderate the link between UGS exposure and provision. The weather, such as whether it is sunny or rainy, may make using UGS easier or more difficult. People's decisions to visit the UGS can also be influenced by the microclimate there (Zhang et al., 2017). The association between UGS exposure and provision is moderated by four primary categories of individual factors. Even if the UGS provision is identical, UGS exposure can vary for people with varied sociodemographic characteristics. Men and women, for instance, might favor using and experiencing green space in different ways (Prince et al. 2011, 2012).

The degree to which a person is cognitively, emotionally, and physically connected to the natural world can have an impact on how they use UGS. Those who have stronger ties to one another are more inclined to spend more time outside in natural settings (Nisbet et al., 2009). The state of a person's physical

health is another factor that can moderate impacts. It's possible that people with physical disabilities will use UGS less frequently than those who are more physically fit overall (Christensen et al. 2010). The amount of free time a person has is another factor that can moderate their use of the UGS. People's usage patterns can shift based on how much spare time they have. The connection between UGS exposure and health result can potentially be moderated by sociodemographic variables. Studies have shown that lower socioeconomic level groups have a higher connection between green space and health (James et al. 2015).

Additionally, a person's behavioral traits, such as alcohol consumption, smoking, engaging in physical activity, and engaging in social interaction, can have an impact on this relationship. The physical state of a person is another possible moderator. For instance, there may be a difference in how UGS exposure and health relate to those with or without chronic conditions (Zhang et al., 2017).

Spatial scale

Lastly, the spatial context of the UGS-health relationship is the last component of the dose-response framework. This association holds true over a range of spatial dimensions, from smaller ones like precincts or communities to bigger ones like towns, regions, cities, and entire countries (Zhang et al., 2017). They are nestled within one another. In other words, the spatial scales measure the extent (size) of urban green spaces. They can be smaller or larger (from a neighborhood setting to a whole city).

The "dose-response" concept that was proposed by authors Zhang et al. (2017) has more details regarding UGS and Health outcomes. For this reason, we will be adapting their concept as our conceptual framework. The framework is found below:

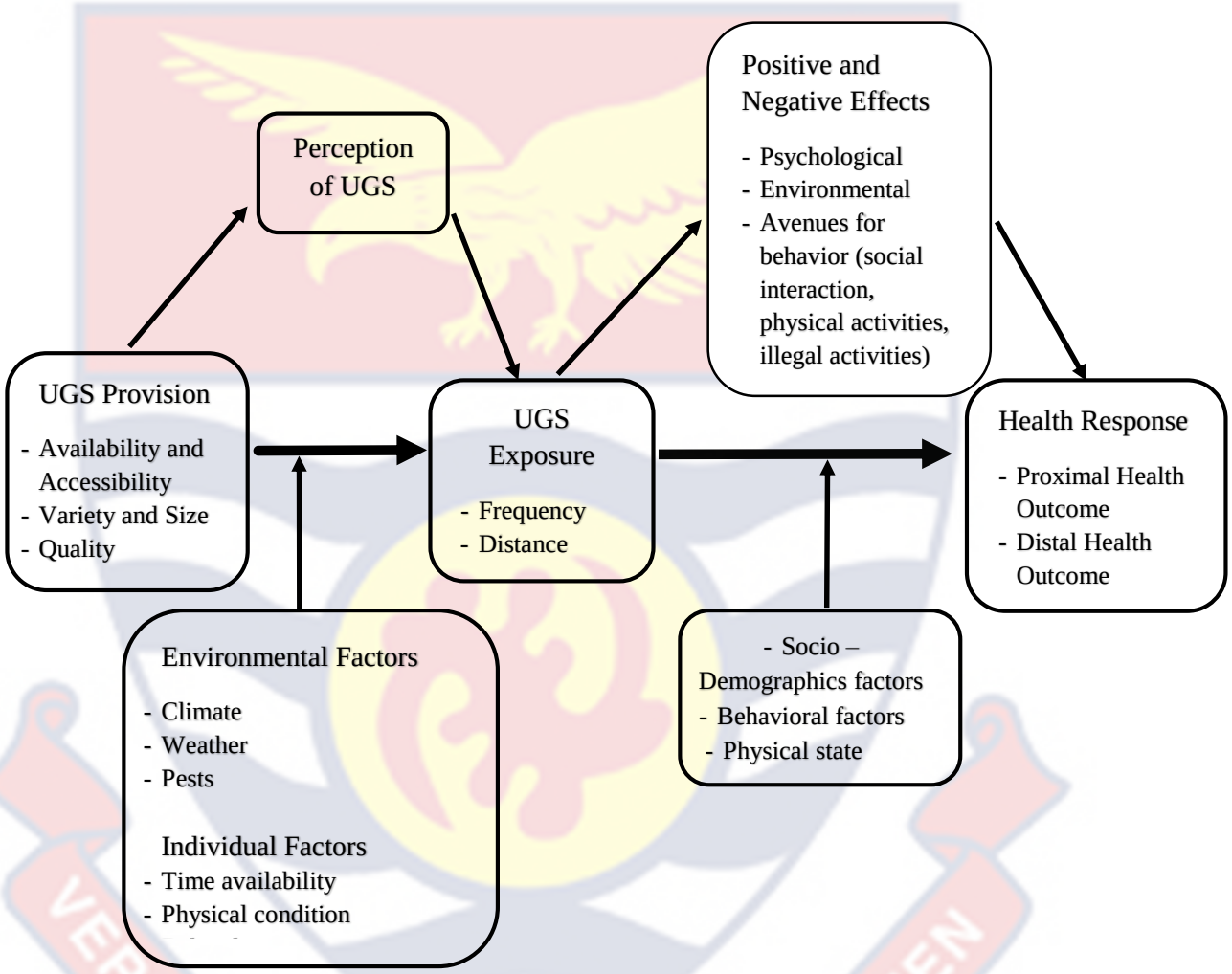

***Figure 1*: Dose-Response concept (Effects of UGS dose on Health)**

Source: Zhang et al. (2017)

CHAPTER THREE

METHODOLOGY

Introduction

The process of gaining knowledge on urban greening and its related diseases largely depends on the methodology used. Given the discussions of the background, literature, and conceptual reviews in chapters one and two. This chapter focuses on the research methodology used to conduct the study, as well as the study area, search strategy, study selection, data collection process, data extraction, and article selection.

Description of the Study Area

Sub-Saharan Africa is the area of Africa south of the Sahara Desert. Geographically, the demarcation line is the southern border of the Sahara Desert. With the traditional depiction of the north as above and the south as below, the current name "sub-Saharan" fits. Alternative modern terms used to describe the region's unique ecology include tropical Africa and equatorial Africa. The Sub-Saharan African region includes 49 of Africa's 54 countries and these countries are grouped into four regions, which are West, East, Central, and Southern Africa. Since the end of the last ice age, the exceptionally harsh climate of the sparsely populated Sahara has effectively served as a barrier separating Africa's north and sub-Saharan regions. The only break in this barrier is the Nile River. A map showing the various Sub-Saharan African countries is depicted on the next page.

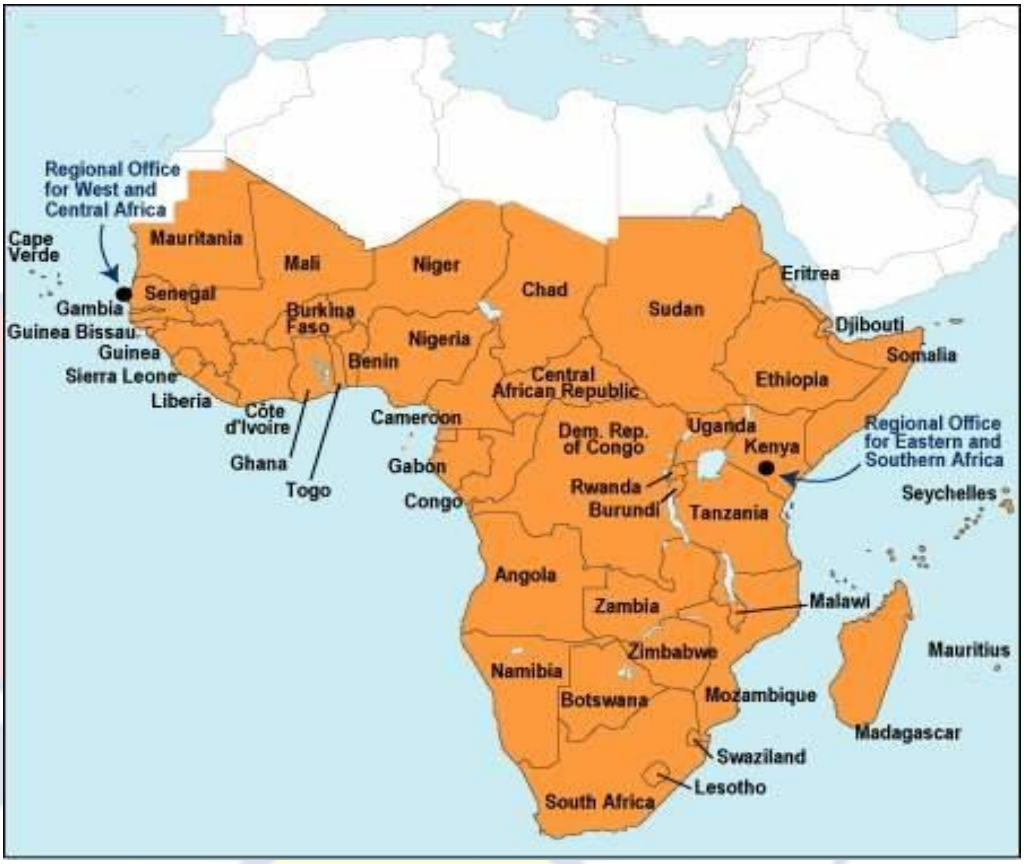

***Figure 2*: Detailed map of Sub-Saharan African countries**

Source: Idowu Johnson, 2012

With the majority of the continent remaining in its current location for more than 550 million years, Africa is the oldest and most stable landmass on Earth. Only 10% of its land area is located below an altitude of 500 feet, making most of it a wide plateau. Humid rainforests can be found close to the equator, but the majority of sub-Saharan Africa is made up of grasslands with sporadic trees to the north and south of that zone (New World Encyclopedia, n.d). Along the Atlantic coast in the south is the Kalahari Desert. Sub-Saharan Africa has a diverse landscape, ranging from broad savannas and grasslands to deep forests and tall mountains.

A wide range of plant and animal species can be found in the region, and the climate is also diverse, ranging from tropical to temperate (moderate). Altitude and distance from the equator both have a significant impact on climate. It can be mild in the highlands, even near the equator. The seasons are alternately rainy and dry, although it rains more frequently in humid forests. There are several significant rivers in Sub-Saharan Africa, including the Congo, Niger, and the Nile, which have been essential in the history and development of the area. Agricultural products, minerals, and other natural resources are abundant in the area (New World Encyclopedia, n.d).

Geology

Sub-Saharan Africa's geology is complicated, and diverse, and has a lengthy, complex history. With the formation of Pangaea, the last supercontinent, 300 million years ago, the history of Africa's physical geography began. Pangaea started to disintegrate some 175 million years ago, and when it drifted and collided, the continents that we see today were created. This supercontinent's center was Africa. The area contains some of the oldest rocks on Earth as well as some of the most active geological regions on the planet (Libretexts, 2020).

One of the most significant geological features of Sub-Saharan Africa is the Great Rift Valley, which runs from the Red Sea down through eastern Africa. This massive trench was formed by the separation of the African and Arabian tectonic plates and is home to a number of active volcanoes and other geologically active features. Huge fissures in the earth's crust along this rift valley have filled with water throughout time, forming some of the deepest lakes in the world. For instance, Lake Tanganyika, which has a depth of 1,470 metres,

is the second-largest and second-deepest freshwater lake in the world (4,820 ft). The nations of Djibouti, Eritrea, Ethiopia, and Somalia are located on the projecting peninsula known as the Horn of Africa, which is east of the rift valley (Libretexts, 2020).

Demographics

A little more than half of all people in Sub-Saharan Africa in 2021 were between the ages of 15 and 64. Additionally, a significant 42 percent of the population was made up of youngsters under the age of 15. Africa's population is generally young. In the Sub-Saharan area, only 3% of people were 65 years of age or older. The median age was the lowest on the continent in Niger, Uganda, Mali, and Angola as of 2021(Statista, 2022). Currently, there are about 800 million people living in the 48 independent countries that make up Sub-Saharan Africa. Even though colonialism altered African politics and economies, many Africans still live relatively unchanged lives. A vast portion of Sub-Saharan Africa is still rural. In Sub-Saharan Africa, only about one-third of the population lives in cities. Slums housed at least 54% of these city dwellers.

Culture

As a result of Sub-Saharan Africa's vast breadth, the region is home to a plethora of cultural subgroups, each with their own set of traditions. A contemporary culture can be found in many different domains, and it incorporates aspects of many different indigenous cultural traditions, such as music, sculptures, dances, and art, in addition to the colonial traditions that were brought over from Europe. Sub-Saharan Africa's diverse population offers a wide range of spoken languages and dialects. These languages are divided into

six families. Aramaic and Amharic are members of the Afro-Asian language family. In the African Horn, modern Hebrew is spoken. Namibia is home to the Khoisan language family, which includes Nama, Kung, and Maligo. The Niger-Congo family languages are spoken in Africa's west and south. Among the Indo-European languages spoken in Africa are English, French, and Portuguese (Ranaa Aboumosallam Arafat, 2022).

Kiswahili and Amharic are the most common dominant languages found in Sub-Saharan Africa. Amharic is an Ethiopian language, whereas Swahili is a Bantu language. Many countries in Sub-Saharan Africa are Bantu-speaking. Bantu is a significant ethnic group composed of approximately 500 ethnic groups. Other important languages in Sub-Saharan Africa include Hausa and Yoruba. Hausa is spoken by up to 44 million people. Hausa is spoken in Cameroon, Niger, Ivory Coast, Ghana, and other countries. Yoruba, which is spoken by roughly half of the people in Nigeria and Benin, is a less dominant language than Hausa. Oromo is another widely spoken language in Somalia and Kenya. There are numerous dialects of Oromo. Other popular languages spoken in Sub-Saharan Africa include Lingala, Zulu, and Igbo, among others. English, French, and Arabic are introduced and widely spoken in various countries. The addition of English, French, and Arabic facilitates localization and marketing in Sub-Saharan African developing countries (Ranaa Aboumosallam Arafat, 2022).

Religious beliefs vary greatly across Sub-Saharan Africa. The three major religions found in Sub-Saharan Africa are African traditional religions, Christianity, and Islam. The majority of the people in the region are Christians, but many are also Muslims.

Nature of urban green spaces

Cities in Africa such as Cairo (Egypt), Lagos (Nigeria), Nairobi (Kenya), Durban and Johannesburg (both in South Africa) and Maputo (Mozambique) emphasized the development of trees over the establishment of other forms of green areas, as stated in the 2011 African Green City Report. According to the research, during the previous five years, governments in Maputo, Lagos and Durban have planted 2,800, 500,000 and 62,000 trees, respectively (Mensah, 2014). Eucalyptus species, Acacia species, Terminalia catalpa, Azadirachta indica, Gmelina Arborea, Tectona grandis (teak), Polyathia longifolia (Weeping willow), and Delonix regia were among the trees typically found in African cities, especially West African cities (Fuwape & Onyekwelu, 2011). Most urban areas in Ghana are dominated by the royal palm tree, Acacia auriculiformis, Polyathia longifolia (Weeping Willow) and Mangifera indica (Mango tree) Cassia siamea (Siamese Cassia) (Mensah, 2014).

In addition, it was discovered that the distribution of green space in Africa is substantially more concentrated in West, East, and Central Africa, and to a lesser degree in the south, than it is in Northern Africa. This was shown to be the case. It has been determined that the different types of vegetation and biological zones in Africa have an effect on the distribution of these species. For instance, it was revealed that the northern Africa desert vegetation zone, which includes Libya, Algeria, Tunisia, Egypt, and Morocco, has adverse soil characteristics that inhibit the formation of green spaces (Mensah, 2014).

Search Strategy

This is a set of steps that we followed when searching for information regarding our research topic. It helped us focus our search and find relevant information more efficiently as well as ensuring that we find the most relevant and reliable sources of information for our needs. These are the steps we used in developing our search strategy: first of all, our research topic was defined by clearly identifying the focus of the research which helped in narrowing down the search and relevant information were found more easily; secondly, key terms and phrases were identified, that is, we thought of key concepts or themes related to the research topic, and identified the specific terms or phrases that can be used to search for information. Furthermore, Boolean operators were used such as AND, and OR, to narrow or broaden the search. For instance, when AND was used, returned results that included both terms we were searching for (Urban Greening AND Its related diseases) were obtained while using OR will return results that included either of the terms (Urban Greening or Urban Green Spaces with its related diseases). Moreover, filters and advanced search options that allowed us to narrow our search by Publication date, Article type, Language, or other criteria were used.

Table 1: Search Strategy Summary

Keyword	Urban Greening	Green space	Sub-Saharan West Africa	Related Diseases
Search Terms	Green Urban Trees	Environment Park Biodiversity	West Africa Sub-Saharan Africa	Health Non-Communicable Disease Pests
Location	Title Abstract	Title Abstract	Articles	Title Abstract

Study Selection

The study selection helped in deciding on which studies or sources of information to include or exclude from our research. This process is important because it helped in ensuring that only relevant and reliable sources of information were considered.

Table 2: Study Selection

Component	**Inclusion**	**Exclusion**
Study Design	Peer-reviewed Journal Articles	Articles not related to either health, disease, or urban greening
Language	English	Languages other than English
Participants	Healthy and Unhealthy Humans Living things (animals and trees)	Non-Living things

Data Collection Process

To better understand the connection between urban greening and the diseases it is associated with, a systematic literature study was undertaken. The systematic review was carried out and reported by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. What is the link between urban greening and urban diseases? was the main question in this review. To find a response to this query, the databases of Google Scholar, Research Gate, Pubmed, Web Science, Science Direct, Public Library of Science, Oxford University Press (OUP).com, Sage Publication INC, Multidisciplinary Digital Publishing Institute (MDPI). Com, Education Resources Information Center (ERIC), EMERALD, WILEY ONLINE LIBRARY, SPRINGER, ROUTLEDGE, TAYLOR and FRANCIS GROUP as well as ELSEVIER in October 2022 were examined. The searches were limited to the period from January 2010 to July 2022 because it is more recent, up-to-date, detailed, and more relevant to current knowledge on the topic. Where necessary, we used articles and publications that date back to the year 2006.

Data Extraction

We combined and extracted data from the included sources (articles and journals) in an Excel file. Other articles cited in the various articles obtained were also downloaded and used. Other information was directly obtained from Microsoft Edge and Google Chrome.

Selection of Relevant Articles

A thorough skimming of reviewed and journal articles between 2010 and 2022 was done. Articles not having relevant information on urban greening, green spaces, and diseases related to urban greening were excluded. The

relevant articles were downloaded and scrutinized for more information and reference. Therefore, an inclusion-exclusion criterion was used.

The PRISMA diagram below summarizes the steps in selecting the relevant information.

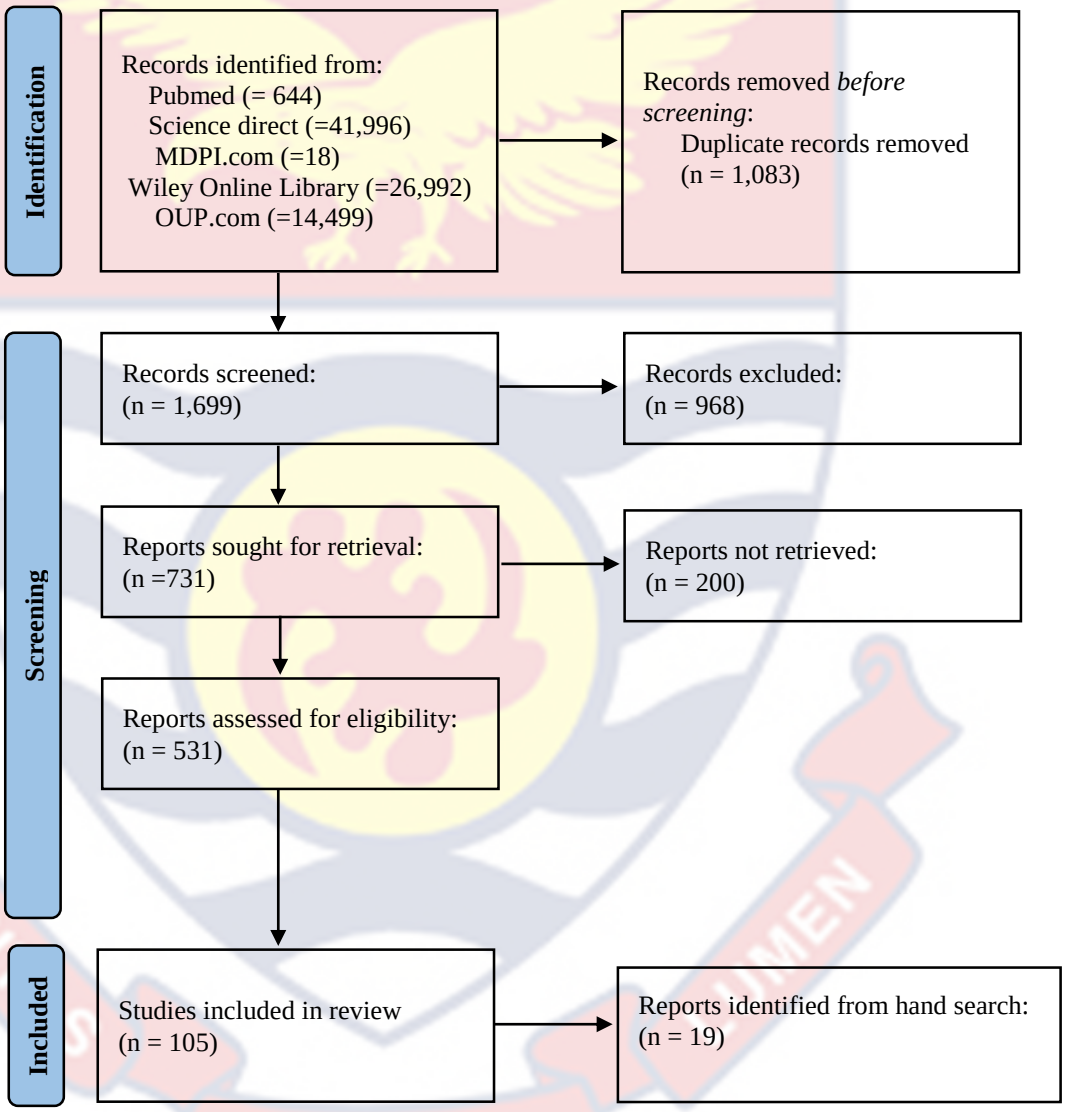

***Figure 3*: PRISMA diagram**

Source: Page et al. (2020). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews

CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

This chapter takes us on a journey through the heart of the findings of our study. Prepare for a fascinating exploration of the key findings and enlightening discussions that shed light on the significance of our research. It also discusses the results that were derived from the analysis obtained from the review made of other researchers' works.

Results

Two main search engines were used. They are the Microsoft Edge and Google Chrome. The results obtained are quite different. When using the google scholar website in both search engines, it was observed that the results are huge. For instance, when using it on chrome, 91,600 results were obtained where 69,600 are global, 22,000 are regional and 6,498 are local. When used on Microsoft Edge, 9,000 results were obtained. This is because this website contains several articles from other educational sites such as OXFORD UNIVERSITY PRESS (OUP.com), Web of Science, Wiley Online Library, mdpi.com, Pubmed, Elsevier, and Emerald, among others. It was therefore omitted from use. Two tables were drawn in Excel, one containing information obtained from the various educational websites on Microsoft Edge and the other containing information obtained from Google Chrome.

The information obtained from the two main search engines and drawn in Excel was summarized in the PRISMA diagram. From the diagram, it could be noticed that after sorting the information obtained, about 105 of the studies were included in the review, of which 19 were identified from a hand search.

From the PRISMA diagram, the Records excluded included documents or research that were either unrelated to the research issue or did not consider the research topic in their abstracts. The Reports not retrieved contained documents that did not have full access to the literature. The studies included in the review were deemed necessary and important to the study because they provided detailed information on not only the availability nor accessibility of green spaces in urban areas, but also the potential effects they could have on the health of urban dwellers. A few references that are listed at the conclusion of each study and may shed further light on the subject were also included.

It was realized that most of the information or studies conducted were on the developed countries and few were on sub-Saharan Africa. About 10 of the records identified were on urban green spaces in the African continent, the rest were mostly conducted overseas (with the majority in the Asian continent, China to be precise; followed by the United States of America; and the European continent). In some of the Sub-Saharan African countries such as Burkina Faso, Central Africa Republic, Togo, just to mention a few; no research was conducted on that topic. It is worth noting that there is a limited amount of research available on urban green spaces in Ghana. Specifically, only three research papers have been conducted, and unfortunately, none of them provided information on related diseases. In Ghana, there were only three research papers on urban green spaces and none of them provided information on related diseases. To conclude, the main focus of most, if not all studies conducted in sub-Saharan countries was on the presence and importance of urban green spaces; very little was said regarding the impacts these green spaces have on urban dwellers (be it positive or negative).

Discussion

In simple terms, urban greening is known as the practice of adding greenery to cities, such as gardens and parks. Greening has numerous environmental and public health benefits, such as lowering air pollution, reducing heat islands, and providing recreational opportunities for city dwellers. However, there are some potential drawbacks to urban greening, particularly in terms of public health. Certain types of vegetation, for example, can provide habitat for disease-carrying insects like mosquitoes, and many plant species can cause skin irritation, allergic reactions, or other health problems. Furthermore, urban green spaces can serve as breeding grounds for bacteria and other pathogens, posing a risk to public health.

Greening the urban environment has a significant impact on the local climate and could help alleviate the effects of climate change. Parks and gardens, for example, can help to regulate the local microclimate by lowering temperatures, improving air quality, and mitigating the urban heat island effect. Trees and vegetation, for example, can provide shade and lower surface temperatures, reducing energy consumption and the need for air conditioning. Green spaces can also absorb carbon dioxide and other air pollutants, improving air quality and mitigating the health effects of air pollution. Green spaces can also help with runoff and stormwater management, lowering the risk of flooding and improving water quality as well. Urban greening could also help in attenuating the effects of climate change by providing habitat for wildlife and supporting biodiversity. This can be essential for maintaining the health and resilience of urban ecosystems, especially in the face of rapid urbanization and changing climate conditions.

It can be deduced from the review that trees are of great importance to urban greening. The presence of trees in urban areas could lessen the heat island effect that is brought on by the absorption and retention of heat by asphalt and concrete surfaces. Trees give shade and cooling. Trees offer shade, which can contribute to a reduction in the local temperature. This can be especially useful in the hot summertime. By absorbing carbon dioxide and other air pollutants and releasing oxygen back into the environment, trees improve the quality of the air. In metropolitan regions, where pollution levels might be high, this can help to enhance the quality of the air. Because there is frequently little green space in urban settings, it can be challenging for animals to survive. Trees provide a habitat for wildlife. As a habitat for birds, insects, and other animals, trees can contribute to the development of a more varied and lively urban ecology. Another conclusion that may be drawn is that Western nations like the United States of America and a portion of Europe have been able to find a solution to the problem of shrinking of their urban green spaces.

In addition to their many utilitarian advantages, trees help improve the appearance of cities by adding to their natural beauty. A sense of green space and natural beauty can be created by trees in an otherwise built-up area. Urban greening can also lead to the creation of "green" jobs, which are occupations that emphasize preserving and improving the natural environment. Jobs in sectors like conservation, sustainability, and environmental education may fall under this category. In short, urban greening can boost the local economy by fostering the expansion of "green" enterprises and by generating both direct and indirect employment opportunities.

Furthermore, tourists can be drawn in large numbers by green places, which also helps to strengthen the local economy and fosters cross-cultural interaction. Urban green space size may have an effect on the advantages it offers to residents. Larger green spaces, according to research, generally contain more varied vegetation and a wider selection of services, which can draw more people and offer more recreational options. Greater social interaction and community involvement opportunities for social interaction and community involvement can be found in larger green spaces. Smaller green areas can, however, nonetheless offer people a lot of advantages. For instance, smaller green spaces might be more practical and simpler to reach, particularly for residents of heavily crowded urban areas. Smaller green areas can also add to a neighborhood's overall aesthetic appeal and create a sense of continuity in the greenery. The effect of urban greening on residents will ultimately rely on the requirements and tastes of the community, the amount of accessible green space in the area, and the availability of green space.

Moreover, urban greening can offer food and habitat to a wide range of beneficial insects, including bees, butterflies, and ladybugs. These insects can aid in plant pollination and pest population management, promoting a better urban habitat. On the other hand, urban greening can also draw pests that could harm both people and property. Pests like mosquitoes, parasites, and rats, for instance, can find shelter and breeding grounds in trees and shrubs. In addition to spreading diseases, these pests can harm buildings and other structures.

To reduce these health risks and others, urban greening programs must carefully consider the types of vegetation used, the maintenance of green spaces, and the overall health of the urban environment. Finally, with careful planning

and management, urban greening can provide significant benefits to both the environment and public health.

Sub-Saharan Africa's urban green spaces are quite limited and face numerous challenges. Despite their potential benefits, many cities in the region lack adequate green spaces, such as parks and gardens, and existing green spaces are frequently neglected and misused. This is due to a combination of factors, including limited maintenance funds, the rapid pace of urbanization, the uncooperative attitude of urban dwellers towards these open spaces, less priority for greenery, competing priorities for urban development as well as political instability (for instance, wars). Furthermore, many cities in the region have limited access to basic services such as water and sewage, making it difficult to maintain green spaces.

CHAPTER FIVE

SUMMARY, CONCLUSION, AND RECOMMENDATION

This chapter summarizes the study's key findings and provides a conclusion as well as some recommendations as to how urban green spaces are related to urban diseases.

Summary

To enhance the quality of the environment and the lives of those who live and work in urban areas, the technique of "urban greening" involves introducing plants, trees, and other green features to those areas. Urban green spaces can provide several advantages, including improving air quality, lowering the heat island effect, supplying habitat for wildlife, and enhancing the overall aesthetic value of the area. Urban greening, which is the integration of plants, trees, and other natural components into a city's-built environment, comes in a variety of forms. Several examples include:

Roofs that are partially or completely covered in vegetation are referred to as "green roofs." Green roofs can improve air quality, lower stormwater runoff, and insulate buildings. Vertical gardens connected to the side of a building are known as "green walls." Buildings with green walls can be kept cooler, have better air quality, and have a refuge for wildlife. Street trees are those that are positioned next to roads and in other public spaces (Wood & Esaian, 2020). Street trees can enhance air quality, provide shade, and lessen the impact of the heat island effect. Parks and public gardens are open-air green areas with facilities including playgrounds, formal gardens, and other features. People can relax, exercise, and interact with nature in parks and public gardens. Rain gardens are small depressions that are intended to catch and filter runoff

from storm drains. Enhancing water quality and reducing erosion are two benefits of rain gardens. Greenways are linear parks that follow rivers or abandoned rail lines as natural corridors. Greenways can offer a location where people can go for walks, rides, and nature-related activities.

Sustainable Development Goal (SDG) 11 calls for increased urban green space because of the positive impact it has on city dwellers' quality of life. One-way urban greening could help reduce healthcare costs is by improving air quality. Trees and other forms of plant life can reduce the negative health impacts of air pollution, such as asthma attacks, heart attacks, and strokes. By reducing weight, improving mental health and pregnancy outcomes, and decreasing mortality and morbidity from chronic diseases, exposure to green space enhances health. Furthermore, green spaces can provide a setting for exercise, which in turn reduces the probability of developing obesity-related health problems including diabetes and cardiovascular disease. Researchers have found that people of all ages, but especially children and the elderly, are more active when they have ready access to parks and other green spaces.

Conclusion

Improved air quality is one of the many benefits of urban greening, which occurs when plants take in carbon dioxide and release oxygen. Home values are greater in general for properties that have access to green space, according to research. It has been found that people's mental and physical health improves when more green spaces are available to them. The presence of green areas in a neighbourhood has been shown to increase neighbourliness and a sense of community. Having easy access to green spaces can encourage exercise, which is good for people's physical well-being. Green spaces help

mitigate the heat island effect, which causes cities to be noticeably warmer than their rural neighbours. The biodiversity of a city can be increased through urban greening by providing habitat for a wide variety of plant and animal species. Green areas reduce the risk of flooding by filtering and absorbing rainwater. By providing insulation and shade, green spaces can reduce the amount of money and time spent cooling and heating a building. Green infrastructure that is well-planned and managed makes a city more resilient, sustainable, and fair in terms of nutrition and food security, reducing poverty, improving ways to make a living, mitigating and adapting to climate change, reducing the risk of disasters, and protecting ecosystems. The analysis shows that there are not many studies looking into the link between green spaces in cities and disease in Sub-Saharan Africa.

Recommendation

Utilizing integrated pest management (IPM) techniques is crucial to reducing the detrimental effects of pests on urban greening. To effectively and sustainably manage pests, a variety of tactics, including physical, biological, and chemical controls, must be used. The use of physical barriers to keep pests away from plants or the removal of sick plants are examples of physical controls. Utilizing natural predators or parasites to reduce pest populations is known as biological control. Pesticides are utilized in chemical controls; however, they should only be used as a last resort and in moderation because of their potential harm to the environment and human health. This can also involve actions like establishing native species that are less alluring to pests, erecting physical barriers to hinder insect access, and, if necessary, utilizing ecologically friendly pest treatment techniques. Urban greening can affect pests in both good

and bad ways, but with careful planning and management, any adverse impacts can be reduced, promoting a wholesome and sustainable urban environment. Urban greening can also help to create healthier and more sustainable cities by regulating the local microclimate, improving air quality, reducing runoff, and supporting biodiversity.

Lastly, Sub-Saharan African researchers should be encouraged to conduct more research on urban greening and the diseases that are associated with it in Sub-Saharan Africa. It is critical that national governments, city authorities, and urban dwellers work together to safeguard these open spaces. Green spaces should be prioritized on urban planning authorities' development agendas, and allied institutions managing green spaces should be adequately resourced to carry out their duties.

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