UNIVERSITY OF NAIROBI

DEPARTMENT OF ARCHITECTURE

AN INVESTIGATION INTO THE GOVERNANCE OF WATER ACCESS IN INFORMAL SETTLEMENTS IN KENYA: A CASE OF KIBERA SLUMS IN NAIROBI COUNTY.

By

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A Research Project Submitted to the Department of Architecture in the Faculty of Built Environment & Design in Partial Fulfillment of the Requirement for the Award of the Degree of Master of Urban Management of the University of Nairobi

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DECLARATION

This research project is my original work and has not been submitted for another degree qualification of this or any other university.

Signed.  Date. 21st July 2022

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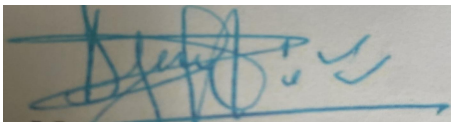
Reg. No. W50/79723/2012

This research project has been submitted for examination with my approval as the University supervisor.

Signed.  Date. 21st July 2022

Dr. Maurice O. Oyugi

Signed.  Date. 26th July 2022

Arch. Erustus O. Abonyo

DEDICATION

For my late Dad *Jack Lucas Ng'iela* and my Mum *Jane Ng'iel*a. Thank you for your stewardship in my pursuit of scholarly greatness.

ACKNOWLEDGEMENT

I wish to thank the Almighty God for his blessings which enabled me to have a sound mind and good health during the period of my study. The successful completion of this research project was made possible by the endless support of friends and colleagues not only at the University of Nairobi but far beyond this great institution. Am particularly indebted to my two resourceful and supportive supervisors; Dr. Maurice O. Oyugi and Arch. Erastus O. Abonyo of the Department Architecture, Faculty of Built Environment and Design, the University of Nairobi who committed their valuable time and knowledge to shape this academic paper to its best.

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ABSTRACT

The supply of cheap housing in cities has led to a steady increase in slum populations. Because most slums are informal and unplanned, they often lack access to even the most basic services. Water is an example of a need that most residents of these slums must pay for than their more wealthy and well-to-do neighbors, despite the fact that the bulk of them are on low incomes (Momanyi, 2005). In this study, we looked at the water governance issues in Kibera, Kenya, which is widely considered to be the largest slum in Africa. We focused specifically on the Public-Private Partnership between the two largest water suppliers in the slum, the Nairobi Water Company and Private Vendors, whose troubled partnership has significantly contributed to the ongoing water governance chaos. Therefore, the purpose of this research was to examine the management of water distribution in Kenya's slums (using the Kibera slums in Nairobi County as a case study). The research used a survey methodology, with 385 randomly selected households serving as the sample size. Each head of household was given a questionnaire that they may fill out in their own time. Using the descriptive statistics and SPSS, we conducted a descriptive analysis. The research found that community engagement in the governance of water access was minimal in Kenya's informal settlements. The governance of water supply in Kenya's slums relied heavily on community input. The regulation of water access in informal settlements was significantly improved with the help of community engagement. Water availability in Kenya's informal settlements was mostly governed by community engagement. Locals' involvement in the project's early stages helped them to better understand their duties, improve the long-term viability of water delivery systems, and give them more say in water development efforts in their region. Their region had a preexisting legislative structure that regulated the administration of water supply in informal settlements. The Kibera informal settlement's legal structure had a crucial role in determining how water was regulated. Kibera, a Kenyan informal community, has serious problems with water access due in large part to the lack of a proper legal framework. The fact that the existing legal framework failed to account for established land tenure system in informal settlements limited the success of water governance in Kibera since substantial capital outlay required for water infrastructure were not provided. The disaggregation of the poor affected governance of water

access in Kibera informal settlement hence matters of the poor was a major factor that affected governance of water access in Kibera. Owing to disaggregation of the poor, the vulnerable groups' or 'disadvantaged' were not catered for, equity was highly limited in the access of water. The disaggregation was key in determining the minimum amount of water per person per day in the light of different needs. This study recommends that the level of participation of the community in governance of water access in Kibera informal settlement in Kenya should be enhanced to avert many challenges that face governance of water access in Kibera informal settlement. The Nairobi City County Government should work with the water service provider (Nairobi Water Company) and in collaboration with the local community and other stakeholders such as NGOs and CBO's to review the existing legal framework on governance of water access in Kibera informal settlement in Kenya. This will help to make the legal framework friendlier to the residents of the informal settlements. The government should also review the existing the existing framework on the disaggregation of the poor. This should be with the view of making it more inclusive as well meet the specific need of the poor in terms of water access.

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ACRONYMS

DO	District Officer
GWP	Global Water Partnership
GOK	Government of Kenya
MBK	Maji Bora Kibera
MDGs	Millennium Development Goals
NCC	Nairobi City Council now Nairobi City County
NMS	Nairobi Metropolitan Services
NWC	Nairobi Water Company
OECD	Organisation for Economic Cooperation and Development
PWV(s)	Private Water Vendor(s)
PPP(s)	Public-Private Partnership(s)
SDGs	Sustainable Development Goals
UN	United Nations
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
WASREB	Water Services Regulatory Board
WHO	World Health Organisation
WRA	Water Resources Authority
WRM	Water Resource Management
WSTF	Water Sector Trust Fund
WSPs	Water Service Providers
WSS	Water supply and sanitation services
WSSCC	Water Supply and Sanitation Collaborative Council
WWAP	World Water Assessment Programme
WWDR	World Water Development Report

DEFINITION OF TERMS

Community participation: Refers to individuals, families, or communities assuming responsibility for their own welfare and developing capacity to contribute to their own development.

Disaggregation of the poor: Refers to categories of slum dwellers as 'vulnerable groups' or 'disadvantaged'. The categorization is too broad to address distinct needs that different members of these categories might have.

Governance: The making and implementation of rules, and the exercise of power, within a domain of activity (Keohane, 2002).

Legal framework: Refers to the government role in providing effective, appropriate supervision of institutions supplying water in the slum areas.

Water governance: Refers to the range of political, social, economic and administrative systems that are in place to develop and manage water resources, and the delivery of water services, at different levels of society (WHO, 2004).

CHAPTER ONE:
INTRODUCTION

1.1 Background

Threatening human existence in many areas, including food production, industrialisation, and the whole ecosystem, inadequate management of fresh water and accessible land resources is a major obstacle to sustainable development and environmental protection. It was determined during the 2000 World Water Forum in The Hague that the water problem is often a governance catastrophe, as stated in the Global Water Partnership Framework for Action GWP (2000). Therefore, GWP (2003) defined water governance as the spectrum of political, social, economic, and administrative structures in place to cultivate and manage water resources and the distribution of water services.

Water management on a local, national, and international scale is guided by the Dublin Principles, which stipulate that: First, freshwater is a limited and precarious resource that must be carefully managed because of its importance to human survival, economic growth, and ecological balance. Principle 2: Users, planners, and policymakers at all levels should be involved in water development and management. The third tenet is that women are crucial in water provision, management, and protection. Principle 4: Water should be treated as an economic good since it has value across all its potential applications. Policymakers, public and commercial sectors, civic citizens, or consumers from centralized to decentralized levels all have a role in water development and management, as outlined in Principle 2. As a result, this concept is crucial in defining other important characteristics of water regulation and administration, such as openness, inclusivity, responsiveness, sustainability, and efficacy. One of the most pressing issues when talking about water access and provision is principle 3, which emphasizes women's vital role in providing, managing, and preserving water.

The word "water crisis" is used to describe a wide variety of water issues that have been occurring all over the globe. Water access and sanitation services for low-

income customers — the poor and vulnerable populations — are an area where private sector engagement in cooperation with the government has been encouraged (Sohail and Cotton 2003).

Since there is no preexisting infrastructure to support urban utility services like water and sanitation, they are severely lacking. Therefore, there is about one pit latrine for every 50 to 500 individuals in Kibera. Twenty ablution blocks have been constructed as part of the Nairobi Regeneration Programme to enhance the slum's access to clean water and sanitary facilities.

Among Kenya's shanty settlements, Kibera has the worst water scarcity. Kibera gets its water via piped water, boreholes, and the contaminated Ngong River, all of which are hawked to residents. Pipes carrying drinking water run parallel to those carrying waste. Refuse and human wastes are transported down these ditches to the river at the valley floor and eventually reaches Nairobi Dam. Plastic pipes are fragile and easily broken, requiring sloppy repairs that put public health at risk. There is a high risk of water-borne illnesses including cholera and typhoid due to the pipes being clogged with debris and patched back together without being cleansed (GOK, 2012).

The Athi Water Works Development Agency initiated free and clean water distribution initiatives for local communities in 2021 as a means of controlling the spread of the Covid-19 virus. Boreholes have been drilled and steel tanks installed above the ground to store the water. Distribution lines generate 2.5 million liters every day. This work mainly benefits the communities of Kibera DC, Silanga, Kianda, and Soweto.

Nairobi City County authorities believe they are not compelled to supply Kibera with efficient amenities like water and a sewage system since its residents are seen as residing there unlawfully due to Kibera's status as an informal community. Because of this, people in Kibera have to pay exorbitant fees to get water from street sellers (Nairobi City Council, 2007).

Kibera's water access problem has been the focus of several efforts. Many water projects were established and implemented in places like Kibera over a number of decades, notably during the United Nations International Drinking Water and Sanitation Decade (1981-1990). Nonetheless, governments, donor agencies, NGOs, and CBOs have begun water projects with little input from the people who stand to benefit (supply-driven approach). Instead, the responsibility for the projects' upkeep and operation has fallen on the shoulders of the respective municipal governments. Because of the difficulty governments have had in maintaining and sustaining these projects due to poor management systems and dwindling finances, many water projects have failed. Coverage and access to water and sanitation systems have declined dramatically, and investments and user benefits have been severely diminished. (UNHCR, 2010).

SHOFCO, KWAHO, and Water Is Life Kenya are just a few of the NGOs and CBOs that have gotten involved in making sure people in Kibera have access to clean drinking water. SHOFCO was established in 2016 with the goal of improving inhabitants' access to potable water and sanitary facilities. To reach more people, they created a system of pipes in the air. With the aerial pipes connecting water kiosks around Kibera, residents now have the water supply without worrying about potential contamination. A total of 24 water stations and 47 public restrooms have been installed and used by over 9500 people in the area since the project began.

However, one of the most perplexing aspects of the water issue is that the water supply is illegally piped in from Nairobi Water and Sewerage Company, henceforth referred to as Nairobi Water Company or NWC. To Private Water Vendors (henceforth PWVs) by way of a formidable network of former and current public officials of the corporation. According to the Technical Director of NWC we interviewed, PWVs buy about half of NWC's water supply and then resell it to end-users at inflated costs. Director claims that NWC "cannot do anything to halt the

unlawful connections" because company personnel "would be beaten up" if they "dared" to enter Kibera to verify or monitor the water (NCC, 2007).

1.2 Problem Statement

According to a cost-benefit study, one of the biggest advantages of bringing water and sanitation closer together is the time people would save traveling between different service locations. When resources are easily accessible, people are more likely to work, go to school, and relax (WHO, 2007). The lack of access to water and sanitation and the rise in water-related catastrophes are two major water issues that threaten the long-term viability of human settlements in the informal sector. Consequences to health, safety, the environment, economic growth, and development from these issues are incalculable (WHO, 2007).

The poorest residents, particularly women and children, are the most marginalized from political participation. Women's health, as well as their sense of self-worth and physical security, are negatively impacted by a lack of access to clean water and sanitary facilities. Because of the societal responsibilities that are expected of them, women and girls, in particular, are hampered in their production by the time-consuming and resource-intensive chore of water collection and storage. Since the poor are less likely to be connected in the first place and more likely to depend on informal suppliers, even the lowest rates may not benefit them. It is estimated that 44 percent of the population in South Asia, 24 percent in sub-Saharan Africa, 24 percent in East Asia, and 6. 5 percent in Latin America and the Caribbean live below the poverty line (WWAP. 2009). Projected urban growth over the next several decades is likely to increase those numbers.

The world bank cites the modest development in Sub-Saharan Africa as a contributing factor to the worldwide slowdown in severe poverty reduction. The rate of poverty in the area fell by 1.6% between 2015 and 2018, according to the most recent available figures. In 2018, this equates to 40 percent of the world's population, with two-thirds of the world's extreme poor residing in Sub-Saharan Africa. However,

although the poverty rate has dropped from 56 percent in 1990 to 40 percent in 2018, the actual number of people living in poverty has increased. In other words, it is anticipated that 433 million Africans would live in severe poverty in 2018, up from 284 million in 1990, and the poverty rate in Sub-Saharan Africa has not decreased quickly enough to keep up with population growth in the area (World Bank, 2020).

As a result of growing urbanization, the urban poor sometimes find themselves relegated to slum-like areas known as "informal settlements," where they lack access to basic amenities like as clean water, proper sanitation, medical care, decent housing, and a guarantee of ownership. Only a fraction of low-income urban residents have access to affordable, clean, piped water. The majority of slum residents are undocumented, which may make it difficult for them to get the infrastructure financing or help they need to make the upgrades to water services that are essential to increasing their access. Many squatter camps are located in low-lying, flood-prone locations, making them prime targets for natural disasters. Large numbers of people living in slums are thus exposed to a high rate of illness.

Water and sewage systems must be made available to new urban residents. While some communities may be fortunate enough to get these services via municipal or county government, many more live in such places and must rely on informal means. As is more often the case, they are typically provided informally by vendors who routinely demand high prices for water of dubious quality. Greater water accessibility is a top priority for local officials (WWAP, 2009). The price of poor sanitation and water infrastructure is steep: Each year, diarrhoea kills 1.6 million children, mostly due to poor living conditions including lack of clean water and proper sanitation. In addition, cleanliness. Lost productivity due to trips to the water supply and polluting of natural areas by wastewater have significant monetary implications.

Despite efforts to eradicate them, urban slum populations persist because of the low cost of housing there. As most slums are informal and unplanned, they often lack access to even the most basic services. The bulk of people living in these slums are not well off, yet they nevertheless have to pay more for necessities like water than those who live in more wealthy communities (Momanyi, 2005). Momanyi (2005) claims that most of the metropolitan areas in developing countries have complex water governance difficulties, especially in the informal settlements. Corruption undermines trust in institutions and contributes to existing issues with water management. As a result, there has to be other options to make things better; include bettering and tailoring the legal framework governing access to water, as well as holding multilateral and bilateral dialogues on effective water governance involving the stakeholders and forming an Association of Water Consumers to represent and protect all the households using water in informal settlements (Momanyi, 2005).

This paper examines the water governance issues in Kibera, Kenya, which is widely considered to be the largest slum in Africa. The authors conclude that the Public-Private Partnership between the two largest water suppliers in the slum, the Nairobi Water Company and the Private Water Vendors, is to blame for the slum's water woes. The water company loses money because private vendors frequently install unmetered water connections. Therefore, this study sought to investigate the governance of water access in informal settlements in Kenya: a case of Kibera Slums in Nairobi County.

1.3 Objectives

1.3.1 General Objective

The study's general objective was to investigate the sustainability of water governance in Kibera Slums in Nairobi County, Kenya.

1.3.2 Specific Objectives

The study was based on the following specific objectives;

i. To examine the effect of the legal framework on the governance of water access in Kibera informal settlement.
ii. To find out how disaggregation of the poor influences governance of water access in the informal settlement.
iii To examine the effect of community participation on the governance of water access in Kibera informal settlement.

1.4 Research Questions

i. What is the effect of the legal framework on the governance of water access in Kibera informal settlement?
ii. How does the disaggregation of the poor influence governance of water access in Kibera informal settlement?
iii. What is the effect of community participation on the governance of water access in Kibera informal settlement?

1.5 Justification for the Study

Past studies on water issues majorly dwell on water supply matters encompassing access, quality, and affordability in terms of cost per litre. This study's findings and recommendations may be of importance to the water sector players such as water service providers, regulatory authorities, and the Ministry of Water and may help the government formulate policies meant to address the governance of water access in informal settlements and beyond. The Study may also fill in the knowledge gap by illuminating the determinants of the governance of water access in informal settlements in Kibera Slums. The Study may further be useful to the Ministry of Water, Sanitation and Irrigation in making key decisions on changes necessary in implementing the governance of water access in informal settlements in Kenya. This includes whether there is a need to increase community participation in the planning and implementation of water access initiatives. Lastly, the findings may be

invaluable to Researchers and Scholars since they may form a basis for further research in areas such as the role of a tripartite partnership between Water Service companies, Private Vendors and Non-Governmental Organizations in the success of governance of water access in informal settlements.

1.6 Scope

The study focused on governance of water access in informal settlements in Kenya. Specifically, the study sought to establish the effects of the legal framework and how disaggregation of the poor and community participation affects the governance of water access in the informal settlement of Kibera. The study was based in Kibera slums in Nairobi City County, which is the geographical area of the study. The study was conducted for nine months, from October 2020 to June 2021.

1.7 Limitations of the Study

The study findings were only generalized to Kibera Slums in Nairobi County as other contextual realities exist between different informal settlements in Kenya. The study was prohibited by apathy from the Kibera Slums residents as the majority of them were preoccupied with their income generation activities and had very little time to attend to our interviews. The high level of insecurity within the valley alleys slowed down the rate of the data collection process. However, the Researcher overcame these challenges by using research assistants who were residents and were well known within the informal settlement. The Researcher also engaged some village elders who assigned local youth to accompany the data collection team to ensure sufficient cooperation by the residents.

1.8 Study Assumptions

This Study took the following assumptions; that the knowledge of the sampled household heads is representative of other households in Kibera informal settlement in Kenya; that the sampled population represented the general population of residents of Kibera; that the respondents were to be truthful and freely give correct information.

The methods of data collection were to be accurate and enhance the accuracy of required data.

CHAPTER TWO

THE STUDY AREA

2.1 Introduction

This chapter presents the physical area of the Study, including other related attributes like history, hydro-geology, and infrastructure that are related to the Study on the governance of water access in informal settlements.

2.1.1 Site and Location

The success of water access governance depends on an effective balancing of the socio-economic, political, legal and physiographical factors supporting the informal settlement. Therefore, a number of factors need to be considered in ensuring access to water in Kibera is achieved more effectively and efficiently, considering all the attributes of good governance. Kibera, arguably the largest informal settlement in Africa, is located in Nairobi County, which is the capital city of Kenya, approximately 7 kilometres from the central business district. The informal settlements' location is bounded by the longitude: of 36° 46' and 59.99" E and latitude: of -1° 18' and 60.00" S covering an area of approximately 2.5 kilometres square. This research study was carried in Kibra Sub-County and more-so in Kibera informal settlement. Kibera informal settlement is situated in Kibra Sub-County of formerly Nairobi South District, comprising mainly Kibera, Makina, Sarangombe, Lindi, and Laini Saba administrative locations. The main attributes of Kibera have continued to influence WSS dynamics within the informal settlement.

The continental, national, regional and local contexts of the study area are represented graphically in Figure 2.1 and Figure 2.2

2.1.2 History of Kibera

Kibera was first a human settlement in the woods in Nairobi's outskirts, and its history is intertwined with that of the Nubian people. These people originated in

Sudan but were transferred to Kenya by the British colonial authority to serve in the East African Rifles. In 1904, after serving with the British army, several men of Nubian descent who had been enlisted in the King's African Rifles (KAR) were given small plots of property on the forest's edge as compensation for their service. When first established, the town was known as "Kibra." "meaning "forest" or "jungle" in the language of the Nubians. Other African ethnicities began relocating to Kenya after its independence in 1963. Kibera is the de facto name since nobody could say the actual name.

There are presently nine recognized villages in Kibera, and each one has a Village Elder responsible for their administration. Located in the northern portion of the valley east of Nairobi Dam are the communities of Kianda, Soweto, Kisumu Ndogo, Lindi, Laini Saba, Siranga/ Undugu, Makina, Mashimoni, and Raila. Military significance is often reflected in place names. For instance, "Laini Saba," from the earlier "Lain Shabaan," is slang for a shooting range. Similarly to the way that military barracks are divided up into "camps," so too was Kibera. Specifically, the region "The Kings African Rifles (KAR) inspired the name "Kambi KAR," which is derived from the Swahili term for "camp." Government officials have attempted to evict Kibera inhabitants several times since the communities first began operating. The use of recognizable names suggests a fight with law enforcement. Soweto, a South African township where students rebelled in 1976, inspired the naming of the community of the same name.

The majority of homes built now are mabati-style, single-story dwellings, with just a select minority opting for higher-rise options. A typical home in Kibera is under 3 square meters in size, and often houses as many as five people (District Officer, 2008). Gatuikira, or small lanes, are used as open sewers and sidewalks, as buildings are thrown up on every available plot of land. There are spots in these alleyways where even a person of average build would have to squeeze to get to the other side.

2.2 Population Structure and Composition

In 2019, the population of Kibra Sub-County was predicted to be 185,768. This included 94,199 men and 91,569 females, who lived in 61690 homes with an average size of 3 persons. As a result of the high population density, the average size of a household in the Kibera slums is 5. With a population density of up to 129,000 people per square kilometre in the Soweto and Makina sections and over 34,000 people per square kilometre in the Lindi section, Kibera slum is situated 7 kilometers from the Central Business District (GOK, 2019). The Laini Saba, Lindi, Kisumu Ndogo, Makina, and Soweto neighborhoods of the Kibera informal community were the primary focus of the research. Water contamination has increased as a result of the high population density, making it more likely that illnesses like typhoid and dysentery would spread via contaminated water. A rise in civil strife over limited water resources is another effect of the pressure. Disputes at water collection lines and communal taps in Kibera about who should get water first and the quantity of jerricans allowed per person are a major source of pollution in the area. Most often, the stress has caused a decrease in the quantity of water supplied to homes, which is below the recommended daily maximum of 40 liters. Because of the high population density, it is crucial that the region be governed effectively and efficiently to guarantee that all inhabitants have access to sufficient supplies of clean water.

CONTINENTAL CONTEXT

NATIONAL CONTEXT

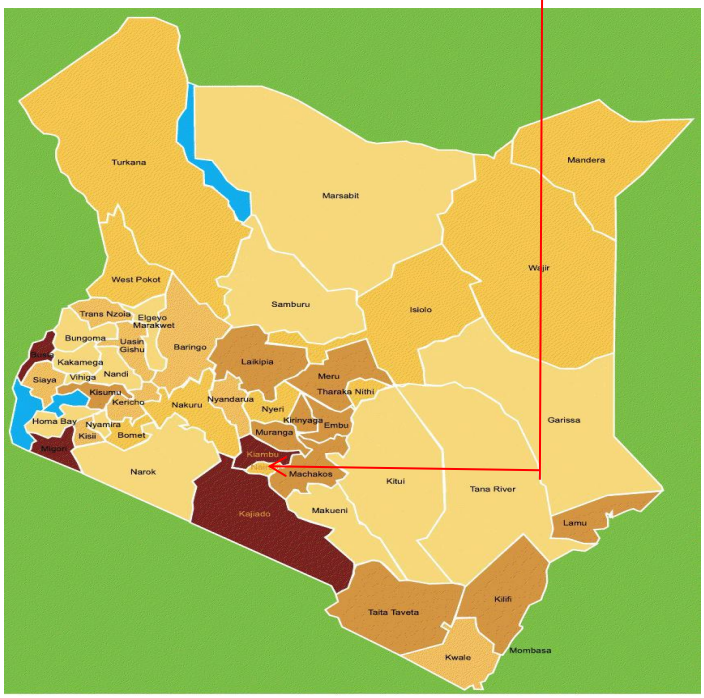
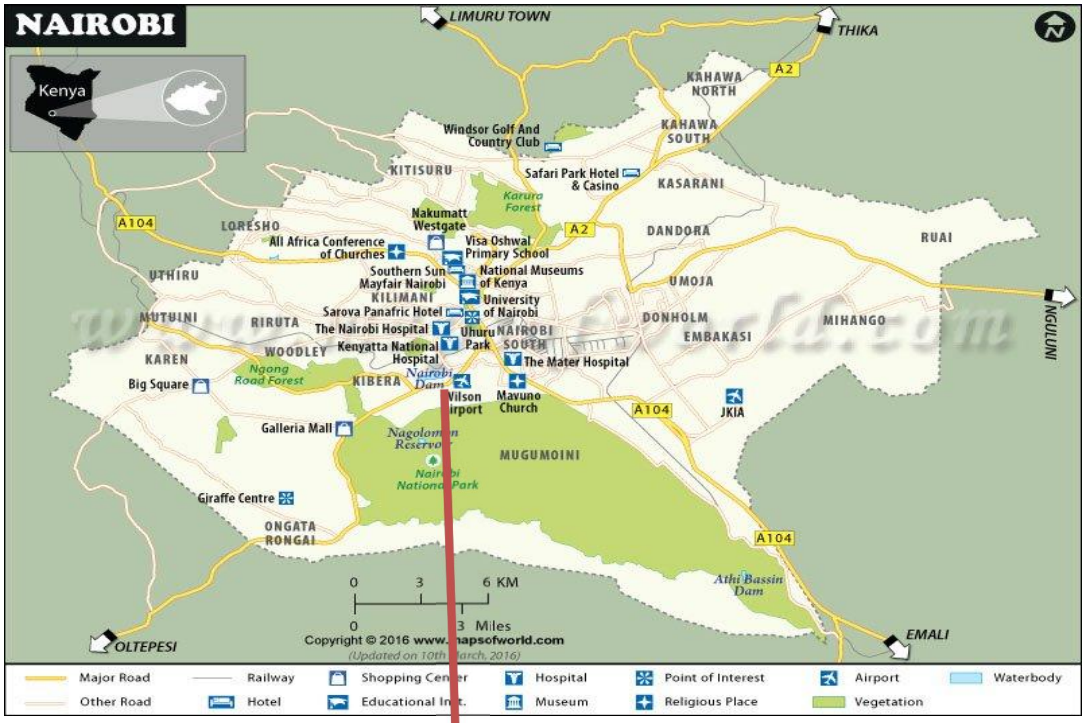


Figure 2. 1: Location Context

Source: *https://geology.com/world/africa-satellite-image.shtml*
Source: *KNBS, 2019*

REGIONAL CONTEXT



Source: RCMD, 2021

LOCAL CONTEXT

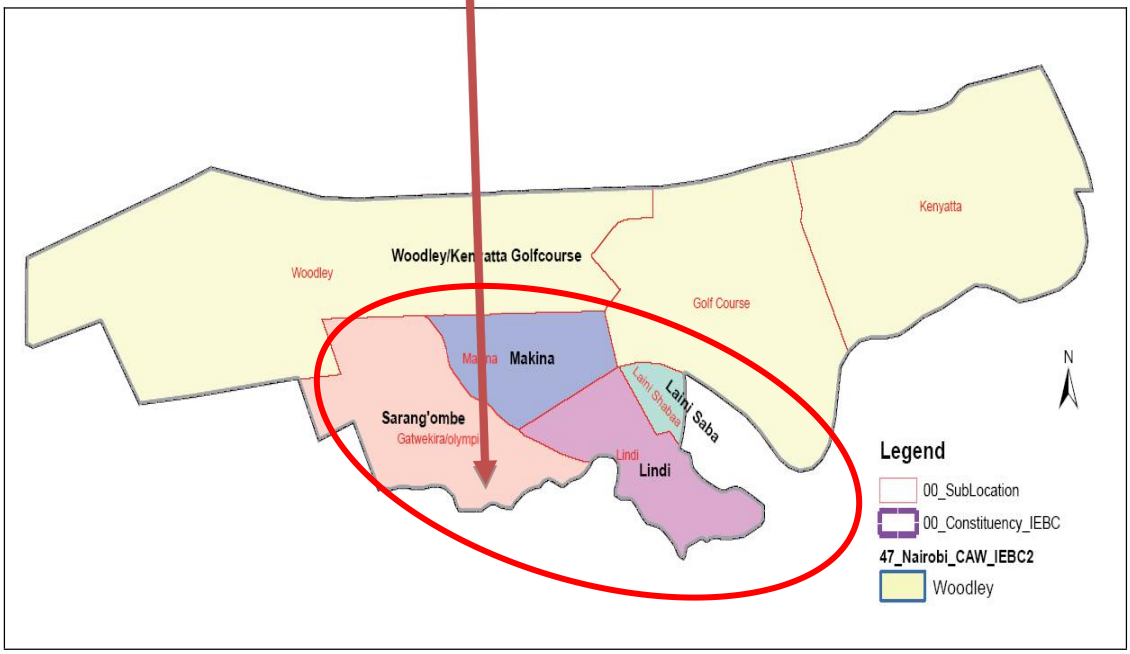


Figure 2. 2: Administrative Locations of Kibra Sub-County

Source: KNBS, 2019

2.2.1 Population Projection and Growth Trends

In the last fifty years, the population of the City of Nairobi has steadily grown from 0.5 million people in 1969 to 1.3 million people in 1989 and 2.1 million in 1999. According to the 2009 census, the population was 3.1 million people, while in the 2019 census, it was 4.3 million. According to the Kenya National Bureau of Statistics, Nairobi's inter-censual population growth rate of 3.8 per cent between 2009 and 2019 is relatively high compared to the total national growth rate of 2.3 per cent over the same period (GOK, 2019). Population projections for Kibera have been made using the growth rate of 2.3%, which currently prevails in the country. The projection is important in determining the budget for the various land uses and the demand for urban services such as water. It also gives a basis for urban infrastructure planning, development and services.

This is the exploration formula used to the Kibera population: P1=P0 (1+r) n.
In this equation, P1 represents the anticipated population, P0 represents the actual population, r represents the annual growth rate of 2.3%, and n represents the number of years. In line with Kenya's long-term development strategy, Vision 2030, this was predicted for the year 2030.

Kibera's projected population from 2009-2030 is shown in Figure 2.3 below. Between 2009 and 2019, the female population expanded by 8.6 percent, while the male population grew by 9.9 percent, resulting in a relatively constant pace of population growth. The estimated 28 percent increase in both the male and female populations indicates that the male population will continue to outnumber the female population.

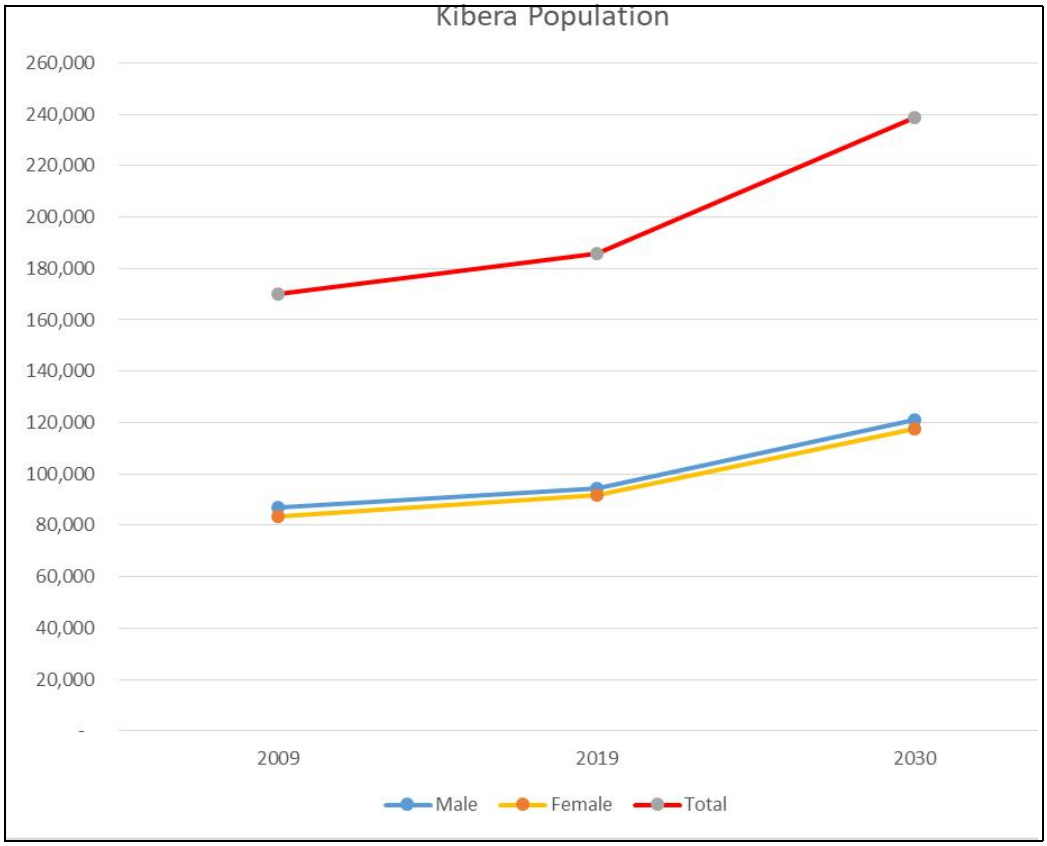


Figure 2. 3: Population projection in Kibera

Source: (Researcher, 2021)

Assuming no changes in other socioeconomic or physical variables, the above population forecasts will be steady as long as death rates stay unchanged. The demand for and availability of water are heavily influenced by population expansion. Increases in population result in a higher need for available water. Therefore, based on the data we have, the need for Kibera's water supply is rising as the city's population rises. As a result, locals are experiencing water shortages. Since the Nairobi dam, historically a major source of water supply and recreation, has been polluted by the massive discharge of municipal wastewater and urban surface drainage into the Ngong river basin, the effect of population growth is more pronounced in the water quality, further straining the water resource availability in Kibera informal settlement.

2.3 Physiographical Characteristics

Physiographical characteristics of the City of Nairobi provide support to a myriad of developments in Kibera slums, affecting water resource availability and quality.

2.3.1 Rainfall

Because of its proximity to the Equator and the Indian Ocean, Nairobi has a more temperate version of the climate typical of the Tropical Savannah. As the sun travels from the Tropic of Capricorn to the Tropic of Cancer across the Equator, it affects the weather in East Africa. There is a low-pressure band, the Inter-Tropical Convergence Zone (ITCZ), that forms throughout the area around the equinoxes. The ITCZ is where the prevalent trade winds from the Northeast and Southeast converge, lifting the air to produce clouds and amplifying the typical weather patterns of the area. It's because of this that cities like Nairobi, which are close to the equator, have two distinct rainy seasons: one from March to June (the long rains) and another from October to December (Oyugi, 2018).

Nairobi receives around 900 millimeters (mm) of rain per year on average, while the amount may range from 500 millimeters (mm) to 1,500 millimeters (mm). Since Kibera is considered part of Nairobi for the purposes of this study, its precipitation totals will be included. The long rains, which occur from about the middle of March to the beginning of June, and the short rains, which occur from about the middle of October to the beginning of December, are the two primary rainy seasons in Nairobi and its environs. The beginning and termination of these rains might occur on a wide range of dates, making accurate prediction difficult. Since the catchment basin in and around Nairobi City relies heavily on this rainfall, understanding its seasonal variations is crucial for preparing for water scarcity and floods during the long rains.

On a yearly basis, renewable freshwater resources are anticipated to yield 20.2 billion m^3. The total volume includes 19.59 cubic meters of surface water and 0.621 cubic kilometers of groundwater. Many variables, like run-off rate and the dryness of

the catchment region, affect the actual quantity of water available for use in any given year. Since Kibera relies on water from Nairobi's catchment regions and groundwater, this is an important factor in the Study. Knowing the rainfall pattern is crucial for all stakeholders in the water sector to know when to expect water shortages and create a plan to mitigate the same, since rainfall levels within Nairobi are vital as they provide a fundamental water supply for catchment regions. Like most of the City's poorer neighborhoods, Kibera is situated in the City's lower regions, close to river courses, where torrential downpours inflict widespread destruction due to inadequate drainage. For Kibera's population to have adequate water access, the city's water sector has to be properly governed.

The rainfall pattern of the City is so unreliable, with annual amounts varying from 500mm to 1500mm, as indicated in Figure 2.4

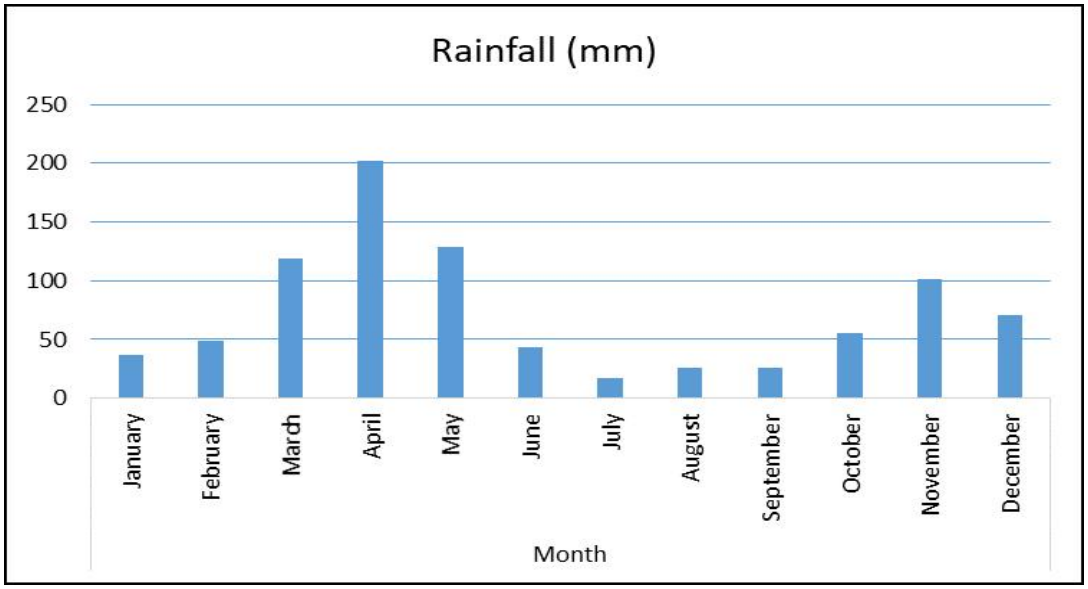


Figure 2. 4: Mean rainfall in Nairobi

Source: (Oyugi, 2018)

2.3.2 Hydrogeology

The Water Resources Management Authority (WRMA) classifies Kenya's aquifers as shown in Table 2.1 below:

Table 2. 1 Kenya's Main Water Aquifers

Category.	Illustration.	Examples.
Strategic aquifer.	A large chunk of a region's water supply comes from aquifers. There are major transboundary aquifers in areas where other resources are unavailable or would need considerable investment in time and money to develop.	Tiwi, Nairobi, central Merti, Sabaki, Nakuru, Kabatini, Lake Naivasha Lamu Island
Major aquifer	Good-quality water from high-yield aquifer systems	Daua and Elgon volcanic rock aquifers
Minor aquifer	Lacking in quality and producing just a trickle of water, aquifer systems are considered to be very rare.	Mandera - Jurassic (Mesozoic-Palaeozoic)
Poor aquifer	Low- to negligible-yield aquifer systems with moderate to poor water quality.	Basement System
Special aquifer	WRMA-recognized aquifer systems	Isinya

The demand and supply management and incentive structures that have been set up for groundwater management can only be identified by examining the country's legislative, legal, and institutional systems. It is essential that local institutions manage four aquifers, with all their activities, accomplishments, and restrictions. In addition to the primary surface water supply sources, the Nairobi aquifer system is of primary economic importance to Kenya by providing supplementary or emergency water for domestic and industrial use in Nairobi. The Merti aquifer is a large fossil

aquifer that provides one of the few reliable water sources in the semi-arid northeast of Kenya. Much of the Nairobi metropolitan area is buried by these Plio-Pleistocene volcanic interbedded with historic land surface and intervolcanic deposits. The groundwater flows eastward from the Rift Valley's eastern rim, recharging a complicated, stratified aquifer system. In the recharging zone, it is unrestricted but becomes so to the east. The major aquifer layer of the Upper Athi Series is normally located between 120 and 300 m bgl, and is restricted. The hydraulic conductivities may vary from 0.01 to 1.3 m/s, while the transmissivities can go from 0.1 to 160 m2/s. The coefficient of storage varies from 4.2 x 10(-1) to 1.2 x 10(-4) The normal depth of a borehole is between 250 and 400 m. (Mumma et al. 2011).

All water resources in Kenya are owned by the government, and using them requires a permission that specifies how it will be put to use, how much of it may be abstracted, and for how long. However, groundwater management in Kenya is not addressed by any specific policies, regulations, or organizations. Instead, groundwater management is within the purview of natural resources, land use, and physical planning, as well as the larger regulatory, legal, and institutional frameworks pertaining to water resources. From the standpoint of groundwater management, the present day legislative, legal, and institutional frameworks fall short. The current methods aren't up to par with what's needed for effective groundwater management, thus they need to be revised.

Over 6 million people, including 4.7 million in the City of Nairobi, rely on water from the Nairobi volcano-sedimentary regional aquifer system (NAS) in Kenya. Underneath Nairobi, groundwater levels have fallen at a median rate of 6 m/decade since 1950, while built-up areas have expanded by 70% since 2000. This 10-fold increase in groundwater abstraction parallels the expansion of urban populations since the mid-1970s. However, current drought circumstances have led to an uptick in requests for borehole licenses, suggesting that climate change may be playing a role despite the lack of discernible patterns in climate data since the 1970s. Since

1950, the groundwater level is predicted to have dropped by an average of 4 meters throughout the whole aquifer region and by as much as 46 meters below Nairobi, with a net groundwater storage loss of 1.5 billion m3. Current trends and projections indicate a six-fold growth by the year 2124. While the regional anthropogenically driven depletion trend may be somewhat alleviated by conjunctive water usage, modeled future management scenarios imply that future groundwater abstraction necessary to fulfill Nairobi's anticipated water demand is unsustainable (Oiro et al. 2020). Since the level of abstraction has grown, groundwater sources are unusual in Kibera, and the rapid depletion below is a cause for concern.

Kibera was formerly covered with forest, but as more and more people move there in search of affordable homes, the trees have been cut down. It might be argued that the people of Kibera are responsible for their own water crisis, since their invasion of the forest and subsequent destruction of the water catchment basin may have led to the shortage in the first place. Depletion of water catchment regions has environmental consequences that impact both the direct victims and bystanders, as well as future generations. Kabete Water Works and Hill Tank Reservoir in Nairobi's suburbs gather rainwater from the city's high-rainfall Ndakaini, Sasumua, Ruiru, and Thika regions and provide it to the informal community of Kibera for residential use. Low volumes from the dams and high demand owing to a rise in the city's population have resulted in a significant drop of amounts of water delivery in Nairobi (and Kibera). Fourty-five percent of Kibra Sub-County people purchase water from vendors, 16 percent buy water from public pipes, and just 11 percent have water piped directly to their homes, according to the 2019 Kenya National Bureau of Statistics Population and Housing Census. Since there is less infrastructure in place, a smaller share of people in informal settlements have access to piped water. Kibera, the largest informal settlement in Nairobi, is in a particularly precarious position because of its proximity to the Ngong River and its lack of adequate drainage systems. More than half of the locals say their homes were flooded during the prolonged rainfall.

2.4 Infrastructure

2.4.1 Housing

Housing can be referred to as many habitable units within an area. Due to rapid rural to urban migration, a number of young people have ventured into an inward migration to urban areas and, more so, major cities, notably the capital city of Nairobi. This inward push for accommodation has led to congestion in the informal settlements where houses of 10ft x 10ft have been constructed using mud and iron sheets.

Relatively affordable housing has led to an increase in the population of inhabitants in Kibera, with the current disputed population size ranging from 200,000 to 1 million people domiciled in a local area of about 2.5 kilometres. This wide disparity is because of the high number of unregistered people living there and because many people constantly move in and out; official government statistics cannot capture this movement (Momanyi, 2005). As shown in Figure 2.5, Kibera is divided into nine official villages, each with its Village Elder. These villages include Kianda, Soweto, Kisumu Ndogo, Lindi, Laini Saba, Silanga/ Undugu, Makina, and Mashimoni. Other new villages in Kibera now include Gatwekera and Raila, among others. Housing accommodation is made of at least single storey iron sheet housing, with the average home size in Kibera being 3 metres by 3 metres and occupants of an average of five people per dwelling unit, as shown in Plate 2.1

Urban utility services such as water or sanitation are minimal. Living structures are constructed haphazardly on every available space, leaving narrow alleys commonly known as Gatuikira, which serve as open drainage of dirty water/sewer and footpaths. Kibera is among many informal settlements in Kenya that suffer from the greatest water shortage. In terms of water sources, Kibera relies on hawked water drawn from piped water, boreholes and, in certain instances, the polluted Nairobi River to meet its daily domestic water needs. In this context, governance matters in water access are essential because the current existing land tenure system does not allow for

permanent housing structures. This has allowed only temporary housing making it difficult to invest in permanent water infrastructure to serve the housing units. Therefore, proper governance structures should be put in place to ensure access to water services by the residents of Kibera.

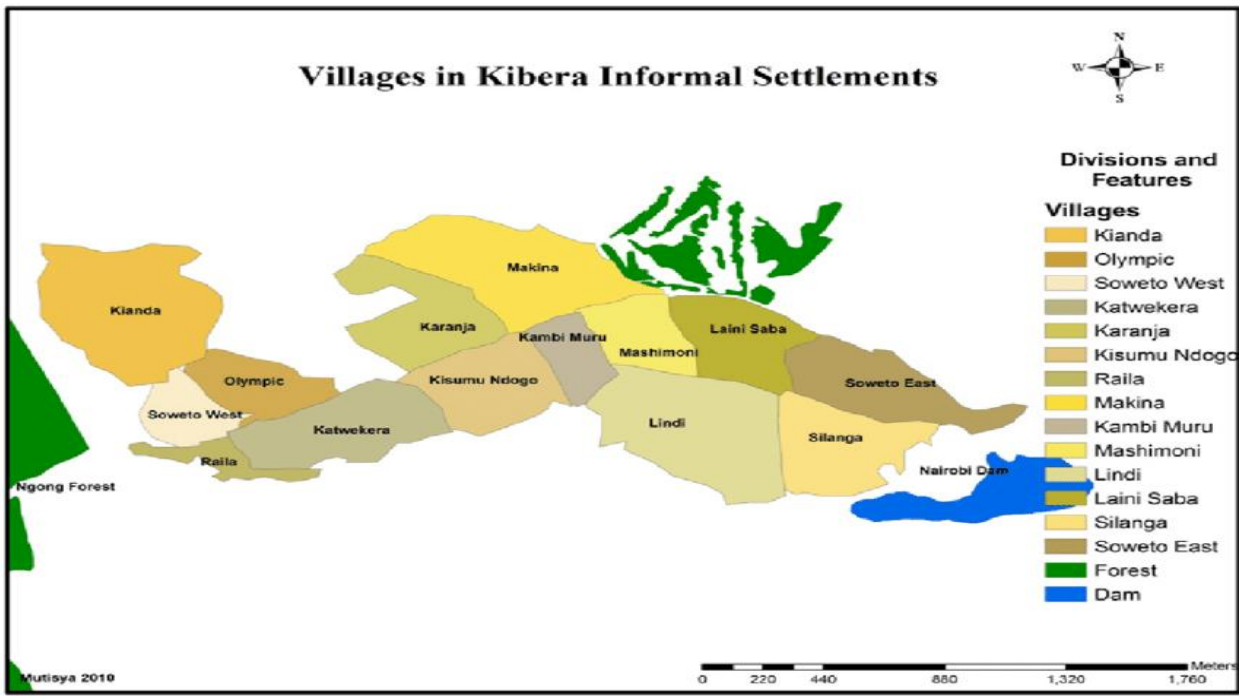


Figure 2. 5: Map of Kibera

Source:https://www.researchgate.net/figure/A-map-of-villages-in-Kibera-informal-settlements_fig5_50392060 retrieved on 18th March 2022

2.4.2 Access Roads

Both the Langata-Southern bypass to Ayany and the Highrise to Makina DC/Karanja route provide paved access to Kibera. One of Kibera's paved roadways is seen in Plate 2.2. New asphalt roads are being built by the Nairobi Metropolitan Services (NMS) in Kibera to increase mobility across the entire informal settlement. After its completion, the project would have added 28 kilometers of new roads to the 444

kilometers of existing roadways in Nairobi County's slums, at a total cost of Sh5.8 billion.

Besides the major asphalt highways, many essential urban amenities such as access to clean water and sanitation are either nonexistent or severely limited. Most homes are inaccessible to cars since the secondary roads and walkways are composed of soil and wash off during the rainy season. Non-Governmental Organizations (NGOs) like SHOFCO that periodically depend on water trucks to deliver potable water services to the people cannot access the housing complexes and instead must position their water vehicles in open areas, where residents must use jerrycans to collect water.

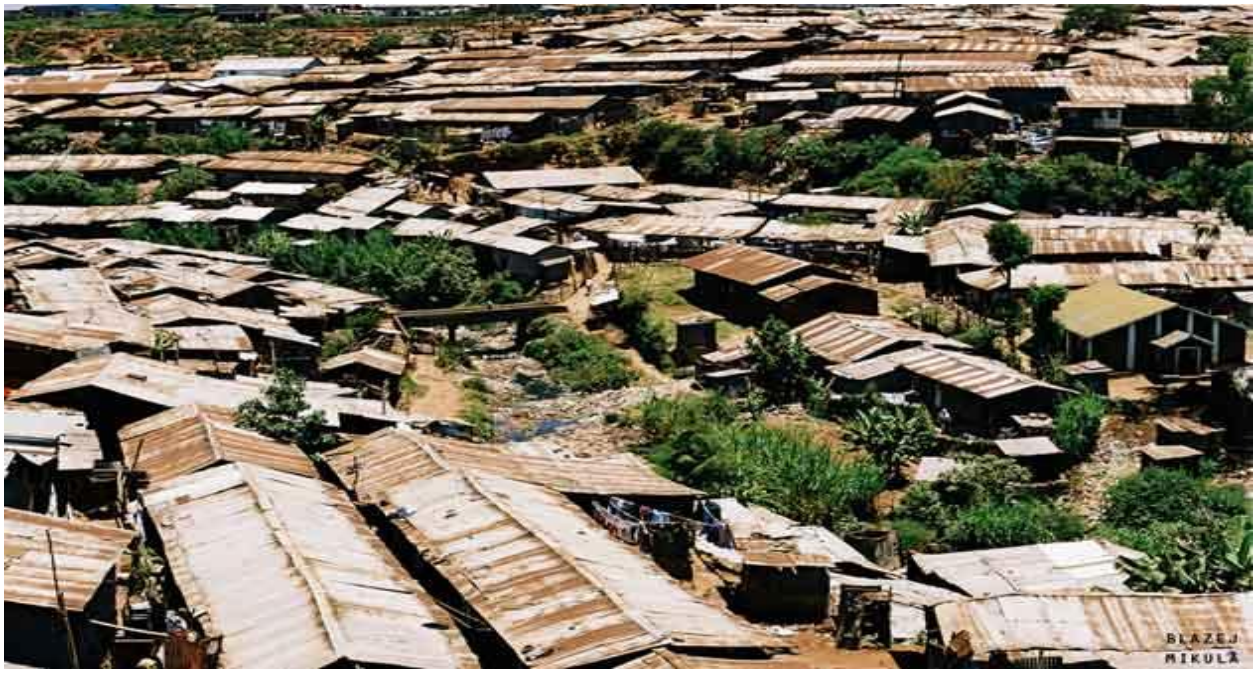


Plate 2. 1: Housing in Kibera

Source: (Researcher, 2021)

In addition to the aforementioned asphalt thoroughfares, Plate 2.2 reveals that dirt roads, which turn muddy during the rainy season, and the narrow pathways known as "Gatwikira" function as open drains for rainfall and sewage throughout the remainder

of Kibera. Due to a lack of drainage, many homes in the area are prone to flooding whenever it rains heavily since the 'Gatwikira' cannot adequately collect the excess water. There are no way outs to the water system since the roads are all too small. Most water lines are constructed of plastic and are located above ground, making them easy targets for vandalism and structural manipulation. Sewage easily seeps in via cracks in these pipes caused by inadvertent foot traffic or purposeful manipulation by vandals or rivals, threatening the safety of the water supply.

Kibera's severe public health status is directly related to the city's water pollution. Diarrheal infections, cholera, and typhoid are only some of the diseases that water, sanitation, and hygiene problems contribute to in Kenya. The slums of Kibera need need better municipal administration and infrastructure. Now that the non-profit group such SHOFCO has installed an aerial water network in Kibera, people can look forward to cleaner water and less chance of theft and pollution.

Plate 2. 2: Tarmac roads in Kibera

Source: (Researcher, 2021)

2.4.3 Water Supply

Clean piped water and sanitation are only two of the many issues that the Kibera informal community must contend with. Most people in Kibera have to rely on vendors to provide their water needs, and not all of those merchants can be trusted. Every individual has the right to water that is both clean and safe, in sufficient quantity, and of appropriate quality, as stated in Article 43 (d) of the Constitution of Kenya, 2010. For those living in Kibera's makeshift communities, these protections exist only on paper. In order to raise the price of water, unscrupulous sellers may simply create the illusion of a scarcity by cutting off water supply to some areas. That's why only around 32% of Kibera's homes have indoor plumbing or a communal water supply for their yards.

In 2016, a new method was developed for installing above water pipes, which was a great improvement for the people living in the Kibera slum. Up until recently, residents relied on tainted water piped in via plastic pipes. However, thanks to cutting-edge aerial water delivery infrastructure, they now have access to pure water pumped directly from a borehole. Kibera's water is still fresh, although it contains more fluoride than water elsewhere. Using reverse osmosis technology, SHOFCO's new, cutting-edge water purification system distributes water through an aerial pipe network to key tanks and eventually to homes via water kiosks.

In many of these communities, people may get water through digital water points and pay for it with token services. A monthly fee is charged and paid using a pay-bill number on a mobile phone in order to keep using the tokens. In Kenya, one can purchase a 20-liter jerrycan for for two shillings (less than 2 euro cents). A lot of Kibera's cartels didn't like the initiative since it made it so they had to lower their rates to stay in business.

Plate 2.3 Aerial water piping system in Kibera

Source: (Researcher, 2022)

The aerial water pipes bring water to kiosks throughout the informal settlement. Although this system does not bring running tap water to each informal housing unit in Kibera, it does bring clean, portable water within a much shorter walking distance; residents no longer need to walk a long distance to fetch water. Access to clean water is finally available in Kibera, and the timing could not have been more critical than now. Other critical interventions in the provision of water and sanitation in Kibera Informal Settlement was a collaboration of the National government with Mazingira Yetu a CBO, which entail the construction of 19 ablution blocks, unblocking, rehabilitation of manholes, an extension of the sewer line to Jamhuri Showground, and laying of 18 km of water supply lines to provide water for the ablution blocks. At the ablution blocks are purpose made water kiosks for access to clean water by the residents. The project is currently 75% complete and set to benefit more than 40,000 residents of Kibera informal settlement.

CHAPTER THREE
LITERATURE REVIEW

3.1 Introduction

This chapter presents the review of available literature related to the study on governance of water access in informal settlements. The chapter also presents the theoretical and conceptual framework of the study.

3.2 Theoretical Review

Kooiman's theory of governance served as a conceptual framework for the research. Kooiman's theory defines governance as "the totality of theoretical conceptions on governing" (Kooiman, 2003), where "governing" refers to "the totality of interactions, in which public and private actors participate, aimed at solving societal problems or creating opportunities for societies; attending to the institutions as contexts for these governing interactions; and establishing a normative foundation for all these activities (Kooiman, 2003).

The following are some of the most important terms in this definition and their analyses. At the outset, when Kooiman talks about "interactions," he is referring to "the multi-lateral connections between social and political actors and entities (individuals, organizations, institutions)" (Kooiman, 2003). Second, the "interactions" process requires the participation and engagement of both public and private players, which necessitates the inclusion of both formal and informal organizations. As a third point, "attending to the institutions as contexts for these controlling interactions; and building a normative framework for all those activities" refers to the particular settings for and standards of interactions (Kooiman 2003).

Self-governance (the ability of social entities to rule themselves autonomously), co-governance (the ability of social and political actors to interact and cooperate in shared matters), and hierarchical governance are all explored and analyzed within the

same work (the top-down system). PPP is considered a kind of co-governance, which is relevant to our current work analyzing the difficulties of PPP in Kibera (UN, 2003).

Some of Kooiman's ideas on governance are fascinating, and they are applicable to the current endeavor, therefore his theory is worth exploring. This is due to the fact that governance encompasses not only the State but also its interaction with private players and civil society. When discussing governance for sustainable human development, the UNDP takes the same stance. According to researchers Roger and Hall, governance "embraces the connection between a society and its government" and "governance includes the state, but it exceeds the state by incorporating the private sector and civil society groups" (Robin 2003). This is a crucial feature of good governance, and we acknowledge that the above-mentioned players are necessary for the proper implementation of government in every given nation (UNDP, 2004).

Distributed governance, as used by Kooiman in particular, describes how both official and informal institutions contribute to policy making. Different perspectives have been used to define and discuss this concept in the ongoing worldwide conversations on efficient water governance (Robin 2003).

The exposition of the Kooiman theory of governance, however, has certain flaws. First, he doesn't give non-hierarchical forms of governance the attention they deserve among the many models of leadership he covers. Evidence from a variety of international contexts demonstrates that effective governance requires a mix of hierarchical and non-hierarchical structures. Since hierarchical steering has impeded proper engagement of civic actors, the existing form of government in Kenya, and especially Kibera, has resulted in inefficiencies in governance generally and water governance specifically. Because of this, we believe that Kooiman's theory is unsuccessful in this investigation because it lacks the non-hierarchical mode that is present in the alternative theories (Kooiman, 2003).

3.2.1 Water Sector Governance in Kenya

Good governance, as argued by Kariuki (2017), is critical for many different sectors providing services to the public as well as the national government. The supply of water, which is necessary for human existence and livelihood security, is one such sector. Managing the water system is a complex endeavor that calls for cooperation between a wide range of official and informal actors as well as a variety of state laws and regulations. Formal and informal actors alike need to have their roles defined, their actions monitored, and their results communicated effectively in order to strike a balance between competing interests and requirements. To achieve this balance, it is necessary to have the full participation of all stakeholders, including the government, community organizations, and consumers, to guarantee that all competing interests are addressed and there is no negative economic, social, legal, or political fallout. It is everyone's responsibility to ensure that water is managed in a sustainable and accessible manner since water is a limited and irreplaceable resource.

Kenya's water laws have come a long way from the colonial era, when they prioritized commercial agriculture and the provision of water services to the settler population above the needs of the indigenous population. However, most legislation on water administration and management still take a top-down approach, leaving people and their water demands on the sidelines even in the newly established African governments.

Since Kenya's independence in 1963, the government has worked to simplify several administrative processes, one of the most essential being the provision of water. With this, we want to begin mending the divides that the colonialists so ruthlessly sowed. A Ministry of Water Resources Development and Management was established to lead these initiatives. A new strategy was required to alter the dominant narrative since preliminary studies indicated that the Ministry of Water's original policy of supporting water projects on a self-help basis in the setting where local people took responsibility was ineffective (GOK, 2009).

The National Policy on Water Resources Management and Development Sessional Paper No. 1 of 1999; the Country Strategy on Water and Sanitation Services; and the Country Strategy on Integrated Water Resource Management are just a few of the government publications that preceded the Water Act of 2002 in streamlining Kenya's water supply. The Water Act of 2002 is the most up-to-date and consequential of these texts, since it brings together key ideas from the others and applies them to the problem of water supply for the whole country. The Water Act serves as a comprehensive statute for the administration of water supplies. Its focus is on the delivery of water services, and it was written to guarantee that people have access to clean water and sewage systems (GoK, 2011).

It aims to transform the water sector in Kenya by introducing radical new approaches to water resource management and service provision. Moreover, it allows for: i. Community input into resource planning and management. To achieve this goal, various stakeholders form Water Resources Users Associations to mediate disputes. The Act promotes catchment-wide cooperative resource management.
ii. The creation of an impartial Water Appeals Board charged with mediating and resolving conflicts between those with water rights and others who don't have any of those rights. Expanding access to water services for all low-income areas by establishing a Water Resources Trust Fund to be administered by Trustees (GoK, 2011).

To summarize, Akech (2007) contends that the Water Act of 2002 produces an inefficient and undemocratic institutional framework for water administration, making it inappropriate for productive private sector engagement. There are too many entities with overlapping duties created by the Water Act, which is likely to produce disputes in reality since the framework is not connected to major existing environmental management institutions. Conflicts between the new water governance institutions established by the Water Act and preexisting water

governance institutions, notably municipal governments, are also expected to arise. Perhaps even more critically, the Water Act is not well-suited to allocate and coordinate institutional tasks. Instead, there is a large but pointless dispersal of these duties. As a result, he draws the conclusion that the drafters of the Water Act failed to successfully find an appropriate institutional framework, and that the Act must be revised in order to encourage the efficient and democratic involvement of the private sector in water distribution. Therefore, the Water Act of 2012 was enacted to address the problems with the Water Act of 2002.

3.2.2 Water Act 2012

When it comes to water laws, nine separate Acts have been consolidated into one: the Water Act of 2012. This streamlined law simplifies and modernizes a framework that had been in existence for over a century but was becoming more antiquated. In that sense, it reflects the needs of today's water infrastructure and needs of the people.

The government holds water resources on behalf of the people of Kenya in accordance with the Water Act of 2012. The Water Resource Regulatory Authority was established as the national government's agency in charge of regulating the management and use of water resources in accordance with the Water Act of 2012.
The Water Resources Authority is a corporate organization with perpetual succession and a common seal established to manage water resources. Previously known as the Water Resource Regulatory Authority. It is responsible for monitoring the government's plans and policies for the allocation of financial, administrative, and technical assets for the purpose of water management and usage.

In accordance with Article 67 of the Constitution of Kenya, the National Land Commission is responsible for regulating the management and use of water resources, and the Water Resources Authority is responsible for formulating and implementing standards, procedures, and rules for the management and use of water resources and flood mitigation.

Basin Water Resources Boards were set up as a result of the Water Act of 2012, with the responsibility of protecting water supplies, enhancing water availability, enforcing rules, and simplifying the creation of Water Resource User Associations. The Water Resource Users Association was established to facilitate cooperative water management and the amicable settlement of water-related disputes; its creation was guided by the Water Act of 2012.

The National Water Storage Authority was established as a result of the Water Act of 2012 and given the responsibility of developing national public water works for water resource storage, maintaining and managing national public water works infrastructure for water resource storage, and making rules and enforcing water harvesting strategies on behalf of the national government.

As a result, the County Government, in conjunction with the water service providers within the County, and through the County Government's institutional structure for water services, have created Water Works Development Boards charged with the task of creating national public water works for water services, as well as formulating development and investment plans for rural and urban areas that aggregate data from county development plans. Its other goals are to give technical help to the water service providers as County Government agents for County asset development in conjunction with the various County Governments, and to contribute to the national development and funding plan created by the Cabinet Secretary.

As a result of the Water Act of 2012, the Water Services Regulatory Commission was set up. The commission's responsibilities include awarding licenses for the provision of water services, validating the water and sewerage rates submitted by the county water service providers, and approving their implementation in accordance with consumer protection regulations.

Supply of water services within the licensing area and the development of county assets for water service provision are the responsibility of water service providers, who are established under the Act.

3.2.3 Water Act 2016

The government of Kenya drafted the Water Bill in 2014, which eventually led to the Water Act in 2016, which assigned responsibility for water supply and sanitation service provision to 47 newly constituted counties in accordance with Kenya's 2010 Constitution. The main goal of the Water Act of 2016 was to bring the water industry into compliance with devolution as outlined in the constitution. For this reason, the Act represents a significant step forward in the regulation of the sector, since it prioritizes the use of water for residential purposes above irrigation and other uses and acknowledges that water is a common resource between the national and county governments. Additionally, it establishes measures to guarantee water supply to unconsolidated communities, like those in informal settlements. The operation of the Act is clearly illustrated in Figure 3.1 below.

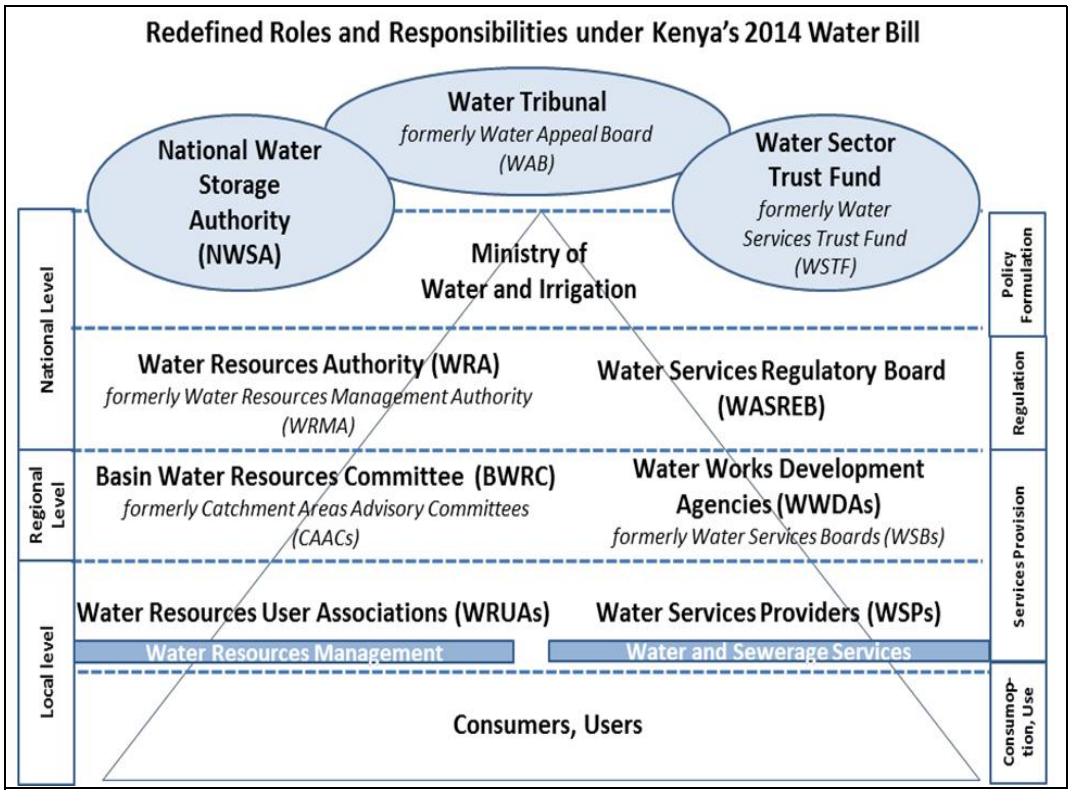


Figure 3. 1 Water Act 2016

Source: https://www.2030wrg.org/2016

These new entities were formed, and the Water Act 2012 bodies that were previously in place were given more authority and responsibility, under the new law. It established a new Water Tribunal with more people and more places to handle complaints. The alignment also resulted in the establishment of a Water Sector Trust Fund (WSTF), with funding coming from a variety of new places outside only the federal and state governments. For the sake of water resource management and flood control, the National Water Storage Authority was also established.

3.3 Population Growth and Water Governance

The global population is projected to increase from its current 7.8 billion to 9.7 billion by the year 2050, a growth rate of more than three times the rate of increase seen over the last century. Although there is no intrinsic worldwide water shortage, a

handful of locations are perennially short of water due to rising water demand at a pace that exceeds the rate of population growth (IPCC, 2007). Since a growing number of people must rely on a finite supply of natural resources to make a livelihood, we can all agree that population expansion and environmental deterioration are inextricably linked. Population growth is only one of several variables that impact WRM and add to the strain on the world's water supply (Liu and Chen, 2006). The people who live in and around a watershed expect the watershed to provide them with a variety of services. Water demand and supply are controlled by a number of physical, legal, and institutional mechanisms. Watershed habitats start to degrade, for instance, when the demand for water rises over a particular threshold. Population, resource, and constraining factor data are all important for watershed management (Poudel, 2003). It is becoming more complicated and challenging to manage the surroundings in which people live, as observed by Gregersen (2007) in their research on integrated watershed management. They note that growing human populations put strain on the planet's natural resources and spur the invention of technology that enable humans to wreak havoc on the environment with less resistance and in less time.

Industrial wastes and chemicals, human waste, and agricultural waste all contribute to water pollution and deplete fresh water supplies (World Water) (fertilizers, pesticides and pesticide residues). It has been found that one estimate puts worldwide wastewater output at over 1,500 km3. For the sake of argument, let's say that 1 litre of sewage pollutes 8 litres of freshwater. Around the planet, pollution levels might be as high as 12,000 km^3. Critical problems lay ahead in dealing with growing water shortages and water pollution, and as always, the poor are the hardest impacted, with 50% of the population of developing nations vulnerable to dirty water sources (World Water Assessment Programme, 2003).

Today, cities are home to almost half of the world's population; by 2050, that number is expected to rise to more than 60 percent. Over the same time period, worldwide

water consumption is expected to grow by 55%, with over 4 billion people living in water-scarce locations. This implies that there will inevitably be intense rivalry among many sectors of the water user community, including the agricultural, energy, and urban sectors. That indicates that the security of our water supply is in jeopardy unless something is done. Public policies play a crucial role in addressing present and developing difficulties in this field since water is of public interest as the livelihood for current and future generations. If we don't want future generations to be saddled with debt and expenses, we need to ensure that water-related risks are managed effectively and efficiently in our cities today. Water problems include more than just hydrology, finances, and infrastructure, and are typically characterized as governance disasters. They often shed light on gaps in knowledge about who does what, at what level of government, and why when it comes to public policy making (OECD 2016). This research seeks to address the knowledge gap about the effects of Kenya's current legal framework on the management of water supply for the most vulnerable people of the Kibera informal settlement.

Despite the fact that having access to water has been recognized as a basic and inalienable human right, many women and the most vulnerable people in the world still lack it (WWDR, 2003). Lack of access to adequate and clean water is directly responsible for the deaths of around 2.2 million individuals in underdeveloped nations every year (WSSCC, 2004). More than half of the world's 1.2 billion people without safe water sources are women (ibid.). In addition, women and girls in most developing nations are responsible for home and communal water supply and management (Ekejiuba, 1995), with some spending more than 8 hours per day carrying an average of 15 Iitres of water across distances of 10–15 kilometers (UNIFEM, 2003). The lives of women and girls, especially, will be profoundly affected by these obligations. Carrying water "not only causes them bodily diseases, but also makes it impossible for people to engage in activities like as education, money generating, politics, leisure, and enjoyment," as Obando (2003) notes. The

fraction of the world's population that lacks access to, or can't afford, adequate drinking water is a major obstacle to meeting the Millennium Development Goal.

Residents in informal settlements often struggle to satisfy urgent personal requirements and familial responsibilities due to a lack of work and/or low pay among the employed. When women's other resources for making ends meet dry up, it's not uncommon for them to expand the number of sexual partners they have in order to ensure that they always have enough money to cover essentials like housing, food, clothing, and education for their dependents (Zulu, 2002).

Not surprisingly, water management is no simple undertaking. It may be difficult for women to balance their jobs as water suppliers and managers with other responsibilities, such as taking care of the home's heating and cleaning needs, which might limit their ability to become involved in community issues (Obando, 2003). In the informal settlements, securing water may be an expensive task in and of itself. Slum dwellers in Kenya spend at least five times as much per liter of water as their wealthy counterparts in the West. The cost of water is higher for residents in Nairobi County's slums than it is for those who live outside of the slums but are still connected to the city's main water pipelines. From 0 to 6 metres square, the Nairobi Water Company (NWC) charges a fixed cost of Kshs. 204, whereas from 7 to 60 metres square, customers are taxed at a rate of Kshs. 53 per square metre. In contrast to the slums, where water vendor kiosks charge between Kshs. 2 and 10 per 20-litre jerrycan. To prevent water pollution, vandalism and theft of subterranean pipes, the non-profit organization Shining Hope for Communities (SHOFCO) installed aerial piping and water vending devices that accept plastic tokens from customers for a modest rate of Kshs. 2. Southern Region Coordinator for NWSC Philip Gitau has said that providing the Kibera informal population with reliable piped water is challenging. This is because the vast majority of homeowners despise water meter boxes and instead choose the anonymity and convenience of water from redirected pipes. After taking a look at how water is governed in Kibera, it's clear that NGOs

play a vital role in making sure that everyone has access to clean water that meets their needs.

3.3.1 Water Situation

The results of Participatory Poverty Assessments (PPAs) highlights water and governance as critical issues for the world's most disadvantaged people. Poor people value clean water and decent governance for their own sake, regardless of the benefits they may provide to their health or education (Kamminga and Schuringa, 2003). Providing better water and governance infrastructure is not just a means to an end it is the aim itself, helping to lift impoverished communities out of their plight. Water supply and management in developing nations saw massive infrastructure developments in the 1980s and 1990s. According to Woodhouse (2017), narratives that tried to center governance at the river basin scale, to limit water usage in favor of protecting and restoring water resource ecosystems, and to promote economic efficiency via market mechanisms have shifted to emphasize scarcity. Some nations have made structural changes to their administration, whereas the trajectories of other countries have been more evolutionary, driven by domestic conditions and hence including the local needs and ambitions of the people.

According to the WHO's assessment report from 2000, a large percentage of the world's population still lacks access to safe drinking water and effective government. There was an increase in water availability by 800 million people and governance by 750 million between 1990 and 2000. (WHO 2003). Considerably less than one percent of these enormous populations. There was an increase from 79% (4.1 billion) to 82% (4.9 billion) of the world's population having access to an improved water supply, and from 55% (2.9 billion) to 60% having access to enhanced governance facilities (3.6 billion). Some 40% of Africans and 52% of Asians, respectively, lack access to adequate water supply and governance. Even if the rate of access is greater in other parts of the globe, many millions of people in Latin America and the Caribbean still lack it (WHO, 2003).

In 2019, the proportion of the population with access to piped water ranged from 47% in rural Africa to 100% in Northern America and Europe. The starkest example of these geographical differences is in the area of rural government, where Asia only has 31% coverage whereas Northern America has 100%. (WHO, 2000). Comparatively, just 24% of the population in Africa and 49% of the population in Asia have access to piped water via home connections, whereas 66.0% of the population in Latin America and the Caribbean does. In regions where government is present, almost half of the population uses sewage systems, but just 13% of Africans and 18% of Asians do (WHO, 2000).

In 2002, the World Health Organization estimated that around 1.1 billion people lacked regular access to safe drinking water, and another 2.4 billion lacked fundamental aspects of governance. The impoverished and the vulnerable in rural regions and urban informal settlements were hit the hardest. They go without clean water and a place to properly dispose of waste in silence. UNICEF reports that one third of the world's population does not have access to clean water, forcing them to drink from rivers, lakes, shallow wells, and ponds that are often polluted and spread illnesses like cholera and diarrhea. Infections spread by polluted water or human waste are the second largest cause of mortality among children globally, behind respiratory diseases, and the survey shows that over 700 children under the age of 5 die every day as a result. The number of children who chronically skip school due to illness increases inequality in already underprivileged areas. There is a detrimental effect on food security, livelihood options, and educational prospects for impoverished families all throughout the developing world due to water scarcity, poor water quality, and bad governance. The present water use disparity between developed and developing nations is staggering, with the former using 30–50 times as much water as the latter (UN-HABITAT, 2003). Consequently, achieving Goal 6 of the Sustainable Development Agenda, which calls for access to clean water and

sanitation, requires a regulatory framework that promotes effectiveness, efficiency, and inclusion.

The continued danger to human health from substandard water supplies is a pressing concern. Diarrhea alone is responsible for an estimated 11% of the total daily global disease load in 2019, leading to the deaths of l.8 million persons each year. According to estimates, children in impoverished nations bear the brunt of this problem due to poor water, sanitation, and hygiene. When it comes to providing access to water, government is decades behind. Sub-Saharan Africa and South Asia, both of which have 37% coverage, are at the epicenter of the governance issue, making this MDG one of the most difficult. There is cause for hope given that South Asia has made twice as much progress since 1990 in governing water access as China has, but still a great deal of work has to be done given that just a third of the world's population is without access to clean drinking water.

The fast expansion in the population in Africa since 1990 has outpaced the rate at which government coverage has improved; as a result, the number of unserved persons has increased by 111 million. However, China and India, two of the world's most populous nations, have among of the lowest coverage levels across the board. It's not only Yemen that has a dismal degree of government oversight; Afghanistan, Cambodia, Mongolia, Myanmar, Nepal, and Yenisei also have this problem. Enhancing governance coverage must be a top focus (WHO, 2003).

Given the high priority the poor place on water and good government, several governments have redirected substantial investment dollars in these areas in order to help those in need. For instance, in 1996, after hearing that access to clean water was a top priority for the poor, the Kenyan government committed one-third of the debt relief funds received by the country as part of the Heavily Indebted Poor Countries (HIPC) initiative to bolstering the country's water infrastructure and enhancing its ability to effectively govern its water resources. In several nations, water and good governance are essential issues in every political party's platform during national

elections. During the 2022 election campaigns in Kenya, major political candidates have promised voters that they would improve access to clean water for drinking, farming, and industry. From 1971 until 1991, the City of Nairobi received World Bank money to improve urban housing affordability, water delivery, and sector governance. Water supply increased at the same rate as the urban population, according to an analysis of these projects, while tariff restructuring kept water prices low (World Bank 1996).

Despite the fact that the urban population has increased by a factor of two over the rural population in the last century, the proportion of the urban population that is actually connected to a water supply has been steadily declining (WHO 2003). The prospect of a sustained increase in per capita water demand in the area is low due to the strain that rapid urban population growth is placing on municipal supply systems (Thompson et al. 2003). The health and dignity of all people depends on their ability to access a sufficient and clean water supply and on the effectiveness of their government.

Kenya is a water-scarce nation due to its meager yearly renewable freshwater resource of 647 cubic meters per inhabitant (UNDP, 2004). The proportion of the population that has access to clean and safe water is 59% on average, 66% in urban areas, and 42% in rural settlements, as reported by KNBS (2019). Water collection is a time-consuming task that frequently stops women from engaging in income-generating activities or, in the case of girls, inhibits them from attending school, and just 42% of the rural population has access to an improved drinking water source.

Women and girls who have easy access to water near their homes may devote that time and energy to building a stronger economy via employment and education. Improving home water supply services helps alleviate "time poverty" among women, who lose a total of 40 billion working hours per year in Africa due to the need of carrying water (Cosgrove & Rijsberman, 1998). Wajir has the lowest rate of access to clean water in Kenya at 2%; Makueni County has the lowest at 3% with just 9% having access to the public standpipe; Migori and West Pokot have the lowest at 1%. (KNBS 2019). Unless appropriate institutional frameworks are in place to guarantee

good governance, water-borne illnesses that are caused by insufficient clean water supply will be on the increase. Over 60% of premature deaths in Kenya may be attributed to the high prevalence of infectious diseases. Malaria accounts for 32.6% of all cases of illness in Kenya, with respiratory illnesses coming in at 24.6%, diarrhea at 17.2%, and intestinal worms at 0% (UNESCO, 2006).

3.3.2 Water Resources Utilization and Governance

The quality of life and economic output of a country's citizens are directly and significantly influenced by the availability of water, which is a crucial resource everywhere in the globe, including Kenya (Lukwiya, 2009). Nevertheless, there are obstacles and growing demands in the way of water resources are used (Mohammed, 2004). Numerous technological, economic, social, and political aspects affect the efficiency with which water is used, making it necessary and advantageous to innovate, exert influence, and alter current practices in order to maximise water's usefulness (Mualla and Salman, 2002). Previous research has focused on the elements that affect efficient water usage, but this study will broaden that scope by looking at the many different industries that make use of water. However, millions of the impoverished have trouble gaining access to water for reasons that go beyond the physical resource base, and the situation can be salvaged only via good governance. This is particularly true in low-income neighborhoods, where meeting current demand would make water conservation efforts futile. This necessitates the categorization of all current water sources in order to maximize productivity (Guttman et al. 2009).

While Lake Victoria, the Tana River, and other water aquifers in Kenya are often cited as examples of the country's abundance of fresh water, their distribution through time and space is very variable (Cong, 2007). Water resources have not been properly utilized to make them available to the people, hence present utilization rates are still low. Growing needs for irrigation, home usage, and manufacturing processes have all contributed to shortages in recent years. Water resources that any nation may

sustainably exploit economically are, however, sadly, still rather little (Des Grees du Lou, 1999). Many factors are now contributing to the deterioration of water quality and the increasing demands on water resources to be used (Mohammed, 2004). Challenges to water resource usage in Kenya today include, but are not limited to, rapid population expansion, growing urbanization and industrialisation, unchecked environmental deterioration, and pollution (Lukwiya P, 2009). Given this, it's important to recognize that the ways in which water is accessible, utilized, and managed may be impacted by preexisting legal and regulatory frameworks, and therefore, the extent to which water resources contribute to sustainable lifestyles. In addition, inadequate policies contribute to the waste of natural resources that has a negative impact on people's ability to make a living. For the most part, indigenous water management systems were predicated on the idea that water may be used freely and openly for particular purposes while remaining under the exclusive jurisdiction of some people (Orindi, 2005).

3.3.3 Relationship between Community level of Literacy, Water and Governance

In many places, the accessibility of water supplies depends critically on the level of education in the populace. This indicates that a community's capacity to effectively manage its Water Resources is related to the quality of education it provides its residents (Juwanaet al. 2009). The Earth Summit's Agenda 21 mandates decentralizing water management to the local level, and this in turn necessitates training and education for water management personnel at all levels. Adoption and maintenance of technology may be challenging in areas where residents lack technical expertise (World Bank, 2004). There is a clear correlation between rising educational and health-hygiene-awareness levels, and the need for more secure government services. As a human, industrial, and ecological resource, water is essential to ensuring a bright future. To "ensure availability and sustainable management of water and sanitation for everyone," the United Nations' Sustainable Development Goals (SDGs) for 2030 have been increased.

However, recent research has shown that lack of knowledge about water resources and systems is a major contributor to unsustainable water management and consumption. In rural parts of poor nations, where traditionally ascribed gender roles in water administration retain power. Gondo et al. (2020) emphasizes that demographic and socio-economic variables impact water resources governance at the family level. They examine the demographic and socioeconomic aspects that contribute to the tension between customary and statutory institutions in the management of water supplies, drawing on concepts from the institutional bricolage and mass-elite theories. Although males are more prominent in the water governance decision making process, we discovered that they also play major roles in water collection, disproving the common belief that men make all water access choices and women are the primary family water collectors. Stakeholders need a knowledge of the water resources already in place, as well as a basic education, to be an active part of the solution.

Better waste management practices are more likely to be demanded and adopted by households whose members have higher levels of education (United Nations, 2003). Health is given more importance by those with more knowledge, which in turn increases the need for better water governance automation. The capacity of communities in informal settlements to manage their systems depends on the assistance of private organizations and NGOs in the form of social inter/intra mediation and the provision of extensive training and counseling.

Control, particularly financial control, must constantly be handed as much as possible to the community in order for programs to succeed (Palmer, 1998). The likelihood of a system's long-term viability increases if its users have a hand in starting the project and determining its most important details. Through public engagement, you may increase the visibility of such services, resulting in more demand for them and longer-term viability. Communities, private contractors, and other organizations must have healthy working relationships with one another, with

the community serving as the customer and the contractors and other organizations receiving appropriate incentives. According to Palmer (1998), who evaluated the Mvula Trust water project in the Republic of South Africa for the World Bank, community buy-in and increased grant funding per person both contribute to the long-term viability of a project.

3.3.4 Effects of Cultural and Economic Factors on Governance

Small businesses, especially those operating at the cottage-industry level, may benefit from an increase in the availability of water. If a proper water distribution system and enough government services are not already in place, these enterprises might choose to build them (Hutton et al. 2004). Brick casting, pottery, brewing beer, selling tea, hairdressing, laundry, and handicraft are just a few of the many commercial pursuits that rely on clean water. Increased food security may result from better livestock farming and market gardening made feasible by a more reliable supply of household water. In Zimbabwe, for instance, it was discovered that irrigation projects enabled vegetable fields to provide annual food sales of US$2000 (WHO, 2003).

There has to be increased allocations of resources for water projects on both the international and national levels, which requires fresh lobbying and appraisal of existing water programs. Improvements in water supply and governance are often seen through the lens of health; hence, fewer cases of sickness are among the direct and immediate effects. The World Development Report (WWDR) from 1993 made the following recommendations: "Diseases spread by feces are very widespread in underdeveloped nations, and this is mostly due to a lack of water and proper administration. " There are five illnesses that are almost usually directly related to inadequate water and governance supply in informal settlements (WHO, 2003).

A growing proportion of the global population living in poverty is both a symptom and a cause of the water governance dilemma, which has devastating consequences for all human beings. Offering disadvantaged communities access to high-quality

water resource management is a crucial step toward ending poverty. A rising number of people in the developing world have inadequate access to water, but experts think that with the right management, this problem may be solved (World Water Assessment Programme, 2003). It should also be mentioned that 1.6 billion of the world's population is in developing nations that lack the infrastructure necessary to transport water from its natural sources (rivers and aquifers). The economic water deficit may be traced back to a country's extreme poverty and/or economic difficulties (IPCC, 2007). Consequently, there is a clear connection between poverty and water problems; if poverty levels in a nation are reduced, then there will be a greater likelihood that the country's water supply will be secure (Sullivan, 2002).

Many families must shell out hard-earned money to purify their water by boiling it, store it, or buy it from vendors since there is no other viable option for them to get the water they need. Purchases of water, in particular, may be among the most expensive of these considerations (Hutton et al. 2004). At 2 shillings per 20 liter container, the fee is still eight times that of the lowest tariff for residential connections and four times that of the average tariff in Kenya, as noted in the World Water Development Report of 2003. Water rates in Nairobi's informal settlements are estimated to be Kshs 5 per 20 liter jerrycan, or over Kshs 500 per cubic meter, during times of shortage; this is significantly higher than water rates charged anywhere else in the world and is approximately twenty times the price paid by those with piped connections for the same amount of water (Seureca, 2002). Each user must pay a fee in order to make use of the latrines and other water facilities in the informal settlements that are within the purview of formalized administrative systems. Predicting and explaining families' decision to pay for improved water supply services requires taking into account both social pressure and household attitude.

Water governance, and even the realms of discussing governance in the well-coordinated and managed water resources and sanitation, are strongly influenced by

cultural norms in Africa. For many cultures, dealing with human feces is a very offensive subject that should be avoided at all costs. Because of the stigma attached to dealing with human waste (WHO, 2000), people are often hesitant to take on the responsibility of overseeing sanitary facilities. Most toilets in Kenya's informal settlements are shared by more than a hundred families, regardless of gender or age, despite the fact that customary aspects prohibit sharing toilets between adults and children, men and women, in-laws and outsiders in general (United Nations, 2000). Most water and sanitation facilities are owned communally, which limits individual use and encourages the development of alternative systems for disposing of human waste.

3.3.5 Water Resources Governance

Managers in the public sector, especially in corrupt Southern nations, are unaccountable because they prioritize personal gain above the public good. Without checks and balances, the political elite may exploit their position to enrich themselves at the expense of their constituents by choosing managers and staff members based on political affiliation rather than on the merits of the applicants. Nepotism's ability to redistribute wealth to the political elite is tempered by the fact that it wastes public funds by filling government positions with people who aren't qualified for them. Swyngedouw (2004) reported that there were as many as 1,500 individuals on the payroll at the public water service in Guayaquil, Ecuador, in the early 1990s, many of whom got pay checks but never showed up for work. This was before the business was privatized in 2000. Both free market ideologues and water justice movement activists agree that accountability is an important issue, but they disagree on how to address it. However, the issue of what kind of limitations would be appropriate to fix the problem arises. Improvements in institutional responsibility to promote rule-bound conduct are supported by both camps as a means to better performance and public service delivery, but there is fundamental disagreement about who should create these rules and what they should look like. Privatization, according to advocates of the free market, is the "short way" to utility reform since

the profit-motive operates as the most effective restriction on human conduct (World Bank 2004). A senior member of the World Bank's staff, Menahem Libhaber, is quoted below making the case that the private sector requires more efficient and professional management than the public sector (because, for example, private sector managers are not "replaced every three years") because private sector managers have to respond to "economic" or market imperatives rather than "political" ones.

Water is an essential element for maintaining and expanding human civilization. Water is a precious resource that needs extra care for a number of reasons, including its usefulness and the difficulties posed by water overuse, scarcity, and degradation (Pinderhughes, 2004). The term "Water Resource Management" refers to the practice of influencing the hydrological cycle for the sake of societal and economic progress. The benefits of water usage and the avoidance, reduction, or avoidance of problems caused by either water plenty or scarcity are all part of this (Olokesusi, 2006). As with other sectors of the Kenyan economy, there are a number of legislative and institutional weaknesses and a lack of capital infrastructure to practically manage water resources, all of which contribute to the main scope of WRM: poor watershed management, inadequate water accessibility and quantity, poor water quality, and a lack of adequate institutional capacity (Syngellakis and Arudo, 2006).

The topic of gender and water governance has been extensively researched and written about. While this literature's case studies cover a wide range of topics, a common theme implies that women are expected to take care of water needs at home but are often excluded from decision-making in traditional social structures. Women and men should have equal say in water allocation negotiations, as recommended by good water governance. However, research suggests that men are more often the ones who make the call on how water is managed. Despite the fact that males and females do not share the same water-related passions, this remains a constant. Some academics contend that this culturally assigned gender position ignores and restricts women's agency in water management, despite the fact that it is a cultural norm (Gondo, 2020).

Consolidation across sectors is required to include development, supply, demand, and usage, with an emphasis on the community's livelihood and the environment that supports them, in order to achieve sustainable Water Resource Management (Donkor et al. 1999). Regarding the demand side, successful water shortage removal programs need increased water production throughout the board. Water may be made more accessible and its quality improved by the careful maintenance and restoration of natural systems that capture, filter, store, and release water, such as rivers, marshes, forests, and soils (Donkor, 1999).

The only real barrier to effective management of water resources is the widespread reluctance of national, regional, and local authorities to see water management as a priority (IDRC, 2005). In a similar vein, the rising demand for water resources is making water management an urgent ecological concern in a world already plagued by such issues. This need is being fueled by a growing population and the aspirations of that population for a higher quality of life (Flint, 2004). In contrast, when individuals change some characteristics of themselves, it may have both beneficial and bad effects on their environment. Population density in the former case triggers innovations in ecological management, while demand-related pressures on natural resource availability lead to ecological deterioration (Tukahirwa, 2002).

Water management, including evaluation, monitoring, and forecasting of water resources, is an area that must be developed in light of increased demands for water of sufficient quality (Akumiah, 2007). This necessitates the conscious cultivation and management of water and other resources in order to guarantee the people a decent standard of living (Orindi, 2005). A higher quality water management system is required in Kenya, according to research by Twinomugisha (2005). Water's monetary benefits are highlighted, but the study doesn't give much thought to how the resource is managed.

To end extreme poverty and hunger (Goal 1) and ensure a sustainable future, improved water management is an undeniable strategy (Goal 7). To eradicate poverty, preserve the planet, and secure prosperity for everyone, the United Nations (2015) established 17 sets of Sustainable Development Goals (SDGs). As part of the governance of water access, all countries were expected to guarantee the availability of sustainable management of water and sanitation by 2030. However, many countries have struggled to meet this goal, particularly due to insufficient funding for the creation of associated infrastructure to support accessibility of the water resources to the end user. In a similar vein, Cong (2007) argued that an operational strategy for water management in Kenya was necessary to ensure coordinated and effective WRM. This study recognizes that previous research neglected to address concerns related to Water Resource Management procedures in the real world. This is significant because it allows watershed residents to have safe places to live and reduces the vulnerability of rural production systems by improving the management of erratic rainfall distribution (for example, via greater water storage).

3.3.6 Water Governance and Poverty

These results are seen for the impoverished in a number of areas. These include issues of accessibility (in terms of amount, quality, and time of water supply) as well as livelihoods, or the ways in which water may be used to enhance the lives of the poor (for example, through development of alternative or supplementary income streams). It is possible to see the effects of water governance systems in terms of social interactions and processes, such as the existence of covert or overt disputes about access and instances of inclusion and exclusion. Poor people's political voice may grow as a result of these processes, which also alter existing power and influence systems. (In this regard, water governance is considered as a key to much bigger challenges of governance and political development since water is such a fundamental resource to all people.

3.4 Empirical Review

Kibera, a squatter colony in Kenya, has a number of challenges when it comes to managing the distribution of its water supply. The key elements include the country's legal framework, the categorization of "the poor," and the degree to which local communities are involved in decisions on water distribution in informal settlements.

3.4.1 Legal System

Despite the fact that "no household ought to be denied of the right to water on the basis of their housing or land status," as the UN Economic and Social Council (2004) puts it, the reality reveals that the two problems are intricately interwoven. In addition, existing policies and standards do not include squatter areas. As a result of their non-formal status, most low-income communities do not have legal access to credit or even the most basic services (UN, 2004). For the reasons stated above, including their location outside the urban border or the absence from urban master plans, metropolitan communities beyond the urban boundary are automatically classified as informal (Baumann et al. 2004). It is crucial to consider organizational, fiscal, and traditional diversities within a particular framework when developing policies to address this issue, as limiting secure tenure only to land possession has not proven to be effective, justifiable, or flexible enough to bring about improvement in the past, as claimed by WaterAid.

The proliferation of intermediate ownership systems designed to safeguard the fewest possible possession rights allows for a wider range of responses to local conditions. However, in certain contexts, particularly in peri-urban regions, they must compete with traditional land distribution systems. People in these communities have difficulty engaging with the official sector in general, and the supply of water and sanitation in particular, due to a lack of solid tenure. Therefore, it is not uncommon to have two distinct WSS systems operating side by side: one that provides water via municipal or privately owned pipelines, and another that provides water mostly through street sellers. Disentangling land ownership from water,

sanitation, and hygiene (WSS) access has resulted in several successful programs that have brought much-needed amenities to previously underserved areas without the need for any land tenure or WSS grants. Without the assurance of permanent residency, many have been reluctant to take use of these services, thus far making this a temporary fix at best. Moreover, advancements like this may only be seen as 'end of pipe' remedies since they don't address basic problems. It is unlikely that progress will be made to alleviate poverty and protect people from displacement if there is a lack of secure land tenure, which in turn perpetuates the issue of illegitimacy (WaterAid, 2007). Those with a tight budget not only have fewer options when it comes to deciding how to spend their money, but also have less say over WSS concerns.

Existing rules and guidelines provide additional challenges for the less fortunate, since they are primarily designed to support the formal sector. International contractors are increasingly being used to create WSS infrastructure, which may significantly increase both the initial and ongoing expenses of a project (Terry and Calaguas, 2003). While monetary donations from consumers may be the focus in more formal, higher-income settlements, members of low-income communities may want to contribute their time and energy instead.

Especially in peri-urban settings, private home networks may not be the best option for everyone (Ahmed and Sohail, 2003). When extrapolated to the informal sector, these norms and recommendations seem prohibitively costly because they fail to account for context-specific factors such as the availability of resources, the level of expertise in the community, and the willingness of the community to pay for services (UN-Habitat, 2003). This is crucial throughout building, especially for WSS upkeep, and the solution should reflect this. The residents of a Tanzanian peri-urban low-income settlement have decided that water kiosks are the most convenient and cost-effective method to get drinking water (Wandera, 2021). However, there aren't necessarily legal protections for non-traditional methods of getting water. Although

residents of a peri-urban region in Mexico have begun rainwater gathering on their own initiative, they lack the resources and expertise needed to take the next step. In general, instead of attempting to address this divide, our judicial system serves to fortify the same conditions that ignore the poor. Therefore, in the past, it has frequently been unsuccessful to use the same concept providing remedies in many contexts (Wandera, 2021). This research seeks to clarify the situation of access to clean and safe water in acceptable amounts in the Kibera informal settlement, which is mandated by Article 43(1d) of the bill of rights in Chapter 4 of the Constitution of Kenya (2010).

3.4.2 Disaggregation of 'the poor'

The issue of inadequate access to WSS has a disproportionate impact on already marginalized communities. We must, however, inquire as to the identity of "the impoverished." Many governmental agencies and nonprofits are ill-equipped to serve low-income neighborhoods, particularly those on the outskirts of major cities. When it comes to helping people, labels like "vulnerable" or "disadvantaged" are just too blankety to meet the varying needs of those who fall into such categories (McIntyre and Gilson,2002). Women and children (particularly girls) are disproportionately affected by the absence of WSS or the division of labor in the family since they are responsible for fetching water and performing other domestic chores that rely on water, such as cleaning, childcare, cooking, and hygiene (Howard and Bartram, 2003).

The lack of access to WSS and the impacts connected with it disproportionately affect the most marginalized segments of society, highlighting the need of justice in this sector. Women and children in low-income areas have a heightened threat of sickness and illness, as was previously shown (UN-Habitat, 2003).

As was previously noted, several groups have established a recommendation for the bare minimum of water a person needs to survive. The standard established by WHO

and UNICEF requires 20 litres per person per day to be available from within 1km of distance to the household (Howard and Bartram, 2003). This is only a rough estimate, however, and should not be used in every circumstance. Because men and women have traditionally had distinct responsibilities in terms of productive, reproductive, and other daily activities, disaggregation is crucial for determining the minimal quantity of water per person per day. In addition to differences in age and body type, variables such as environment, food, and level of physical activity also contribute to wide variations in the nutritional needs of men, women, and children (Howard and Bartram, 2003).

Furthermore, various water uses must be taken into account. Uses for home water include drinking and cooking, personal and household cleanliness, and recreation, as suggested by White et al. (1972) and mentioned by Howard and Bartram (2003). (car washing, etc.). A fourth category, "productive use," is introduced by Thompson et al. (2001) referenced in Howard, (2003). This group includes uses such as agriculture, small-scale manufacturing, catering, etc., all of which may be very important in peri-urban settings, as was previously demonstrated. Minimum water requirements for an individual or community may only be determined after considering all these elements.

3.4.3 Community participation

Water and sanitation include several parties, including government departments, businesses, nonprofits, and residents themselves. When considering the latter category, there is a wide range of participation models, especially when considering the extent of engagement of low-income areas in the design, roll out, and upkeep of WSS. While individuals on lower incomes are disproportionately impacted by insufficient WSS, it is crucial to investigate how they might contribute to the process of installation or to the improvement of access to these services. There is a risk for conflict owing to competing policies when implemented in the same region since external support agencies (ESAs) cannot agree on whether "the poor" should be considered just as receivers or contributors to service provision. On the basis of the

disaggregation debate, it is clear that the disaggregation of disadvantaged communities is crucial in the process of participation, since certain members, such as women and children, need particular treatment. Among other things, the presence of males in public forums may make women feel threatened and discourage them from taking part in public life (UN-Habitat, 2003).

While there is much evidence linking participatory design with long-term viability of rural water infrastructure, Sara, J. et al. (2014) note that researchers have paid less emphasis to determining which types of community engagement are most effective. The large expenditures and duties placed on community members via demand-oriented planning highlight the need of filling this information vacuum. In many cases, the community must pay for the entire cost of ongoing operation and maintenance (O&M), provide some of the initial funding for the water system's capital cost (through cash or labor contributions), participate in project-related planning meetings and training, and make critical decisions about the type of technology to be used, the cost of services, and the management of the infrastructure. Typically, municipalities are mandated by their water provider to establish a water committee to administer the system on an ongoing basis. The planning and design of rural water projects may benefit from a better understanding of which of these activities contributes to water system sustainability. Through passive involvement, underprivileged communities are informed of planned or decided-upon water and sanitation measures without any effort to gather local input or expertise. Even while experts in the water and sanitation sector are obligated to communicate with low-income groups on how to improve the local water and sanitation situation, they are not required to take residents' views into account throughout the implementation process (WWAP 2009). Although this is the case, it runs counter to the notion of effective governance of community initiatives, according to which the public should be included in the early and central stages of planning and executing municipal policies, programs, and projects.

'The Poor' agree to accept main responsibility well-defined for specified components of a negotiated water and sanitation upgrade when communities are requested to contribute via the supply of labor or financial contributions to the provision of water and sanitation facilities. Poor communities and other critical players form a partnership to enhance access to water and sanitation by pooling resources, sharing expertise, and assuming shared risks. The word "partnership" suggests a committed and mutually beneficial connection. For the impoverished communities to successfully demand and/or execute water and sanitation improvements, they must engage in community engagement via self-mobilization. Community organizations build relationships with outside players, some of whom may bring organizational and technical expertise, but these groups continue to have discretion over the use of allocated funds (UN-Habitat, 2003).

3.4.4 Impact of civic education on Public participation

It was Pateman (1970) who pioneered the Participatory Democratic Theory and that mapped out the connection between citizen engagement and good government. It lays out the case for why individuals and the state may both benefit from more participation in decisions that have an impact on their lives. Direct and representative democracy, as well as voting in elections, are all elements of what is meant by "participation." According to Pateman (1970), the representational institutional structures necessary for democracy at the national level are inadequate if people are not integral to the democratic process. Substantive involvement at the national level depends on the social development and training of people, which provide them with the necessary skills, attitudes, and emotional talents that emerge from the act of participation itself. Every time a citizen takes part in democratic processes, they gain valuable experience that will help them in the future. According to the view, the key to good government is empowering as many people as possible to participate in the decision-making process at the most local level. The idea describes a functional democracy characterized by a decentralized two-tiered government in which governance and public participation are carried out at the municipal level. The local

level provides both a forum for addressing public concerns and training ground for those interested in becoming involved in the national level of governance. This idea is reminiscent of Kenya's two-tiered structure of central and regional administrations. It explains in depth how the people may take part in decentralized administration.

Pharr and Putnam (2000) argue that a more educated, sophisticated, and outspoken population with less faith in politicians and political institutions drives the desire for greater levels of public engagement in public affairs. Because of this, citizens and government officials are able to have productive conversations outside of the typical democratic election year cycle. The people's awareness of their duties is essential to the success of any effort to encourage genuine public involvement. Second, they need the skills and knowledge necessary to fill such responsibilities effectively (Omolo, 2010). The public's ability to participate meaningfully is hindered when awareness is lacking understanding of involvement. To a greater extent, stakeholders are engaged when they have a solid grounding in the systems and procedures that shape public policy. According to John (2009), there is a strong correlation between a citizen's degree of education and their involvement in the political process. The primary goal of public education is to increase citizens' familiarity with and understanding of government services, institutions, and avenues for engagement. When people in a democracy really vote, that democracy becomes more stable. This understanding has been cited as the motivation for democratic countries to create civic education programs to educate individuals on civic problems and encourage greater engagement in the democratic process. Knowledge gained via civic education enriches governmental structures, policies, and procedures. Understanding and familiarity with policy making are bolstered by involvement in community group activities. Knowledge aids and inspires stakeholders, and participation broadens the public's familiarity with and understanding of policy making and institutional frameworks (Siala, 2015). People's understanding of how their voices are heard and considered in policy making is facilitated through civic education. Difficulties in understanding reports from technical specialists have an influence on the efficiency

and efficacy of citizen involvement. The incapacity to grasp the reasoning behind the conclusions reached is the inevitable consequence.

Every person in Kenya has the right to take part in the running of the country, either directly or via their chosen leaders. As a result, governments all over the globe have launched a wide range of programs to increase public participation in policy making. Thus, devolution and good governance in the devolved governments depend critically on meaningful public engagement because of the high hopes that it would significantly boost service delivery and improve accountability. But this can only happen if the general people has a firm grasp of how the government operates.

When we talk about civic education, we are talking about teaching people about the political and economic factors that affect their daily lives. Citizens are educated in their unique responsibilities in society via this process. Chapter 1 of the Kenyan Constitution vests all authority as a nation in its inhabitants. Either the people themselves or their democratically chosen representatives may use this authority. Without proper education on community concerns, citizens are unable to actively participate in their government. It is only via the dissemination of accurate information about specific community initiatives or challenges that citizens' capacity may be increased. Civic education on public issues is a key pathway for strengthening capabilities. The right to seek, receive, and disseminate information or ideas is protected by Article 33, paragraph 1. Civic education is the key to achieving this goal.

It is the responsibility of the government to educate its people about their rights and basic freedoms so that they may exercise those rights and fulfill those freedoms. They have the ability to define these rights and to demand that responsibility bearers like governors, powerful people, and public officials uphold them. Because of this, residents and voters are able to hold their representatives to account for carrying out their duties. Thus, the governed are expected to take part in the process of identifying, planning, implementing, monitoring, and evaluating projects or programmes when public involvement is in place. Civic education is crucial because it provides the

means for disseminating knowledge to the populace. The National and County governments have a civic responsibility to guarantee that the participating group or community has appropriate knowledge and information on how the projects will impact them in order to ensure proper public engagement in matters and initiatives that affect the community. It's reasonable to assume that without civic education, in which participants are informed of the project and what is expected of them, no public participation forum would work.

3.4.5 Locational Planning for Squatter Communities

Debates have raged regarding whether or not cities in emerging nations should destroy unplanned constructions, regulate the same, ignore or tolerate other cities, or some combination of these options. Rapid urbanization is fueled in large part by the movement of young people from rural to urban areas. A growing number of people from rural areas are moving to metropolitan areas, putting a pressure on already overburdened infrastructure and making it difficult for newcomers to find affordable housing and gainful jobs. In most cases, informality is still the best and quickest way to blend into a city. And thus, slum and squatter settlement populations grew by an average of 15% annually. To what extent are informal settlements planned, and in what directions would they develop, are natural questions to ask. Without adequate housing, sustained growth in informal settlements is impossible. The first and most important move toward giving the poor the agency they need to implement effective ecological and anti-poverty measures. Having a safe place to live has been cited as a prerequisite for enjoying a wide variety of other advantages, from peace of mind to easier access to healthcare, education, and economic possibilities. Realizing these advantages at the community level relies on success at the household and individual levels, which is consistent with the MDGs' focus on providing a safe place for people to live in order to end their poverty. Unauthorized land use; unapproved settlement patterns; excessive residential densities; construction that doesn't comply with building codes; occupancy that began with a violent land takeover are all hallmarks of the informal settlements' planning. Initiating a regime of planning that accounts

for the aforementioned characteristics while also taking into consideration the interests of all stakeholders is crucial.

Different levels of government engagement need for different types of planning techniques to be implemented in informal settlements. Part of Plan A is to force people out of their homes and demolish any buildings on the property. Eviction and demolition projects see slum residents and squatters as the issue, not the solution, and both entail sweeping out informal settlements with little or no consultation. Many Kibera people have lived there for years, and others have strong ties to the city's political leaders, making mass evictions an unlikely outcome. Plan B involves implementing programs to provide affordable homes. Most urban planners blame an insufficient supply of affordable housing for urban slums. Therefore, the issue of informality in metropolitan areas might be resolved by the construction of additional low-cost dwelling units. Through the implementation of Slum/squatter upgrading programs in collaboration with informal inhabitants, community organizations, companies, and local authorities, physical, social, economic, and environmental changes may be made to a community. Some examples of these essentials include water and sewage systems, waste collection and disposal, drainage systems, roadways, sidewalks, and streetlights.

One such approach is the program that aims to better the lives of those who live and work in Kenya's informal settlements is the Kenya Slum Upgrading Programme (KENSUP), a joint effort between the Kenyan government and UN-HABITAT. It's official: KENSUP has been released. World Habitat Day 2004 was celebrated all around the world on October 4. The goal of KENSUP is to show that a multidisciplinary and integrated approach to slum upgrading is possible in Kenyan cities, thereby proving that the goals of the Habitat Agenda and the Millennium Development Goals, which seek to improve the lives of residents in informal settlements, are attainable. The United Nations Human Settlements Programme (UN-HABITAT) proposes a strategy to slum upgrading that connects the supply of basic infrastructure (such as water and sanitation) with income-generation activities. The

next step is to advocate for pro-poor government, better housing, and tenure security. One of UN-key HABITAT's tenets is the encouragement of widespread collaboration. When it comes to slum upgrading, KENSUP emphasizes a few crucial factors: communication, good administration, and the supply of basic amenities like water and sanitation systems. It is often recognized that up to 40 percent of the total cost of a settlement goes into creating an integrated infrastructure system for both newly founded communities and slum improvement initiatives. Affordable housing for the poor may be achieved through reducing the price of infrastructure via integrated housing and infrastructure development (UN, 2004). Despite the early success of a similar program in Kibera Raila village, where many people were transferred to better accommodation, the vast majority of those people later returned to the informal settlements for which they had been displaced in exchange for money. The government should conduct an audit to verify that households with enhanced section allotments indeed go back to the informal neighborhoods.

3.4.6 Security of Land Tenure System in Kibera.

The term "land tenure system" refers to the institutional frameworks and procedures that provide people ownership and use of land. It includes potential foundations for land distribution, tenure security, property and land transactions, land use, and conflict resolution. In the informal settlements of Nairobi, there are seven primary types of land ownership. There is freehold land (2.6% of all land), uncommitted state land (31.8% of all land), land intended for public utility (6.2% of all land), private land (7.3% of all land), regularized land (42.6% of all land), city county land (3.1% of all land), and group land (2.6% of all land) (6.4 percent). Different tenure systems apply to each of these groups, but all of them are involved in land management in some way, whether as clan leaders, members of self-help welfare organizations, victims of violent gangs, or representatives of the county administration. These entities are accountable for facilitating land access, conducting transactions, handling development control, maintaining information, and resolving land disputes. These

organizations' land management services are often unofficial, openly unlawful, and at the root of many territorial disputes (Omwoma, 2013).

On September 21, 2016, Act No. 27 of 2016 relating to Community Land became law. The purpose of this law is to implement Article 63 of the Constitution of Kenya, 2010 (the "Constitution"), which creates the category of "community land." Land owned through a customary tenure system, freehold tenure system, leasehold tenure system, or other tenure system recognized under this Act or any written legislation may all vest in the community.

Publicly-owned space in Kibera should be developed as proposed by me to the National Government. Unofficial habitation inside the Community, as defined by the established communities. To that end, all unregistered community land must be held in trust by county governments on behalf of the communities to whom it belongs. It is required by section 8 of the Land Registration Act, 2012 (No. 3 of 2012) that a community land register be established for each registration unit, such as a village, with the following information: (a) interest; (b) the name of the registered community/village; (c) a register of members of the registered community which shall be updated annually; (d) the user of the land; (e) such particulars of members of the registered community as the Registrar may require. Since there are so many people living in the Kibera informal settlement, the national government should adopt the community land ownership rights paradigm in order to deal with the problem of absentee landlords who were given plots of property but do not really live in the area.

3.5 Conceptual Framework

The main objective of this study is to investigate the sustainability of governance of water access in informal settlements. In carrying out this study, it was conceptualised that water access in informal settlements is only possible with proper governance. It seeks to achieve this by looking at various parameters that determine governance with special emphasis of the water sector in the informal settlements; key among

them is the existing legal framework, disaggregation of the ‘poor’ and community participation. Access to water by individual households are the ultimate purpose for which various actors in the sector aims to achieve by ensuring that laws and rules are put in place, also ensuring the end users are involved at various stages and the vulnerable members are classified for the water projects that meet their needs. To this end, the three key considerations mentioned above that this study attempts to look at are critical in ensuring proper governance structures are put in place hence effectively lead to sustainability of the water projects in the urban areas. The success of governance of water access is also influenced by the availability of project funding therefore the intervention of funding organizations such as government (County and National) as well as NGO,s, CBO’s are critical and is considered in this framework.

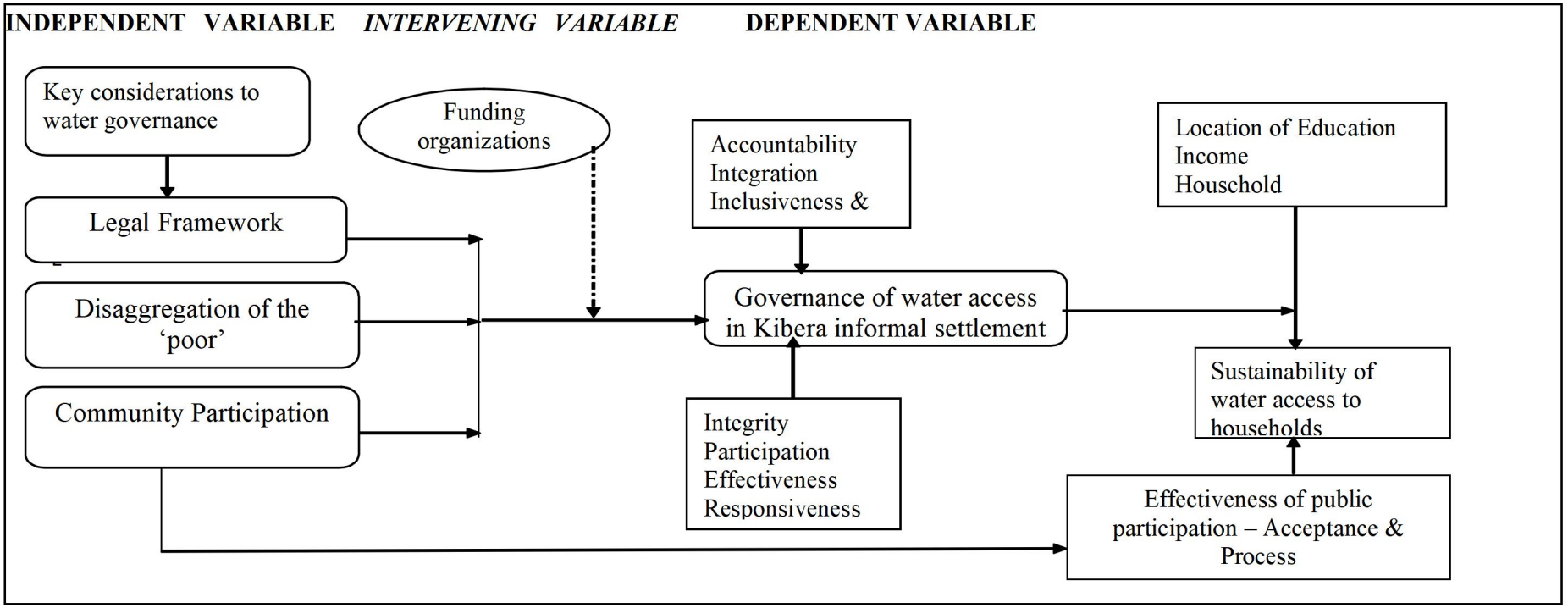


Figure 3. 2 Conceptual Framework: Governance of water access in informal settlements

Source: (Researcher, 2021)

Households in informal settlements have restricted access to water due to a lack of infrastructure. Research shows that informal communities are often overlooked and are seldom connected to a piped network. Only a few outlying properties have access to this citywide amenity. Stand pipes, water kiosks, and mobile sellers provide water to the majority of home (Otieno, 2013). In this conceptual framework illustrated in Figure 3.2, it is assumed that to achieve appropriate levels of water access that is measurable by the various principles of governance, there has to be appropriate legal framework and involvement of the community. There are two ways to evaluate the public's or community's level of involvement: acceptance and process. Whereas it is expected that the water resource project will be cost-effective, time-efficient, and well-managed if the acceptance criteria—representativeness, independence, early involvement, influence, and transparency—are met, the process—accessibility of resources, task definition, structured decision making, and cost-effectiveness—are The conceptual framework has taken into account additional factors of access to water in the urban setting, such as income, education, and the location of families, all of which contribute to effective water governance. It is possible that residents of informal settlements like Kibera will not have reliable access to water if these factors are absent.

The conceptual framework further assumes that the sustainability of water access depends on categorising the vulnerable to identify their unique needs and involving the end users to ensure water access in informal settlements will be sustainable, efficient and inclusive. The residents of the informal settlements who are the consumers will be responsive because they have been involved in the initiation, implementation and management of WSS. The level of transparency and accountability will be acceptable thereby creating a high level of integrity.

3.6 Summary

This Chapter has presented: a theoretical and conceptual discussion of the five major concepts applied throughout the project: governance, corruption, water governance

institutions, Public-Private Partnership and its characteristics; and main characteristics of good governance and the relations among governance, corruption, water governance institutions and Public-Private Partnership.

3.7 Research gaps

Numerous research gaps were found after reviewing the relevant literature. Community and marginalised group's participation in water governance remains underdeveloped. The bulk of slum dwellers have modest wages, yet they nonetheless pay more for water and other necessities than their middle-class and upper-class counterparts (Momanyi, 2005). Momanyi (2005) argues that corruption is a multifaceted element upsetting the governance structure and exacerbating the water governance difficulties in informal settlements in most metropolitan regions of developing countries. Therefore, some alternatives should be implemented, such as holding multi-lateral and bilateral dialogues on effective water governance involving the stakeholders, forming an Association of Water Consumers to speak for and protect the interests of all the households in informal settlements that rely on water, and modifying and modernizing the legal framework governing access to water (Momanyi, 2005). Since Momanyi's (2005) research was completed over a decade ago, its results need to be verified by means of a new investigation. Thus, one of the goals of this study is to assist close this informational gap by shedding light on such hitherto unexplored areas as the impact of the legal and institutional framework on the management of water supply. More importantly, the efficiency of institutional capabilities to guarantee that WSS are delivered to inhabitants in informal settlements. As this was a poll, more insights may have been gained by analyzing data from the Kibera slums specifically. This study attempted to provide data that would bridge these gaps in the existing literature.

CHAPTER FOUR
METHODOLOGY

4.1 Research design

Descriptive research survey data were employed to precisely characterize the study's population. The survey used questionnaires and the technique of observation to gather data from the selected population on their attitudes and levels of knowledge. According to Mugenda (2008), the descriptive design is a technique that allows the researcher to efficiently and effectively synthesize and arrange data. This plan was approved since it accurately portrayed the situation without introducing any arbitrary changes (Kothari, 2004). By analyzing a representative cross-section of a group, this research may quantify the prevailing sentiments and broader tendencies among that community. It's a way to quickly and easily collect quantitative information from a large group of individuals via the use of closed-ended questions (Asenahabi, 2019).

4.2 Population

When doing research, it is important to have a clear idea of how many individuals, services, items, events, groupings of objects, or homes are in the population. According to Mugenda, (2008), in order to generalize the study's findings beyond the study's specific population, that group must have certain observable traits. The heterogeneity of the population is assumed by this definition. Household heads in the Kibera slums served as the study's population. There are about 250,000 people living in Kibera, with around 103,190 households living in the slums.

4.3 Sampling frame

Fisher et al (1998) formula was used to calculate the required sample size.

$$\frac{n=z2pq}{d2}$$

n= desired sample size

z=the standard normal deviation at the required confidence interval

q=1-p

d= degree of accuracy

p= proportion of the target population estimated to have particular characteristics being measured

$$n = \frac{1.96^2 (0.5) (0.5)}{0.05^2} = 384$$

From the target population of 103,190 households, the researcher used simple random sampling to proportionately select 385 respondents. This gave the study a sample size of 385 respondents.

Table 4. 1 Sampling Frame

Stratum	**Sample size (groups)**
Lainisaba	77
Lindi	77
Makina	77
Kisumu Ndogo	77
Soweto West	77
Total	**385**

Source: Researcher, (2021)

4.4 Sample and Sampling Technique

The sample was chosen by a stratified random sampling method. This is due to the high accuracy with which the approach can estimate parameters pertaining to the whole population (Shuttleworth, 2008). Only five of Kibera's nine formal settlements were selected on account of being the largest and oldest. The study's participants were divided into five strata based on the local administrative regions of Laini Saba, Lindi, Makina, Soweto West, and Kisumu Ndogo. Using a simple random selection method, the researcher selected 385 participants from each of the five governmental regions to form a representative sample. Seventy-seven heads of home were randomly picked from each socioeconomic group. In addition to being in accordance

with Krejcie's (1970) table for selecting sample size, this method also follows the principles outlined in the aforementioned.

4.5 Data Collection Procedure and Instruments

For this study, we used a questionnaire filled out by household heads that they completed independently as a means of data collection. The study was sanctioned by the academic institution and the researcher. The questionnaire is the study's primary data collection instrument, thus the research assistants were given extensive training on its use. Since the application is English-based, they received training in literacy and cultural considerations. Respondents who could not speak or understand English were not left out, since they were taught how to translate the tool into Kiswahili. Research assistants were taught how to record supplementary data provided by respondents on the back of the questionnaire sheet for later coding purposes. Key to their education was the ability to interact and connect with community people while drawing on their research background. I defined "vulnerable population" for the study assistants. Pregnant women, the elderly, children, persons with inadequate education, and the destitute were all listed as vulnerable populations, and the reasons why they are regarded such were discussed throughout the training. Before giving out questionnaires, the researcher would brief the participants on the study's goals and provide them with instructions on how to fill them out. The researcher questioned people who had trouble reading and filling out the questionnaire, and then filled in their responses.

The questionnaire served as the major means of information gathering. The feasibility, relevance to the study topic, and sample size of the questionnaire all contributed to its selection as the data collecting tool. More importantly, it saves money (Denscombe, 2008). In order to collect data from the 385 respondents, a self-administered questionnaire comprising both open-ended and closed-ended questions was created and distributed. There were two major parts to the survey. The first section asked respondents for some background information, whereas the second section asked questions directly related to the research topics. Both open-ended and

closed-ended questions were included in the survey. The structured questions were used to save time and money and to make analysis simpler since the data was already in a useable format, while the unstructured questions were used to get a more honest and in-depth answer from the responder. Information such as the variety of water storage, the distance from homes to the next standpipe, and the tools used to transport water were also gathered via direct observation.

4.6 Pilot Test

The study was a pilot project conducted by the researcher with five County heads of household. Household heads who did not take part in the main research were recruited for the pilot study. Cronbach's Alpha Coefficient was used to provide an assessment of the instrument's dependability. When it came to gauging the idea of interest, a reliability value of 0.75 indicated that the items were generally consistent with one another (Mugenda, 2008). Clarity enhancing comments from responders were included into the final version of the test.

4.7 Data Collection Limitations

There were a number of problems with the data gathering, the first of which being the fact that the respondents were all tired. This was rather typical, since many respondents thought they had already been interviewed by several researchers in the past, without receiving any benefit from the previous work conducted in Kibera. Some of the responders didn't work together because of this. It required a lot of effort on the part of the researcher and their helpers to get the respondents to comply and take part in the activity. Several strategies were used to gather information in an effort to reduce the possibility of information bias, which may have jeopardized the credibility of the results. The second flaw of this research was the insufficiency of both primary and secondary sources. To assure the accuracy of the results, every available piece of information was utilised.

4.8 Data Processing and Analysis

The term "data analysis" refers to the whole procedure that begins after data collection and concludes with its interpretation and processing (Kothari, 2004). Data was edited and coded for processing when fieldwork was completed. Statistical Package for the Social Sciences (SPSS) was used to analyze both qualitative and quantitative data brought in from the field.

By using SPSS, we were able to calculate and display in a variety of formats the frequencies, percentages, means, and standard deviations that emerged from our many data sets. Descriptive statistics were used in the evaluation of the quantitative data. Content analysis was used to examine qualitative data by building a set of recurrent themes. Raw data was also processed using Microsoft Excel to get useful results.

4.9 Data Output and presentation

The findings of this study were presented in the form of a written report, charts, pictures, tables and graphs depending on the type of research questions to be addressed. A data needs matrix is presented in Table 4.9.1 to summarize the relationship between research objectives, data parameters and the expected output.

Table 4.9. 1 Data Needs Matrix

Study Objective	Type of data	Sources of data	Methods of data collection	Scale measurement	Methods of data Analysis	Methods of data presentation	Expected output
i. To examine the effect of legal framework on governance of water access in Kibera informal settlement.	Water providers in the area Types, distribution and operations of water facilities in the area	Documents from Nairobi Water Company Literature from Ministry of Water & Irrigation	Literature review Observation Written questionnaires Photography	Nominal Ordinal	SPSS Frequency analysis	Bar charts Pie charts Standard deviation	Whether there are laws and regulations and if they are effective in governance of access to water

ii. To find out how disaggregation of the poor influence governance of water access in the informal settlement.	Physical survey Socio-economic survey	Household's survey	Literature review Observation Written questionnaires	Nominal Ordinal	SPSS	Bar charts Standard deviation	If the vulnerable groups are involved in governance of water access Their roles and challenges they face in the process. Adequacy of water distribution points

iii. To examine the effect of community participation on governance of water access in Kibera informal settlement.	Role of Actors Organisations involved in water provision	Literature and journals by NGO,s CBO′s	Written questionnaires Interview schedules Oral interviews Literature reviews	Nominal Ordinal	SPSS Tables	Bar charts Pie charts Standard deviation	Consultative forums on initiation of water projects Group leaders′ involvement Maintenance of water systems

Source: Researcher, 2021

CHAPTER FIVE
DATA ANALYSIS, PRESENTATION, AND INTERPRETATION

5.1 Introduction

This chapter presents an analysis of the data that was collected from the field on the governance of water access in informal settlements in Kenya: a case of Kibera Slums in Nairobi City County.

5.2 Questionnaire Return Rate

The research aimed to survey 385 people, and as can be seen in Table 5.1 below, 300 people participated and returned questionnaires for analysis, for a response rate of 77.9 percent. According to the criteria established by Mugenda and Mugenda (1999), a response rate of 50% is acceptable for analysis and reporting, a rate of 60% is good, and a rate of 70% or more is outstanding. These response rates were sufficient and representative. This impressive turnout was achieved by making additional phone calls and in-person visits to remind respondents to fill out and return the surveys.

Table 5. 1 Questionnaire Return Rate Rates

Targeted	Returned	Per cent
385	300	77.9%

5.3 Household socio-economic information

Age, marital status, religion, education, employment, and monthly family income were some of the demographic variables this research intended to identify. With this data, we hoped to gauge how well the responder understood the issues surrounding the management of water distribution in Kenya's most largest slum, Kibera, located in the county of Nairobi.

5.3.1 Age distribution of the respondents

The participants' ages were collected as part of the investigation. Studying water governance should also take into account a person's age. Some studies have shown that the elderly drink less water but make major choices on water at the family level, while other studies have shown the opposite, that children consume more water than the elderly.

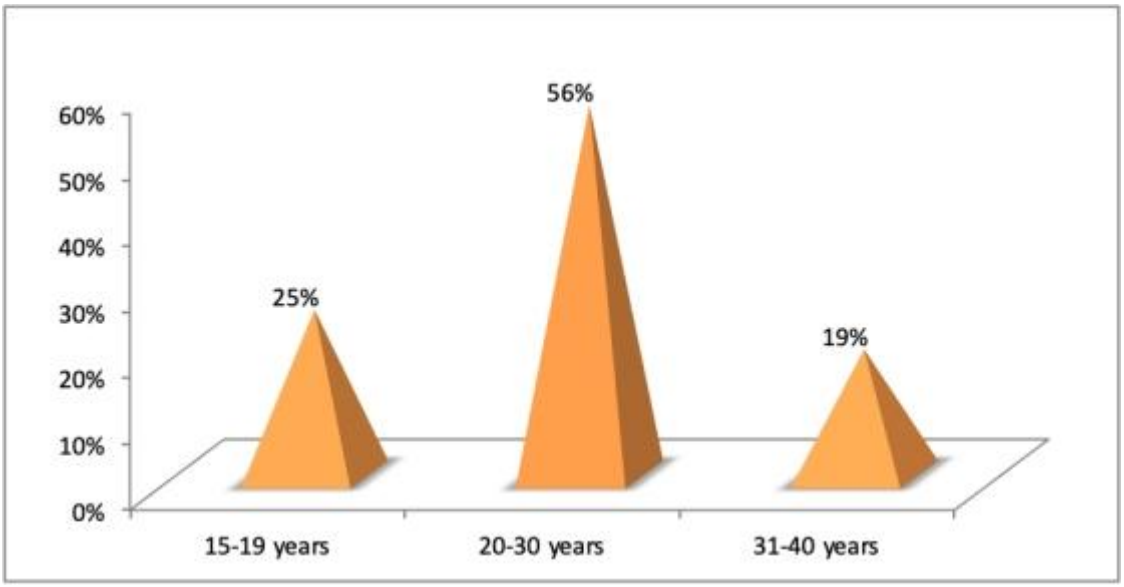


Figure 5. 1 Age distribution of the respondents

The results show that the age of respondents is an important factor in analyzing water supply and use policies. Figure 5.1 shows that of the respondents, 56% (n=56) were between the ages of 20 and 30, 25% (n=25) were between the ages of 15 and 19, and 19% (n=19) were between the ages of 31 and 40.

5.3.2 Distribution of the respondents by marital status

Participants were asked about their marital status as part of the research. There was a conventional assumption that households with married adults tend to have more individuals, and hence consume more water. It is important to consider gender in the

context of water governance challenges, but it is also important to situate gender connections within a wider social, political, and biophysical framework.

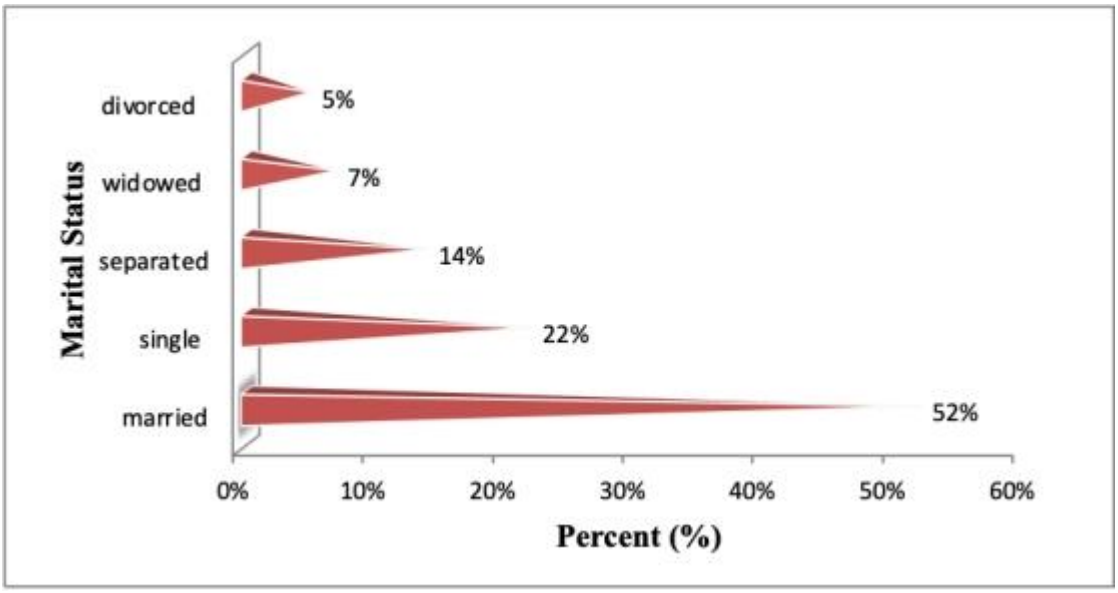


Figure 5. 2 Distribution of the respondents by marital status

According to the findings, half of the respondents 52% (n=52) were married, 22% (n=22) were single parents, 14% (n=14) were separated, 7% (n=7) were widowed while 5% (n=5) were divorced as illustrated by the figure 5.2 above.

5.3.3 Distribution of Respondents by religious denomination

Participants were asked to identify their religious affiliation as part of the research. Since religious leaders are regularly called upon to direct their congregations in various community project participation endeavors, this research seeks to advocate for a multi faith approach to water governance.

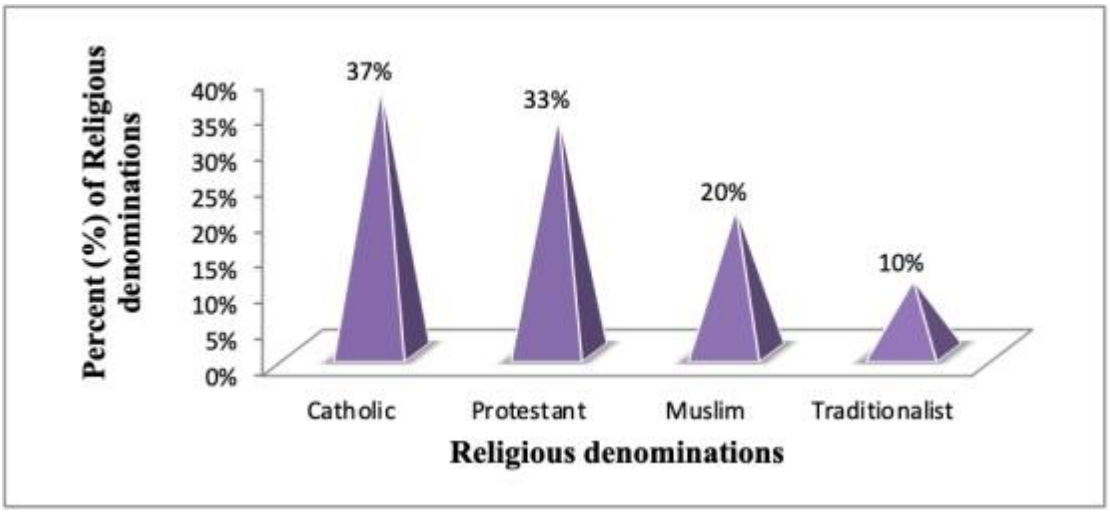


Figure 5. 3 Distribution of Respondents by religious denomination

Figure 5.3 shows that of the respondents, 37% (n=37) identified as Catholic, 33% (n=33) as Protestant, 20% (n=20) as Muslim, and 10% (n=10) as Traditionalist.

5.3.4 Highest level of school/level

The participants' greatest level of education was investigated in this research. Access to cleaner water is a function of a person's level of education. A person with a low level of education has fewer options and less capacity to advocate for improved facilities and services from the relevant authorities. From the viewpoint of traditional institutions, the fact that children (particularly girls) are expected to shoulder the responsibility of water gathering has a negative impact on their ability to learn. However, the majority of respondents (93%) had some type of formal education and were therefore well informed about water access governance.

Table 5. 2 Level of school/level

	Frequency	Percentage
Never	21	7
Primary	75	25
Secondary level	156	52
Tertiary level; (colleges, polytechnics	36	12
University level	12	4
Total	**300**	**100**

Source: Researcher, 2021

Using data from Table 5.2, 52% of the households surveyed had at least a secondary education, 25% had a primary education, 12% had some college, and 7% had never attended school. Institutions enforcing types of water governance have a significant impact on people's day-to-day interactions with water. More individuals with greater levels of education than fewer persons with lower levels of education favored obtaining water via government-run channels. As a result, it is important to recognize that the majority of household respondents had completed at least some sort of formal education, allowing them to offer reliable data on the long-term viability of water projects in their community.

5.3.5 Average income range per month

The purpose of this research was to determine the average monthly income of the respondents. The primary factor in household water access management is household expenditure, a measure of household welfare. As a result, it presumes that low-income families are more inclined to depend on unimproved water sources due to their lower cost.

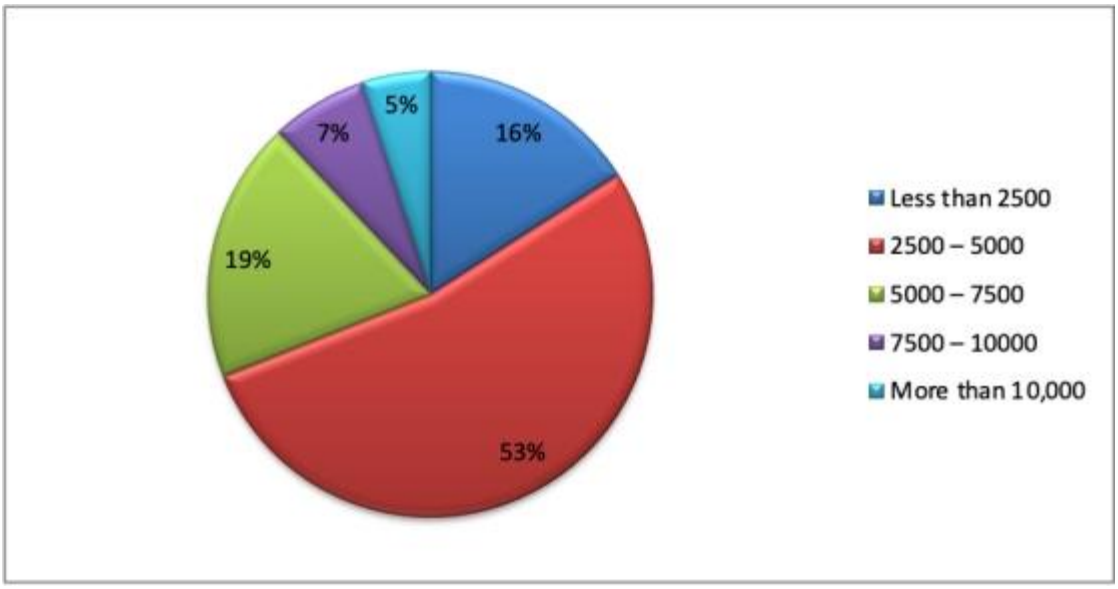


Figure 5. 4 Average income range per month

As can be seen in Figure 5.4, the majority of families in the Kibera Slums of Nairobi County (53%) had an average monthly income from all sources of between Kshs 2500 and Kshs 5000, while 19% had between Kshs 5000 and Kshs 7500, and 16% had less than Kshs 2500. As a result, most families lived in poverty, with little resources leaving them unable to provide even for their most fundamental necessities. This study's results are supported by the argument that people may still be water-poor despite the availability of better water sources if they lack the financial resources to purchase water on the go.

5.4 Effect of community participation on the governance of water access

The research aimed, in part, to see how local involvement affected decisions on water distribution in the Kenyan slum of Kibera. Kibera residents in groups with similar problems work together to recognize those problems, reach consensus on how to address them, and put plans into action. More fair and long-term water distribution is possible via community involvement in decision-making processes. In spite of this, there has been a heightened institutional search for optimum techniques to strengthen local contributions in water choices due to the known effects of community engagement in the water access governance process.

5.4.1 Participation in the initiation/start of water projects

The goal of the research was to determine whether residents of the Kibera slum in Nairobi County, Kenya, had helped kick off any recent water infrastructure initiatives..

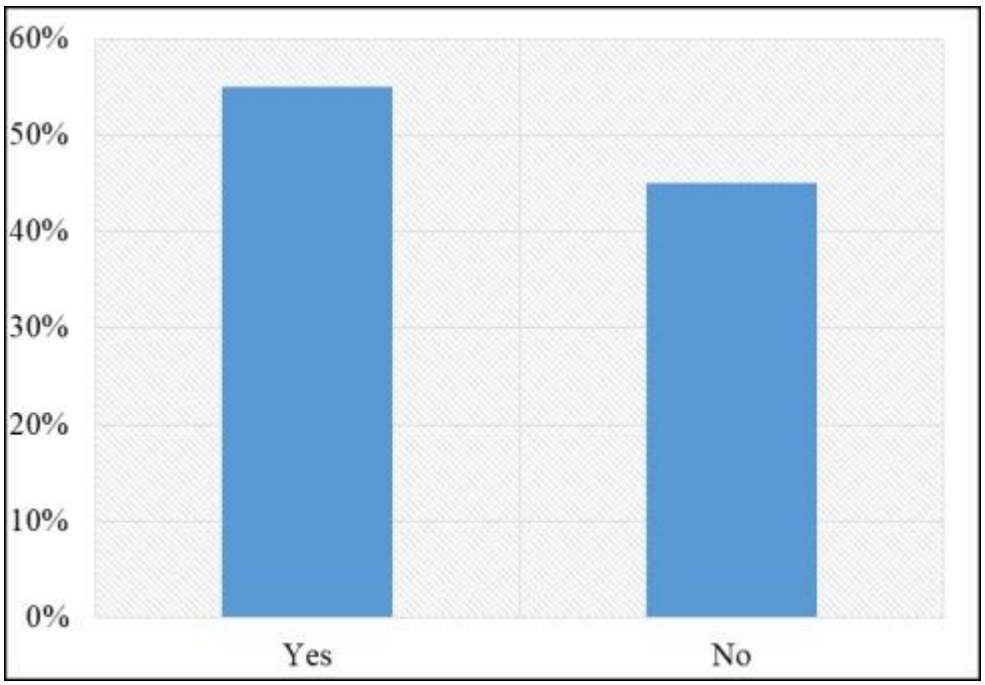


Figure 5. 5 Participation in the initiation/start of water projects

From the data shown in Figure 5.5, it can be seen that the majority of respondents (55%) had been involved in the beginning stages of the water projects, while only 45% had not. Knowledge about the current initiative is one of the primary indications of mobilizing, as Rashied (2016) agrees. When people are informed about the initiatives, possibilities, and possible advantages that directly affect their lives, they are more likely to become involved. Although 55% of Kibera families participated in the initiation, this is considered low to moderate when compared to the recommended threshold of 60%. This indicates that stakeholder involvement in

Kibera's water access governance was low to moderate in the area's informal settlements.

5.4.2 Area of participation in the project initiation

The study inquired about the area of participation in which the respondents had participated.

Table 5. 3 Area of participation in the project initiation

	Frequency	**Percentage**
I was consulted through a meeting	168	56
I contributed materials	117	39
As a leader/part of the committee	15	5
Total	**300**	**100**

From the data shown in Figure 5.5, it can be seen that the majority of respondents (55%) had been involved in the beginning stages of the water projects, while only 45% had not. Knowledge about the current initiative is one of the primary indications of mobilizing, as Rashied (2016) agrees. When people are informed about the initiatives, possibilities, and possible advantages that directly affect their lives, they are more likely to become involved. Although 55% of Kibera families participated in the initiation, this is considered low to moderate when compared to the recommended threshold of 60%. This indicates that stakeholder involvement in Kibera's water access governance was low to moderate in the area's informal settlements.

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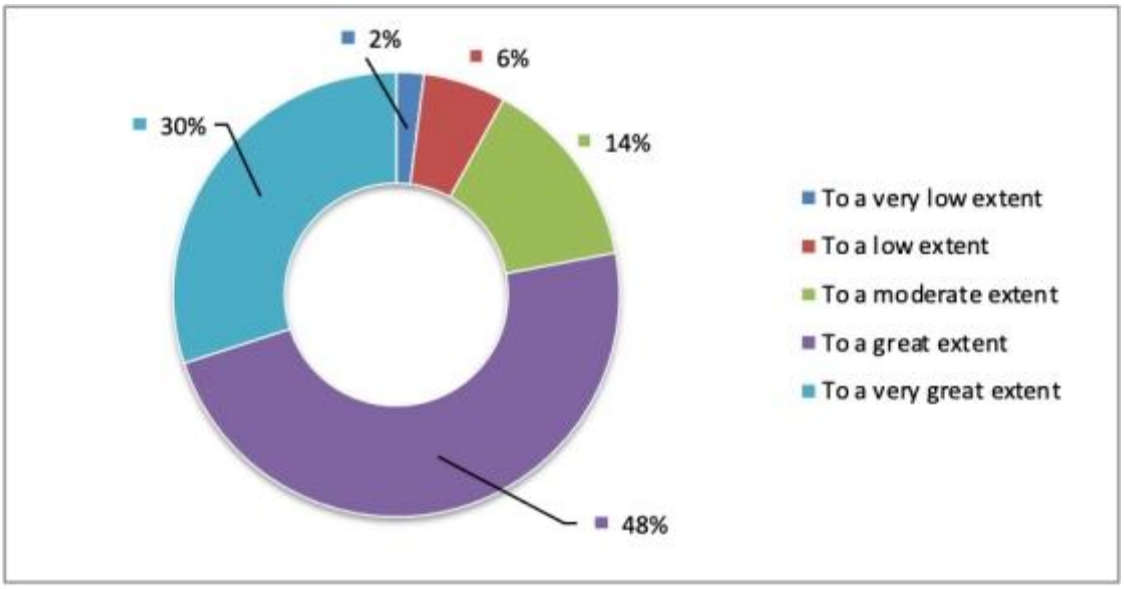

Figure 5. 6 Community participation

Figure 5.6 shows that over half of the households surveyed believed that community engagement had a significant impact on water access governance in informal settlements; another 30% believed it had a very significant impact; and 14% believed it had a moderate impact. It is generally established that community engagement in planning increases the likelihood of a water system's long-term viability, but scholars have paid less attention to pinpointing the specific types of participation that have the greatest impact (Sara, J. et al. 2014). Considering the large financial commitments and new burdens of leadership that demand-oriented planning places on local residents, our research suggests that filling up this information gap is crucial. In order to improve the management of water distribution in slums, it was crucial to include the local populace.

5.4.4 Benefits associated with community participation

The study inquired from the respondents about the main benefit associated with community participation in the project.

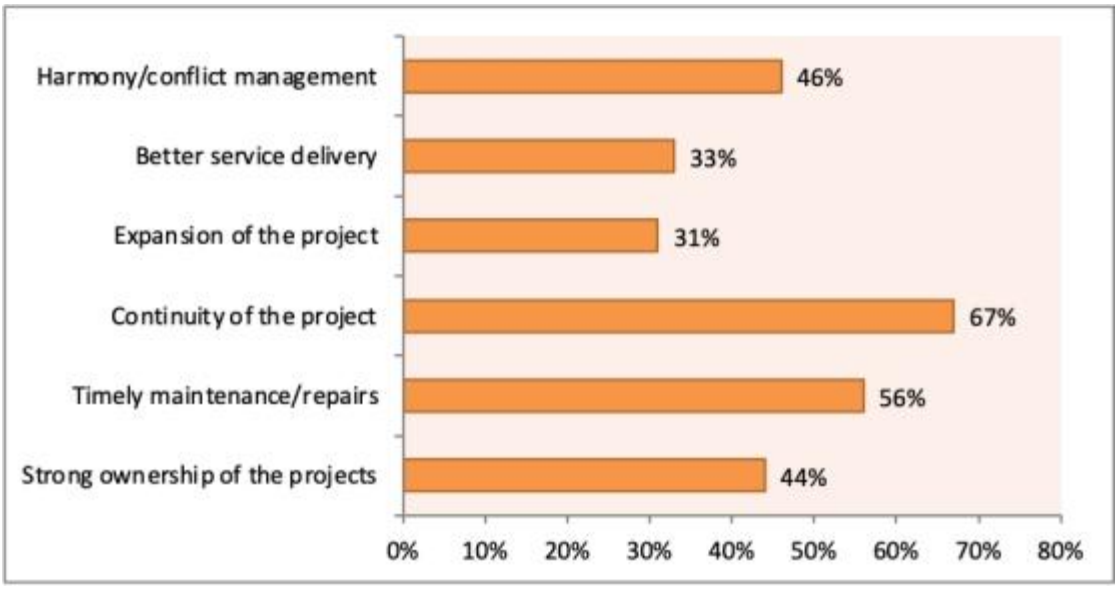

Figure 5. 7 Benefits associated with community participation

Based on the data in Figure 5.7, we can see that the majority of households believe that the continuity of the project is the most important benefit of community participation in the project, followed by timely maintenance/repairs (56%), harmony/conflict management (46%), strong ownership (44%), and better service delivery (33%). When asked why the project was expanded, 31% gave this reason. Everyone benefits by participating in the social, economic, and cultural aspects of their society. Researchers discovered that the majority of residents of the Kibera informal settlement profited greatly from community engagement in the administration of their water access demands.

5.4.5 Community participation and governance of water access in Kibera informal settlement in Kenya

This research aimed to learn how including locals in water management in Kibera's slums impacted the administration of piped water supplies. The respondents were asked to indicate how much they agreed with a statement on how community engagement improved the governance of water access in Kenya's informal settlements. Data was collected using a five-point Likert scale, with 1 representing a

strong disapproval, 2 a moderate disagreement, 3 a neutral stance, 4 an agreement, and 5 a strong agreement. SPSS was used to calculate the means and standard deviations in Table 5.4

Table 5. 4 Community participation and governance of water access

Statements	Mean	Std dev
A community's involvement is essential to the long-term viability of its water infrastructure.	4.09	0.48795
Stakeholders' support has ensured that participants are actively involved in project planning and implementation or through formal or informal training and consciousness-raising activities.	4.39	0.75593
Stakeholders' involvement in the project implementation has enhanced continuity in the operation of the water project	2.43	0.78680
Stakeholders' participation has enabled them to clearly understand their roles	4.23	0.48795
Stakeholders are better placed to lobby for government and donor support for the community project	3.89	0.57735
With the Stakeholders' support, the community ensures the success of a project through collective efforts to increase and exercise control over the project	4.03	0.81650
Stakeholders influence and share control over water development initiatives, and the decisions (e.g. for expansion, operation, and maintenance) and resources which affect them	4.05	0.48795
Stakeholders' support ensures that community project is managed effectively, minimizing waste and thereby ensuring their sustainability more so financial sustainability	3.06	0.51411
Stakeholders' support brings together individuals, families, or communities who assume responsibility for their welfare	3. 01	0.01521

(ownership)		
Stakeholders' contribution influences the direction and execution of water development projects rather than merely receiving a share of project benefits	3.56	0.48795
Community participation has increased project efficiency	3.87	0.48795
Building a partnership with the communities leads to improving the people's problem-solving capacities	4.01	0.57735

Findings showed that the majority of respondents agreed with the following statements about the importance of stakeholder participation in water supply system sustainability: stakeholders' support has ensured that participants are actively involved in project planning and implementation or through formal or informal training and consciousness-raising activities (Mean=4.39); stakeholders' participation has enabled them to clearly understand their roles (Mean=4.23); stakeholder participation is essential for the sustainability of water supply systems (Mean=4.09); and stakeholder participation is essential for the sustainability of water supply systems Building partnerships with communities leads to increased problem-solving abilities among the populace (Mean=4.01), stakeholders are in a better position to lobby for government and donor support for the community project (Mean=3.89), community support has increased project efficiency (Mean=3.87), and stakeholders' support is essential to the project's success (Mean=4.03).

The study's results demonstrate that community involvement played a crucial role in defining water access governance in Kenya's Kibera informal slum. Through community engagement, the residents were instrumental in conceiving of and carrying out the project. They had a firm grasp on their functions, improved the long-term viability of water distribution networks, and strengthened local authority over water development projects.

5.5 To examine the effect of the legal framework on governance of water access in Kibera informal settlement in Kenya.

The second purpose of the research was to look at how the legislative framework in Kenya's Kibera informal settlement affected the management of water distribution. The results are provided in the following topics. Rights and basic freedoms are enshrined in Kenya's 2010 Constitution, which serves as the basis for the country's social, economic, and cultural policies. Human rights and basic freedoms should be recognized and protected in order to uphold the worth of all people, advance social fairness, and allow everyone to reach his or her full potential. The people living in Kibera's slums have a lot of potential, and it's crucial that we help them realize it by providing them with reliable water infrastructure.

5.5.1 Existing legal framework that controls governance of water access

The respondents were to indicate whether there was an existing legal framework that controlled the governance of water access in informal settlements in their area.

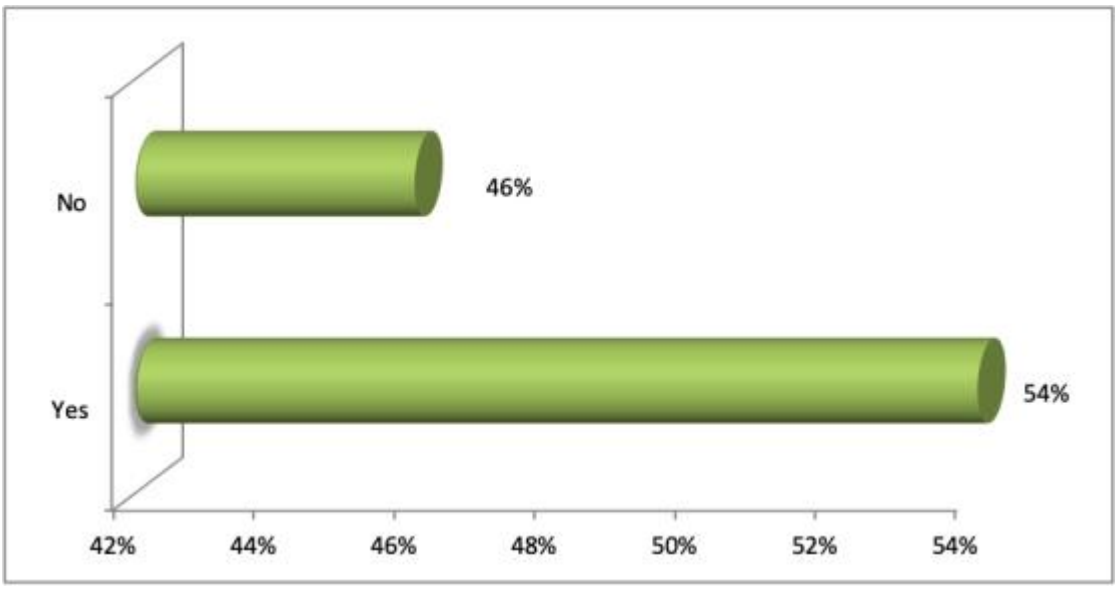

Figure 5. 8 Existing legal framework and governance of water access

Findings show that 54% of respondents believe there is a legislative framework in place to regulate the management of water resources in the Kibera informal community. Although 46% of respondents said there was a legal structure governing water access in informal settlements, no such framework was found.

5.5.2 Legal framework and governance of water access

The study sought to find out the extent to which the legal framework influenced the governance of water access in Kibera informal settlement.

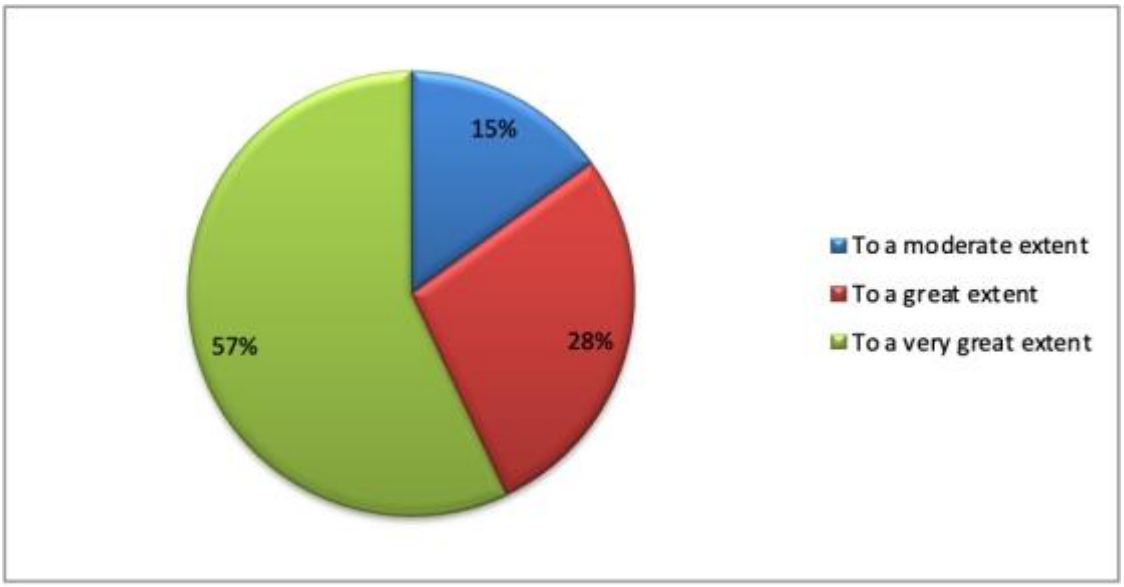

Figure 5. 9 Legal framework and governance of water access

It was found that 57% of respondents said the legal framework had a "very great" or "great" impact on the governance of water access in the Kibera informal settlement, while 28% said the same thing and 15% said it had a "moderate" impact. The Constitution of Kenya (2010), the County Government Act (2012), and the Water Act (2016) make up the current legislative framework impacting the administration of water access. These legal frameworks underpin the guiding concepts of water access governance in the Kibera slum. Several of these characteristics include fairness, involvement, responsiveness, efficiency, and inclusiveness. As a result, it is

clear that the legal framework had a crucial role in determining how the Kibera informal community handled the management of its water supply.

5.5.3 Legal framework on the governance of water access

Respondents were asked to indicate the degree to which they agreed that certain parts of the legal framework influenced the governance of water access in informal settlements like Kenya's Kibera slum. On a scale from 1 (Strongly Disagree) to 5 (Strongly Agree), respondents gave their opinions as follows: Neutrality Level 3 Both 4 and 5 indicate agreement. SPSS was used to calculate the means and standard deviations shown in Table 5.5.

Table 5. 5 Legal framework on governance of water access

	Mean	**Std dev**
Existing policies and regulations do not take account of informal settlements	4.71	0.48795
Due to their informal status, most low-income groups, lack security of tenure to the land they settle on	3.71	0.75593
The slum dwellers do not have legal access to credit and consequently to services such as water	3.57	0.78680
Lacking secure tenure, it is difficult for those communities to engage with the formal sector in general and specifically in respect of water and sanitation provision	4.02	0.57735
Low-income groups do not only lack access to services but more importantly they lack generally the power of decision-making, including decisions regarding WSS issues	4.00	0.81650

The majority of respondents in this study agreed with the following statements: existing policies and regulations do not take account of informal settlements (Mean=4.71); without secure tenure, it is difficult for those communities to engage with the formal sector in general and specifically, in respect to water and sanitation

provision (Mean=4.02); low-income groups not only lack access to services, but more importantly, lack generally the power of decision-making; and finally, existing policies and regulations do not take into account the needs of low-income groups.

Legal framework was shown to positively correlate with water access governance. There was adequate evidence from the data to demonstrate the association with statistical significance. Access to WSS services in all areas, fostering receptivity to residents' needs and aspirations, is guaranteed by the legal system. This is accomplished via the construction of an administrative and institutional framework at the National and County government levels. Because of this, the legal framework in Kenya played a pivotal role in shaping how water access was governed in low-income communities. Inadequate consideration of informal settlements in the current legal framework hampered efforts to manage water use in these communities. In addition, the people living in the shantytown of Kibera weren't allowed to have any input over the management of the water supply. They didn't feel that their contributions to water governance were being properly appreciated

5.6 To find out how disaggregation of the poor influence governance of water access in informal settlements in Kenya.

The third objective of the study was to find out how disaggregation of the poor influences governance of water access in Kibera informal settlement in Kenya. The findings are presented in the subsequent sub-themes.

5.6.1 Disaggregation of the poor and governance of water access

The respondents were to indicate whether there was disaggregation of the poor that affected governance of water access in Kibera informal settlement in their area.

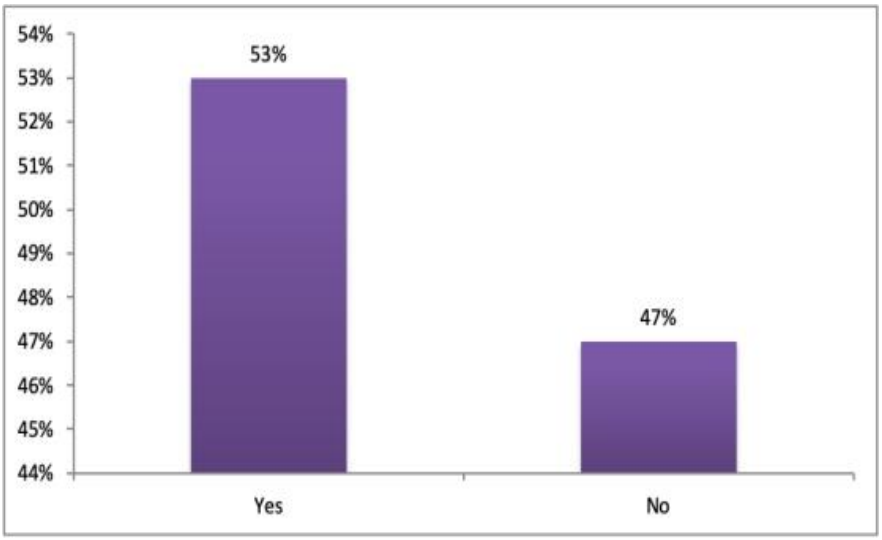

Figure 5. 10 Disaggregation of the poor and governance of water access

Figure 5.10 above shows that the majority of respondents in Kibera informal settlement agreed that impoverished people's disaggregation impacted the governance of water access. 47% of respondents, however, said that inadequate disaggregation had little effect on water access governance in Kibera's informal community.

5.6.2 Disaggregation of the poor and governance of water access

The study sought to find out the extent to which the disaggregation of the poor influenced governance of water access in Kibera informal settlement in the area.

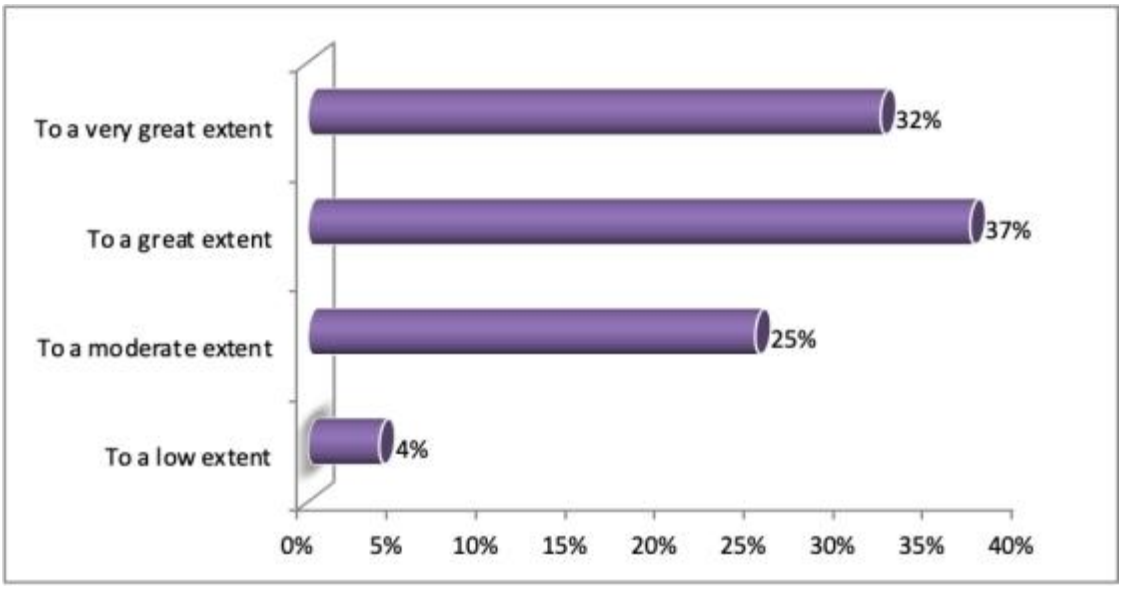

Figure 5. 11 Disaggregation of the poor and governance of water access

Figure 5.11 shows that the results of this study indicate that weak disaggregation negatively impacted water access governance in Kibera informal settlement by 37%, 32%, and 25%, respectively.

To show how aggregation might obscure regional heterogeneity of poverty and to test the robustness of the chosen indicators, several research have analyzed data at both the disaggregated and aggregated levels. Disaggregated data pinpoints where poverty and vulnerable populations are most prevalent. Among them, access to good sanitation and/or a water supply is crucial; hence, an acceptable level of governance of WSS must follow the strategy of disaggregation to identify the diverse demands of these families. From the results presented above, we can conclude that the fragmentation of the poor has had a significant impact on the administration of water supply in Kibera informal settlement.

5.6.3 Disaggregation of the poor on governance of water access in informal settlements

The purpose of this research was to determine whether or not impoverished people's disaggregation affected the management of water supply in Kenya's slums. We asked

respondents to rate their agreement with a statement that disaggregation of the poor impacted water access governance in Kenya's informal settlements. Likert scales from 1 (Strongly Disagree) to 5 (Strongly Agree) were used to evaluate the replies. With a 2 - Disagree Neutrality Level 3 We have two sets of 5s: 4-Agree and 5-Strongly Agree. Table 4.7 displays the results of an SPSS calculation of the means and standard deviations.

Table 5. 6 Disaggregation of the poor on governance of water access in informal settlements

	Mean	**Std dev**
Formal institutions often lack the knowledge and skills to deal with poor communities	3.65	0.69007
Categories identified as ‘vulnerable groups’ or ‘disadvantaged’ are too broad to address distinct needs that different members of these categories might have	4.14	0.89974
the issue of equity plays an important role in water and sanitation	3.92	1.21499
Disaggregation is important to determine the minimum amount of water per person per day in the light of different needs but also gender roles as regards productive, reproductive, and other daily activities	3.82	0.53452

The majority of respondents agreed with the following statements about the importance of equity in relation to water and sanitation (Mean=4.14), that disaggregation is important to determine the minimum amount of water per person per day in light of different needs but also gender roles as regar as equity, and that the categories identified as "vulnerable groups" or "disadvantaged" are too broad to address distinct needs that different members of these categories might have.

This suggests that weak disaggregation adversely impacted water access governance in Kenya's Kibera slum. Due to impoverished people being split up into different

groups, services aimed at helping the most vulnerable and disadvantaged were not provided, hence there was very little water equality. Disaggregation was crucial in establishing a base daily water requirement for a variety of uses.

CHAPTER SIX
SUMMARY OF THE FINDINGS, DISCUSSIONS, CONCLUSION, AND RECOMMENDATIONS

6.1 Introduction

This chapter presents a summary of the findings, conclusion, and recommendations on governance of water access in informal settlements in Kenya: a case of Kibera informal settlement in Nairobi City County.

6.2 Summary

6.2.1 Effect of community participation on governance of water access

According to the findings, almost half of Kibera's informal settlement population helped launch water projects. This shows that residents of Kenya's Kibera slum have a fair amount of say in the management of public water systems. The principles of openness, transparency, inclusivity, and communication must be applied by all parties involved for public involvement to be considered a best practice.

According to the findings, over half of people engaged in water governance contributed to or attended meetings for the launch of water projects as members of a consultative committee or as contributors of materials. Community involvement in the management of water distribution in Kenya's Kibera informal settlement was crucial for a number of reasons, including the cutting of operating costs, the boosting of project efficacy, and the extension of the projects' useful lifespan.

Results showed that community involvement has a significant impact on water access governance in low-income neighborhoods. Therefore, community involvement was a key component in improving water service delivery in informal communities.

The study found that the main advantage associated with community participation in the project was the continuation of the project (67%), timely maintenance/repairs

(56%), harmony/conflict management (46%), strong ownership of the projects (44%), better service delivery (33%), and expansion of the project (22%). (31 percent).

Involvement of the target communities is critical for the sustainability of water supply systems (M=4.09), stakeholders influence and share control over water development (M=4.39), and stakeholders' support has ensured that participants are actively involved in project planning and implementation or through formal or informal training and consciousness- raising activities (M=4.23).

Consequently, governance of water access in Kenya's slums was largely shaped by the involvement of local communities. As a result of their involvement in the project's design and execution, the locals have a firm grasp on their respective duties, the water supply systems in their region are more resilient, and they have more say over water development efforts.

6.2.2 To examine the effect of legal framework on governance of water access in informal settlements in Kenya.

Water access in informal settlements was found to be governed by an existing legal framework. To a large degree, Kibera's legislative structure shaped how water access was governed inside the community. The legal-policy framework in Kenya, and by extension Kibera, has resulted in some very positive policy institutions and networks for the effective governance of access to water services. This is true for the development of systems that encourage public participation, as well as for the establishment of mechanisms for resolving conflicts and empowering those affected by them.

Existing policies and regulations do not take into account of informal settlements (Mean=4.71), and without secure tenure, it is difficult for those communities to engage with the formal sector in general and specifically in respect of water and sanitation provision (Mean=4.02). As a result, low-income groups not only lack

access to services but, more importantly, lack the power to make decisions, including decisions pertaining to water and sanitation provision.

Because of this, the legal framework in Kenya played a pivotal role in shaping how water access was governed in low-income communities. Water governance in informal settlements was constrained since the current legal framework did not adequately take into consideration the unique characteristics of these communities. Residents of informal settlements were also barred from participating in water governance since they were not recognized as integral stakeholders.

6.2.3 To find out how disaggregation of the poor influences governance of water access in informal settlements in Kenya.

The findings of the research showed that the governance of water access in the Kibera informal community was impacted by the impoverished being split up into smaller groups. Water availability in Kibera's informal community was significantly impacted by the disaggregation of the poor. Therefore, the poor's fragmentation had a significant role in determining the effectiveness of Kibera's water administration.

It was determined from the results of the study that the categories identified as 'vulnerable groups' or 'disadvantaged' are too broad to address the distinct needs that different members of these categories might have (Mean=4.14); that equity plays an important role in water and sanitation (Mean=3.92); and that disaggregation is important to determine the minimum amount of water per person per day in light of different needs but also gender roles as regards productive, reproducing, and hygienic activities.

Consequently, impoverished people's disaggregation has a major impact on water governance in Kenya's slums. Due to impoverished people being split up into different groups, services aimed at helping the most vulnerable and disadvantaged were not provided, hence there was very little water equality. The disaggregation was

critical in establishing the bare minimum of water required per person per day in consideration of varying requirements.

6.3 Conclusions

6.3.1 Effect of community participation on the governance of water access

Researchers found that informal settlements in Kenya had a modest amount of community engagement in the control of water access. Low civic awareness among the populace, disorganized civic education, and difficulties in obtaining information all contributed to middling quality public involvement that has not been maximized. Governance of water access in Kenya's informal settlements benefited greatly from community involvement, which cut costs, increased efficiency, and ensured the projects would last. According to the results, community involvement impacted water access management in Kibera's informal settlement significantly. For this reason, including the local population was crucial to improving the management of water supply in shantytowns.

The research found that the key advantages of community involvement in the water project were the continuation of the projects, timely maintenance and repairs, harmony and conflict management, strong ownership of the projects, improved service delivery, and extension of the project.

The research found that in Kenya's informal settlements, community involvement in water management was a crucial determinant of governance. As a result of being included at every stage of the process, residents have a firm grasp on the water infrastructure in their region, are more invested in its long-term viability, and can have more influence over its growth.

6.3.2 To examine the effect of legal framework on governance of water access in Kibera informal settlement in Kenya.

The research found that the regulation of water access in the region's informal settlements was governed by preexisting legal framework. To a large degree, Kibera's legislative structure shaped how water access was governed inside the community. Therefore, the legal framework had a significant role in determining how water was governed in the Kibera slum.

The research found that the legal framework was an important factor in the administration of water distribution in the Kenyan slum of Kibera. Due to the absence of a comprehensive land tenure system that would allow for investment in water infrastructure, water governance in informal settlements is constrained by the current legal framework's failure to account for these areas. Kenyans, according to Article 1(1) of their 2010 constitution, have all authority as a whole. To put it another way, the people are supposed to use this authority either via direct involvement in government or through their democratically chosen representatives. The Constitution also established a decentralized government in an effort to give citizens a greater say in how they are governed and to reduce the burden placed on federal agencies. This resulted in the establishment of 47 counties where citizens could have a voice in policymaking, and as a result, Articles 10(2a) and 232(1) of the Constitution were amended to make "citizen participation" a national value and a principle of public service. Public funds were first distributed to the Counties in Kenya under the Constitution of 2010. The care of water systems, public health, transportation networks, and agricultural systems have all been delegated to the counties. Without feedback from locals via a well-structured public involvement platform, it would be impossible to comment on how well the services are performing. Kibera's forum is co-organized by the county administration (through the ward administrators) and non-governmental organizations (NGOs) like SHOFCO.

6.3.3 To find out how disaggregation of the poor influences governance of water access in Kibera informal settlement in Kenya.

The research found that weak disaggregation impacted water access governance in Kibera slum. Water availability in Kibera's informal community was significantly impacted by the disaggregation of the poor. Therefore, the poor's fragmentation had a significant role in determining the effectiveness of Kibera's water administration.

The research found that inadequate disaggregation has a major impact on water governance in Kenya's slums. Because the poor were not grouped together, the needs of the most vulnerable and disadvantaged people were not met, and water equality was severely compromised. The disaggregation was critical in establishing the bare minimum of water required per person per day in consideration of varying requirements.

6.4 Recommendations of the study

1. Citizen awareness should be raised to increase the amount of community engagement in the administration of water access in Kenya's informal settlements. There has to be a massive civics education initiative with plenty of funding behind it. As a governance and development project, the civic education program should be funded at both the national and County levels if residents are to feel empowered to participate in the management of water resources in their communities. Doing so would aid in avoiding several difficulties associated with informal settlements' administration of water access.

2. Standards for public engagement need to be defined and enacted at the federal, state, and local levels of government. To put into action the national policy on public participation, legislation should be established at the national level to define criteria for public engagement, and the same should be cascaded to the community level. Standards for successful public engagement

should be established and adhered to by all parties involved. Kenya's government, via the appropriate ministry and in consultation with the local community and key stakeholders, should examine the current legislative framework for the management of water supply in the country's many unplanned communities.

3. To guarantee an adequate general impression of involvement and service delivery to all members of society, particularly the most vulnerable, the government should establish a department to foster discourse and evaluate the engagement of the people and civil society. The goal here should be to broaden its appeal and accommodate the unique requirements of the economically disadvantaged in terms of water supply.

4. Alternate and creative tenure arrangements that take into account the needs of people living in informal settlements should be included into the Land Act No. 27 of 2016. It is recommended that the Community Land Act of 2016 be amended to protect the tenure rights of people living in informal settlements and to expand the definition of a community to include the inhabitants' villages in these areas. This would make it possible for federal and local governments to pool resources to improve water infrastructure.

6.5 Suggestions for further studies

Since this study was on the governance of water access in informal settlements in Kenya: a case of Kibera Slums in Nairobi City County, the study recommends that;

i. A similar study should be done among informal rural settlements in other counties in Kenya for comparison purposes and to allow for the generalization of findings on the governance of water access in informal settlements in Kenya.

ii. Other studies should be conducted on the challenges facing the governance of water access in informal settlements in Kenya.

iii. Similar studies should be conducted on the role of women in the governance of water access in informal settlements in Kenya.

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APPENDICES

APPENDIX I: QUESTIONNAIRE

Instructions: (*Please read the instructions given and answer the questions as appropriately as possible*). It is advisable that you answer or fill in each section as provided. Make an attempt to answer every question fully and honestly.

SECTOR A: Household socio-economic information

1. How old are you now?

2. What is your marital status?

Married [ ] Divorced [ ] Widow [ ] Single [ ]

4. What is your religion?

Christian [ ] Traditionalist [ ] Muslim [ ]

5. What is your education?

No formal education [ ]

Primary education [ ]

Secondary education [ ]

Tertiary education [ ]

Degree holder [ ]

Others [ ]

6. What is your occupation?

Housewife [ ] Formal employment [ ] Non-formal employment [ ]

Jua-kali [ ] Farmers [ ] Pastoralist [ ]

What is the size of your household? ……..

7. What is your family income per month (Total family income per month)

…….

Section B: Effect of legal framework on governance of water access in informal settlements in Kenya

8. Are there existing legal framework that control governance of water access in informal settlements in your area?

Yes [ ] No [ ]

9. To what extent does the legal framework that control governance of water access in informal settlements in your area?

To a very low extent [ ] To a low extent [ ] To a moderate extent [ ]

To a great extent [ ] To a very great extent [ ]

10. The following statements are the related to the effect of the legal framework on governance of water access in informal settlements in Kenya. To what extent do you agree with each one of the statements? Use a scale of 1-5 where 5-To a very great extent, 4-To a great extent, 3-To a moderate extent, 2-To a little extent, and 1-To no extent.

	1	**2**	**3**	**4**	**5**
Existing policies and regulations do not take account of informal settlements					
Due to their informal status, most low-income groups, lack security of tenure to the land they settle on					
The slum dwellers do not have legal access to credit and consequently to services such as water					
Lacking secure tenure, it is difficult for those communities to engage with the formal sector in general and specifically in respect of water and sanitation provision					
Low-income groups do not only lack access to services but more importantly they lack generally the power of decision-making, including decisions regarding WSS issues					

Section C: How disaggregation of the poor influence governance of water access in informal settlements in Kenya

11. Is theredisaggregation of the poor that affect governance of water access in informal settlements in your area?

Yes [ ] No [ ]

12. To what extent does the disaggregation of the poor influence governance of water access in informal settlements in your area?

To a very low extent [ ] To a low extent [ ] To a moderate extent [ ]

To a great extent [ ] To a very great extent [ ]

13. The following statements are the related to the effect of disaggregation of the poor on governance of water access in informal settlements in Kenya. To what extent do you agree with each one of the statements? Use a scale of 1-5 where 5-To a very great extent, 4-To a great extent, 3-To a moderate extent, 2-To a little extent, and 1-To no extent.

	1	**2**	**3**	**4**	**5**
Formal institutions often lack the knowledge and skills to deal with poor communities					
Categories identified as 'vulnerable groups' or 'disadvantaged' are too broad to address distinct needs that different members of these categories might have					
the issue of equity plays an important role in relation to water and sanitation					
Disaggregation is important in order to determine the minimum amount of water per person per day in the light of different needs but also gender roles as regards productive, reproductive and other daily Activities					

Section D: Effect of community participation on governance of water access in informal settlements in Kenya

14. Have you ever participated in the initiation/start of the water projects in this area?

Yes [ ] No [ ]

15. If yes, what was your area of participation?

-I was consulted through a meeting

-I contributed materials

-As a leaders/part of the committee

-Others – specify…….

16. Are other partners/stakeholders involved in the water projects in this area?

Yes [ ] No [ ]

17. In which ways are they involved:

-Designing [ ]

- Contribution of funds/other resources [ ]

- In management/running of the operation of the rural community based water projects [ ]

18. In your opinion, to what extent has the community participation affected the governance of water access in informal settlements in your area?

To a very low extent [ ] To a low extent [ ] To a moderate extent [ ]

To a great extent [ ] To a very great extent [ ]

19. Name at least two main benefits associated with community participation in the project?

Strong ownership of the projects

Timely maintenance/repairs [ ]

Continuity of the project

Expansion of the project

Better service delivery [ ]

Harmony/conflict management

20. The following statements are the related to the effect of community participation on governance of water access in informal settlements in Kenya. To what extent do you agree with each one of the statements? Use a scale of 1-5 where 5-To a very great extent, 4-To a great extent, 3-To a moderate extent, 2-To a little extent, and 1-To no extent.

Statements	**1**	**2**	**3**	**4**	**5**
Involvement of the target communities is crucial for the sustainability of rural water supply systems					
Stakeholders' support has ensured that participants are actively involved in project planning and implementation or through formal or informal training and consciousness-raising activities.					

Stakeholders' involvement in the project implementation has enhanced continuity in the operation of the water project					
Stakeholders ' participation has enabled them to clearly understand their roles					
Stakeholder are better placed to lobby for government and donor support for the community project					
By the Stakeholders' support, the community ensures the success of a project through collective efforts to increase and exercise control over project					
Stakeholders influence and share control over water development initiatives, and the decisions (e.g. for expansion, operation and maintenance) and resources which affect them					
Stakeholders support ensure that community project are managed effectively, minimizing wastes and thereby ensuring their sustainability more so financial sustainability					
Stakeholders' support brings together individuals, families, or communities who assume responsibility for their own welfare (ownership)					
Stakeholders ' contribution influences the direction and execution of water development projects rather than merely receive a share of project benefits					
Community support has increased project efficiency (how quick repairs are done					
Building a partnership with the communities lead towards improving the people's problem solving capacities					

Thank you for your participation

APPENDIX II: INTERVIEW GUIDE FOR KEY INFORMANTS

Section A: Background information

1. What is your designation?

……

Section B: Effect of legal framework on governance of water access in informal settlements in Kenya

2. What are the existing legal frameworks that control governance of water access in informal settlements in your area?

……

……

3. How do the legal frameworks affect governance of water access in informal settlements in your area?

…….

Section C: How disaggregation of the poor influence governance of water access in informal settlements in Kenya

4. Is theredisaggregation of the poor that affect governance of water access in informal settlements in your area?

……

…….

5. In what ways does the disaggregation of the poor influence governance of water access in informal settlements in your area?

……

……

……

Section D: Effect of community participation on governance of water access in informal settlements in Kenya

6. Is there community participation in the governance of water access in informal settlements in Kenya?

……

……..

7. In what ways are community members involved in the governance of water in informal settlements in Kenya?

……

……

8. How does community participation affect governance of water access in informal settlements in Kenya?

……

……

Thank you for your participation