

Inaccessible and Unaffordable? The State of Water and Sanitation Services in Nairobi, Kenya

Obel Lena Omina, Wang Tao, Wang Feng, Edwin Kipkirui



Abstract: As the limited water resources become increasingly stressed by factors such as rapid urbanization, population growth, and climate change, the need for sustainable urban water management is more important than in the past decades. A large part of the world's population still lacks access to clean water and sanitation, making achieving Sustainable Development Goals a challenge. Water is an indispensable resource and plays an important role in ensuring the achievement of Sustainable Development Goals. Therefore, there is a need to prioritize research on the availability, affordability, and access of water resources to promote sustainable water resource management. In this study, we reviewed academic articles and published reports from various institutions and organizations to assess water sources, infrastructure, coverage, accessibility, and affordability of water and sanitation services in Nairobi County. The study identified Nairobi's main water sources as municipal water, primarily from surface water and groundwater. However, the capacities of the water sources, treatment plants, and wastewater treatment plants were found to be insufficient, resulting in water shortages in most parts of the city. Most of the infrastructures were also found to be insufficient and old, contributing to water distribution inefficiencies, frequent leakages, and pipe bursts which hampers water reliability. The study suggests prioritizing the water and sanitation sector in government budgets to increase infrastructure development investments and funding. Appropriate wastewater treatment methods should also be adopted and implemented to enable wastewater to meet water consumption standards and be potentially integrated into supply systems.

Keywords: Municipal water; Water accessibility; Water affordability; Water and Sanitation Services

I. INTRODUCTION

The majority of the world's population has yet to comprehend that, freshwater supplies are not as plentiful as they are thought to be. There is no doubt that water is one of the most important resources for human survival, and we cannot exist without it.

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Access to clean water and sanitation services (WSS) is a fundamental human right that is vital for overall well-being and sustainability, as recognized by the United Nations through the development of the Sustainable Development Goals (SDG 6) in 2015 [1, 2]. Despite the recognition of access to WSS as a basic human right, practical data contradicts this ideal. Millions of people today face challenges in accessing these important services [3]. Countries continue to struggle with expanding access, indicating a large gap between the recognized right to water and the practical problems encountered [4, 5].

Although progress has been made in providing global access to WSS, a large proportion of the world's population continues to lack access to safe, improved water and sufficient sanitation facilities [6]. According to a recent assessment by the Joint Monitoring Programme (JMP) with UNICEF and WHO, only about 57% of the urban population has access to safe drinking water, with only 14% having sewer connections [7]. The differences are most pronounced in developing/underdeveloped nations, where people are more vulnerable due to a lack of infrastructure, resources, and political will [8].

The report by the World Population Prospect indicates that the world's population is quickly increasing and is expected to reach 2.4 billion by 2050 [9]. This rise in population, combined with challenges of urbanization and climate change, is expected to put more pressure on the limited available water resources, with the existing water supply infrastructure struggling to fulfill the ever-increasing demand for WSS [10, 11].

Access to water and sanitation entails more than just having water; it also includes assuring the availability of water in terms of quantity, quality, and enhanced sanitation services [12, 13]. The availability of water and sanitation services is heavily influenced by the level of infrastructure development. Infrastructure such as pipelines, treatment plants, and distribution networks must be built and maintained to ensure consistent access to clean water and adequate sanitary facilities [14].

Nairobi, like any other city, struggles to achieve the country's constitutional responsibility of supplying clean and safe water to all inhabitants. This is exacerbated by several issues, including climate change, population increase, poor water management, and insufficient infrastructure.

These problems have had serious effects on the population, including limited access to WSS, unpredictable supply, high WSS costs, and environmental deterioration [15, 16].

To address these concerns, we analyzed the present Nairobi water system in terms of service accessibility and price, as well as the obstacles to water resource sustainability.



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The goal of this study is to look at the accessibility and affordability of WSS in Nairobi County, identify potential issues, and make recommendations for the long-term accomplishment of Vision 2030 and SDG 6.

II. MATERIALS AND METHODS

A. Study Area

This research focuses on Nairobi County. The County is divided into sub-counties and constituencies (figure 1) for easier resource management, allocation, and distribution. With a population of approximately 5.3 million, it serves as the city's largest as well as its economic, political, and cultural core [9, 17]. The city's rapid urbanization is fueled by factors such as rural-urban migration, economic growth, and industrialization, resulting in a current population increase.

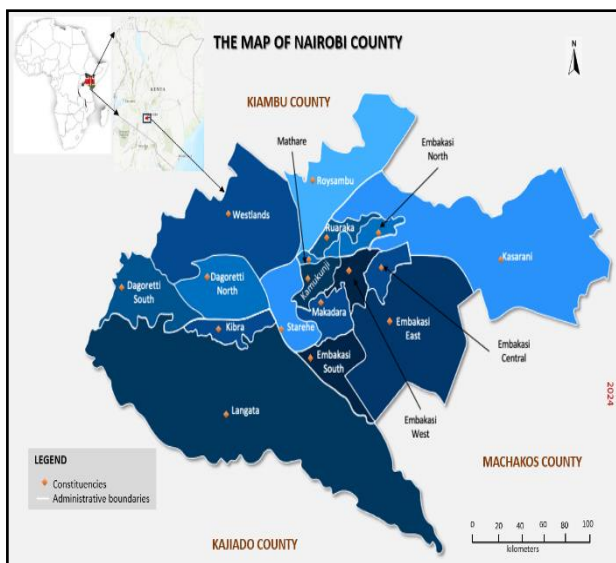


Figure 1: Nairobi County and its Constituencies

As the city continues to develop and grow in population, the demand for water resources has increased, creating considerable challenges to the long-term management of its water cycle [18, 19]. Its population relies on a variety of water supply sources, including groundwater and surface water.

The water supply systems date back to the colonial period when the city was founded by the British in the late nineteenth century [20]. Initially, Nairobi's water supply was primarily provided by natural sources such as springs and rivers located outside the administrative boundaries of Nairobi County. However, as the County's population grew over time, water demand increased significantly.

The Nairobi City Water and Sewerage Company (NCWSC) was established in 2003 to oversee the city's WSS. However, past inequalities in water distribution and the establishment of infrastructure continue, resulting in disparities in access and affordability among residents [21].

While the city's population is rapidly increasing (figure 2), the water supplies are insufficient to support the ever-increasing population. As a result of the imbalance between water resources and population expansion, there is an unequal water supply, which leads to poor access, particularly in low-income areas and informal settlements [22, 23]. Although the County's population growth rate has significantly decreased

(figure 2), the city's slight rise in population continues to impose significant strain on existing water resources [24, 25]. This predicament has far-reaching implications for the region's water resource sustainability and management.

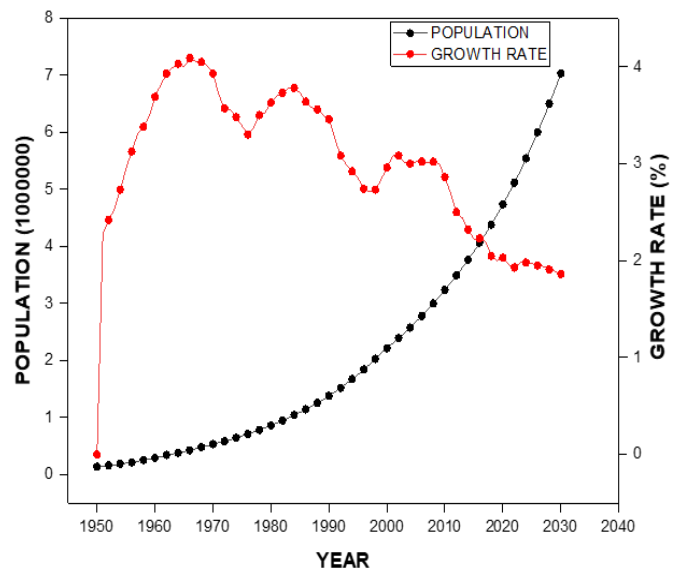


Figure 2: Nairobi's Historical and Projected Population and Growth Rate. Data Source: Data Source: World Population Prospects 2022 [9]

B. Methodology

This research employed the Morgan and Krejcie formula to determine the sample population size with $\pm 95\%$ confidence level for the survey conducted in Nairobi County [26].

$$S = \frac{X^2 NP(1 - P)}{d^2(N - 1) + X^2 P(1 - P)} \quad (1)$$

Where:

S Required sample size

X^2 Chi-square for 1 degree of freedom at desired confidence level (95% $= 1.96^2 = 3.841$)

N Estimated population size

P Population proportion ((assume 50% (gives maximum sample size)/30% (gives minimum sample size))

d^2 degree of accuracy expressed as a proportion (0.05)

To ascertain the appropriate sample size, the samples collected were evaluated to identify and eliminate any erroneous data. Ultimately, a total of 390 responses from residents, along with input from other stakeholders, were identified as suitable samples for analysis. In addition to those samples, supplementary reviews from academic articles and published reports were incorporated into the analysis. These were drawn from the existing literature, and various organizational and institutional websites such as the United Nations, Nairobi City Water and Sewerage Company (NCWSC), Athi Water Works Development Agency (AWWDA), Water Services Regulatory Board (WASREB), and National Environment Management Authority (NEMA), among others.



III. RESULTS AND DISCUSSION

A. Accessibility of Water and Sanitation Services

a. Water resources

Nairobi County relies mainly on surface water for its municipal water supply.

Approximately 80% of the water supply for Nairobi's residents comes from surface water sources, with the remaining 20% sourced from groundwater due to inadequacies in the municipal water supply [27][47][48][49]. The surface water consists of four major sources: Thika Dam, Ruiru Dam, Sasumua Dam, and Kikuyu Springs. These vital sources of water contribute to the region's water demand, ensuring that residents have access to water that is clean and safe for consumption.

Table 1 contains detailed information about each water source's specific attributes, providing comprehensive insights into their contributions to the Nairobi water supply system.

Once collected, municipal water is treated in the Ngethu, Sasumua, Kabete, and Kikuyu Springs water treatment plants. Some of the systems' facilities, such as the raw/treated water transmission pipelines at Sasumua WTP and Ngethu WTP, are located outside of Nairobi County's geographical boundaries (table I).

b. Water Availability

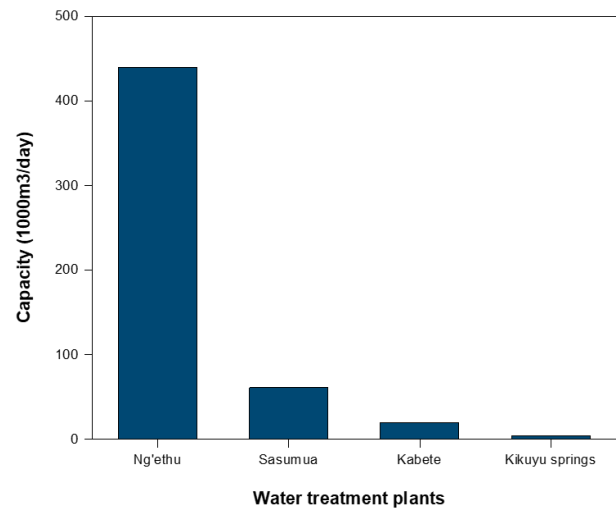


Figure 3: Capacity of Water Treatment Plants

According to the NCWSC, the volume of water supplied in Nairobi is determined by the capacity of the water treatment plants. The four WTPs have a maximum daily production capacity of 440 million, 61 million, 20 million, and 4 million liters, respectively (figure 3).

Table I:- Characteristics of the Main Municipal Water Sources

Dam/Spring	Thika dam	Sasumua Dam	Ruiru Dam	Kikuyu Springs
Location	Ndakaini in Murang'a County	Njambini, Nyandarua County	Githunguri, Kiambu County	Magana Flowers in Kikuyu, kiambu County
Constructed year	1994	First phase:1955 Second phase:1968	1950	1913
Water source	Thika, Githika, and Kayuyu rivers	Sasumua, Chania and Kiburu streams	Ruiru river	
Storage capacity (million m3)	70	15.9	2.9	N/A
Design yield capacity (m3/day)	460,000	59,000	22,700	6000
Daily transmission (m3/day)	430,000	56,200	21,700	4000-5,500
Capacity utilized	93%	95%	96%	30%
Treatment plant	Ngethu WTP in Kiambu County	Sasumua Dam WTP	Kabete WTP	Kikuyu spring WTP through chlorination
Design capacity of the WTP (m3/day)	440,000	63,500	22,700	
Contribution to Nairobi water supply	84%	11.6%	4%	0.4%
Distance to Nairobi (reservoir)	90km	60 km	25km	10km
Service reservoir served	Gigiri	Kabete	Kabete	Kabete

The current capacity of WTPs cannot fulfill the city's increasing demand for water. The current water demand is at 870 million liters against the 525.6 million liters supply (capacity of the WTPs) (figure 4). With the increasing and frequent droughts affecting river discharge, it's anticipated to limit available water supply further. The NCWSC's public notice report indicates that the city's water supply is limited by the WTPs' existing production capacity. Therefore, even if the primary water sources (Dams) overflow especially during the wet seasons, the supply remains constant since they

cannot exceed the installed production capacity. A significant observation made on the current primary water sources is the considerable overflow of water from the dams in the wet season leading to a waste of large volumes of water, which could have otherwise been stored to alleviate the water shortage during the dry season.

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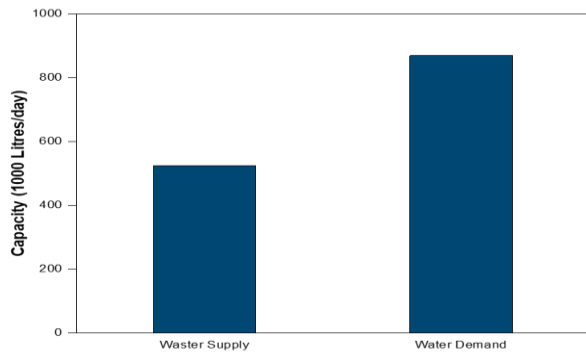


Figure 4: Current Water Supply and Demand in Nairobi

c. Access to Sanitation Services

The government of Kenya aims to attain universal access to sanitation by 2030. However, securing full connection to sewer systems and access to sanitation services, including toilets, garbage collection, and disposal facilities, is challenging. This is due to unplanned rapid urbanization, inadequate infrastructure, and overgrowing population. It's crucial to note that despite garbage and solid waste not necessarily being part of water and sanitation, the situation in Kenya differs. Solid waste management is incorporated into the broader context of environmental sanitation and hygiene practices. This is evident in the Kenya Environmental Sanitation and Hygiene Policy 2016-2030, where solid waste management is mentioned as part of its scope [28].

The majority of the population lives in informal settlements (slums), with inadequate access to essential services [29]. As reported by the UN, approximately only 40% of Nairobi's population have access to enhanced sanitation facilities, for instance, flush toilets connected to a sewer system or pit latrines with slabs [30]. Many of the residents rely on the communal pit latrine which are often poorly maintained and unhygienic [31]. The use of on-site/open disposal of faecal waste is also common although at a minimal rate, which causes pollution of the environment [32]. The mushrooming houses in these areas make it difficult for the garbage collection facilities (municipal garbage trucks) to access those regions. Therefore the residents rely on private garbage collectors for sanitation services at a fee [33].

A survey by Iddi, Akeyo [34] in the urban informal settlements of Nairobi, shows that there was a high percentage of individuals with a lack of access to improved toilets and garbage collection facilities. According to the recent report from AWWDA, the current sewerage development coverage is at 50% indicating that a significant number of individuals are unable to access sanitation services [35].

d. Infrastructure Development

The importance of infrastructure development in improving WSS accessibility cannot be underestimated. The imperial evidence from both developed and developing countries indicates a positive correlation between infrastructure availability and the development of access to

WSS [36-38]. Water system infrastructure includes both water supply and sewerage systems. In Nairobi, the water infrastructure system faces a significant challenge which limits the accessibility of WSS. The existing infrastructures are not sufficient to cater to the growing population and urbanization. Consequently, there is inadequate provision of WSS, leading to limited accessibility in some areas or complete absence of such facilities in others.

As reported by NCWSC, most of the infrastructure dates back to the colonial period, this aging infrastructure contributes to the inefficiencies in water distribution [39]. Leakages, pipe bursts, and system failures become more prevalent causing water loss and hindering the reliability of the water supply. Apart from the old infrastructure, the situation in Nairobi is directly linked to the capacity and availability of the current WTPs and piped water systems that cause water shortages and inconsistent water supply.

e. Piped Water Supply

Most Nairobi households lack piped water systems, particularly in low-income districts where residents live in "single/double rooms" with no water infrastructure installed. In these regions, residents rely on communal taps for water, but some are often dry and outdated compelling residents to seek alternative water sources.

According to the survey done across Nairobi, only 77% of the participants had access to a piped water system, leaving the remaining 23% without such access in their households. As much as more than half the population has access to piped systems and with the need to ensure equitable access by all by 2030, the remaining population has a right to access these services.

With the rapid growth of informal settlements, especially in the eastern part of the city (Kayole, Soweto, Mathare, etc.), the development of the water infrastructure becomes a challenge. This has resulted in the uneven distribution of the water pipes in these regions compared to the northern and western parts.

f. Water Rationing

Since 2017, the city implemented a water rationing system, one of the well-publicized examples of water scarcity in the city. NCWSC has frequently used this mechanism to ensure equitable distribution of water within the city. Water availability varies by region, with some areas receiving water on designated weekdays, and others for just a few hours, all based on the water levels in the reservoirs.

According to the AWWDA report, the initial objective was to ensure the residents of Nairobi receive water at least 18 hours per day but currently NCWSC can only manage to supply the water for an average of 8 hours per day [35]. The low capacity of water supply by the municipality forces the company to apply water rationing mechanisms depending on the situation. Due to water rationing and the uneven distribution of infrastructure development, high- and middle-income areas have more hours of water supply compared to low-income areas [40].

Table II:- Water Tariff Change from 2022/2023 to 2024/2025

Consumer Category	Tariff structure-water			
	Previous Tariff	Current Tariff		
	Consumption Block (M3)	Previous Tariff (Ksh/ M3)	Consumption Block (M3)	Current Tariff (Ksh/ M3)
Domestic/Residential	0 – 6	34	1 - 6	45
	7 - 60	53	7 - 20	67
	>60	64	21 - 50	70
			51 - 100	76
		101 - 300	78	
		>300	80	
Commercial/ Industrial/ Government institutions	0 – 6	34	1 - 50	67
	7 - 60	53	51 - 100	76
	>60	64	101 - 300	78
		>300	80	
Schools/Universities/Tertiary institutions	0 - 600	48	1 - 600	50
	601 - 1200	55	601 < 1200	55
	>1200	60	>1200	60
Other Categories	Gated community	53	Gated Community	67
	Bulk water supply	30	Bulk Water Supply	32
	Water kiosks	20	Water Kiosks	22

B. Affordability of Water and Sewerage Services

Water affordability refers to an individual’s, household’s, or community’s ability to access and pay for an adequate and safe supply of water without financial hardship. It is a critical component of ensuring that everyone has access to this basic human need. Several factors influence water affordability:

a. Water Tariff and Sewer Tariffs

The provision of adequate and reliable WSS brings about significant advantages in social, health, and economic aspects, particularly for low-income households [41]. Offering such services in the context of high poverty, water scarcity, and high inequality rates is a difficult balancing task for water managers. However, well-designed policy tools, including water tariff structures that embrace equality, equity, cost-effectiveness, sustainability, and political viability, could go a long way in providing better WSS [42].

In recent times, the water and sewer tariffs have been adjusted, affecting the affordability of WSS. This adjustment has had a notable effect on the livelihoods of residents, particularly those residing in slum areas. In Nairobi, tariffs were changed for the periods from the previous 2022/2023 to the current 2024/2025 [43]. Implementing tariff adjustments is a positive initiative as the generated revenue contributes to the infrastructure and other developments. However, it’s essential to implement changes equally across all levels of consumption to avoid placing excessive burdens on particular groups. Maintaining uniform rates ensures fairness and equitable distribution of costs among consumers.

An increase in the cost of WSS from being cheap makes access to WSS expensive for some residents. From the current tariff change (table II), there is a slight increase in the cost of water which could be seen as cheap, moderate, or expensive depending on the socio-economic class of the residents. From the information gathered from the field observation/questionnaire survey, 75% of the respondents experienced an increase in their water bill whereas 50% complained of having difficulties in paying for the WSS. Consequently, some residents (50%) reported not being able to pay their water bills whereby risked eviction from their houses or water disconnection depending on the agreement with the house rental owners.

b. Cost of Water

Access to WSS is critical for sustainability, but the significant/increased cost associated with these services impedes growth for both individuals and communities, particularly those with limited financial resources.

In Nairobi, WSS is less expensive in high- and middle-class regions (where there’s better infrastructure development) than in informal settlements (which lack basic WSS facilities), forcing inhabitants to rely on water vendors for some services such as access to water.

For instance, in Nairobi, the cost of municipal/piped water ranges from Ksh 34 to Ksh 67 per m3 (1000 liters) (table II). In contrast, a 20-liter jerrycan costs Ksh 20-50 in informal settlements with inadequate access to piped water. This means that residents of informal settlements pay more than twice as much per liter for water as they would have if municipal water had been available and reliable.

c. Alternative Water Sources/Vendors

Alternative water sources, particularly water vending, are widely used in Nairobi. They play a critical role in water service delivery, particularly in the city’s urban informal settlements and poorer suburbs, where formal water infrastructure is lacking [41, 42]. They provide an important source of water in the ever-expanding slums, trading at a price that the community can afford, though the price is often exaggerated [43].

Nairobi’s municipal water supply is insufficient to meet the everyday needs of its population. To meet their water requirements, many residents have to seek alternative sources of water, such as water vendors or water kiosks. Based on the survey we conducted, 75.7% of respondents use alternate water sources such as informal vendors, boreholes, and wells. Boreholes, informal vendors, and wells are used by 47.3%, 36.5%, and 16.2% of the respondents, respectively (figure 5).



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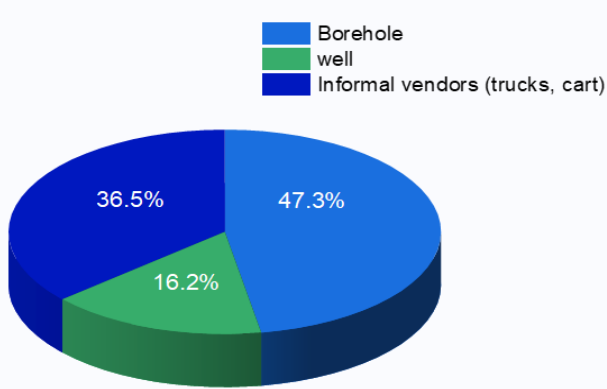


Figure 5 Other Water Sources

The survey also shows that alternative water sources are more accessible and reliable than municipal water sources (in-house piped water systems). This suggests that respondents find these sources to be more convenient and reliable for their daily water needs. The fact that municipal water supply is intermittent and unpredictable causes vendors to hike prices arbitrarily, even though tariffs for these kiosks have only increased by 10% (table II), as per the current water tariff, further burdening low-income households. According to the survey findings, 78% of respondents had to pay more for water services owing to scarcity or unavailability, putting a strain on their household budget, especially given the current high inflation rate.

d. Inflation Rates

Inflation, also known as a continuous increase in the overall price level of goods and services, has broadened the economic implications. Households, particularly low-income ones, face affordability challenges as rising living costs strain budgets, potentially leading to water insecurity and reliance on unregulated water sources. The potential implications on water quality, health, and community resilience also merit attention in the context of high inflation rates. Kenya relies on imported goods such as fuel, in which due to inflation other sectors also bear high costs [44]. This high cost of living is causing unbearable damage to the lives of people not only in food purchases but also WSS. According to a survey by the Kenya National Bureau of Statistics [45], there was a 0.2% increase in the housing, water, and other Fuels Index between February and March 2024. The expenses associated with daily life have been increasing gradually, as evidenced by the rise in prices of food Transportation, energy, and the surge in crude oil prices. The report indicates that the price increases in those commodities were primarily attributed to a 1.4% increase in the price of gas/LPG during the same period. Table III, highlights a detailed overview of the fluctuations in commodity prices over the preceding 12 months. Most of the basic commodities had a price increase which had an impact on the citizens' purchase. This finding mirrors an earlier survey finding we conducted in Nairobi city on the same issue, where some residents spend more than 11% of their monthly income to purchase water.

Table III:- National Average Retail Prices of Selected Commodities

Commodity Name	Quantity	Measurement Unit	Average price (Ksh)			% Change over past month (February 2024-March 2024)	% Change over past year (March 2023-March 2024)
			March 2023	February 2024	March 2024		
House rent-single room	1	Per month	3,935.39	4,069.91	4,087.36	0.4	3.9
Gas/LPG	13	Kg	3,137.70	3,187.10	3,231.84	1.4	3.0
Electricity	50	KWh	1,099.73	1,406.00	1,400.00	-0.4	20.5
Kerosene/Paraffin	1	Litre	146.86	193.96	189.48	-2.3	29.0
Diesel	1	Litre	162.91	196.21	191.11	-2.6	17.3
Petrol	1	Litre	180.05	206.97	199.77	-3.5	10.9
Sugar	1	Litre	156.18	200.01	189.45	-5.3	-21.3
Maize flour(sifted)	2	kg	183.97	154.54	145.57	-5.8	-20.9
Wheat flour	2	kg	196.04	200.41	190.72	-4.8	-2.7
Beef with bones	1	kg	535.68	621.22	624.68	0.6	16.6
Tomatoes	1	kg	86.38	86.01	87.52	1.8	1.3
Onion-Leeks and bulbs	1	kg	101.10	150.63	167.28	11.1	65.5
Oranges	1	kg	77.49	86.27	88.53	2.6	14.2
Potatoes (Irish)	1	kg	99.01	101.86	109.74	7.7	10.8

The survey results indicate that most of the participants earn a monthly income falling within the range of 0 to Ksh 25,000 (figure 6). This income bracket is comprised of a significant number of people facing difficulties in covering their basic needs. The survey found that respondents in this income group spend between Ksh 1500 to Ksh 3000 on water per month (figure 6). It is important to note that despite the prevailing inflation rates and the upward trend in water and sanitation tariffs, the majority of respondents have not experienced corresponding increases in their salaries. Consequently, this static income situation compels them to adapt their living standards, thereby impacting their household budgets.

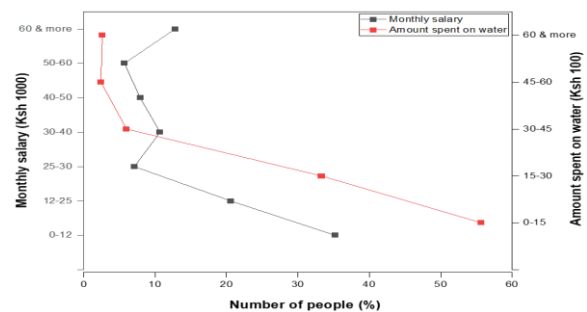


Figure 6 Monthly Salaries and Monthly Spending on Water Services



IV. CONCLUSION AND RECOMMENDATIONS

A. Conclusion

Access to WWS in Nairobi has improved, but there is still more to be done to achieve SDGs. The global impact of climate change, along with rapid urbanization and population growth, has overtaken the city's ability to provide services to its citizens due to inadequate resources. The research assessed the municipal water and wastewater cycle in relation to WSS accessibility and affordability. Surveys, interviews, and literature reviews were used to conduct analyses that provided insight into the situation in Nairobi.

The findings show that the majority of Nairobi's water sources are outside the city's geographical boundaries. This situation makes it difficult for the city to effectively manage its water sources, resulting in occasional intercity conflicts.

The findings also show that there is an imbalance in infrastructure development within the city, with the eastern region, which is typically characterized as low-income, having limited infrastructure development (piped system in households) when compared to the more affluent northern and western regions. One of the issues the city faces in providing WSS is disparities in infrastructure development. The low-income areas are highly inhabited with mushrooming structures, some of which have encroached on and destroyed the city's infrastructure installation pathways. This makes it difficult for the county's government to increase water and sanitation infrastructure development. According to the survey, although 77% of respondents had access to a piped system in their homes, 23% still lacked access, impeding the achievement of SDG 6 by 2030.

In addition, the analysis shows that the capacity of the WTPs is insufficient to meet the rising population's water needs. As long as water is available, the supply for consumption is determined by the capacity of WTPs, which currently does not meet demand. This creates water scarcity and inaccessibility, particularly in areas with minimal water infrastructure development.

The findings indicate that the city's WWTPs cannot efficiently treat sewage generated within the city. A large majority of residents, particularly those living in low-income areas, are not linked to sewerage systems.

The lack of sewage connections exacerbates environmental difficulties in these areas, providing challenges to both sustainable development and public health.

Due to a lack of access to WSS, services are in great demand, hence most inhabitants rely on alternative sources to meet their water demands. More than half of those polled used alternative water sources because municipal water is untrustworthy. This allows sellers to boost prices indiscriminately, making access to water expensive for the majority of households. According to the poll, 78% of respondents had to pay extra for water services, affecting their household's capacity to finance the services due to rising inflation rates, which increased municipal WSS pricing.

Based on the findings, it is clear that a considerable proportion of Nairobi residents encounter barriers to accessing and affording WSS. As urbanization and population expansion accelerate, access to these services is projected to become increasingly vital. As a result, urban planners and developers must devise more sustainable

measures to close this gap and ensure that all inhabitants have enough access to WSS.

B. Recommendations

Although there are projects to increase the water availability in the city, the water transfer from other counties can sometimes be a temporary solution to water scarcity issues due to issues such as climate change and conflict of interest between the counties, therefore it's recommended to tap into the reclamation of wastewater which have other benefits other than functioning as a water source.

Utilizing reclaimed wastewater offers several advantages: it boosts water reserves by lessening the need for higher-quality water, diminishes wastewater release, thereby curbing water pollution, and proves economically beneficial by cutting down on costs compared to transporting water from afar. With proper treatment to ensure suitable water quality, increased wastewater could serve as a plentiful and dependable resource to meet most water needs. It's important to acknowledge that this reclaimed wastewater is readily available within urban areas.

Considering the utilization of wastewater treatment plants as potential water sources, it can be anticipated that the overall water supply will experience an increase, as depicted in (figure 7) in the case of Nairobi County.

Research conducted by Ahmadi and Zarghami [46] has also emphasized the efficacy of incorporating treated water into the water supply system, highlighting its significant role in mitigating water scarcity issues.

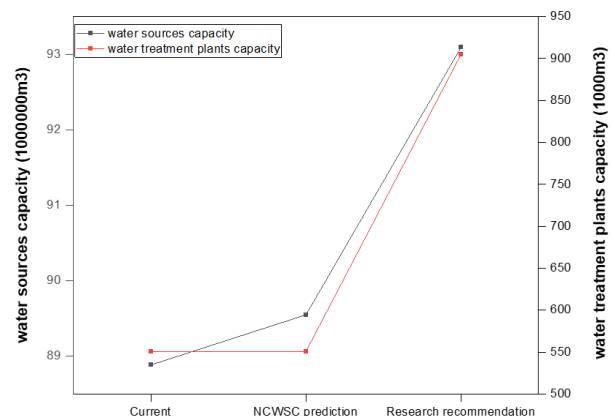


Figure 7: Wastewater as a Water Source

In addition, Given the pressing necessity to enhance the accessibility and affordability of WSS, coupled with Kenya's status as a developing face of development, the allocation of available resources across its various ministries is challenging. Therefore, sometimes the resources allocated to the Ministry of Water are limited hindering the progress of required developments within the sector. This limitation underscores the urgency of rallying all the relevant stakeholders towards a common goal of mobilizing necessary resources to enhance the developments including getting more investments and funding.



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Availability of data and material	Not relevant.
Authors contributions	All authors have equal participation in this article.

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