AN ASSESSMENT OF USER PERCEPTIONS AND EXPERIENCES OF URBAN GREEN SPACES IN NAIROBI, KENYA: THE CASE OF JEVANJEE GARDENS AND NAIROBI ARBORETUM

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DECLARATION

This project report is my original work and has not been presented for a degree or any other award in any other University

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	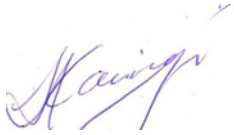
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DEDICATION

I would like to express my gratitude to my mother for her unwavering belief in me. She has dedicated herself to my welfare from the very beginning. She is the driving force behind my present accomplishments. I appreciate her constant encouragement, reminding me to always strive for excellence.

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ABSTRACT

The rapid urbanization in developing regions, particularly in Asia and Africa, has sparked concerns regarding the decreasing availability of urban green spaces, as well as their usage. This study aimed to evaluate the user perceptions and experiences of urban green spaces in Nairobi city. The research employed a case study design with a mixed-methods approach, encompassing a survey of 80 park users in Jevanjee Gardens and Nairobi Arboretum, along with insights from key informants. Data collection methods encompassed questionnaires, interviews, observations, and visual materials. Data analysis involved descriptive and inferential statistics, using SPSS software. The report emphasized the distinct attributes of Jevanjee Gardens and Nairobi Arboretum, highlighting variations in size, management structures, biodiversity, landscaping, infrastructure, and accessibility. While both parks contributed to the ecological landscape, they encountered challenges related to infrastructure, accessibility, and security. The study revealed noteworthy associations between park usage and socio-economic factors, underscoring the importance of understanding user profiles, satisfaction levels, and awareness of the benefits of green spaces. Despite these challenges, the park users acknowledged the advantages of green spaces, although satisfaction levels varied, with the majority finding park designs efficient. Notably, the presence of natural attractions, including flora and fauna, exerted a significant influence on park users. Statistical analyses confirmed the linkage between park usage and socio-economic factors, emphasizing the significance of public awareness and perceived value in the utilization of green spaces. In the pursuit of modelling an ideal green space, the approach was comprehensive and inclusive, soliciting input from regular park users and drawing inspiration from global case studies. Armed with this valuable information, the study harmonized these insights with expert knowledge to formulate an ideal green space model, with Jevanjee Gardens serving as the primary example. The features integrated within green spaces served specific purposes that enhanced functionality, aesthetics, and overall appeal. They contribute to the visitor experience by providing conveniences, cultural and historical context, recreational opportunities, and spaces for community engagement. When well-designed and integrated, these features create a vibrant and inclusive environment suitable for individuals from diverse backgrounds and interests. In summary, the study provides valuable insights into the dynamics of urban green spaces in Nairobi City. It underscores the imperative need for community participation, and equitable distribution to enhance these spaces,

rendering them more accessible and attractive to a diverse community of visitors while promoting urban sustainability.

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ABBREVIATION

CRS Creative Research Systems

EN English Nature

FAO Food and Agriculture Organization

FONA Friends of Nairobi Arboretum

GIS Geographic Information Systems

GS Green Space

KFS Kenya Forest Service

NCCG Nairobi City County Government

NMK National Museums of Kenya

PGIS Participatory Geographic Information Systems

PGS Public Green Space

SPSS Statistical Package for Social Science

UGS Urban Green Space

UNFPA United Nations Population Fund

WHO World Health Organization

CHAPTER ONE: INTRODUCTION

1.1 Background to the Study

Over time, cities were built on natural areas to concentrate human and economic activities. This has been, however, at the expense of green spaces. In fact, in the 19th century, cities grew, followed by heavy exploitation of rural hinterlands, especially where the land lay idle – one of the symptoms of urban growth, predominantly leading to rural-urban migration and urban sprawl. With the increased unplanned population, densification strategies commenced, catering to the increased housing demand and economic opportunities. This gave rise to the compact city, generally attributed with significant benefits, socially and economically connected with high density. Nevertheless, this high density also meant a substantial impact on the environment and the health and well-being of the city dwellers. Urban planners and city administrators then recognized the essence of consciously conserving green spaces for the city dwellers' well-being (Velegrinis & Weller, 2007).

Aronson *et al*. (2017) illustrates that green spaces in the urban landscape provide an extensive variety of ecosystem benefits that combat several urban ills and enhance urban residents' lives, health, and well-being. In addition, they make an enormous contribution to many ecosystem services. These ecosystem services support cities' ecological integrity and protect the urban population's health. Similarly, Sauvageau (1999) illustrates that green spaces have the capacity to filter air, reduce pollution, attenuate noise and lower temperatures, infiltrate stormwater, replenish groundwater, and provide food through urban agriculture. For instance, urban trees reduce air pollution by absorbing certain airborne pollutants from the atmosphere (Chiesura, 2004). Previous empirical evidence indicates a linkage between the proximity of green spaces and improved well-being. They act as natural pockets for all residents, which the relevant institutions generally maintain for leisure and recreation of citizens (Rojas *et al*., 2016).

Public green spaces in cities are scarce and inequitably distributed (Krellenberg *et al.*, 2014). For example, the five high-income municipalities in Santiago de Chile have an average of $11m^2$ of public green per urban resident, while the five low-income municipalities have an average of $2m^2$ of public green per urban resident. They contrast the WHO guidelines of $9m^2$ of unpaved green space per resident (Contesse *et al.,* 2018). Moreover, access to these green spaces is stratified to income, age, gender, ethnic and racial characteristics, disability, and other

differential axes (McConnachie & Shackleton, 2010). For several decades, this uneven access to urban green space has been considered a tremendous environmental injustice because of its significant relation to public health (Jennings *et al.,* 2012).

The environmental injustice is partially attributed to the explosive urbanization that commenced in the mid-20th century. Public budgets limited green space development and management, and not to mention land use contestation, hampered green space planning. This haphazard urbanization process did not consider the vitality of urban green spaces, thereby constraining the green spaces to small pockets amongst the urban grey buildings' matrix. This scenario is prevalent in developing countries, especially in Africa, and in some cases traced back to colonial and post-colonial city planning. For example, the Nairobi Colonial City Master Plan of 1948 ensured that green and open spaces received significant emphasis accounting for 27.5% (Makworo, 2012; Makworo & Mireri, 2011). Moreover, the Nairobi Metropolitan Strategy of 1972 did not prioritize public open spaces. Furthermore, the absence of public open spaces in the 2009 National Land Policy posed a setback to the issues surrounding public open and green spaces in the nation.

This study is an assessment of how users perceive and experience green spaces in Nairobi, using Jevanjee Gardens and Nairobi Arboretum as case studies. The study integrates various methodological and analytical approaches to understand the characteristics of the two green spaces (Jevanjee Gardens and Nairobi Arboretum), socio-economic characteristics of their users, and the user perceptions and experiences.

1.2 Statement of the Research Problem

With rapid increase in population, green spaces are declining, especially within the urban landscape, despite their ecological importance. It is even more common in developing regions like Asia and Africa, which have experienced a rapid urbanization process leading to the emergence of large and fast-growing cities. Further, nearly half of the global population are urban residents. The situation will rapidly increase to approximately two-thirds in 2050 because more people will migrate to cities for better job opportunities and higher living standards. Such densification leanings will then pressure cities' existing infrastructure and facilities. Thus, the available land and the minimal green spaces will be purposely zoned for housing to feed the increased demand, setting the depletion of minimal green spaces available within the city.

Moreover, over time, cities have developed without consideration of the environmental and human aspects, mainly attributed to the densification tendencies. The Nairobi Central Business District (CBD) is no different, and the current atmosphere depicts auto-centric, overcrowded, and inadequate open and green spaces. Where such spaces exist in the CBD, the situation is convoluted by oblique development and insufficient maintenance. The aesthetic quality of the green infrastructure is also wanting, and inadequate, to complement the architecture and built environment. As such, the resultant landscape can be said to exhibit visual blight and disorder. Open spaces similarly lack the coherence that green infrastructure networks should have.

The development of green spaces in Nairobi has evolved in an unplanned manner instead of following a strategic approach. This has resulted in a disregard for the preservation of existing natural resources and inadequate consideration for the relationship between green spaces. The minimal existing green spaces often experience a short life cycle of a 'build-demolish-rebuild' pattern. This shows that policymakers and urban planners lack a clear vision of improving cities, especially the ecological environment. Moreover, most existing green spaces are poorly designed, lacking the requisite recreational amenities to support the excellent quality of the desirable social atmosphere that urban open spaces are designed to create. The leisure facilities, such as areas for strolling and seating, are either lacking, inadequate or very uncomfortable.

These green spaces often lack aesthetic features that attract park users. Moreover, there are fears of insecurity mainly due to the absence of essential amenities like proper lighting, the presence of street urchins and stray animals, inaccessibility, inadequate maintenance of the green spaces, and the perceived unfriendly form of nature and greenery in some of these spaces. These factors render urban green spaces unappealing, psychologically uncomfortable, and unsuitable for social and recreational activities. Arguably, urban green spaces are essential in the city fabric because they offer multiple urban services to various stakeholders.

However, these spaces consume large spatial areas where land is scarce and costly; thus, planners and city managers often confront conflicting challenges. This offers a prospect for future design initiatives, which will give feedback on the synergies and trade-offs in green space development and can be used to measure its success or failure. Additionally, the assessment of user perceptions and experiences, as well as the characteristics of green spaces, is a vital component of urban planning and environmental design. It enables a comprehensive understanding of the challenges faced by these spaces, guides the development of strategic

solutions, and ensures that urban green spaces contribute positively to the well-being, social cohesion, and overall quality of life of city residents. Understanding the characteristics of urban green spaces allows planners and policymakers to assess the strengths and weaknesses of urban green spaces. By aligning these characteristics with the preferences and needs of the community, planners can create spaces that enhance the overall well-being of users, fostering positive perceptions and meaningful interactions within urban environments. Given this background, the primary objective of this study is to evaluate how park users perceive and experience urban green spaces in Nairobi, using the case studies of Jevanjee Gardens and Nairobi Arboretum. The results will give an idea on how to amplify the functionality of urban public green spaces and suggest an ideal model that links green space components with urban green services.

1.3 Research Questions

1. What are the characteristics of public green spaces in Nairobi City?
2. What are the social-economic characteristics of public green spaces users in Nairobi City?
3. How do users perceive their experiences of public green spaces in Nairobi City?
4. What is an ideal urban public green space?

1.4 Research Objectives

1. To examine the characteristics of public green spaces in Nairobi City.
2. To evaluate the socio-economic characteristics of public green spaces users in Nairobi City.
3. To assess user's perceptions and experiences of public green spaces in Nairobi City.
4. To model an ideal urban public green space.

1.5 Research Hypothesis

1. H_{01}: There is no significant association between socio-economic characteristics of park users and the frequency of urban public green space usage.
2. H_{02}: There is no significant association between awareness and perceived value of green spaces and the frequency of public green space usage.

1.6 Justification and Significance of the Study

A strong connection exists linking green spaces and sustainable urban development, underscoring the importance of conserving these spaces. Achieving this goal will require well-

structured strategies to address challenges related to green spaces in urban areas. The results of this study will expand the existing knowledge; highlighting how green spaces and their land-use components can enhance the well-being of urban residents and communities, encompassing aspects such as health, physical and cognitive fitness, and social interactions. The research will shed light on the properties, features, and essential elements of green space components and networks that users value. It will also contribute to the enhancement of spatial layout and planning for these areas. Furthermore, in the context of devolution, the findings will inform the planning of green spaces in other Kenyan cities like Kisumu, Mombasa, and Nakuru.

1.7 Scope and Limitations of the Study

The study delves into the responses of individuals who frequent urban green spaces, examining their preferences and experiences in urban settings, with a particular focus on their interactions with green spaces and their various elements as interconnected social environments. The study was conducted in Nairobi Arboretum and Jevanjee Gardens in Nairobi, Kenya. Nairobi Arboretum lies within a high-income residential area and is predominantly in its natural and organic state. On the other hand, Jevanjee Gardens is significantly smaller, with pockets of green spaces within the CBD. These distinct features make the study sites essential and insightful, especially when examining their various dynamics.

In the context of the study, it is important to note that the research did not delve into the temporal dimension of user behavior analysis, specifically regarding observed seasonal variations in user patterns. The scope of this study focused on assessing the overall user perceptions and experiences of public green spaces, with an emphasis on characteristics, challenges, and satisfaction levels. While acknowledging that user patterns in public green spaces may exhibit fluctuations based on seasons, this specific aspect was beyond the designated scope of the research.

1.8 Operational Definitions and Concepts

- ***Space*** refers to any green or grey area situated within the confines of buildings or other areas that are typically overlooked or not designated for specific purposes other than ensuring safety, enhancing visual appeal, or providing physical separation.
- ***Green space*** can be defined as an expansive area featuring abundant vegetation and green surroundings that are open to the public, such as parks, forests, natural reserves, and similar green spaces. These spaces may exhibit both designed and cultural attributes as well as a

more unspoiled, natural quality. The key criterion for inclusion is that these areas are freely accessible to the public.

- ***Public space*** pertains to all land and areas that the public can access, whether they are indoors or outdoors.
- ***Recreational space*** comprises functionally dedicated green and urban spaces intended or utilized for leisure purposes, including sports and physical activities.
- ***Parks and gardens*** are partially landscaped, primarily green zones designed for social, recreational, and aesthetic uses, even though historically, these functions have been closely connected with food cultivation.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter highlights the empirical literature on the concept of green spaces, discussing the diverse green space typologies and their perceived benefits. The chapter is organized into sections relevant to understanding how perceived satisfaction levels of green spaces can be deduced. This chapter also goes on to illustrate how city managers and the local community can collaborate to effectively plan for green spaces, citing various global success stories. The chapter then concludes with a summary highlighting the existing knowledge gaps in the study's scope, as well as the theoretical and conceptual frameworks.

2.2 The Concept of Green Spaces

Within existing literature, numerous definitions of urban green spaces are often quite expansive. This section aims to provide insight and clarity regarding the concept of urban green spaces by illustrating a variety of definitions. In developed countries, there is a range of definitions for "urban green spaces" put forth by different scholars. Fratini & Marone (2011) used a broad definition, encompassing all areas naturally or artificially covered with vegetation. Fam *et al*. (2008) defined urban green spaces as spaces with any form of vegetation, including trees, shrubs, and grasses. Swanwick *et al*. (2003) characterized urban green spaces as areas primarily composed of unsealed, permeable surfaces such as grass, shrubs, forests, wetlands, and trees, which can be privately or publicly accessible or managed.

Jim & Shan (2013) viewed urban green spaces as outdoor areas with some level of vegetation, primarily located in semi-natural settings, a perspective shared by Baycan-Levent & Nijkamp (2009), who described them as urban areas primarily covered by vegetation, whether publicly or privately accessible. In developing countries, Cilliers *et al.* (2012) employed a more comprehensive definition, referring to urban green spaces as the entire urban green infrastructure, encompassing a network of natural, semi-natural, and artificial ecological systems across various spatial scales within and between urban areas. In a broader context, Nur *et al*. (2020) defined an urban green space to be any area or land in an urban setting that is enclosed with vegetation.

In both scenarios, the standards used to delineate green spaces primarily revolved around the presence of green vegetation. This inclusive perspective means that urban green spaces encompass a wide range of urban areas or plots of land that, to varying degrees, feature some kind of vegetation, whether it's natural or man-made, and are accessible for city residents' use. This interpretation means that urban green spaces extend beyond just parks and gardens, encompassing a broader array of land categories with vegetation, including forests, woodlands, urban tree areas, and allotments.

2.2.1 Typology of Urban Green Spaces

Urban green space typology offers a structured approach for classifying these spaces into distinct categories, considering multiple factors like size, purpose, characteristics, facilities, and ownership. Several classification systems have been created for this purpose. For instance, in a research conducted by Bonsignore (2003) in the USA, 26 distinct urban green space types were identified. On the basis of size, Herzele & Wiedemann (2003) categorized urban green spaces into six primary types: residential, neighborhood, quarter, city, district green, and urban forest.

Baycan-Levent & Nijkamp (2009) proposed an alternative classification method, emphasizing the values or purposes of urban green spaces. They organized these spaces into sixteen distinct categories, primarily grounded in five key values: ecological, social, economic, planning, and multi-functional. Azadi *et al.* (2011) categorized urban green spaces into eight broad types, considering the nature of the green spaces, which include general green spaces, brownfields redevelopment, greenways, neighborhood gardens, green belts, forests, and parks – in urban areas.

Chowdhury *et al*. (2021) classified green spaces in Yogyakarta (Indonesia) into two main categories: linear and non-linear spaces, encompassing various forms like town parks, sports fields, and recreational parks. In contrast, Swanwick *et al*. (2003) advanced a classification system for urban green spaces that integrates these diverse perspectives and considers factors such as ownership, character, and functions of green spaces. Their classification system broadly categorizes urban green spaces into four primary types: semi-natural, linear, functional, and amenity green spaces. Amenity green spaces include recreational, casual, and private green areas. Functional green spaces involve productive, burial sites, and institutional grounds. Semi-

natural green spaces consist of wetlands, woodlands, and other natural habitats. Lastly, linear green spaces encompass river and canal banks, as well as transportation corridors.

2.2.2 International Guidelines and Standards of Urban Green Space Coverage

In a broad context, green spaces have garnered significant attention from various stakeholders and influential parties. Various quantitative standards have been established to improve the accessibility of green spaces. On a global scale, both the WHO and FAO have put forth a minimum guideline of $9m^2$ of green space per urban resident (Kuchelmeister, 1998). Nevertheless, Zhao *et al.* (2010) and Wang (2009) have pointed out that many developed countries generally adhere to a standard of $20m^2$ of park area per person. Expanding upon the WHO's recommendations, the European Environmental Agency suggests that urban residents ought to have access to urban green spaces like parks within a radius that can be covered by walking for approximately 900 metres or for about 15 minutes (Barbosa *et al.*, 2007).

In addition to these guidelines, English Nature, recommends allocating 2 hectares, approximately 4.5 acres, of accessible green space per 1,000 individuals, ensuring that no person resides farther than 300 meters from the nearest green area, which is roughly a 5-minute walk away (Schipperijn *et al.*, 2010; Cianga & Popescu, 2013; James *et al.*, 2009). This differs from the national standards in the USA, where green space provision varies from 6.25 to 10.5 acres per 1,000 residents (Wen *et al.*, 2013). In Denmark, municipal authorities in Copenhagen have embraced a green space standard aimed at providing green areas within 400 meters for at least 90 percent of residents (Schipperijn *et al.*, 2010).

Comparable standards for green spaces are being put into practice in many developing countries. For example, the municipal authorities in Bangkok, Thailand have established a criterion of $10m^2$ of green space per person to enhance green space availability in Bangkok (Fraser, 2002). While quantitative standards of this nature have not been extensively integrated into urban planning systems across African countries, certain nations have introduced regulations and requirements. In Cote D'Ivoire, for instance, real estate firms are required to allocate 5% of developed areas for green spaces (Cobbinah *et al.*, 2021). In Kenya, Nairobi City County has put forward a guideline stating that newly developed residential areas should include a mean of 3,588 individuals per hectare of neighborhood green space (Makworo & Mireri, 2011). Likewise, in Lagos, Nigeria, there is a planning requirement specifying that 8-10 % in residential areas must be allocated for green spaces (Abegunde, 2011).

2.3 Benefits of Green Spaces

Recreation and leisure are recognized as important social benefits provided by urban green spaces in both developed and developing nations. Studies conducted in China by Cai (2018), Xing *et al*. (2018), and Jim & Chen (2006) have shown that a significant number of city dwellers utilize green areas for leisure and recreational purposes such as relaxation, engaging in activities with children, taking leisurely strolls with pets, and experiencing nature. Onder *et al*. (2011) discovered that urban green spaces, including parks and gardens, function as gathering spots, in which individuals can relax and unwind. These spaces offer opportunities for exercise, sports, relaxation, interaction with nature, and social engagement, contributing to social cohesion and integration (Zhang *et al.*, 2015; Kaźmierczak, 2013). Public green spaces are seen as investments meant to benefit the entire urban population.

Furthermore, green spaces have a beneficial impact on the physical and mental health of city dwellers. Proximity to green spaces correlates with improved emotional and mental well-being (Barton *et al*., 2015), stress reduction (Woo *et al.*, 2009), and better mental health in children (Taylor & Kuo, 2011). Greenery also assists in regulating temperatures through the provision of shading, creating a cooling effect, and reducing the risk of heat-related health problems among city residents (Wolch *et al*., 2014; Singh *et al*., 2010). Studies by McPherson *et al*. (2011) and Alexandri & Jones (2008) have indicated that green urban areas assist in alleviating urban heat, reducing the effects of urban heat islands and improve the overall well-being of city dwellers. Moreover, the conservation of biodiversity, including flora and fauna, is a prominent feature of urban green spaces. Numerous studies have demonstrated that various categories of urban green spaces harbor considerable biodiversity (Lafortezza *et al*., 2009; Cornelis & Hermy, 2004; Godefroid & Koedam, 2003).

From an architectural perspective, green spaces contribute to the beautification and enhancement of urban design and the overall urban landscape. Mao *et al.* (2020) emphasize how green vegetation improves urban architecture and enhances the cityscape through its diversity. Beyond the aesthetic appeal, green spaces help enhance the urban aesthetic quality, making cities more organized and visually distinctive (Jennings *et al*., 2016). As stated by Baycan-Levent & Nijkamp (2009), green spaces play a vital role in urban planning as they contribute to the city's character, ultimately boosting their appeal as destinations for residence, employment, investment, and tourism.

Economically, urban green initiatives, which are frequently characterized with requiring substantial manual labor and maintenance, provide temporary and long-term employment opportunities. In developing nations, these employment opportunities are essential in addressing high unemployment rates. A study in Abidjan, Cote D'Ivoire, Mensah (2014a) revealed that many individuals with various skills find employment in urban green spaces. Furthermore, green spaces can increase property values, contributing to urban development (Lutzenhiser & Netusil, 2001). Studies in Dutch towns such as Emmen, Apeldoorn, and Leiden have shown that houses near green spaces and natural parks end up having relatively higher property values (Luttik, 2000).

Sustainable urban development is a fundamental concept in urbanization, and urban green spaces are considered a crucial, high-priority resource in achieving it. Developing these spaces should involve an interdisciplinary and holistic approach, considering socio-economic, cultural, political, planning, and management aspects to enhance and optimize existing urban green spaces and policies (Haq, 2011). Previous studies have demonstrated the vital role of urban green spaces in the sustainability and well-being of citizens, particularly in urban environment (Sauvageau, 1999; Chiesura, 2004).

2.4 Empirical Studies on Green Spaces

2.4.1 General Studies

A number of studies have presented compelling proof regarding the crucial role green spaces play in advancing sustainable development of cities (Barthel *et al*., 2015; Fam *et al.,* 2008; Harnik & Simms, 2004). This section aims to emphasize the various empirical investigations that have revealed these contributions to urban development. It also offers a theoretical foundation for understanding the significance of green spaces in the context of feasibility and sustainable urban and environmental planning. Tahmasebi *et al*. (2014) conducted a study to assess the optimal selection of sites for urban parks in the vicinity of the City of Shahrood. The initial approach employed in this endeavor involved the integration of GIS with overlay techniques. Subsequently, criteria influencing site selection were assigned weights using the Analytic Hierarchy Process (AHP), and a pairwise comparison was conducted. The goal was to identify the most suitable location for the construction of a neighborhood-scale park.

Dueholm & Smed (2014) provided clarification on the benefits and challenges associated with urban green spaces by summarizing findings from various studies in a comprehensive manner.

They stressed the importance of a unified strategy in the planning, monitoring, design, and upkeep of urban green spaces to improve environmental sustainability in cities worldwide. These green areas have crucial functions in areas like societal welfare, economic progress, cultural enhancement, and ecological sustainability within the framework of sustainable urban growth. Khalil (2014) conducted an evaluation of the spatial significance in the distribution of green spaces within Jeddah city by employing Geographic Information System (GIS) technology. The GIS analysis was utilized to investigate the spatial dispersion of requirements and accessibility. The findings from this study reveal that the average green space available per person is 0.9 square meters, and around 70% of the population must travel a distance exceeding 500 meters individually to access a green space.

Desai & Bhagat (2017) concluded that urban green spaces offer both social and ecological benefits, with the most prominent impact being their environmental function. Green spaces in urban areas play a crucial role in enhancing environmental quality and mitigating the negative effects associated with industrialization and transportation development. In their study focused on Region Six in Tehran city, Desai & Bhagat (2017) employed the TOPSIS model within the ArcGIS software to identify optimal locations for creating parks and green spaces. The results indicated that the southern end of the study area represents the most suitable location for the establishment of parks and green spaces. Alizadeh & Hitchmough (2019) conducted a spatial analysis of access to urban green spaces using descriptive analysis. Their objective was to evaluate how urban land use is distributed in relation to access to urban green spaces. The outcomes of their spatial examination of green spaces revealed that the northern and central areas have better and more equitable access to green spaces.

Lahoti *et al*. (2019) employed a sector-specific thematic map featuring concise categories of urban green spaces in Nagpur City, India. Their objective was to provide valuable information to stakeholders, including policymakers and urban planners, regarding the current state and distribution of recreational green spaces in the city. The study utilized an innovative mapping technique that effectively assessed both the quality and spatial distribution of these green spaces, facilitating the prioritization of efforts to enhance green space provision in urban areas. Mensah (2014) conducted a systematic review and discovered that many African countries predominantly depend on master plans as their primary method for urban area management. These master plans visually outline the desired future urban layout on a map. However, these plans often struggle to address emerging challenges linked to urban development in Africa, like

the excessive loss of green spaces. This limitation arises from the fact that most master plans are outdated, inflexible, and do not incorporate input from a broader range of stakeholders, including the local community.

McConnachie *et al.* (2010), utilized GIS Analysis to explore green space inequality in South Africa. The study focused on nine towns situated within the Albany Thicket Biome in the southeastern region of South Africa. Apart from Mossel Bay, all the towns were situated in the Eastern Cape, which is considered the country's poorest province. Among the nine towns, two, namely Butterworth and Zwelisha, are situated in areas previously designated as racially segregated homelands during the apartheid era, and as a result, they exhibit notably lower socioeconomic status compared to the other towns. Within each of these towns, there is a coexistence of affluent suburbs, originally reserved for white residents, alongside townships, and in most cases, neighborhoods established under the Reconstruction and Development Program (RDP). Additionally, informal unplanned housing areas are also present.

The study, using the entire town as the basis for analysis, reported an average of 36.5 square meters of public green space per capita for these towns. However, considering that the affluent suburbs have larger land plots and access to private green spaces, there is a higher demand for public green spaces in the poorer suburbs. Furthermore, it was observed that the average size of each public green space in the RDP neighborhoods was significantly smaller compared to those in the townships, which compromises their ability to fulfill various functions such as aesthetic value, passive recreation, conservation, carbon sequestration, wildlife habitat, and space for sports activities. This research underscores the significant disparities in green space availability among affluent suburbs, impoverished suburbs, and the newly developed housing program areas.

Yirga Ayele *et al*. (2022) explored park management models in Addis Ababa. These models include public and for-profit combination, national park, parastatal, public and non-profit combination, and nonprofit organization models. Each model has different ownership, funding sources, and management structures. These models have implications for management of green spaces. This study identified major challenges in the management of green spaces in Addis Ababa at three governance levels: policy, tactical, and operational. Key challenges included the absence of sustainable green space planning, political interference, limited cooperation between departments, and a lack of specific laws for green space management. Additionally,

challenges at the operational level include re-organization of environmental protection institutions, expert shortages, limited cooperation with the community, budget constraints, limited involvement of NGOs, and the conversion of green spaces for alternative uses, such as housing and commercial use. Strategic Park management involves cross-sectoral and inter-sectorial approaches at these three governance levels, with a focus on policy, tactical, and operational activities.

M'ikiugu *et al*. (2012) discovered that urban green spaces (UGS) benefit significantly from their vital role in enhancing the satisfaction and behavior of residents. This study outlined a method for evaluating green spaces using landscape metrics and identifying potential expansion zones by conducting a suitability checklist and proximity analysis in Central Nairobi, Kenya as the representative study area. In this region, UGS was distributed unevenly, lacking in size, character, and accessibility. The final composite suitability map indicated that addressing these deficiencies is possible by expanding UGS in identified high-potential areas.

Kiplagat *et al*. (2022), in their study in Kisumu City and Eldoret Municipality, Kenya, revealed that urban green spaces have varying characteristics, which can be classified into attributes that are common, moderately common, and less common. Frequently observed traits comprise unrestricted entry, plant life, economic prospects, and security. The moderately prevalent characteristics encompassed amenities for sanitation, cleanliness, security personnel, and clean consumable water. Additionally, green space characteristics vary, influencing visitation patterns, which are driven by factors like accessibility, socio-demographic attributes, and multifunctional roles of green spaces.

2.4.2 Socio-Economic Characteristics of Public Green Space Users

Urban green spaces play a vital role in enhancing the quality of life in metropolitan areas, serving as hubs for social interactions, recreation, and environmental benefits. This synthesis draws from several key studies that delve into the socio-economic dimensions of public green spaces, exploring the diverse perspectives and usage patterns across different demographic groups.

De la Barrera *et al*. (2016) investigated socio-economic characteristics and perceptions of users in public green spaces in the Metropolitan Area of Santiago, Chile. The study emphasized the universal recognition of the social and environmental value of green spaces across income

neighborhoods. Residents shared a vision on neighborhood safety, identifying children as primary users. Green spaces were viewed as contributing to environmental benefits and personal/social development. Despite these shared values, variations in user demographics and activities were observed, with lower-income areas displaying more diverse and intensive use, higher community attachment, and increased responsibility for green space maintenance. The study highlighted the complexity of safety perceptions and the influence of socio-economic factors on expectations, underscoring the need for comprehensive exploration in future research.

Wilkerson *et al.* (2018) explored the role of socio-economic factors in shaping ecosystem services dynamics in urban environments. The study revealed a nuanced relationship between socio-economic factors and ecosystem services, emphasizing variations in perception, inequalities in provision, and differing preferences. The authors advocated for integrating socio-economic considerations into urban planning, proposing a conceptual model differentiating between the biophysical supply, demand, and benefits of ecosystem services. This model aims to guide planners and managers in addressing diverse needs, stressing the importance of contextual factors. The study called for a reassessment of simplistic targets for green space, urging planners to consider varying socio-economic contexts for more equitable and effective provision of urban ecosystem services.

Phillips *et al.* (2021) conducted a study on the socio-economic characteristics of the Brussels Capital Region (BCR), analyzing urban green spaces (UGS) with a focus on gender, age, and household composition. Using Multiple Correspondence Analysis (MCA) and Chi-squared tests, the research explored diverse patterns in UGS use and valuation among socio-demographic groups. Mismatches in UGS provision were identified, emphasizing the need to consider user preferences, socio-demographic factors, and accessibility in UGS planning. The study underscored the importance of addressing identified mismatches for improved user satisfaction and inclusivity.

In Kabisch & Haase (2014) studied urban green space (UGS) provision in Berlin, uncovering significant variations in distribution across the city. While most sub-districts met UGS threshold values, outer districts had extensive UGS compared to high-density and immigrant areas. Cluster analysis revealed three significant clusters, and dissimilarity analysis indicated less access to UGS in high-density and immigrant areas. The study highlighted potential socio-

environmental injustices, emphasizing the need for nuanced UGS planning to address distributional disparities.

Alberta (2014) provided insights into the demographic composition and usage dynamics of urban parks in Kisumu, Kenya. Female household heads aged 35-45 showed widespread awareness of urban parks, but actual visitation was at 60%, citing lack of interest and safety concerns. Specific parks drew women due to amenities, indicating the impact of facilities on preferences. Economic activities were observed in certain parks, but the underutilization of parks for recreational and educational purposes raised concerns. Accessibility, influenced by foot travel, was a key factor in park use, with inhibitions linked to inadequate facilities and maintenance.

2.4.3 User Perception's and Experiences of Public Green Spaces

The exploration of user perceptions and experiences within urban green spaces is a subject of growing importance in contemporary research, shedding light on the nuanced dynamics that shape individuals' interactions with diverse environmental settings. In this academic discourse, three distinct studies contribute to this evolving field by scrutinizing the multifaceted aspects of public green spaces (PUGS) in various global contexts.

Rey Gozalo *et al.* (2019) conducted a research study in Cáceres, Spain, examining user satisfaction and perceptions concerning two distinct types of green spaces – large and small parks. Overall, users expressed heightened satisfaction with the park features, with noise being a notable exception. Despite differences between park types, both exhibited similarities in environmental, social, and geographical aspects, leading to comparable overall user assessments. The study emphasized significantly greater satisfaction in large parks, particularly regarding aesthetics, conservation, size, groves, and shade. It established a critical association between satisfaction with specific features and overall satisfaction, underscoring the significance of environmental factors such as cleanliness, air quality, and noise. An examination of annoyance with noise sources revealed variations between large and small parks. User activities, including walking, exercising, and relaxing, were more prevalent in larger parks, aligning with the park size. The findings underscore the importance for urban planners to consider factors like noise mitigation, park size, and user safety to optimize overall satisfaction and foster diverse recreational activities in both large and small green spaces.

Peschardt & Stigsdotter (2013) investigated user perceptions and experiences of Small Public Urban Green Spaces (SPUGS) in relation to the Perceived Restorativeness Scale (PRS). The

study identified variations in the evaluation of SPUGS based on the PRS components, with Rosenhaven and Gråbrødre Torv receiving the highest scores across all five components. Key Perceived Sensory Dimensions (PSDs), particularly 'serene' and 'social,' consistently emerged as influential in components like compatibility, coherence, and preference. The research further distinguished the preferences of the 25% most stressed users, emphasizing the significance of 'nature' in their perceived restorativeness. Gråbrødre Torv and Rosenhaven were identified as the two most restorative SPUGS, highlighting the potential for diverse environments to exhibit similar restorative values. The study contributes valuable insights for the design of SPUGS, emphasizing the importance of 'serene' and 'social' characteristics, even in smaller urban spaces, and suggests that SPUGS may play a distinct role in the overall green city structure compared to larger urban green spaces. The findings provide a foundation for practitioners in designing restorative environments within the constraints of limited size and urban challenges.

Manyani *et al.* (2021) conducted research in South Africa, offering significant insights into how users perceive and interact with public green spaces (PUGS). Most respondents were women (59%), predominantly aged between 18 and 35 (42%), revealing a notable unemployment rate of 46%. Key elements noticed in PUGS included litter, children playing, and livestock, with variations in the prevalence of natural and artificial features between formal and informal PUGS. Visitor accounts highlighted the significant impact of litter on PUGS experiences, and preferences tended toward swings and play equipment, especially in formal settings. Safety emerged as a pivotal consideration in the preferred appearance of PUGS, with openness and formality being favored. Deterrents to PUGS visits included maintenance issues, spatial arrangement concerns, and cultural restrictions, particularly influencing women. These findings underscore how maintenance, safety, and cultural factors play a crucial role in shaping preferences and experiences across diverse demographics and types of PUGS.

2.5 Planning of Green Spaces

To comprehensively gauge the caliber of green spaces, a comprehensive understanding of their provision, utilization, accessibility, functionality, necessity, and desirability is imperative. Consequently, the quality of these spaces is significantly influenced by factors such as their design, planning, upkeep, management, and utilization. It is essential to underscore that the quality of green spaces holds equal importance alongside their quantity. Establishing green spaces represents a crucial stride in enhancing the aesthetics of a locality or public area, which can be achieved through meticulous planning and adept construction methodologies.

2.5.1 Defining the Quality of an Ideal Public Green Space

Williams *et al.* (2020) suggest that an ideal urban green area should possess certain attributes, including cleanliness, safety, ease of access, and tranquility. Similarly, a study conducted by Wright *et al.* (2002) outlined a set of attributes that an ideal urban green space should include. These encompass the presence of leisure facilities, conveniences for comfort (e.g., toilets, seating, and shelter), ease of access, the existence of natural elements (such as wildlife and plants), the presence of personnel, and inclusiveness. Gobster *et al*. (2016) also noted that an urban green space should exhibit traits such as naturalness, cleanliness, safety, aesthetic appeal, accessibility, and appropriateness of development. Henderson (2013) emphasized that community engagement, user satisfaction, equitable access, and safety are crucial elements of a well-maintained urban green space.

The Green Flag Award, which acknowledges green spaces and parks that are generally well-kept and managed, utilizes distinct criteria for evaluation. These criteria include environmental consideration, historical preservation, effective management, cleanliness, community involvement and participation, as well as the visual appeal and attractiveness of each space. Plymouth's Green Space Strategy defines essential aspects for assessing the quality of green spaces, covering elements like ease of access, a friendly environment, community involvement, promotional efforts, aesthetic attractiveness, safety and protection, efficient administration and upkeep, environmental preservation and heritage conservation, sustainability, and design. An examination of literature focusing on green spaces in developing countries reveals that key elements of an ideal green space comprise ease of access, community involvement, safety, and the presence of amenities (Henderson, 2013).

2.5.2 Indicators of an Ideal Green Space

Successful green spaces have a variety of attributes that contribute to their visual appeal and functionality. These qualities encompass sustainability, connectivity, accessibility, inclusivity, and biodiversity. Notable features associated with the effective establishment and management of green spaces include:

- **Sustainability:** Green spaces enhance urban areas by adding to their attractiveness and serving as venues for cultural events and artistic activities. They also boost land values, offer safe pathways, contribute to ecological functions like flood protection and sustainable drainage, create microclimates, aid in air purification, and promote biodiversity.

- **Connectivity and Accessibility:** The design of these areas should smoothly blend with the adjacent street plan and incorporate entry points at significant junctions. The design should promote the establishment of cohesive, safe, and attractive routes that link to the network of green spaces. These routes should encourage individuals to commute to school or work and access services without using motorized modes of transportation.
- **Inclusiveness and Community Involvement:** Parks and green areas should function as resources accessible to a wide and diverse demographic, including individuals of various genders, ages, and backgrounds. These areas should promote social inclusivity and accommodate a range of activities. It is important that all individuals feel comfortable within these spaces, with no one group dominating.
- **Biodiversity:** Establishing a range of green areas helps achieve conservation goals, as each space offers a unique habitat for various species. The success or decline of these habitats is often linked to the level of management and intervention. For example, flourishing or declining biodiversity may be related to the extent of human involvement in these areas.

2.6 Legal and Institutional Framework for Urban Green Spaces in Kenya

The legal and institutional framework relevant to urban green spaces is of paramount importance as it provides the foundation for their planning, protection, management, and sustainable development.

2.6.1 Legal Framework

Legislation in Kenya pertaining to green spaces and their significance encompasses a range of key aspects, each playing a vital role in safeguarding these essential urban and rural sanctuaries. The Environmental Management and Coordination Act serves as the bedrock of environmental conservation and management in Kenya. While not directly targeting green spaces, it establishes the legal framework that underpins all environmental protection efforts, indirectly encompassing green areas within its scope. This act is particularly relevant because green spaces are integral to environmental conservation and the preservation of biodiversity. It ensures that activities surrounding green spaces adhere to rigorous environmental standards, fostering a harmonious coexistence between human settlements and nature (GoK, 2012).

The Physical Planning Act of 2019 takes center stage in regulating physical planning and land use throughout the country. It intricately addresses land allocation, development, and

safeguarding, explicitly acknowledging the significance of green spaces. By providing guidelines for the allocation of land within both urban and rural landscapes, it effectively endorses the role of green spaces in urban planning. These verdant pockets not only enhance the quality of life for residents but also contribute to the sustainable and ecologically responsible development of Kenya's urban areas (GoK, 2019).

The Urban Areas and Cities Act of 2011 is designed to oversee the planning, development, and management of urban areas and cities in Kenya. This legislation carries specific provisions related to public spaces, including green areas. It keenly recognizes the pivotal role played by green spaces in urban life, from facilitating recreation to fostering environmental sustainability. Moreover, the Act places the responsibility on local authorities to allocate and maintain green spaces within urban centers, ensuring that these vital components of urban living receive the attention they deserve (GoK, 2019).

The County Government Act acknowledge that Kenya's counties may enact their own by-laws and regulations concerning green spaces. These local laws, although subject to regional variation, typically address key issues such as the establishment, management, and utilization of parks and green areas within a specific county. County-specific regulations are crucial because they enable the tailoring of green space policies to match the unique needs, characteristics, and aspirations of each region. They empower local governance and management of green spaces, ensuring that they serve as meaningful assets to their respective communities (GoK, 2013).

The National Land Policy of 2009, while not a legislative Act, is a policy document that plays a pivotal role in emphasizing the importance of green spaces and public amenities within the broader context of urban planning and land use in Kenya. It recognizes green spaces as integral components of urban development, promoting sustainable land utilization and the creation of high-quality living environments (GoK, 2009). The National Environment Policy of 2013 underscores Kenya's unwavering commitment to sustainable environmental management, which inherently includes the safeguarding and preservation of green spaces. It explicitly acknowledges the multifaceted role played by these spaces in maintaining ecological equilibrium, nurturing biodiversity, and cultivating a healthful living environment (GoK, 2013).

Lastly, the Community Land Act of 2016 primarily concerns itself with the ownership and management of community land, which may encompass communal green spaces and natural resources. This act assumes significance in instances where communities exercise traditional or communal stewardship over green spaces. It provides a legal framework for the responsible management and utilization of these shared resources, ensuring that they continue to benefit local communities while maintaining their ecological integrity (GOK, 2016).

In conclusion, Kenya's legal landscape is rich with legislation and policies that underscore the profound importance of green spaces. These laws, ranging from national to county levels, not only safeguard these areas but also recognize their pivotal role in environmental conservation, urban planning, and community well-being. By embracing and implementing these legal provisions, Kenya stands to foster a more harmonious and sustainable coexistence between its urban and rural areas and the natural world.

2.6.2 Institutional Framework

The institutional framework in Kenya, particularly in Nairobi, pertaining to green spaces is crucial for the management, protection, and promotion of these areas within urban and rural settings. The National Environmental Management Authority (NEMA) plays a central role in environmental conservation and management at the national level. While not exclusively focused on green spaces, its regulatory oversight ensures that any activities, developments, or projects in and around green spaces adhere to environmental standards. NEMA's role is vital in safeguarding the ecological integrity of these areas. On the city scale, the Nairobi City County Government is directly responsible for planning, land allocation, including managing green spaces in the city. It oversees the allocation of land for parks, gardens, and recreational areas, ensuring that green spaces are integrated into the city's urban planning for the benefit of its residents.

The National Government Ministry of Environment, Climate Change and Forestry is responsible for environmental and forestry matters and plays a critical role in setting policies and guidelines related to green spaces. It collaborates with county governments to ensure that green spaces are protected, developed, and preserved in line with national environmental objectives. The National Land Commission (NLC) oversees land management, allocation, and use at the national level. It ensures that land designated for green spaces is protected from

illegal land grabs or unauthorized developments, preserving these areas for their intended purposes.

The Kenya Forest Service (KFS), while primarily focused on forests, plays a role in managing and protecting urban forests and green belts within Nairobi. These green spaces contribute to urban biodiversity and provide essential ecosystem services. Numerous NGOs and CBOs in Kenya, including those operating in Nairobi, are dedicated to environmental conservation and the preservation of green spaces. They often collaborate with government institutions to organize clean-up activities, tree planting, and community engagement in green space maintenance. Lastly, Research and academic institutions conduct studies and research on green spaces. They provide valuable data and recommendations for improving the management and relevance of these areas.

2.7 Gaps Emanating from Literature Review

Most research studies concerning guidelines and allocations for green space in cities, particularly in developing nations such as African countries, are quite limited. It can be argued that while there has been a rise in studies focusing on the quantitative expansion of green spaces, there has been minimal attention given to assessing the quality of urban green spaces (Feltynowski *et al*., 2018; Kabisch *et al.*, 2015).

Existing literature that promotes strategies like densification and urban compactness tends to overlook the challenges associated with urban green spaces (Byrne *et al.*, 2010). It is imperative that we conduct a more thorough examination, evaluation, and discourse on the impacts of urban densification on green spaces and explore potential mitigation measures. Instead of neglecting or exacerbating these challenges, we should endeavor to address them. Such an analysis should not only revisit the discussion on quantitative standards for public green spaces but also consider qualitative objectives as part of the solution towards green space planning and the creation of compact cities in the pursuit of sustainable development.

Van de Voorde (2017), employing a descriptive cross-sectional research approach, reveals that parks significantly contribute to promoting socio-economic advancement of Kisumu City. However, it should be noted that the study lacks a specific emphasis on user satisfaction and the overall park experience. Gacihi (2014), utilizing a non-experimental research approach, highlights the limited usage of Christina Wangari Park in Thika. Notably, the study does not

center on the engagement of the community in park design and administration. Muiruri (1990), in a mixed-method study, found that parks are utilized for both active and passive recreational pursuits, despite the absence of essential recreational amenities. However, worth mentioning, the study did not prioritize the evaluation of user satisfaction and the overall park experience.

In contrast to most research studies that tend to overlook community participation in the design and planning of urban green spaces, this study addresses a critical gap by placing a specific emphasis on assessing user satisfaction and the overall park experience. Existing studies, particularly those focusing on the quantitative expansion of green spaces, have lacked a comprehensive evaluation of the quality of these spaces. Furthermore, while existing literature advocating for strategies such as densification and urban compactness tend to overlook the challenges faced by urban green spaces. This study aims to conduct a more comprehensive examination of user perceptions and implications associated with these challenges. Additionally, the research endeavors to model an ideal green space by incorporating user feedback, insights from global case studies, and expertise from relevant professionals.

2.8 Theoretical Framework

This study adopts the green urbanism theory as its theoretical framework. Green urbanism by Lehmann (2010) serves as a guiding principle for policies and initiatives aimed at the development of new urban areas while preserving the urban natural setting. It advocates for the inclusion and safeguarding of urban green spaces within the urban setting. Siikamäki & Wernstedt (2008) define green urbanism as the act of establishing communities that are advantageous for both humans and the natural environment. To deconstruct this concept, it is important to note that "green" signifies a favorable and healthy environment, whereas "urbanism" pertains to the art and practice of establishing new urban areas. In accordance with Karlenzig (2011), the concept of green urbanism began to take shape starting in the latter part of the 1980s in a few American cities, but received significant recognition during the 1990s as numerous cities worldwide began adopting its principles.

Green urbanism encompasses the implementation of eco-friendly building principles, procedures, and technologies at neighborhood scale, effectively connecting buildings, infrastructure, and natural systems (Newman, 2010). The primary objectives of green urbanism revolve around creating cities that promote and facilitate more sustainable and health-conscious lifestyles. These cities are designed to function in harmony with nature, aiming to operate

within their ecological limits. A key aspect of achieving these objectives is the preservation of natural urban vegetation and green cover. As such, it is strongly recommended to incorporate additional urban green spaces like trees, parks, gardens, forests, and green roofs into the urban areas landscape to mitigate issues such as urban heat islands and other environmental challenges (Lehmann, 2010; Beatley, 2012). Therefore, green urbanism advocates for the incorporation of green spaces into a city's environment to safeguard the urban natural surroundings.

Green urbanism as the theoretical framework in this study focuses on creating sustainable and environmentally friendly urban environments while prioritizing the integration and enhancement of green spaces within cities. This concept is driven by the recognition of the numerous benefits that urban green spaces offer, including improved quality of life, environmental sustainability, and overall well-being for urban residents. The salient features of green urbanism, in relation to green spaces, include:

- **Sustainable development**: Green urbanism places a strong emphasis on sustainable development practices within urban areas. It advocates for the responsible use of resources, reduced environmental impact, and the promotion of practices that ensure long-term ecological balance.
- **Integration of nature**: At its core, green urbanism seeks to seamlessly integrate nature into the urban fabric. This includes the creation and preservation of green spaces, such as parks, gardens, and green corridors, within the urban landscape. These spaces not only provide recreational opportunities but also enhance biodiversity and air quality.
- **Human well-being**: A central tenet of green urbanism is the prioritization of human well-being. It recognizes that access to green spaces contributes to physical and mental health. Urban green spaces offer areas for relaxation, exercise, and social interaction, reducing stress and improving overall quality of life.
- **Climate resilience**: The framework of green urbanism acknowledges the role of urban green spaces in enhancing climate resilience. Trees and vegetation within cities help regulate temperatures, reduce the urban heat island effect, and mitigate the impacts of climate change.
- **Biodiversity conservation**: Green urbanism actively supports biodiversity conservation efforts within cities. It recognizes that urban green spaces can serve as habitats for various flora and fauna, contributing to urban biodiversity.

- **Social equity**: An important aspect of green urbanism is ensuring that access to green spaces is equitable. This means that green spaces should be distributed across different neighborhoods and accessible to all residents, regardless of socioeconomic status.
- **Economic benefits**: Green urbanism acknowledges the economic benefits of green spaces. Well-designed urban green spaces can increase property values, attract tourism, and stimulate local economies through activities such as farmers' markets and outdoor events.
- **Urban planning and design**: Green urbanism guides urban planning and design principles to incorporate green spaces from the outset of development. It encourages mixed land uses, compact urban forms, and the preservation of natural features.
- **Environmental education**: Green urbanism promotes environmental education and awareness within urban communities to promote stewardship and care of urban green spaces.

In conclusion, green urbanism is a theoretical framework that emphasizes the importance of urban green spaces as integral components of sustainable, healthy, and resilient cities. It calls for the thoughtful planning, design, and management of green spaces to create urban environments that benefit both people and the planet. By integrating nature into urban landscapes, green urbanism seeks to address contemporary urban challenges while enhancing the overall urban experience.

2.9 Conceptual framework

In the context of this study, we examine two fundamental elements: the dependent variable, which is user perception, and the independent variable, represented by green space (Figure 2:1). User perception encompasses the subjective viewpoints, attitudes, and opinions held by individuals concerning green spaces situated within urban settings. This encompasses how users evaluate aspects such as the quality, quantity, accessibility, and their overall experience within these green spaces. Conversely, the independent variable, green space, serves as the cornerstone of this study. It embodies the physical presence and attributes of urban green areas, including parks, gardens, and recreational spaces.

It is essential to acknowledge the dynamic nature of green space as the independent variable, subject to the influence of socio-demographic factors. These factors encompass a wide range of characteristics, including age, income, education, and cultural background. These elements play a significant role in shaping how individuals interact with, and utilize, urban green spaces.

Preferences and behaviors regarding these spaces can significantly differ among diverse demographic groups.

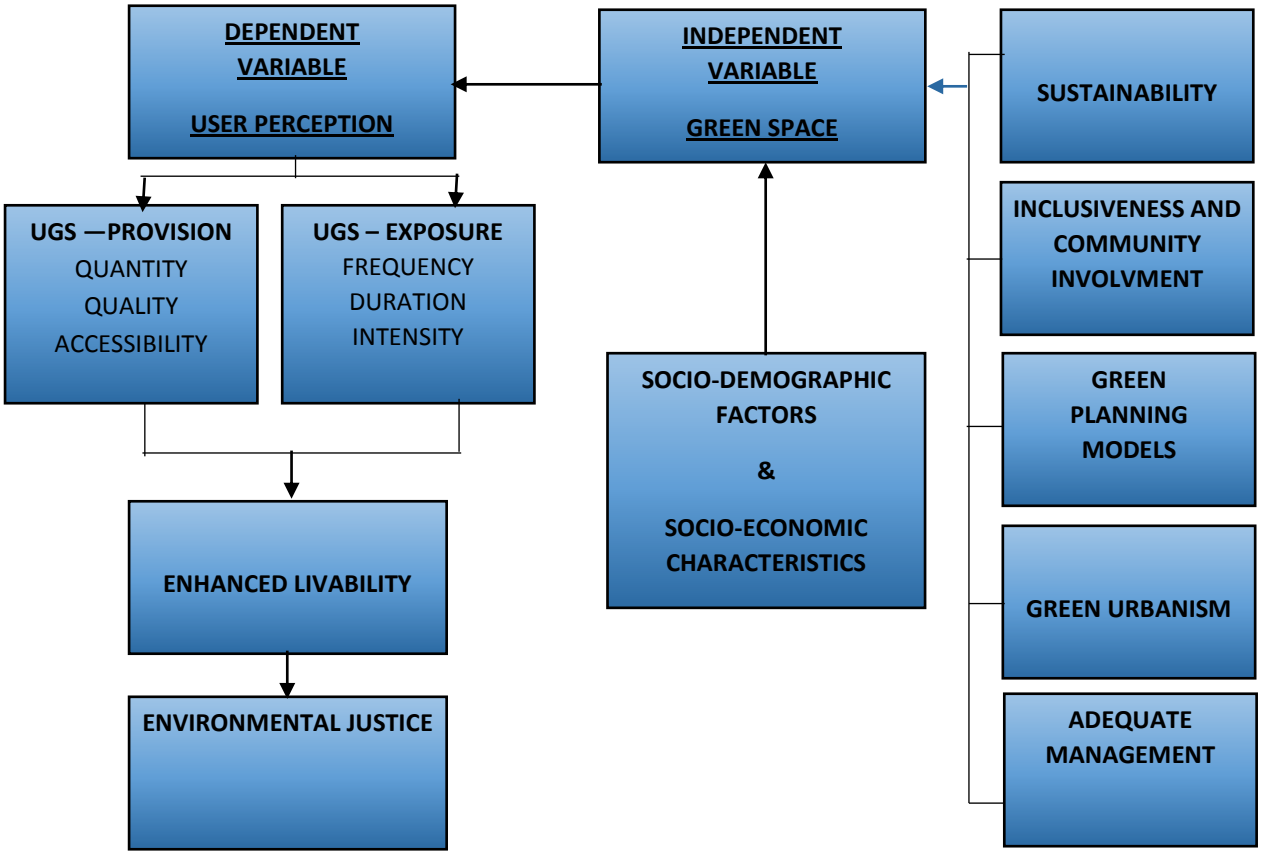


Figure 0:1 Conceptual framework of the study
Source: Field Survey; 2019

Furthermore, we must consider the influence of sustainability models in the study. These models encompass various factors such as active inclusiveness, community participation, the adoption of green urbanism planning models, and comprehensive management strategies. They directly impact the development, maintenance, and integration of green spaces within urban landscapes. These models dictate the design and accessibility of these spaces, which, in turn, influences how appealing they are to users.

The interplay between these socio-demographic factors and sustainability models collectively exerts an influence on the user perception of park users. For instance, individuals from various socio-demographic backgrounds may harbor different expectations and preferences concerning green spaces, influenced by cultural or economic factors. This, in turn, has an impact on how individuals perceive urban green space provision. Their evaluation encompasses aspects such

as the quantity of green space available, its quality in terms of amenities and aesthetics, as well as its accessibility and integration into their daily lives. The interrelationship between socio-demographics and sustainability models plays a crucial role in shaping these perceptions. Additionally, user perception extends to urban green space exposure. This dimension encompasses the frequency of visits to these spaces, the duration of these visits, and the intensity of engagement with them. For instance, some individuals may use green spaces daily for physical exercise, while others may visit less frequently for relaxation and leisure.

Ultimately, the cumulative impact of these factors culminates in enhanced livability within urban areas. Communities that benefit from well-planned, accessible, and meticulously maintained green spaces tend to enjoy an improved quality of life. Moreover, achieving environmental justice entails ensuring that all residents, irrespective of their socio-demographic profile, have equal access to and derive equitable benefits from these green spaces.

In summary, this research framework intricately illustrates the multifaceted relationship between user perception (the dependent variable), green space (the independent variable), socio-demographic factors, sustainability models, and their combined influence on various aspects of urban green space provision, exposure, enhanced livability, and environmental justice. An in-depth understanding of these dynamics is imperative for making informed decisions in the realms of urban planning and policy development.

CHAPTER THREE: STUDY AREA AND RESEARCH METHODOLOGY

3.1 Introduction

In this chapter, we delineate the research methodology employed to fulfill the study's goals. This encompasses details about the study area, research design, target population, sample size, sampling procedure, data collection techniques, methods for analyzing data, reliability and validity assessment of research instruments, as well as the operationalization of variables.

3.2 Study Area

3.2.1 Locational Characteristics

Figure 3:1 shows the study area, Nairobi City County, including the two study sites: Jevanjee Gardens and Nairobi Arboretum. Nairobi shares its borders with Kiambu County to the North and West, Kajiado to the South, and Machakos to the East. It encompasses an area of 696.1 square kilometers, situated between longitudes 36° 45' East and latitudes 1° 18' South, with an approximate elevation of 1,798 meters above sea level (Nairobi CIDP, 2023).

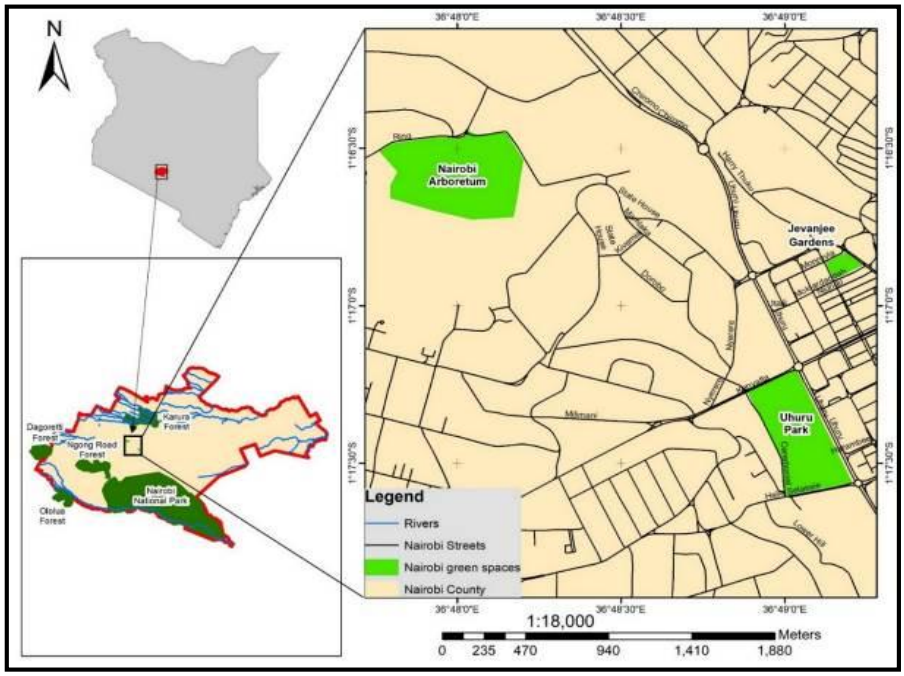


Figure 0:1 The Study Area
Source: Field Survey, 2019

3.2.2 Physical Characteristics

Nairobi is known for its high elevation. The city is situated on the Nairobi Plateau, which has an average elevation of around 1,795 meters (5,889 feet) above sea level. This elevation gives Nairobi a mild and temperate climate compared to many other African cities. Nairobi is surrounded by several hills and ridges, which add to its scenic beauty and geographical diversity. Notable hills include Ngong Hills to the southwest and Karen Hills to the west (Nairobi CIDP, 2023). Nairobi is traversed by several major rivers, such as the Nairobi River, Ngong River, and Kabuthi River, all of which join the larger River Athi on the county's eastern boundary. Prominent water reservoirs in the county encompass the Nairobi Dam, situated along the Ngong River, and the Jamhuri Dam.

Nairobi predominantly contains black cotton and red soils, which are unevenly distributed in various regions. Within Nairobi's limits, three major forests can be identified: Ngong forest located in the southern part, Karura forest in the northern region, and the Nairobi Arboretum. Together, these three forests encompass a total area of 23.19 square kilometers (Nairobi CIDP, 2023). In addition, Nairobi comprises terrestrial environments that support a wide variety of biodiversity and ecosystems. It serves as a habitat for around 100 mammal species, 527 bird species, and a diverse range of plant species (Nairobi CIDP, 2023).

Nairobi's high elevation has a significant impact on its climate, including temperature, rainfall, and humidity. Nairobi experiences relatively mild temperatures throughout the year due to its elevation. The city has a temperate climate with temperatures that are generally cooler than what is typical for its equatorial location. Average daytime temperatures range from 20°C to 26°C (68°F to 79°F) year-round. Evenings can be cooler, especially during the dry season, with temperatures occasionally dropping to around 10°C (50°F) (Nairobi CIDP, 2023).

Nairobi receives a significant amount of rainfall during the rainy seasons, with the long rains being heavier than the short rains. Annual precipitation averages around 800-900 millimeters (31-35 inches), and most of it falls during the rainy months. Nairobi experiences two well-defined rainy periods as well as two dry periods during the year. The extended rainy season typically spans from March to May, whereas the shorter rainy season takes place from October to December. The dry intervals are observed in January to February and from June to September. Nairobi enjoys plenty of sunshine, especially during the dry seasons. It can be quite sunny, with clear skies and minimal cloud cover, making it an appealing destination for outdoor

activities. Nairobi's humidity levels are relatively moderate, and the city is not as humid as coastal areas in Kenya. However, humidity levels may increase during the rainy seasons (Nairobi CIDP, 2023).

3.2.3 Population Dynamics

Based on the Kenya Population and Housing Census of 2019, Nairobi City County had a population of 4,397,073 residents (KNBS, 2019). Within this population, 2,192,452 (49.9%) were male, and 2,204,376 (50.1%) were female. Nairobi has 1,506,888 households, with an average household size of 2.9 persons, and a population density of 6,273 persons per square kilometer (Nairobi CIDP, 2023). Notably, the sub-counties of Mathare, Kamukunji, and Makadara emerge as the top three most densely populated areas. As the total population of Nairobi City County grows over the years (see Table 3:1), there will be an increased demand for green spaces, recreational areas, parks, and open spaces for residents to relax and enjoy nature.

Table 0:1 Population Projections (by Sub-County)

	2019	2022	2025	2027
	Total Population	**Total Population**	**Total Population**	**Total Population**
Nairobi City	**4,397,073**	**4,671,906**	**4,906,355**	**5,049,701**
Westlands	308,854	328,159	344,626	354,695
Starehe	210,423	223,575	234,795	241,655
Njiru	626,482	665,639	699,043	719,467
Mathare	206,564	219,475	230,489	237,223
Makadara	189,536	201,383	211,489	217,668
Langata	197,489	209,833	220,363	226,801
Kibra	185,777	197,389	207,294	213,351
Kasarani	780,656	829,450	871,074	896,524
Kamukunji	268,276	285,044	299,349	308,094
Embakasi	988,808	1,050,612	1,103,335	1,135,570
Dagoretti	434,208	461,348	484,499	498,655

Source: (Nairobi County Integrated Development Plan, 2023)

This will exert pressure on existing green spaces, leading to overcrowding and overuse. This could affect the quality of these spaces and the overall user experience. To cater to the growing population and ensure that there is an adequate ratio of green space per capita, city planners and authorities may need to consider creating new green spaces or expanding existing ones. This is essential to maintain a balance between urban development and access to natural environments. The population growth in Nairobi underscores the importance of effective urban planning and sustainability efforts. Ensuring that green spaces are integrated into the city's

development plans becomes crucial to maintain a high quality of life for residents and preserve the environment.

3.2.4 Land Use

The land use structure in Nairobi is dynamic, with ongoing urbanization and development efforts aimed at improving infrastructure, housing, and services across the city. It is important to note that land use patterns may change over time due to urban planning initiatives and population growth. The city's land use can be categorized into several key sectors as illustrated in Table 3:2 and Figure 3:2. The major land uses in Nairobi are:

- **Industrial and Manufacturing Zones:** Nairobi has industrial areas like Industrial Area and Dandora, which house various manufacturing and processing industries.
- **Educational and Institutional Areas:** Nairobi is home to numerous universities, colleges, and schools, resulting in educational and institutional zones. These areas include sections of Karen and Kileleshwa.
- **Parks and Green Spaces:** Nairobi is known as the "Green City in the Sun" due to its numerous parks and green spaces. The largest urban park in Africa, Nairobi National Park, is located just outside the city centre.
- **Commercial and Retail Zones:** The Nairobi CBD is the city's primary commercial and financial centre. It hosts numerous office buildings, government institutions, financial institutions, hotels, and retail establishments. In addition to the CBD, commercial and retail areas can be found in various parts of the city, including Westlands, Ngong Road, and the Thika Road Mall area.

Table 0:2 Nairobi Land Uses

Land use Type	Area (Km^2)	Cover (%)
• Open lands	198.8	28.55
• Residential areas	175.6	25.22
• Others (including protected areas)	153.6	22.06
• Urban agriculture	96.8	13.9
• Industrial/commercial/service centers	31.8	4.57
• Infrastructure	15.9	2.28
• Recreation	12	1.72
• Water bodies and riverine areas	11	1.69
Total	**696.3**	**100**

Source: (NIUPLAN, 2014)

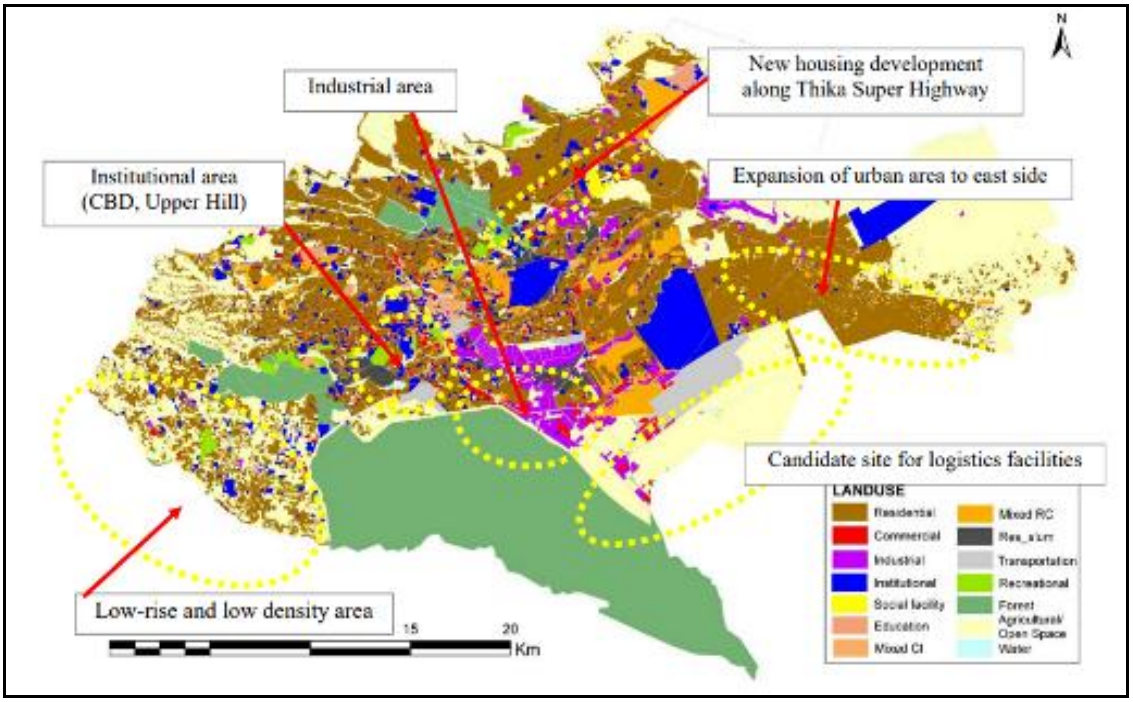


Figure 0:2 Land use Map of Nairobi City County
Source: (NIUPLAN, 2014)

3.2.5 Residential Neighborhoods

The residential landscape of Nairobi is notably diverse, encompassing a spectrum of neighborhoods tailored to accommodate various income groups. At the uppermost stratum, high-income residential areas, exemplified by locales such as Karen, Runda, Muthaiga, Lavington, Gigiri, and Rosslyn, are renowned for their expansive and opulent residences, which are primarily inhabited by diplomats, expatriates, and the more affluent segment of the Kenyan populace. These neighborhoods are characterized by luxurious mansions and estates, creating an exclusive enclave within the city. Progressing to the middle-income bracket, areas such as Westlands, Kilimani, Parklands, Kileleshwa, Lang'ata, Loresho, Spring Valley, and Upper Hill offer a diverse array of housing options, including single-family homes, townhouses, and apartment complexes. This segment of the city caters to the vibrant middle-class demographic, providing a variety of housing choices to meet their diverse preferences and needs.

For the low-income residential areas within Nairobi, which encompass Eastleigh, Githurai, Dandora, Kayole, Huruma, Pangani, Kariobangi, Mathare, Kawangware, Umoja, Zimmerman, and specific sections of Embakasi, present a viable choice. These localities are acknowledged for their cost-effective housing solutions, although they may grapple with challenges pertaining to infrastructure and access to essential services, reflecting the multifaceted nature of the city's

residential landscape. In addition to these income-stratified residential areas, Nairobi is also home to several informal settlements, colloquially referred to as slums. These include Kibera, Mathare, Korogocho, Kangemi, Kawangware, Mukuru, Huruma, Dandora, and Baba Dogo. These settlements are characterized by high population densities, modest housing structures, and a frequent lack of access to basic services. They serve as a testament to the resilience and vibrancy of Nairobi's less privileged communities.

3.2.6 The Study Sites

Jevanjee Gardens, the 5-acre park, was a generous gift from Alibhai Mulla Jevanjee to the people of Nairobi back in 1906. It remains one of the few remaining green oases in the city. Over the years, plans were proposed in 1991 and 2007 by the city council and its partners to develop the park, including the construction of multi-story parking lots, bus stations, markets, theatres, and shopping centres. However, each time, these plans were met with opposition, led by Zarina Patel (the granddaughter of Jeevanjee) and the late Professor Wangari Maathai. This park is open to the public, safeguarded under county and national recreation area regulations. It offers amenities such as a designated smoking area, a shop, two public restrooms, and concrete benches. Situated at the heart of Nairobi's Central Business District, Jevanjee Garden is bordered by Moi Avenue, Muindi Mbingu Street, Monrovia Street, and Mortar Daddah Street.

Conversely, Nairobi Arboretum is situated on State House Road within the Kileleshwa area of Nairobi. Its origins trace back to 1907 when it was established by Mr. Batiscombe as an experimental site for forestry trees. In 1932, the government designated it as a national reserve, and in 1996, the Commissioner of Lands officially granted the government a title deed for the area. Presently, the Kenyan Forestry Department is responsible for its management. The Nairobi Arboretum offers numerous earth-track trails for visitors to explore. It is renowned for its diverse array of flora and fauna, boasting an impressive collection of trees sourced from Kenya, East Africa, and beyond. Notably, Arboretum is home to the oldest tree, which was planted in 1907. Many of these trees are adorned with markings, with some signs dating back to the early years of the Nairobi Arboretum, intricately engraved onto metal plates.

Both parks offer different perspectives on urban green spaces, with Jevanjee Gardens representing a central urban park that has faced development pressures, and Nairobi Arboretum showcasing a green space that focuses on biodiversity and ecological conservation. They serve

as case studies that can help in assessing the characteristics of urban green spaces, public perceptions, and the challenges faced by such spaces in Nairobi. The different features and management of these parks can provide valuable insights into the dynamics of urban green spaces and the role they play in a rapidly urbanizing city like Nairobi. Comparing and contrasting these two parks allows for a more comprehensive understanding of the issues and benefits associated with urban green spaces in the context of Nairobi City County.

3.3 Research Methodology

3.3.1 Research Design

This study employed a case study design using mixed data collection methods. It combined both qualitative and quantitative data collection methods, alongside GIS techniques, to evaluate the state of urban green spaces within Nairobi City County. This was to effectively address the research questions, acknowledging that some inquiries are better suited for quantitative analysis, while others benefit from qualitative exploration. The case study design was employed to assess levels of satisfaction, perspectives, and perceptions regarding green spaces in Nairobi. It is also essential to emphasize that the research was conducted in a natural situs.

3.3.2 Target Population and Unit of Analysis

The focus of this study was individuals who utilize the park. As such, the primary unit of analysis involved urban park users. This approach facilitated the assessment of park users' physical and emotional perceptions in a natural environment, as well as their appreciation for green spaces, primarily based on their sensory responses, including preferences and perceptions.

3.3.3 Sampling Procedure

The study employed purposive sampling to choose the case study area based on its size, location, and accessibility. The park users were chosen using a systematic random sampling method, where every third person was selected entirely by chance, ensuring an equal opportunity for all individuals to be included. Additionally, the research assistants were strategically positioned in quadrants based on aerial maps of the green spaces to ensure comprehensive coverage and representation in the sampling process. This method provided a naturally accurate representation of the diverse demographics in the population. Research assistants were instructed to conduct interviews continuously for a duration of two weeks, encompassing both weekdays and weekends, throughout the entire day.

There is a lack of information about the park users' population in terms of census, enrollment, or admissions. Consequently, the sample size was determined using Creative Research Systems (CRS) (2009) software. The Creative Research Systems (2009) software applies the following formula to calculate the sample size:

$$S = \frac{Z^2 \times p \times (1-p)}{c^2}$$

In this formula, the sample size (S) represents the number of park users in the study across the two parks. The Z-value (1.96 for a 90% confidence level), the proportion of respondents choosing a specific option (p, expressed as 0.5), and the confidence interval (c, expressed as 0.09) were used to calculate it.

$$\frac{1.64^2 \times 0.5\ (1 - 0.5)}{0.09^2} = 83$$

The selection of a sample size of 80 park users was deliberate, aiming to accommodate potential non-responses and ensure statistical robustness in subsequent data analysis. This total sample size was then evenly distributed, with 40 park users surveyed in each of the two parks. The assumption of an equal number of visitors per park, per month, was not arbitrary; rather, it was grounded in available data obtained from county offices and authoritative sources overseeing park management. The decision to allocate 40 respondents to each park was informed by a balanced representation strategy, considering factors such as park size, usage patterns, and the need for comparative analysis. This was further guided by statistical considerations, ensuring that it was of sufficient magnitude to yield meaningful insights into user perceptions and experiences while also maintaining feasibility within the scope of the research.

Additionally, the key informants, including two park managers and one city planner, were purposefully identified. The key informants played a crucial role in providing valuable insights and perspectives related to the green spaces under investigation. The park managers possessed in-depth knowledge about the day-to-day operations, management strategies, and challenges faced within their respective parks. The inclusion of a city planner as a key informant added another layer of expertise to the study. City planners are responsible for urban development and land use planning, and their insights offer a broader perspective into policies, regulations, and planning strategies that influence the design, allocation, and maintenance of green spaces within the city.

3.3.4 Sources and Methods of Data Collection

The research objectives determined the primary and secondary data requirements. Primary data encompassed socio-demographic details, spatial information, environmental aspects of green spaces, and levels of satisfaction. Secondary data was gathered from a range of sources, including government documents, research articles, books, newspapers, reports from institutions, research theses, and statistical information. Additionally, cadastral maps from the Survey of Kenya, satellite images from Google Earth, and national policy documents were consulted to gain insights into the government's directives and plans related to urban green areas and spatial planning.

Table 3:3 gives a summary of the study's data needs and sources. Each research objective is accompanied by a set of specific data needs that are tailored to help achieve these goals. For the first objective, data needs encompass categories like the classification of green space types, their functions, attributes such as size and location, utilization patterns, and associated benefits. The second objective dives into profiling the users of these green spaces. It focuses on demographic data such as age, gender, education, employment, income, and residential information. The third objective delves into data pertaining to the users' behaviors, values, satisfaction levels, exposure rates, and any patterns of misuse or underuse. The fourth objective's data needs revolve around planning policy standards, green space organization, established standards, and the desired characteristics as envisioned by the community.

Table 0:3 Data Needs and Sources for the study

Objectives	Data Needs	Data Sources	Data Collection Methods
Characteristics of public green spaces	Types, functions, characteristics or attributes, uses, and benefits of green spaces	Park users. Key informants	Observation; Interviews; Photography; User survey; ArcGIS-mapping
Socio-economic characteristics of public green spaces users	Demographic characteristics (age, gender, level of education, employment status and level of income); Residential characteristics (tenancy)	Park users	Observation; Interviews Photography; User survey
User's perceptions and experiences of public green spaces	Usage patterns; Values of GS; User satisfaction of attributes of GS utilities; User satisfaction with the quality of GS management, size, design; GS exposure frequency; GS	Park users	User survey

	exposure duration; GS exposure intensity; Misuse and disuse patterns of GS		
Modelling an ideal public green space	Planning policy standards on open and green spaces; GS organization Standards; Ideal GS features and characteristics	Google Earth/Satellite imagery; Key informants; Expert Knowledge	Literature review; User survey; Interviews; Photography; Observation; Mapping Synthesis of findings and expert knowledge

Source: Field Survey; 2019

In terms of data sources, the study taps into a wide spectrum of resources, including secondary sources like past research, journals, and publications, as well as the wealth of information available through Google Earth/Satellite imagery. Moreover, the perspectives and insights of key informants and experts in the field contribute to a deeper understanding of the subject matter. The data collection methods employed align with the specific data needs and include desktop reviews, on-site observations, interviews with both experts and users, photographic documentation, user surveys, and Geographic Information System (GIS) mapping. These methods are carefully selected to ensure a comprehensive and multifaceted examination of public green spaces, drawing data from various sources, and employing a variety of techniques.

The park users survey was conducted during specific times of the day, encompassing both morning hours (9am-12pm) and afternoon hours (2pm-5pm)., covering weekdays and weekends. This comprehensive approach was aimed at securing a highly accurate and representative sample of park users. In addition, Participatory GIS (PGIS) was employed to investigate the patterns and varieties of values and activities among park users. The data collection process involved the utilization of the Epicollect 5 application, an Android application designed to capture GPS point coordinates. Subsequently, these coordinates were exported to ArcGIS to create illustrative and visual representations of the data captures. On the other hand, key informant interviews were done with park managers, urban planners, and policymakers in Nairobi City County. Lastly, field observations were done using observation checklists and photography.

3.3.5 Techniques of Data Analysis and Presentation

The study used both quantitative and qualitative data analysis techniques. Statistical Package for Social Science (SPSS) software was used to generate frequency distribution tables and figures. User perceptions and experiences was analyzed using a Likert scale to gauge user

satisfaction with different green space attributes. Cross-tabulation was carried out to identify connections between demographic characteristics and individuals' perceptions and values concerning green spaces, leading to derived conclusions and recommendations for the design of an ideal green space. Descriptive statistics, such as mean values and standard deviations, were calculated for each attribute to provide a quantitative measure of respondents' satisfaction levels. The Likert scale, ranging from 1=Very unsatisfied to 5=Very satisfied, was used to collect user responses. Mean values were then interpreted to categorize satisfaction levels. Specifically: Mean values between 1.000 and 1.499 indicated very unsatisfied. Mean values between 1.500 and 2.499 indicated unsatisfied. Mean values between 2.500 and 3.499 indicated neutral. Mean values between 3.500 and 4.499 indicated satisfaction. Mean values between 4.500 and 5.000 indicated very satisfied.

This analysis allowed for a nuanced understanding of user perceptions by providing a quantitative measure of satisfaction for each attribute. It offered a systematic approach to interpreting the collected data and categorizing respondents' opinions on the adequacy and condition of various features in Jevanjee Gardens and Nairobi Arboretum. The results gave a comprehensive overview of how users perceived different aspects of the green spaces, contributing to the broader understanding of user experiences and satisfaction in urban parks.

Additionally, qualitative data analysis was illustrated using maps, blueprints, sketches, visual aids, and photographs. The data obtained from the Participatory GIS (PGIS) mapping informed the design and structure of an optimal green space, and the insights from sketches and photographs were utilized to depict the data discussed during the descriptive analysis. The participants were encouraged to designate locations of personal significance, ranging from favorite spots and cultural sites to areas associated with specific activities. To capture the spatial dimensions of these marked locations, GPS coordinates were recorded for data collection. This geospatial information was instrumental in constructing a comprehensive map illustrating the distribution of values and activities throughout the parks.

In conjunction with the mapping activities, qualitative data was gathered through interviews and discussions with participants. These interactions delved into the underlying reasons for attributing certain values to specific locations and provided insights into the nature of activities taking place in these areas. The spatial data acquired through Participatory GIS (PGIS) was subsequently integrated with other relevant datasets, offering a holistic perspective on the spatial patterns of values and activities within the parks.

3.3.6 Hypothesis Testing

By employing the chi-squared (χ^2) test of independence, the study successfully conducted hypothesis testing to explore the potential link between socio-economic characteristics, awareness, and perceived value of green spaces, with public green space frequency, respectively. For socio-economic attributes, separate contingency tables were created for gender, age, marital status, education level, employment status, and individual income earnings of the park users. Likewise, there were two contingency tables for awareness and perceived value: one for "Aware of green space benefits" and one for "Do green spaces meet user needs".

3.4 Reliability and Validity of Data Collection Instruments

A pilot study (at Jevanjee Gardens) was executed prior to the main data collection, although it was subsequently excluded from the primary data collection for the study. This was aimed to uncover any unanticipated issues that may have arisen during the development of the field survey tools. Given that the study incorporated technology for data collection, a dedicated day was allocated for training the research assistants, familiarizing them with the software and various commands in use. The pilot study facilitated an assessment of the validity and reliability of the research tools, ascertaining the duration of the interviews and question clarity.

3.5 Ethical Considerations

A research permit was secured from the National Council of Science, Technology and Innovation (NACOSTI). Prior to commencing data collection, explicit consent for participation was obtained, and the confidentiality of provided information was assured to all respondents. Participants were informed that their involvement was entirely voluntary, and they had the liberty to withdraw at any stage of data collection. To establish trust, an introductory letter from the University was furnished to participants, providing an overview of the survey's purpose and its commitment to preserving confidentiality. Furthermore, a comprehensive introductory message was prominently featured on the survey's first page, reiterating the study's exclusive academic intent.

CHAPTER FOUR: RESULTS AND DISCUSSION

4.1 Introduction

This chapter delves into data analysis, the outcomes of the research, and provides, where applicable discussions drawn from the literature review. The results provided in this chapter are based on each study objective. These are characteristics of public green spaces; characteristics of public green spaces users; user's perceptions and experiences of public green spaces; and modeling an ideal urban public green space.

4.2 Characteristics of Public Green Spaces in Nairobi City

This section examines the various attributes that define public green spaces in Nairobi, shedding light on their size and management structure, biodiversity and landscaping, infrastructure and utilities, accessibility and connectivity, and park entry fees.

4.2.1 Size and Management Structure

Understanding public green spaces and how they are governed is crucial in evaluating their impact on urban landscapes and communities. The management and governance structures of Jevanjee Gardens and Nairobi Arboretum exemplify two distinct approaches to overseeing public green spaces in Nairobi (see Table 4:1). Jevanjee Gardens, 5 acres in size, is owned and managed by the Nairobi City County, while Nairobi Arboretum, 30.4 acres in size, is under the management of Kenya Forest Service and Friends of Nairobi Arboretum (FONA), a Community Forest Association. FONA. Nairobi Arboretum was officially registered in 2009, in compliance with the provisions of the Forests Act 2005. Both management models offer public access, conservation, and community engagement benefits, but they achieve these goals through distinct governance approaches.

The direct management of Jevanjee Gardens by the city county government allows for more centralized decision-making and resource allocation. This can lead to efficient maintenance and development of the park in alignment with the needs and preferences of the local community. In addition, restrictions in the lease agreement also contribute to the long-term preservation of the green space for public use, preventing hasty decisions that might compromise its purpose. On the other hand, the partnership between a government agency (Kenya Forest Service) and a community association (FONA) in the management of Nairobi

Arboretum brings together resources, expertise, and community engagement. This joint effort enhances the arboretum's potential for educational and conservation initiatives. Furthermore, the involvement of a community association leads to greater public participation and a sense of ownership among residents, fostering community attachment and stewardship.

Table 0:1 Size and Management Structure of Jevanjee Gardens and Nairobi Arboretum

	Jevanjee Gardens	Nairobi Arboretum
Size	5 acres	30.4 hectares
Ownership and control	Owned and managed by the Nairobi City County on a 99 years lease commencing January 1932. Management structure is centralized, with decisions made by the county government.	It is managed by a combination of the Kenya Forest Service (a governmental agency) and the Friends of Nairobi Arboretum (FONA) (a Community Forest Association) This reflects a collaborative approach in it is governance
Legal framework	It is governed by a lease agreement that stipulates the terms of use and restrictions on the land.	FONA's establishment and management are under the Forests Act 2005.
Other key attributes	The lease agreement limits Nairobi City County's actions with the land, ensuring its preservation as a public garden and open space.	FONA's involvement signifies community engagement and responsibility in the upkeep of Nairobi Arboretum. Nairobi Arboretum has an educational and conservation-oriented purpose, showcasing diverse trees and supporting research.

Source: Field Survey; 2019

4.2.2 Biodiversity and Landscaping

Public green spaces serve as essential ecosystems, supporting local flora and fauna while promoting biodiversity within the urban environment. Jevanjee Gardens is characterized by exotic trees, shrubs, and ground cover (Photo 4:1). However, the park's lawn often appears dry with noticeable bare patches during the dry seasons. The park's aesthetic is hindered by a significant portion of tree species being deciduous, causing the park to appear lackluster and littered during dry spells. A specific concern has been identified beneath certain trees, such as *Terminalia Mandalay*, where the lawn struggles to thrive. Notably, the strategic use of *Bougainvillea spp* has been employed to craft charming arbors, which have swiftly become favorites among park visitors, often attracting groups.

In contrast, Nairobi Arboretum boasts a sprawling dry forest ecosystem, encompassing over 350 indigenous and exotic tree species, shrubs, and grasses (Photo 4:2) originating from both tropical and global regions, and showcasing botanical diversity. The Nairobi River, that traverses Nairobi Arboretum, enhances the diversity of flora and fauna within Arboretum. Additionally, the riparian zone is ecologically important, hosting a variety of plant species.

Despite its remarkable collection, the arrangement of trees within Arboretum lacks a discernible plan, characterized by a seemingly random juxtaposition of exotics and indigenous species. In addition, there is need for maintenance interventions such as pruning, thinning, and removing hazardous overhanging branches. Regrettably, recent years have seen minimal maintenance work, resulting in the proliferation of weed species like *Lantana* and *Furcraea*, which have encroached on the understory layer, suffocating more delicate species.

Photo 0:1 Trees in Jevanjee Gardens

Photo 0:2 Vegetation in Nairobi Arboretum

Source: Field Survey; 2019

4.2.3 Infrastructure and Utilities

4.2.3.1 Seating Areas, Public Water Taps and Service Stores

Infrastructure and utilities are important in determining usability and sustainability of public green spaces. Jevanjee Gardens and Nairobi Arboretum provide ample seating areas in the form of benches (Photos 4:3 and 4:4). However, both parks lack essential shelters from rain or intense sunshine. This lack of shelter limits the parks' usability during unfavorable weather conditions, potentially discouraging people from enjoying outdoor activities, and impacting negatively on the users' experience, comfort, convenience.

Furthermore, both parks lack public water taps. The inability to access clean drinking water can lead to discouraging park users from spending extended periods in the parks or engaging in physical activities. In addition, despite the presence of service stores (kiosks), both parks are conspicuously devoid of designated food outlets. This deficiency limits users' choices for refreshments and meals, especially those seeking the convenience of on-the-go sustenance, and outdoor culinary diversity that parks can offer.

Photo 0:3 Seating Area in Jevanjee Gardens

Photo 0:4 Seating Area in Nairobi Arboretum

Source: Field Survey; 2019

4.2.3.2 Walkways

Jevanjee Gardens and Nairobi Arboretum have thoughtfully incorporated well-designed walkways that facilitate movement throughout their grounds (Photos 4:5 and 4:6). However, both parks fall short in ensuring equal access and convenience for specific user groups. The absence of ramps, handrails, and tactile indicators creates barriers that hinder mobility and enjoyment of those with limited physical abilities. This contradicts the essential principle of providing equitable and inclusive access to public spaces for all community members. Furthermore, the absence of wider pathways suitable for strollers and the scarcity of designated areas for children to play pose challenges for parents and caregivers with young children.

Photo 0:5 Walkway in Jevanjee Gardens

Photo 0:6 Walkway in Nairobi Arboretum

Source: Field Survey; 2019

4.2.3.3 Toilets

Both parks provide adequate restroom facilities (Photos 4:7 and 4:8). However, these facilities are not appropriate for people with physical disability and those with young children. The

absence of facilities tailored to persons with physical disabilities and those with young children creates an exclusionary environment. The lack of ramps, handrails, and other accommodations can limit those with physical disability to navigate the parks comfortably. Onn the other hand, the lack of baby-friendly amenities, such as diaper-changing stations or private nursing areas, can pose challenges to families with young children.

Photo 0:7 Washrooms in Jevanjee Gardens

Photo 0:8 Washrooms in Nairobi Arboretum

Source: Field Survey; 2019

4.2.3.4 Waste Management

Both parks provide waste bins throughout their premises (Photos 4:9 and 4:10). Whereas Jevanjee Gardens does not have waste segregation (Photo 4:9), Nairobi Arboretum has waste segregation, largely donated by well-wishers (Photo 4:10). The absence of segregated waste management system in Jevanjee Gardens detracts from the parks' waste disposal efficiency and environmental responsibility. This represents a missed opportunity to enhance waste management practices and promote environmental stewardship. Implementing segregated waste bins would improve waste disposal efficiency and align with the parks' responsibility to contribute positively to the surrounding ecosystem and community.

Photo 0:9 Waste Bins in Jevanjee Gardens

Photo 0:10 Chandaria Foundation Waste Segregation Bins in Nairobi Arboretum

Source: Field Survey; 2019

4.2.3.5 Statues

There are three statues in Jevanjee gardens which give the park its unique character and preserve an essential part of Nairobi's history. These are the "Jevanjee" statue (Photo 4:11), the "Queen of Victoria" statue, and the "Birth in the Garden" statue (Photo 4:12). The "Jevanjee" statue is particularly significant because it represents the park's beginnings when Alibhai Mulla Jevanjee generously gave the park to Nairobi. The "Queen of Victoria" statue was revealed on March 17, 1906, with the Duke and Duchess of Connaught present. Before independence, the statue deterred people from taking the land, because doing so would disrespect the British Royal family.

Photo 0:11 "Jevanjee" Statue in Jevanjee Gardens

Photo 0:12 "Birth in the Garden" Statue in Jevanjee Gardens

Source: Field Survey; 2019

4.2.4 Accessibility and Connectivity by Public Transport

Accessibility and connectivity are vital factors in ensuring that public green spaces are inclusive and serve the diverse needs of the city's population. Jevanjee Garden is easily accessible and well-connected via public transport because of its prime location in the Central Business District (CBD). This strategic position enhances accessibility to the park from various parts of Nairobi. Nairobi Arboretum is also easily accessible via public transport, despite the fact it is further away from the CBD. Both Nairobi Arboretum and Jevanjee Gardens make it easy for users to explore the parks through clear signs and directions. At Nairobi Arboretum, well-placed signs and posters give valuable details about different plant species, walking paths, and notable spots. These signs help visitors move around the park comfortably.

4.2.5 Park Entry Fees

Park entry fees can also have a significant impact on access to the parks. Jevanjee Gardens offers free entry, while in Nairobi Arboretum, park users are required to pay an entry fee of Kenya shillings 65 and 27 for adults and children, respectively. Jevanjee Gardens ensures that the park is accessible and inclusive to everyone, regardless of their financial status, while Nairobi Arboretum may exclude some Nairobi residents who cannot afford the entry fees. Free entry encourages more people to visit the park regularly and increases the chances of spontaneous gatherings, picnics, and social interactions among a diverse range of users. Even then, revenue generated from park entry fees may be used for maintenance purposes – leading to better infrastructure and facilities. The challenge for parks like Jevanjee Gardens lies in finding a sustainable funding model that allows them to remain free while ensuring they have the resources to thrive. This might require innovative partnerships, sponsorships, or fundraising efforts.

4.3 Demographic and Socio-economic Characteristics of Public Green Spaces Users in Nairobi City

4.3.1 Demographic Characteristics

This section provides an overview of the demographic characteristics of the park users in terms of gender, age, nationality, educational attainment, marital status, occupation, and monthly income. Understanding how these demographic characteristics intersect with the usage of green spaces, attitudes, values, time spent, and frequency can help urban planners, policymakers, and park managers tailor their strategies to meet the diverse needs and preferences of the community.

4.3.1.1 Gender, Age and Nationality

Gender and age distribution are a significant factor in understanding the preferences and needs of park visitors. Based on the sampled respondents, there were more females visiting the two parks than males. In total, there were 52 females (65%) compared to 28 males (35%). In terms of age, the majority of those who visit the two parks are 18-30 years of age (Table 4:2). Within this specific age demographic, proportions of park users are 52.5%, 50%, and 55% in the overall population, Nairobi Arboretum, and Jevanjee Gardens, correspondingly. This is followed by those aged 31-45 years, also showing a similar pattern in both parks. Very few people aged 61 years and above visit the two parks. In terms of nationality, nearly all (94.75%) of the visits were of Kenyan nationality in both parks (Table 4:3).

Table 0:2 Age Distribution

Age	Nairobi Arboretum			Jevanjee Gardens			General Population	
	F N=40	P %		F N=40	P %		F N=80	P %
18-30	20	50		22	55		42	52.5
31-45	11	27.5		13	32.5		24	30
46-60	6	15		4	10		10	12.5
61-75	2	5		1	2.5		3	3.75
Over 76	1	2.5		0	0		1	1.25

Source: Field Survey; 2019

Table 0:3 Nationality

Nationality	Nairobi Arboretum			Jevanjee Gardens			General Population	
	F N=40	P %		F N=40	P %		F N=80	P %
Cameroonian	0	0		1	2.5		1	1.25
German	2	5		0	0		2	2.5
Kenyan	37	92.5		38	95		75	93.75
Ugandan	1	2.5		1	2.5		2	2.5

Source: Field Survey; 2019

4.3.1.2 Level of Education and Marital Status

Level of education determines personal attitude, decision-making, and understanding of certain social phenomena. Generally, most of the respondents (38.75%) had completed university, followed closely by those who had completed tertiary courses (31.25%) (Table 4:4). Further, when asked about their marital status, 62.5% of them reported being single, while the remainder (37.5%) identified as married (Table 4:4). However, Figure 4:1 suggests that there are gender

disparities in education levels. Females were found to have higher representation at the postgraduate, university, and tertiary education levels than males.

Table 0:4 Level of Education and Marital Status

Education and marital status	Nairobi Arboretum			Jevanjee Gardens			General Population	
	F N=40	P %		F N=40	P %		F N=80	P %
Education								
Postgraduate	2	5		2	5		4	5
Secondary	9	22.5		11	27.5		20	25
Tertiary	10	25		15	37.5		25	31.25
University	19	47.5		12	30		31	38.75
Marital Status								
Married	16	40		14	35		30	37.5
Single	24	60		26	65		50	62.5

Source: Field Survey; 2019

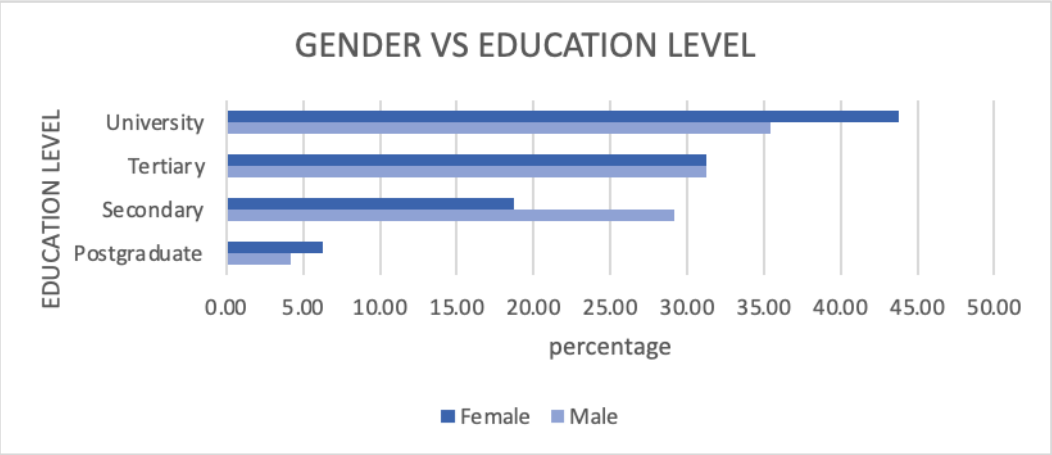


Figure 0:1 Gender and Education Level
Source: Field Survey; 2019

Supporting the findings of Shen *et al.* (2017), marital status emerges as a crucial demographic variable with multifaceted implications for the assessment of user perception of green spaces. This status is intertwined with diverse facets of individuals' lives, impacting their lifestyle choices and leisure preferences. Notably, married individuals may harbor distinct recreational needs and preferences compared to their single counterparts. The understanding of these differences assumes significance as it facilitates the customization of green space amenities and design to cater to the varied tastes within the community. Additionally, marital status sheds light on family dynamics and activities, with insights into how married individuals utilize green spaces for family-oriented pursuits. The link between marital status and social networks becomes evident as married individuals seek green spaces for social interactions with other families or couples, influencing the spatial design to foster community bonding.

Furthermore, exploring the connection between marital status and stress levels contributes valuable insights into the potential stress-relief benefits of green spaces for both single and married individuals. Understanding how marital status influences the frequency and patterns of green space usage is pivotal for designing spaces that effectively meet the needs of diverse user groups. Beyond individual preferences, marital status data assumes a strategic role in informing urban planning policies, guiding the allocation and design of green spaces to ensure inclusivity and accessibility for various marital status groups.

The level of education is crucial in assessing user perception of green spaces and green space characteristics for several reasons. First and foremost, education level often correlates with individuals' cognitive abilities, awareness, and appreciation of environmental factors. A higher level of education might indicate a greater awareness of the benefits of green spaces, leading to more informed opinions about their design and utility. Additionally, education can influence aesthetic preferences and the ability to engage with the natural environment, impacting how individuals perceive and interact with green spaces. It is worth noting that these observations align with the conclusions drawn in the study by Wüstemann *et al.* (2017).

In agreement with Spicer (2015), education is also closely tied to socio-economic status, which can have implications for the way people utilize green spaces. Individuals with higher education levels may be more likely to engage in leisure and recreational activities in green spaces, contributing to a more vibrant and diverse user experience. On the other hand, individuals with lower levels of education might have different preferences and needs that need to be considered in the design and management of green spaces. The level of education is also linked to potential environmental awareness and sustainable behaviors. Those with a higher level of education may be more attuned to environmental issues and more likely to appreciate and support green spaces that contribute to ecological well-being validating the findings from Rabare *et al.* (2009).

4.3.1.3 Employment Status and Monthly Income

As presented in Table 4:5, 33% of the respondents held formal occupations, 27% were engaged in informal sector work, 29% were students, and the remaining 11% were neither employed nor attending school. This means green spaces are accessible to a wide range of individuals with diverse occupations and monthly incomes. However, it also reveals that 60% of green space users in Nairobi are employed, belonging to the working-class group. Even then, a

comparatively higher percentage of the unemployed patronize Jevanjee Gardens. Majority of those employed earn Kenya Shillings 25,000/= and below (Table 4:5). Figure 4:2 reveals that there are more self-employed and employed men visiting the two parks, while there are more female students and unemployed visiting the parks.

Table 0:5 Employment Status and Monthly Income

Employment and income	Nairobi Arboretum			Jevanjee Gardens			General Population	
	F N=40	P %		F N=40	P %		F N=80	P %
Employment Status								
Employed	19	47.5		19	47.5		38	47.5
Self-employed	10	25		13	32.5		23	28.75
Student	8	20		4	10		12	15
Unemployed	3	7.5		7	17.5		7	8.75
Individual Monthly Income Earnings (KES)								
No income	11	27.5		6	15		17	21.25
25000 and less	7	17.5		16	40		23	28.75
25001-50000	10	25		14	35		24	30
50001-75000	7	17.5		3	7.5		10	12.5
75001-100000	4	10		1	2.5		5	6.25
Over 100000	1	2.5		0	0		1	1.25

Source: Field Survey; 2019

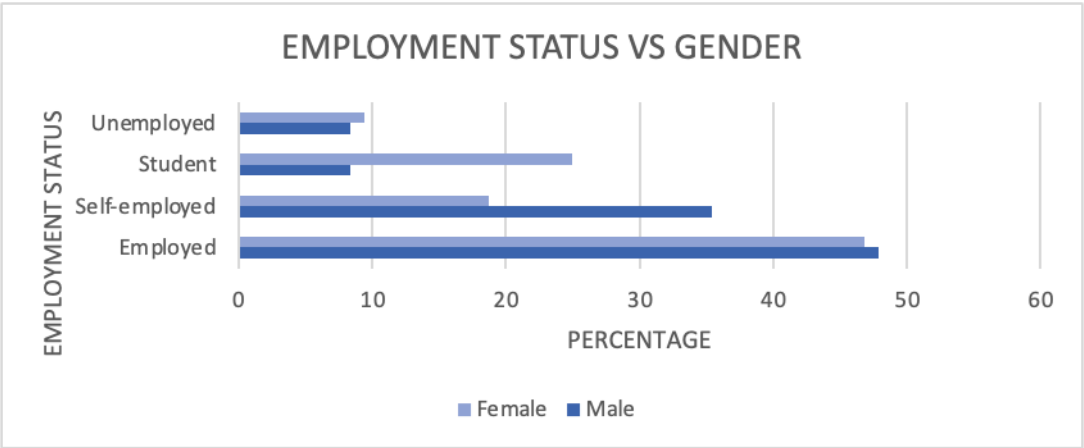


Figure 0:2 Gender and Employment Status
Source: Field Survey; 2019

The consideration of employment status and monthly income emerges as pivotal in evaluating user perceptions of green spaces and their characteristics. Consistent with the findings of De la Barrera *et al.* (2016), these factors impact the accessibility and inclusivity of green spaces. By comprehending the diverse occupational backgrounds and income brackets of users, planners can ensure that green spaces are welcoming and accessible to a broad spectrum of individuals, fostering inclusivity across various socio-economic groups.

Employment status plays a crucial role in shaping leisure patterns and recreation preferences. Employed individuals may view green spaces as havens for relaxation and stress relief after work, while students might frequent them for recreational purposes. This insight is essential for tailoring green space amenities and features to accommodate the varied needs of different user groups. Additionally, employment status contributes to the social dynamics within green spaces, particularly with the influence of the working class on social interactions and activities. Understanding these dynamics informs the design of spaces that facilitate community engagement and social cohesion. These observations are consistent with the results reported in the study conducted by Zou & Wang (2021).

Furthermore, examining the range of monthly incomes provides insights into the economic diversity of green space users, guiding decisions about the types of amenities and services that should be provided to ensure an inclusive and positive user experience. The revelation that a higher percentage of unemployed individuals patronize specific parks emphasizes the importance of understanding how different employment statuses influence park choices, guiding management decisions and resource allocation based on user preferences. Finally, the observation of gender disparities in park patronage underscores the need for creating gender-inclusive spaces and tailoring amenities to diverse user groups. In essence, the nuanced understanding of employment status and monthly income enriches the evaluation of user perceptions, contributing to the creation of more inclusive, engaging, and socially cohesive green spaces.

4.3.2 Characteristics of Park Users Residential Neighborhoods

Understanding the residential neighborhoods of the park users not only uncovers the neighborhood provision of green spaces, or lack thereof, but also attempts to unpack if the residential arrangement plays a role in the intensity and frequency of visits to green spaces. Figure 4:3, a word cloud, reveals that park users come from all over Nairobi City, cutting across the low-, high- and middle-income residential neighborhoods. However, most of the park users reside in Kasarani with a relevance of 0.980 and 8 counts, followed closely by Embakasi, Umoja, and Kileleshwa, scoring a relevance of 0.784.

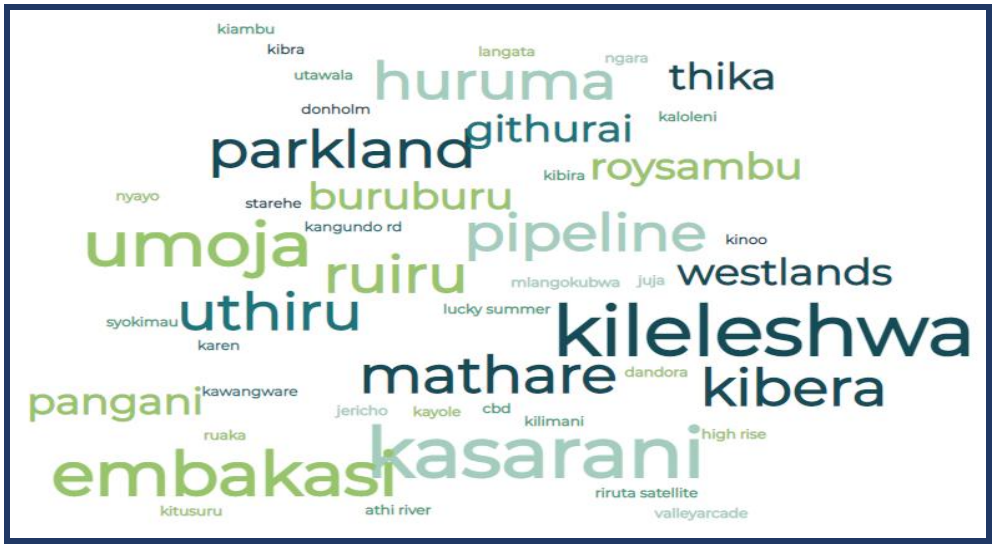


Figure 0:3 Residential Locations of Park Users
Source: Field Survey; 2019

The respondents were further asked how long they had lived in their current residential neighborhoods. Table 4:6 indicates that over half of them had resided in their current residential neighborhoods for three years or more. This suggests a degree of residential stability. However, 63.75% of respondents noted that they have no public green spaces in their current residences or neighboring estates. In alignment with the findings of Baycan-Levent & Nijkamp (2009), this suggests that a considerable portion of the population lacks immediate access to public green spaces in their residential neighborhoods. This absence of direct access hinders opportunities for recreation, physical and mental health, relaxation, and overall well-being, impacting the quality of life for these individuals. Moreover, the significance of green spaces extends to environmental sustainability, as they contribute to the support of biodiversity, the mitigation of heat effects, and the enhancement of air quality. The absence of green spaces in residential areas may restrict the realization of these environmental benefits, aligning with the findings of Swanwick *et al*. (2003).

Table 0:6 Duration of Stay in Current Residential Neighborhood

Duration	Nairobi Arboretum			Jevanjee Gardens			General Population	
	F N=40	P %		F N=40	P %		F N=80	P %
Less than 1 year	4	10		9	22.5		13	16.25
1-2 years	3	7.5		11	27.5		14	17.5
3-5 years	15	37.5		8	20		23	28.75
6-10 years	9	22.5		6	15		15	18.75
More than 10 years	9	22.5		6	15		15	18.75

Source: Field Survey; 2019

4.3.3 Park Visit-Related Characteristics

This section highlights park visit-related characteristics such as awareness of the benefits of green spaces, frequency visits and time spent in the park, origin of visits to the park, mode of transport and time taken to the park, and the purpose of visit to the park.

4.3.3.1 Awareness of Benefits of Green Spaces

The park users were asked if they were aware of the benefits, they accrued from visiting green spaces. Across the board, there is a high level of awareness regarding the benefits of green spaces. In both cases, the majority of respondents (95% for the Arboretum and 97.5% for Jevanjee) reported being aware of the benefits. This indicates that a large portion of the general population recognizes the positive aspects of green spaces. High awareness levels can lead to increased support for the preservation, expansion, and usage of green spaces. This can be valuable for urban planning and environmental conservation efforts.

4.3.3.2 Frequency of Visits and Time Spent in the Park

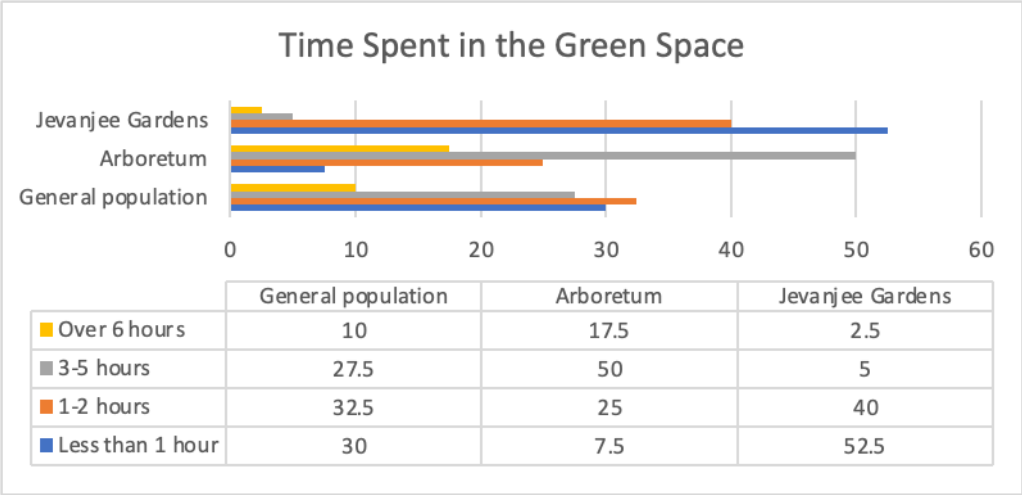
The frequency of visits to the green spaces shows a pattern characterized by a high level of regular use (Table 4:7). Generally, more than 60% of respondents visit the parks at least once a month. This suggests that public green spaces play a significant role in the leisure and recreational activities of Nairobi residents. It is also an indication of the positive impact of green spaces on the local community. However, the proportion of park users, on a weekly basis, is higher in Arboretum (27.5%) than in Jevanjee (17.5%). The reasons behind this disparity could be attributed to the specific attractions, amenities, or programming offered by the Nairobi Arboretum that draw more frequent visitors on a weekly basis.

Table 0:7 Frequency of Park Visits

Frequency	Nairobi Arboretum			Jevanjee Gardens			General Population	
	F N=40	P %		F N=40	P %		F N=80	P %
Daily	1	2.5		6	15		7	8.75
Weekly	11	27.5		7	17.5		18	22.5
Bi-weekly	4	10		5	12.5		9	11.25
Once a month	6	15		8	20		14	17.5
Once in three months	9	22.5		8	20		17	21.25
Once in six months	9	22.5		6	15		15	18.75

Source: Field Survey; 2019

Figure 4:4 indicates that 32.5% of the respondents spend an average of one to 2 hours in the parks. This suggests that a significant portion of park-goers allocate a reasonable amount of time to enjoy the green space, engage in recreational activities, or simply relax. However, 67.5% of the park users in Arboretum spend at least three hours in the park. Longer visits may indicate a higher level of satisfaction in the park. In contrast, most park users in Jevanjee (52.5%) spend less than an hour in the park. This is largely because Jevanjee is utilized as a transit space, as most users visit the park from work to have a break, while for Arboretum, residents set out intentionally from their homes to visit the park.



	General population	Arboretum	Jevanjee Gardens
Over 6 hours	10	17.5	2.5
3-5 hours	27.5	50	5
1-2 hours	32.5	25	40
Less than 1 hour	30	7.5	52.5

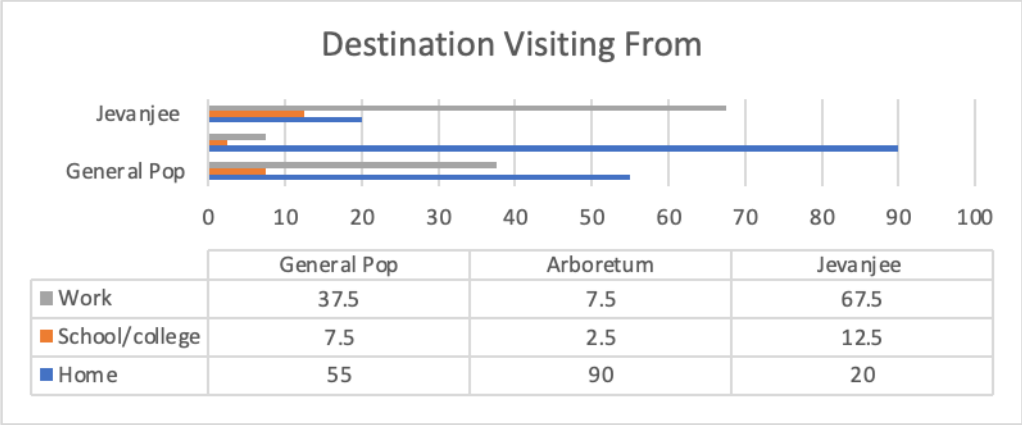
Figure 0:4 Time Spent in the Park
Source: Field Survey; 2019

The findings regarding the frequency of visits and time spent in the park highlight the importance of effective park management and programming. Understanding the preferences and habits of park visitors can help park authorities tailor their offerings and events to better meet the needs and expectations of the community. For urban planners and policymakers, this data underscores the value of investing in and maintaining green spaces within urban areas. The popularity of these parks demonstrates that such amenities are not only appreciated but also extensively used by the public.

4.3.3.3 Origin of Visits to the Park

Figure 4:5 provides valuable insights into the origin of visits to the two parks. Generally, 37.5% of the respondents visit the two parks from their places of work, during or after their working hours for relaxation or recreational purposes. However, Nairobi Arboretum sees a lower

percentage (7.5%) of visitors arriving from work. Jevanjee Gardens, on the other hand, attracts a substantial number of visitors (67.5%) from work, largely due to its location in the CBD.



	General Pop	Arboretum	Jevanjee
Work	37.5	7.5	67.5
School/college	7.5	2.5	12.5
Home	55	90	20

Figure 0:5 Origin of the visit to green spaces

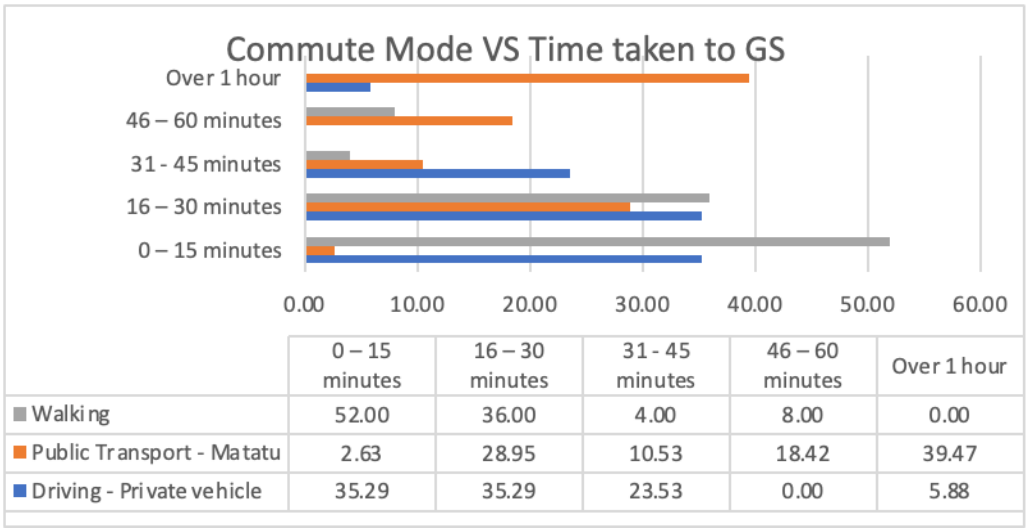
Source: Field Survey; 2019

Majority (55%) of the park users come from their homes (residential neighborhoods). Nairobi Arboretum, with 70% of visitors coming from home, is particularly favored by local residents who use it as a leisure destination close to their residences. On the other hand, Jevanjee Gardens attracts 20% of its visitors from home. The differences between Nairobi Arboretum and Jevanjee Gardens show how the appeal and role of green spaces can vary within a city, reflecting their unique characteristics, locations, and amenities. Understanding these patterns is crucial for park management and urban planning to ensure that these spaces cater to the needs and preferences of the local population.

4.3.3.4 Mode of Transport and Time Taken to the Park

Figure 4:6 presents a cross-tabulation of mode of transport and time taken to the park. Majority of the respondents (52%) prefer walking to the parks, covering at most 15 minutes. This is particularly true for Jevanjee park users. However, for Nairobi Arboretum, the use of public transport or private vehicle is much more preferred. A significant number of the respondents (39.5%) reported taking over an hour to access Nairobi Arboretum when using public transport. This suggests a potential accessibility issue for a substantial proportion of the population, especially those who rely on public transportation. As such, distance may hinder park visits. On the other hand, the fact that Jevanjee Gardens, located in the CBD, is more easily accessible

by walking, highlights the importance of green spaces being conveniently located within urban areas.



	0 – 15 minutes	16 – 30 minutes	31 - 45 minutes	46 – 60 minutes	Over 1 hour
Walking	52.00	36.00	4.00	8.00	0.00
Public Transport - Matatu	2.63	28.95	10.53	18.42	39.47
Driving - Private vehicle	35.29	35.29	23.53	0.00	5.88

Figure 0:6 Mode of Transport and Time Taken to the Park
Source: Field survey, 2019

4.3.3.5 Purpose of Visit to the Park

Generally, 27.5% of the respondents visit either Nairobi Arboretum or Jevanjee Gardens to spend time with family or friends (Table 4:8). However, most of park users in Nairobi Arboretum (42.5%) like spending time with their family or friends. Arboretum is much more spacious and quieter than Jevanjee. As such, Nairobi Arboretum is often frequented by groups of people or individuals accompanied by friends, family, or acquaintances. This underscores the role of green spaces as important venues for social interaction and community bonding.

Table 0:8 Purpose of Visit to the Park

Purpose	Nairobi Arboretum			Jevanjee Gardens			General Population	
	F N=40	P %		F N=40	P %		F N=80	P %
Attend an event	2	5		3	7.5		5	6.25
Education and learning	1	2.5		1	2.5		2	2.5
Enjoy scenery or wildlife	5	12.5		0	0		5	6.25
Entertain a child	2	5		0	0		2	2.5
Health and exercise	3	7.5		0	0		3	3.75
Relax and unwind	5	12.5		31	77.5		36	45
Spend time with family or friends	17	42.5		5	12.5		22	27.5
Walk a pet	1	2.5		0	0		1	1.25
Worship	4	10		0	0		4	5

Source: Field survey, 2019

On the other hand, most park users in Jevanjee Gardens (77.5%) prefer using the park for relaxing and unwinding. This indicates solo visits to the park. This difference might be due to varying preferences, purposes of visits, or the atmosphere of the two green spaces. This can inform decisions related to the provision of seating areas, picnic spots, recreational facilities, and the overall design of the green spaces to cater for both solitary and social park-goers. Table 4:9 provides further insights on categories of people that park users visit the parks with.

Table 0:9 Company to the Park

Company	Nairobi Arboretum			Jevanjee Gardens			General Population	
	F N=40	P %		F N=40	P %		F N=80	P %
Colleagues	15	30.6		9	60.0		15	30.6
Family	17	34.7		1	6.7		17	34.7
Partner	9	18.4		5	33.3		9	18.4
School group	3	6.1		0	0.0		3	6.1
Team/club	5	10.2		0	0.0		5	10.2

Source: Field survey; 2019

The reasons for visiting green spaces can also be influenced by park design and available amenities. Parks that offer facilities for picnics, sports, or social gatherings may attract larger groups of friends and family, while those with serene environments may appeal to individuals seeking solitude. Understanding why people visit green spaces can inform park management and programming decisions.

4.4 Park Users Perceptions and Experiences of Public Green Spaces in Nairobi City

4.4.1 Attitudes of Park Users Towards Public Green Spaces

The large majority of the park users in Nairobi Arboretum (92.5%) indicated that the park met their needs and expectations. On the contrary, a higher percentage of the park users in Jevanjee Gardens (82.5%) believed that their needs are not met. These findings underscore the fact that it is crucial for park management and urban planners to pay attention to the specific requirements and desires of park-goers and make enhancements accordingly. This could involve a variety of improvements, such as providing more amenities, enhancing security, increasing recreational facilities, or conducting surveys to understand the specific needs of the local community and park users. Ultimately, aligning green spaces with users' needs can lead to increased satisfaction and better utilization of these urban recreational areas.

4.4.2 Value Attached to Green Space Attributes

The park users were asked to indicate the extent to which they valued or found various attributes of green spaces important. The mean scores were calculated for each attribute. The mean value associated with a particular green space attribute revealed the extent to which the respondents found the attribute necessary, on average. The higher the mean score, the more important is the attribute. Generally, the park users considered aesthetic, nature, native plants and animals, and social interaction to be important attributes of green spaces, with a mean score of 4 and above (Table 4:10).

Table 0:10 Value Importance Attached to Green Space Attributes

	Not important	Slightly important	Neutral	Important	Very important	Mean	Std. Dev
Aesthetic/Scenic	0.0%	1.2%	7.5%	52.5%	38.8%	4.4	0.7
Nature	0.0%	2.5%	10.0%	62.5%	25.0%	4.2	0.7
Native plants and animals	3.8%	3.8%	7.5%	62.5%	22.5%	4.1	0.9
Social interaction	15.0%	12.5%	20.0%	37.5%	15.0%	4.1	1.1
Health/therapeutic	17.5%	15.0%	20.0%	30.0%	17.5%	3.8	1.1
Activity/physical exercise	0.0%	1.2%	7.5%	52.5%	38.8%	3.7	1.3
Cultural Significance	0.0%	2.5%	10.0%	62.5%	25.0%	3.0	1.4

Source: Field survey, 2019

4.4.3 Value Attached to Activities Undertaken in Green Spaces

The respondents shared their perspective on the significance of activities conducted in green spaces. The results presented in Table 4:11 indicate that, on average, the park users attached higher values to social activities, nature appreciation, and casual recreation in green spaces, with a mean score of 4 and above. The higher the mean score, the more important is the value attached to the activity.

Table 0:11 Value Attached to Activities Undertaken in Green Spaces

	Not important	Slightly important	Neutral	Important	Very important	Mean	Std. Dev
Social activities	0.0%	1.2%	7.5%	52.5%	38.8%	4.3	0.7
Nature appreciation	0.0%	2.5%	10.0%	62.5%	25.0%	4.1	0.7
Casual recreation	3.8%	3.8%	7.5%	62.5%	22.5%	4.0	0.9

Exercise for fitness	15.0%	12.5%	20.0%	37.5%	15.0%	3.3	1.3
Children play area	17.5%	15.0%	20.0%	30.0%	17.5%	3.2	1.4

Source: Field survey, 2019

4.4.4 User Satisfaction with Adequacy and Condition of Green Space Attributes

The respondents expressed their satisfaction or dissatisfaction with the adequacy and conditions of amenities provided in the parks. The data presented in Table 4:12 indicate that, on average, the park users expressed higher satisfaction levels with certain aspects of the parks. These were presence of social interaction opportunities, the abundance of mature trees, accessibility of the park, and the size of the park, with a mean score of 3.7 and above. The higher the mean score, the more satisfied with adequacy and conditions of the park attributes.

Table 0:12 User Satisfaction with Adequacy and Condition of Green Space Attributes

	Very Unsatisfied	**Unsatisfied**	**Neutral**	**Satisfied**	**Very satisfied**	**Mean**	**Std. Dev**
Social interaction	1.2%	3.8%	16.2%	62.5%	16.2%	3.9	0.8
It contains plenty of mature trees	2.5%	10.0%	7.5%	58.8%	21.2%	3.9	1.0
Accessibility of green space	5.0%	8.8%	12.5%	55.0%	18.8%	3.7	1.0
Size of green space	3.8%	12.5%	8.8%	58.8%	16.2%	3.7	1.0
Close to my residence, workplace, or school	2.5%	11.2%	35.0%	42.5%	8.8%	3.4	0.9
Design and appearance	0.0%	22.5%	22.5%	52.5%	2.5%	3.4	0.9
Quality or condition of green space	5.0%	26.2%	8.8%	50.0%	10.0%	3.3	1.1
Beautiful views	7.5%	20.0%	18.8%	42.5%	11.2%	3.3	1.1
Contains Park personnel	3.8%	26.2%	22.5%	37.5%	10.0%	3.2	1.1
Contains a lot of green areas	6.2%	18.8%	27.5%	41.2%	6.2%	3.2	1.0
Sanitation facilities	6.2%	20.0%	23.8%	47.5%	2.5%	3.2	1.0
Is well-maintained	5.0%	22.5%	27.5%	38.8%	6.2%	3.2	1.0
Cleanliness	3.8%	30.0%	22.5%	36.2%	7.5%	3.1	1.1
Landscaping	7.5%	26.2%	17.5%	42.5%	6.2%	3.1	1.1
Contains lots of birds and other wildlife	12.5%	26.2%	20.0%	33.8%	7.5%	3.0	1.2

Contains light structures	2.5%	33.8%	33.8%	27.5%	2.5%	2.9	0.9
Good facilities (toilets, taps, bubblers, etc.)	8.8%	27.5%	31.2%	27.5%	5.0%	2.9	1.1
Cultural significance amenities; statues etc.	3.8%	37.5%	27.5%	27.5%	3.8%	2.9	1.0
Street furniture; benches, rain shelter	7.5%	36.2%	30.0%	21.2%	5.0%	2.8	1.0
Parking provision	11.2%	41.2%	25.0%	18.8%	3.8%	2.6	1.0
Provision of children's facilities	23.8%	46.2%	16.2%	11.2%	2.5%	2.2	1.0

Source: Field survey, 2019

Notably, satisfaction with provision of children's facilities had the lowest mean score of 2.2. The scarcity of dedicated spaces for children makes the inclusion of such facilities within green spaces more critical. Ensuring equitable access to children's facilities is important to promote inclusivity and address the needs of families in various neighborhoods. Children's facilities in green spaces not only provide recreational opportunities for the children but also contribute to the overall well-being of families and communities.

4.4.5 Green Space Characteristics that would Reduce their Value to Users

The respondents expressed their level of agreement or disagreement concerning how various attributes within the parks would impact the value of those spaces to them. Data in Table 4:3 indicate that most of the respondents mentioned that noise, with a mean score of 3.6, as the most important attribute that would diminish the value of green spaces for them. Other attributes include inadequate access, insufficient security and lighting, inadequate signage and wayfinding, and lack of parking facilities.

Table 0:13 Green Space Characteristics that would Reduce their Value to the Users

	Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**	**Mean**	**Std. Dev**
Noisy	1.2%	27.5%	13.8%	30.0%	27.5%	3.6	1.2
Lack of suitable access	1.2%	37.5%	5.0%	28.8%	27.5%	3.4	1.3
Lack of security/lighting	1.2%	25.0%	25.0%	42.5%	6.2%	3.3	1.0
Poor signage/wayfinding	7.5%	32.5%	15.0%	25.0%	20.0%	3.2	1.3

Lack of parking provision	2.5%	43.8%	10.0%	23.8%	20.0%	3.2	1.3
Scary/unsafe	0.0%	46.2%	20.0%	10.0%	23.8%	3.1	1.2
Presence of stray animals/dogs	1.2%	45.0%	13.8%	23.8%	16.2%	3.1	1.2
Unappealing	7.5%	42.5%	6.2%	23.8%	20.0%	3.1	1.3
Poor management	0.0%	37.5%	26.2%	33.8%	2.5%	3.0	0.9
Presence of street urchins	18.8%	30.0%	7.5%	23.8%	20.0%	3.0	1.5
Pollution/litter	3.8%	38.8%	22.5%	30.0%	5.0%	2.9	1.0
Too small	1.2%	53.8%	10.0%	22.5%	12.5%	2.9	1.2
Too far to access	3.8%	52.5%	12.5%	22.5%	8.8%	2.8	1.1
Isolation/not enough people	3.8%	60.0%	15.0%	16.2%	5.0%	2.6	1.0
Overcrowding/ Congestion	10.0%	62.5%	5.0%	13.8%	8.8%	2.5	1.1
Poor recreational facilities	16.2%	45.0%	17.5%	18.8%	2.5%	2.5	1.1

Source: Field survey, 2019

4.4.6 Challenges Faced by Park Users

The challenges as summarized in Table 4:14 identified by park users span various critical thematic areas, encompassing accessibility and connectivity, infrastructure and utilities, sanitation, cultural and recreational aspects, environmental education, and community engagement. These challenges include issues such as inadequate facilities for people with disabilities, unclear signage, rough terrain, parking constraints, high entry fees, and insufficient amenities. Additionally, concerns related to infrastructure maintenance, sanitation facilities, cultural and recreational offerings, environmental education, and community involvement have been highlighted.

In response to these challenges, park users proposed practical solutions. These ranged from the creation of disability-friendly pathways, installation of clear signage, and improvement of terrain for pets to addressing transportation challenges and reducing entry fees. Other suggestions included enhancing street furniture, maintaining pedestrian paths, creating rain shelters, improving street lighting, providing diverse and engaging activities, increasing restroom facilities, and introducing cultural and recreational elements. Furthermore, the importance of fostering community engagement, implementing educational programs, and involving the community in decision-making processes for green spaces was emphasized.

This comprehensive approach, combining the identification of challenges with user-driven solutions, lays the groundwork for enhancing the overall quality, accessibility, and inclusivity

of urban green spaces. It underscores the significance of aligning park design and management with the diverse needs and preferences of the community, promoting a more sustainable and user-centric approach to urban planning.

Table 0:14 Challenges Faced by Park Users

Thematic Area	Challenges by Park Users	Solutions from Park Users
Accessibility & connectivity	The place is not disability friendly.	Create disability-friendly pathways and ramps.
	Lack of clear signs and orientation within the place.	Installation of clear signs and orientation
	Rough terrain for walking pets.	Improve terrain for walking pets.
	Lack of adequate parking space.	Address transportation challenges and parking space issues.
	High entry fees, and expensive facilities	Reduce or eliminate entry fees. Introduce group entry fees.
	Inaccessibility for people far from town.	Introduce public transport incentives/reward system for visiting green space
Infrastructure & utilities	Inadequate street furniture and benches.	Increase of street furniture and benches
	Poorly maintained pedestrian paths	Proper maintenance of pedestrian paths
	Lack of rain shelter when it rains.	Create rain shelters e.g., in the smoking zone
	Inadequate street lighting creating insecurity	Increase street lighting
	Lack of private spaces and engaging activities.	Create spaces for active and passive activities
	Inadequate provision of toilets	Increase the number of washrooms
Sanitation	Inadequate waste bins.	Provision of adequate waste bins
	Lack of clean water.	Introduce taps with clean water at different points within the green space
	Poor sanitation facilities.	Improve the cleanliness standards
	Inadequate landscaping	Regular maintenance and landscaping in the green space
	Lack of baby changing stations	Introduce baby changing stations
	Inadequate provision of water taps	Increase the provision of water taps within the green space and strategically placed
Cultural & recreational areas	Lacking the cultural and heritage arts and monuments	Introduce arts and statues from different cultures
	Inadequate recreational activities	Introduce recreational activities and events that cut across different age groups

Environmental education	Lack of community engagement and involvement	Involve the community of park users in park welfare
Community engagement	Lack of involvement of park users especially in the design and designation of certain functions and user preference	Introduce memberships and welfares that are inclusive to cater to the design and maintenance of green spaces

Source: Field survey, 2019

4.5 Hypothesis Testing

The study had two null hypotheses, which were tested using the chi-square (χ^2) test, with a critical p-value set at 0.05. Table 4:15 presents the summary output results of the first null hypothesis that: There is no significant association between socio-economic characteristics of park users and the frequency of urban public green space usage. The results indicate that gender (χ^2=5.625, p=0.131), education level (χ^2=9.165, p=0.422), and monthly income (χ^2=21.668, p=0.117) of park users do not have a significant association with the level of urban public green space usage. However, age (χ^2=24.671, p=0.016), marital status (χ^2=12.963, p=0.005), and employment status (χ^2=21.541, p=0.010) were found to be significantly associated with the level of urban public green space usage.

Table 0:15 Chi-Square: Socio-Economic Characteristics and Frequency of Green Space Usage

	Value	**Degrees of freedom**	**Significance (2 sided)**	**Level of significance**
Gender	5.625	3	0.131	0.05
Age	24.671	12	0.016	0.05
Marital status	12.963	3	0.005	0.05
Education level	9.165	9	0.422	0.05
Employment status	21.541	9	0.010	0.05
Individual Income earnings	21.668	15	0.117	0.05

Source: Field survey, 2019

Table 4:16 presents the summary output results of the second null hypothesis that: There is no significant association between awareness and perceived value of green spaces and the frequency of public green space usage. The results indicate that both awareness of green space benefits (χ^2=10.253, p=0.017) and perception that green spaces met user needs (χ^2=13.529, p=0.004) were significantly associated with the frequency of urban public green space usage.

Table 0:16 Chi-Square: Awareness and Perceived Value and Frequency of Green Space Usage

	Value	Degrees of freedom	Significance (2 sided)	Level of significance
Awareness of Green Space Benefits vs. Urban Public Green Space Usage	10.253	3	0.017	0.05
Do Green Spaces Meet User Needs vs. Urban Public Green Space Usage	13.529	3	0.04	0.05

Source: Field survey, 2019

4.6 Modeling an Ideal Public Green Space Using the Case for Jevanjee Gardens

In this section, we explore the vision of creating an ideal public green space by synthesizing the research findings (especially the challenges and solutions from park users), insights derived from case studies in literature review, insights from key informant interviews, and the researcher's expertise in urban planning and landscape architecture. The primary objective is to craft an inspiring model for a public green space that optimally caters to the needs and desires of its users, with Jevanjee Gardens serving as the foundational prototype. The choice of Jevanjee Gardens as the focal point was influenced by its strategic location within the CBD, as well as its inclusive free-entry model, which made it a particularly fitting reference point. This process encompasses conceptualization, site planning, and the development of a comprehensive master plan.

4.6.1 Conceptualization of the Characteristics of an Ideal Public Green Space

Conceptualizing the ideal urban public green space, involved a multifaceted approach that incorporated a synthesis of research findings, insights from case studies in the literature review, inputs from key informant interviews, and the researcher's expertise in urban planning and landscape architecture. The process began by meticulously analyzing the challenges identified by park users in the research findings. These challenges, ranging from inadequate facilities for children to security concerns and accessibility issues, provided valuable insights into the shortcomings of existing green spaces. Simultaneously, solutions proposed by park users were examined to understand the preferences and expectations of the community. The literature review contributed additional insights from case studies of public green spaces globally. Examining successful models and strategies implemented in other regions provided a broader perspective on what works well and why. These case studies served as benchmarks and inspiration for potential solutions applicable to the Nairobi context.

Key informant interviews played a crucial role in gaining expert opinions and practical insights from professionals in urban planning and landscape architecture. These interviews provided a nuanced understanding of the challenges faced in urban green space development, as well as innovative solutions and best practices. Expert perspectives were particularly valuable in refining the proposed model, ensuring its feasibility and alignment with industry standards.

The researcher's expertise in urban planning and landscape architecture brought a practical dimension to the modeling process. Drawing on academic knowledge and practical experience, the researcher contributed informed design elements and considerations to the ideal green space model. This expertise was essential in translating theoretical insights into actionable and realistic recommendations.

While the data gathered from the research findings, literature review, and key informant interviews provided a robust foundation for modeling an ideal urban public green space, it is crucial to acknowledge the limitations. The data collected were context-specific to Nairobi, and the ideal green space model derived from this data may be more applicable to similar urban settings. In summary, the modeling process drew on a comprehensive set of data sources, combining the experiences and preferences of park users, insights from global case studies, expert opinions from key informants, and the researcher's professional expertise. While the data was substantial for addressing the objective, recognizing the contextual limitations is essential for ensuring the model's relevance and adaptability beyond the specific study area.

Table 4:17 outlines specific recommendations for an optimal public green space, synthesizing insights from various sources, including research findings from park users, case studies in the literature review, key informant interviews, and the researcher's expertise in urban planning and landscape architecture. These recommendations are not only a reflection of users' views on an ideal public green space but also incorporate best practices observed in green spaces worldwide. In the realm of accessibility and connectivity, suggestions include a comprehensive wayfinding system, well-maintained pet-friendly pathways, and accommodations for diverse mobility needs. Infrastructure and utilities recommendations advocate for strategically placed seating, eco-friendly rain shelters, and energy-efficient street lighting. Sanitation-related suggestions prioritize waste management, clean water provision, and family-friendly amenities. The table serves as a practical guide for urban planners, incorporating a holistic approach that balances user preferences, international best practices, and sustainable solutions to create an inclusive and well-designed public green space.

Table 0:17 Key Recommendations of an Ideal Public Green Space

Thematic Area	Key Recommendations
Accessibility & connectivity	• Comprehensive wayfinding system with clear signage at key points. • Well maintained pathways are pet-friendly and well-maintained, with pet waste disposal stations. • Ramps and accessible pathways to accommodate wheelchairs and strollers. • Tactile and audible signage for individuals with visual impairments.
Infrastructure & utilities	• Optimal locations for seating areas based on user traffic and scenic views. • Additional benches, picnic tables, and seating areas where needed. • Shaded seating for comfort during hot weather. • Rain shelters or pavilions strategically throughout the green space. shelters that blend with the natural surroundings • Eco-friendly and sustainable rainwater harvesting systems. • Adequate street lighting using energy-efficient technologies
Sanitation	• Waste bins in high-traffic areas, near seating, and at entrances and exits. • Water taps, water fountains or hydration stations with clean drinking water • Composting toilets or low-flow water fixtures. • Baby changing stations in accessible restrooms

Source: Field survey, 2019

4.6.2 Siting Planning: Building on the Foundation

Figure 4:7 serves as the site plan, offering a visual representation of the primary functions and zones within Jevanjee Gardens. This strategic approach not only facilitates informed decision-making but also actively engaged the community in the planning process. This achievement ensured that essential facilities like site boundaries, designated smoking zone, kiosks, pedestrian pathways, management offices, "Bunge la Wananchi," and public restroom facilities are strategically situated to align seamlessly with the site's requirements. Moreover, the engagement of the community in this planning process helps to align the layout seamlessly with the expectations and preferences of the park users. This collaborative and informed approach enhances the functionality and user experience of Jevanjee Gardens, making it a well-organized and community-oriented public green space.

Figure 0:7 Designed Site Plan of Jevanjee Gardens
Source: Field survey, 2019

4.6.3 Developing the Master Plan: Achieving Excellence

Utilizing the refined site plan for Jevanjee Gardens as the guiding framework, one embarks on the creation of the Jevanjee Gardens Master Plan, shaping the envisioned public green space. This process incorporates expert insights and user preferences, resulting in a master plan featuring thoughtfully designed zones, each tailored to accommodate a diverse range of activities. These zones are seamlessly integrated to ensure a smooth and harmonious flow throughout the space. The key rationale for the Jevanjee master plan includes:

- **Holistic vision**: The master plan offers a comprehensive and encompassing vision of the entire project area, transcending the immediate site details. It harmonizes the site plan with the larger context, considering neighboring areas and overarching development objectives.
- **Contextual clarity**: The master plan aids stakeholders and decision-makers in understanding how the park fits within the broader urban landscape. By visually representing adjacent developments, transportation networks, green spaces, and relevant elements, it ensures seamless alignment with the overarching vision.
- **Community engagement**: The master plan plays a pivotal role in engaging the community and fostering public participation. It presents the proposed project in an accessible and visually compelling manner, simplifying residents' and stakeholders' grasp of the project's significance and benefits.

- **Effective communication**: These master plans serve as potent communication tools when showcasing the project to investors, developers, and the public. They can be seamlessly incorporated into marketing materials, presentations, and public meetings, effectively conveying the project's vision and potential.
- **Long-term perspective**: The master plan extends the planning horizon to encompass long-term growth and expansion. It assists in identifying areas for future development, infrastructure expansion, and adaptation to evolving needs.
- **Facilitating coordination**: The master plan promotes coordination among diverse stakeholders involved in the development process, including architects, urban planners, engineers, and government agencies. It fosters a unified vision, aligning the efforts of all involved parties.
- **Design guidance**: The master plan includes design guidelines and architectural concepts that define both the aesthetic and functional aspects of the project.

Figure 4:8 illustrates the Master Plan of the ideal green space using Jevanjee Gardens as prototype. Through the thoughtful design, this master plan has achieved a harmonious balance between user desires, global standards for green spaces, and the unique characteristics of Jevanjee Gardens. The park has been reimagined to serve as a welcoming oasis that caters to its visitors' diverse needs and aspirations, creating a sustainable and vibrant urban haven for all to enjoy.

Figure 0:8 Designed Master plan of Jevanjee Gardens; the ideal green space.
Source: Field survey, 2019

The transformation of Jevanjee Gardens into an ideal public green space stands as a remarkable achievement, reimagined to fulfill the diverse needs and aspirations of its visitors. The transformative components include:

- Preservation of Alibhai Mulla Jevanjee statue.
- Street lighting along Muindi Mbingu Street to extend the park's accessibility into the evening hours and for safety measures.
- Pedestrian crossing on Muindi Mbingu Street to provide a secure environment for park visitors to traverse the road with heavy traffic.
- Tactile paving on all walkways for the visually impaired. These tactile cues, defined by texture and pattern, assist individuals in navigating the park safely and comfortably.
- Street cafes along Moi Avenue.
- Mobile food carts and vending booths to offer diverse culinary options and catering to various tastes and preferences.
- Public washrooms with disability inclusion and baby changing stations.
- Amphitheatre with tactile paving walkways for cultural performances, community events, and open spaces for relaxation, picnics, or outdoor gatherings.

- Smoking zone with rain shelter and waste disposal bins.
- Secure children's playground.
- Skating rink to encourage physical activity and exercise.
- Covered seating and benches to encourage longer stays.

CHAPTER FIVE: SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

In this chapter, the study's significant findings are summarized, the conclusion highlighted, and recommendations for practice, policy, and further research provided. The study set out to investigate the characteristics of public green spaces; characteristics of public green spaces users; user's perceptions and experiences of public green spaces; and modeling an ideal urban public green space.

5.2 Summary of Findings

5.2.1 Characteristics of Public Green Spaces

Nairobi Arboretum and Jevanjee Gardens differ significantly in size and management. Jevanjee Gardens, a compact 5-acre park, is directly owned and managed by Nairobi City County, ensuring centralized control. In contrast, Nairobi Arboretum covers a vast 30.4 hectares and adopts a collaborative approach. It is jointly managed by the Kenya Forest Service and the Friends of Nairobi Arboretum (FONA), a community-based association. While both models serve the public, prioritize conservation, and promote community engagement, they employ distinct governance mechanisms. This collaborative framework emphasizes the involvement of both governmental and community entities in the management and stewardship of green space. While both models share common goals of serving the public, prioritizing conservation efforts, and fostering community engagement, they diverge in their governance mechanisms.
The collaborative approach of Nairobi Arboretum underscores a partnership between governmental and community stakeholders, leveraging the strengths of each. This model often promotes a more inclusive and community-driven decision-making process, involving local residents and nature enthusiasts. In contrast, the publicly accessible Jevanjee open space follows a more centralized and administrative governance structure under the direct auspices of the city's municipal authority. Each approach reflects a nuanced strategy tailored to the unique characteristics and objectives of the respective green spaces, contributing to the diverse urban fabric of Nairobi.

The biodiversity and landscaping of the two parks exhibit nuanced characteristics. Jevanjee Gardens features exotic trees, shrubs, and ground covers but may lose some aesthetic appeal

during dry seasons due to deciduous tree species. Nairobi Arboretum, on the other hand, showcases a diverse dry forest ecosystem, housing over 350 indigenous and exotic tree species. This rich botanical diversity is an asset but requires regular maintenance and pruning, and enhancing their ecological value. A majority of respondents expressed satisfaction with the natural aspects in both parks.

Both parks face common challenges in infrastructure and utilities. The absence of rain shelters, convenient taps, segregated waste bins, inclusive walkways, and adequate restroom facilities impacts visitor comfort, hydration, waste management, and accessibility for individuals with disabilities and families with young children. The absence of essential facilities impacts visitors' comfort and overall experience.

Notably, both parks effectively use signage and wayfinding tools to enhance the visitor experience. The provision of inclusive facilities and the efficient use of signage contribute to the inclusivity and sustainability of urban green spaces. Ensuring that parks are accessible to a wide range of users, regardless of age or physical abilities, supports the principles of urban inclusivity and sustainability. However, providing and maintaining these facilities is an ongoing responsibility for park management. Regular maintenance ensures that infrastructure and utilities remain in good condition, contributing to visitor satisfaction and the overall value of the green space.

Accessibility and connectivity are vital aspects of public green spaces. Jevanjee Gardens enjoys easy access due to its strategic location in the CBD, near key transportation hubs. Nairobi Arboretum is also easily accessible through public transport or private car. Both parks feature clear signage and directions for visitors. However, Jevanjee Gardens offers free entry, fostering inclusivity, while Nairobi Arboretum charges an entry fee, contributing to its maintenance but possibly limiting access for some groups. Furthermore, long travel times to the nearest green spaces present a clear challenge, especially for residents of underserved areas.

5.2.2 Socio-economic Characteristics of Public Green Spaces Users

Jevanjee Gardens primarily caters to quick breaks during work hours, with visits lasting about an hour and occurring daily. In contrast, Nairobi Arboretum attracts families and groups spending over 3 hours in the park, indicating diverse user groups. More than 60% of respondents visit the parks at least once a month, with Nairobi Arboretum experiencing more

frequent visits. Many urban residents reside in apartment complexes lacking green spaces, which forces them to travel long distances to access green spaces, sometimes over an hour. Despite this inconvenience, park users are aware of the essential benefits provided by green spaces, with a significant 95% acknowledging these benefits.

This study emphasizes the importance of understanding the diverse needs of urban residents and tailoring green space planning and distribution to accommodate various user groups. It also highlights the resilient demand for green spaces, even in the face of accessibility challenges. The acknowledgment of the importance green spaces by a significant majority of users further underscores their perceived importance in enhancing the quality of urban life. This information can inform future urban planning initiatives aimed at optimizing green space provision and addressing accessibility issues for a more equitable and inclusive urban environment.

5.2.3 User Perceptions and Experiences of Public Green Spaces

Demographic variations in satisfaction levels among park users add a layer of complexity to the understanding of user experiences in urban green spaces. Analyzing user satisfaction through the lens of demographics provides insights into how different groups perceive and interact with green spaces, contributing to a more nuanced understanding of their experiences.

Approximately 60% of park visitors expressed contentment with the quality and condition of green spaces, based on available facilities and park maintenance. However, satisfaction levels varied among different residential areas. Interestingly, park users generally found the design and appearance of both Jevanjee Gardens and Nairobi Arboretum to be efficient, with 73.1% agreeing that the design of Jevanjee Gardens was suitable for a quick break. The variation in satisfaction levels among different residential areas underscores the need to ensure equitable access to high-quality green spaces for all communities. Understanding these demographic variations allows urban planners to tailor interventions and allocate resources more effectively, ensuring that diverse communities have equitable access to high-quality green spaces.

Adequate facilities for children are essential in parks and significantly contribute to high park traffic. Surprisingly, the study revealed that both Jevanjee Gardens and Nairobi Arboretum lacked adequate children's facilities, leading to widespread dissatisfaction among park users. Understanding these factors allows for targeted improvement initiatives. For example, recognizing the importance of recreational facilities suggests that investing in playgrounds,

sports areas, and other recreational amenities can enhance the overall experience of green spaces, making them more attractive to a wider range of users.

The study identified several challenges faced by park users, including noise, security concerns, inadequate furniture, sanitation issues, and accessibility problems. Insecurity, especially in Jevanjee Gardens, was a significant concern, negatively impacting satisfaction levels and the perceived value of the green space. Additionally, the presence of noise as a challenge highlights the importance of managing noise pollution within green spaces. The study also identified several factors that significantly impact the value and experience of green spaces, including recreational facilities, street urchin concerns, and accessibility. Demographic considerations also play a role in the evaluation of challenges faced by park users. Security concerns, noise, and accessibility issues may affect demographic groups differently. Older adults, for example, might be more sensitive to noise, while families with strollers may face challenges with park accessibility. Identifying these variations enables urban planners to implement targeted solutions that address the specific concerns of different demographic groups.

Delving into demographic variations in satisfaction levels enriches the understanding of user experiences in urban green spaces. By recognizing the diverse needs and preferences of different demographic segments, urban planners can create more inclusive, accessible, and user-centric green spaces that contribute positively to the well-being of the entire community.

5.3 Conclusion

The distribution of green spaces within Nairobi City County exhibits irregularity and inequality, primarily attributed to the inadequacies in legislation concerning densification strategies. The absence of a systematic policy in Kenya further compounds the issue, as there is no comprehensive framework governing the fair allocation of green spaces, coupled with a lack of established standards or regulations ensuring accessibility. The management of green spaces faces challenges marked by inefficiency and inadequacy. Notably, there is a dearth of official data and documentation, complicating efforts to effectively oversee and enhance these crucial areas within the city. Despite these challenges, there remains a steadfast demand for green spaces among the residents. This persistent need is underscored by the willingness of individuals to traverse considerable distances, emphasizing the inherent importance of these amenities to the well-being and quality of life for urban dwellers. Furthermore, the demand for public green spaces in urban areas is not uniform but varies based on income levels, the type

of housing that park users inhabit, and the specific type of green space in question. The fact that people are willing to travel for over an hour to access green spaces with their families underscores the essential nature of these amenities. However, there appears to be a lack of prioritization for green spaces among developers and planners.

5.4 Recommendations

5.4.1 To Policy Makers

- Raising awareness among policymakers about the substantial benefits of green spaces and their pivotal role in promoting urban sustainability is of utmost importance. Policymakers should receive training that encourages innovative thinking when implementing urban greening strategies.
- Establishing partnerships and collaborative arrangements that involve the local communities, private sector entities, and public agencies to overcome collective action challenges that hinder individuals from accessing green spaces.
- Encourage developers and property owners to incorporate urban greening and design principles into their projects – through structured incentives and facilitation.

5.4.2 For Future Research

- Future research should undertake a more comprehensive examination of ensuring equitable access to green spaces in Kenyan cities and neighborhoods, with a focus on addressing potential disparities in access related to socio-economic factors and geographic location.
- Exploring public-private partnership models for the provision of urban green spaces.
- Seamless integration of green infrastructure at various levels of urban development, including solutions at the neighborhood level that enhance climate resilience, support sustainable transportation, and contribute to urban cooling.
- Long-term social and health implications of urban green spaces, offering more extensive insights into their impact on mental health, physical activity, and community well-being.
- The role of green spaces in climate resilience, including exploring innovative design approaches aimed at mitigating the effects of climate change, such as urban flooding and extreme heat.
- Further studies can refine economic valuation methods, providing a more accurate quantification of the economic benefits derived from green spaces. This may involve

exploring new dimensions, including the potential of nature-based tourism and ecosystem services markets.

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PARK USERS' SURVEY

STAGE 1: Demographics and Household Data

Location

1. **GPS Location:**
2. **Name of respondent:**
3. **Age:** 18 – 30, 31 – -45; 46 – -60; 61 – -75; over 76.
4. **Gender:** Male; female;
5. **Nationality:** <string>
6. **Marital Status:** Single, Married, Separated/Divorced, Widowed
7. **Level of education:** Primary, secondary tertiary, postgraduate
8. **Current employment status:** Employed, Self-employed, Unemployed
9. **Current occupation:**
10. **Where do you currently work? (Name of the area)**
11. **Individual earning in a month:** No income, 0-25000 KES, 25001-50000 KES, 50001-75000 KES, 75001-100000 KES, over 100000 KES
12. Which estate do you currently live in?
13. **How long have you lived at this address?** Less than 1 year; 1-2 years; 3-5 years; 6 – 10 years; more than 10 years
14. **Residential Status:** Home owner; tenant; living with family in family-owned home; living with family in rental home; government housing; accommodation provided by employer (private sector); accommodation provided by employer (public sector)
15. **What dwelling type do you live in?** Apartment, Bungalow/Maisonette with compound, Courtyard with shared open space, Bungalow/Maisonette with parking space
16. **Do you have green open space in your neighbourhood where a person can relax or children play?** Yes No

STAGE 2: Green space section

17. **Are you aware on the benefits of green spaces?** Yes, No
18. **If yes, what are the benefits?**
19. **Name of green space:** Nairobi Arboretum, Jevanjee Gardens
20. **How frequently do you visit this green space?** Daily, Weekly, Once in two weeks, Once in a month, Once in three months, Once in six months
21. **How many hours, would you usually spend in this green space?** Less than an hour, 1-2 hours, 3-5 hours, Over 6 hours
22. **When you visit this green space, where do you travel from?** School/college, Work, Home
23. **How long does it take you to access this green space?** 0-15 minutes, 16-30 minutes, 31-45 minutes, 46-60 minutes
24. **Which mode of transport did you use to access this green space?** Walking, cycling, public transport, driving private vehicle
25. **Why do you visit this green space?**
26. **Did you visit this green space with company?** Yes no

27. If yes, who? Colleagues, Partner, Family, Team/Club
28. Does this green space meet your needs? Yes no
29. If yes, which one does it meet?
30. If no, why do you think it does not meet your needs?

SECTION THREE USER VALUES AND SATISFACTION LEVELS

31. **How much do you value the following aspects in THIS green space? For the following attributes; Please indicate your levels of importance?** *Very important, important, neutral, slightly important, not important*
Aesthetic/Scenic
Activity/Physical Exercise
Native Plants and Animals
Nature
Health/therapeutic
Social interaction
Cultural Significance

32. **How important to you are the following activities undertaken in your green space? For the following attributes; Please indicate your levels of importance?** *Very important, important, neutral, slightly important, not important*
Casual recreation
Exercise for fitness
Social activities
Children play area
Nature appreciation

STAGE 3: Satisfaction levels

33. For the following values, please indicate your levels of satisfaction How satisfied are you by the adequacy of and condition of these services? (1) very unsatisfied (2) unsatisfied (3) neutral (4) satisfied (5) very satisfied

Quality or condition of green space					
Size of green space					
Accessibility of green space					
Good facilities (e.g. toilets, taps, bubblers etc.)					
Contains light structures					
Contains plenty of mature trees					
Is well-maintained					
Contains a lot of green areas					
Is near a water body					

Beautiful views					
Landscaping					
Contains lots of birds and other wildlife					
Close to my residence, workplace or school					
Cleanliness					
Contains Park personnel					
Design and Appearance					
Sanitation facilities					
Social interaction					
Street furniture; benches, rain shelter					
Cultural significance amenities; statues etc					
Parking provision					
Provision of children facilities					

34. **How much would the following characteristics in your green space reduce its value to you? For the following values, please indicate your levels of consideration** *strongly agree, agree, neutral, disagree, strongly disagree*

Unappealing
Scary/unsafe
Poor management
Noisy
Isolation/not enough people
Presence of street urchins
Lack of security/lighting
Lack of parking provision
Presence of stray animals/dogs
Poor signage/wayfinding
Overcrowding/congestion
Pollution/litter
Too small
Lack of suitable access
Poor recreational facilities
Too far too access

35. what challenges do you face while using this green space?

36. Have you ever participated in the planning and design process of a green space?

37. If yes in what way?

38. If no, why do you think this is the case?

39. Given the opportunity, what would you like to improve in your current green space? Give features and characteristics

GREEN SPACE OBSERVATION CHECKLIST

		Arboretum	Jevanjee Garden
Street furniture	Benches		
	Public arts		
	Rain shelter		
	Aesthetics		
	Utilities		
Light structures	Café/restaurants		
	Service store		
	Washroom		
	Smoking shades		
	Children playground		
Accessibility	Pedestrian bays		
	Pedestrian paths		
	Cycle paths		
	Ramps		
	Bus bays		
	Wayfinding		
	Parking		
Safety	Surveillance camera		
	Security personnel		
	Street lighting		
	Social interactions		
Cultural significance and amenities	Buildings		
	Museum		
	Statues		
	Raised stage		
Biodiversity	Birds and other wildlife		
	Tree nurseries		
	Landscaping		

KEY INFORMANT INTERVIEW GUIDE

1. What are the main functions and benefits of green spaces?
2. Do you think the green spaces are meeting the needs of the users?
3. What are your views on park users‟ satisfaction?
4. What are the challenges faced by Urban Public Parks in the city?
5. What are the possible solutions to the challenges/issues facing Public Parks?
6. Are the parks being used for their designated purposes?
7. How often the green areas are maintained?

8. Which government organization(s) is responsible for planning and management of this green space?
9. What is the main role of Nairobi City County in green areas development and management?
10. How much budget is allocated for the last 5 years for green area development and Management?
11. Who are the main stakeholders participating and will participate in the future?
12. Which institutions (governmental, traditional or community based) are involved in green Space planning and management? Name these organizations.
13. Do local regulations, ordinances, etc. exist for green spaces, trees, nature areas, etc.? If so, please provide examples of these (e.g., tree preservation orders, local nature Protection areas, zoning regulations for open space).
14. How do these local regulations connect to national-level legislation for green space?
15. Can you describe present planning and management of green spaces?
16. What are the most important Strengths, Weaknesses, Opportunities and Threats? Regarding Nairobi's green spaces and their planning and management?

APPENDICES

THIS IS TO CERTIFY THAT:
MISS. SHERLYNE NYABOE OMANGI
of UNIVERSITY OF NAIROBI, 30197-100
NAIROBI,has been permitted to conduct
research in *Nairobi County*

on the topic: *ASSESSMENT OF THE URBAN PUBLIC GREEN SPACE STATUS IN NAIROBI CITY, KENYA THE CASE OF UHURU PARK, ARBORETUM AND JEVANJEE*

for the period ending:
23rd July,2020

Permit No : NACOSTI/P/19/34688/31403
Date Of Issue : 26th July,2019
Fee Recieved :Ksh 1000

.....
Applicant's Signature

.....
Director General
National Commission for Science, Technology & Innovation

THE SCIENCE, TECHNOLOGY AND INNOVATION ACT, 2013

The Grant of Research Licenses is guided by the Science, Technology and Innovation (Research Licensing) Regulations, 2014.

CONDITIONS

1. The License is valid for the proposed research, location and specified period.
2. The License and any rights thereunder are non-transferable.
3. The Licensee shall inform the County Governor before commencement of the research.
4. Excavation, filming and collection of specimens are subject to further necessary clearance from relevant Government Agencies.
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Ref: No. **NACOSTI/P/19/34688/31403**

Date: **26th July, 2019**

Sherlyne Nyaboe Omangi
University of Nairobi
P.O. Box 30197-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Assessment of the urban public green space status in Nairobi City, Kenya. The case of Uhuru Park, Arboretum and Jevanjee"*** I am pleased to inform you that you have been authorized to undertake research in **Nairobi County** for the period ending **23rd July, 2020.**

You are advised to report to **the County Commissioner and the County Director of Education, Nairobi County** before embarking on the research project.

Kindly note that, as an applicant who has been licensed under the Science, Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit **a copy** of the final research report to the Commission within **one year** of completion. The soft copy of the same should be submitted through the Online Research Information System.

GODFREY P. KALERWA MSc., MBA, MKIM
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Nairobi County.

The County Director of Education
Nairobi County.

UNIVERSITY OF NAIROBI

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P.O. BOX 30197-00100
NAIROBI
KENYA

12 June 2019

The Director,
National Commission for Science & Technology
Nairobi, Kenya.

Dear Sir/Madam,

RESEARCH PERMIT: SHERLYNE OMANGI NYABOE

This is to confirm that the above named is a Master of Arts student (Registration Number – C50/5845/2017) at the Department of Geography and Environmental Studies, University of Nairobi registered.

Ms. Omangi is currently undertaking research on a topic titled: **Assessment of the Urban Public Green Space Status in Nairobi City, Kenya. The Case of Uhuru Park, Aboretum & Jeevanjee.**

Any assistance accorded to her will be highly appreciated.

CHAIRMAN
Department Of Geography
and Environmental Studies
UNIVERSITY OF NAIROBI

Dr. Boniface Wambua
Chairman, Department of Geography & Environmental Studies