Right to Water or Privilege? Examining Structural Inequalities in Kenya's Water Sector

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Abstract

Access to safe and affordable water is recognized internationally as a fundamental human right. However, substantial inequalities persist across and within countries, raising questions about whether water access functions more as a right or a socio-economic privilege. This study empirically examines structural inequalities in Kenya's water sector using county-level data on water access, income, governance quality, infrastructure investment, and demographic characteristics. Applying an empirical modeling framework grounded in multivariate regression analysis, the study finds that income levels, governance quality, and infrastructure investment are statistically significant predictors of water access. The results suggests that despite progressive legal frameworks, access to water in Kenya remains strongly conditioned by socio- economic and institutional factors. The papers concludes with the policy recommendations aimed at strengthening equity-oriented governance, poor infrastructure financing, and accountability mechanisms in water sector.

Keywords: Rights to water, Inequality, Governance, Water Access, Kenya

1.0 Introduction

The United Nations formally recognized access to safe drinking water and sanitation as a human right (UN general Assembly, 2010). This, builds upon the earlier commitment by the UN Committee on Economic, Social, and Cultural Rights (CESCR), general commitment NO. 15 which provides the foundational understanding of the obligation, defining human right to water not merely as an aspiration, but as an immediate non-negotiable requirement of human right law. This right is founded on core criteria: availability (sufficient quantity for personal and domestic uses), quality (safe and acceptable color, odor and teste), and acceptability, and crucially, physical accessibility and economic accessibility. Physical accessibility demands that water facilities and services must be within safe physical reach for all sections of the population. Economic accessibility mandates that water, facilities, and services must be affordable for all (UN - CESCR 2023). Furthermore, the human right to water is inextricably linked with other rights, including those enshrined in the international Bill of Human Rights, necessary to

reduce the risk of water-related disease and to provide for consumption, cooking, and hygiene requirements. (UN - CESCR 2002)

Despite this recognition, over two billion people globally lack safely managed drinking water services, with disparities heavily skewed against low income and marginalized populations (WHO & UNICEF, 2025). These inequalities underscore a persistent gap between legal commitments and lived realities.

At the regional Africa level, the commitment to water access is enshrined within the broader context of economic, social, and cultural rights recognized by Africa Charter on Human and Peoples' Rights (ACHP, 2020). The charter and subsequent resolutions emphasize the need for equitable and sustainable use and management of water resources for poverty alleviation and socio-economic development, as highlighted by the African Water Vision 2025. (Economic Commission of Africa, 2025)

Crucially, regional instruments stress the protective component of the human rights to water. This includes protection against arbitrary and illegal disconnections, the prohibition of unlawful pollution of water resources, and non-discrimination in access. These guidelines also call for non-interference with access to the existing water supplies. (ACHP, 2020).

Sub-Saharan Africa exhibits some of the widest inequalities in water access worldwide. Rapid urbanization, weak institutions, underinvestment in infrastructure, and governance failures conspire to constrain progress (World Bank, 2019). Access to water often mirrors income distribution and political influence, reinforcing structural inequalities. (WHO, 2025).

Kenya's Constitution (2010) enshrines the right to water under Article 43. This constitutional declaration places a positive and immediate obligation on the state, requiring both the National and County governments to take proactive steps to ensure universal access to water.

Despite this constitutional clarity, the reality of water access in Kenya remains uneven. National water coverage stood at approximately 62% in 2022, including that a significant portion of the population lack safe and reliable access (KNBS, 2023). This display is not random; it is shaped by disparities in income, governance capacity, infrastructure spending, and urbanization patterns (WASREB, 2023). This raises a fundamental question: Is water in Kenya a right in practice, or a privilege determined by structural factors?

2.0 Background of the Kenya Water Sector

2.1 Historical Background

To fully understand contemporary disparities in Kenya's water sector, it is essential to recognize the historical foundation of infrastructural inequality. Much of Kenya's urban development was shaped by a colonial history of spatial segregation and biased infrastructural planning. The layout of services, including piped water, was often deliberately segregated along ethnic and later, socio-economic lines (Nilsson,D., & Nyanchag, E. N., 2014).The historical path dependency means that modern infrastructure deficits in areas like Nairobi's informal settlements are not simply failures of recent planning or population pressure. They are, fundamentally, the consequences of an infrastructural layout that historically defined who was considered a "state subject worthy of services" and who not was. (ACRC, 2024). Slums for instance in Nairobi, despite their age, continue to be defined by lack of infrastructural integration and formal rights to land. This structural exclusion makes it exceedingly difficult to establish formal, equitable water systems today, perpetuating informal, precarious, and expensive access for the urban poor. (Chumo, I., etal.2025)

2.2 Decentralization and the Water Act, 2016: Structure and Institutional Roles

Following the promulgation of the 2010 Constitution, the Kenya government initiated comprehensive sector reforms aimed at decentralizing water services provision to the 47 County Governments. This move, stipulated in the County Government Act (2012) and reinforced by the Water Act (2016), transferred the responsibility for water and sanitation services to the sub-national level (the county governments).

The decentralized structure established key national institutions to manage regulation and water resources: the Water Resources Authority (WRA) for water resources management and the Water Services Regulatory Board (WASREB) for service regulation, including setting service standards and overseeing Water Services Providers (WSPs). The stated goals of the Water Act, 2016, included improved water governance, accountability and the integration of climate resilience measure.

2.3 Institutional Conflict and Regulatory Uncertainty

The implementation of the Water Act 2016, however, generated significant political and legal conflict, creating systemic instability. The Council of Governors (CoG) challenged the Act in court, arguing that it was unconstitutional because it established a centralized

framework that excluded county governments from their devolved functions. (Nation, Africa, 2019).

The CoG specifically claimed that the Act diverted funds meant for county governments to "unnecessary multiple intuitions of the national government "(Nation Africa, 2019). This protracted intergovernmental dispute severely undermines the ability of County Governments to take genuine ownership of their water mandates. Furthermore, it creates a high degree of regulatory uncertainty regarding investment approvals and financial stability, making it difficult for Water Services Providers to secure commercial financing necessary for major infrastructure expansion.

Regulatory ambiguity, particularly concerning who controls tariff adjustments and borrowing consents for infrastructure projects, delays crucial service expansion, effectively freezing existing geographical and socio-economic inequalities. The institutional friction resulting from this governance conflict represents a structural impediment to fulfilling the constitutional right to water (Otieno, Obosi, & Magutu, 2023).

3.0 Literature Review: Evidence of Disparity in Kenya

The literature review and available operational data provide critical evidence illustrating the systemic failures and structural barriers that prevent the fulfilment of the right to water. Prior studies using WASREB data highlight persistent inter-county inequalities driven by infrastructure financing gaps and institutional performance (WASREB, 2020)

3.1 Review of Performance: National Trends and Regulatory Oversight

The Water Services Regulatory Board (WASREB) plays a critical role in setting service standards, issuing licenses, and guiding tariff structures, including advocating for pro-poor tariffs. As illustrated in the table 1 below, the national data tracked through key performance indicators (KPIs) over more than a decade (2009- 2022), highlights both progress and severe structural stagnation.

The data shows an increase in water coverage, rising from 46% in 2009to 62% in 2022, representing a 16% point expansion. However, this expansion has been achieved without corresponding improvements in efficiency or reliability. First, Non-Revenue Water (NRW) water lost through leakage, theft, or metering inaccuracies, remained stubbornly high. It was 45% in 2009, dropped to slightly to 42% in 2013, appreciated to 47% in 2018, but reverted to 45% in 2022. The failure to reduce NRW to WASREBs

recommended 25%, signifies massive, persistent infrastructural and managerial deficit. The lost water represents both significant revenue leakage (hindering investment capacity) and a structural barrier to expanding service reliability. If the 45% was contained, it would free up supply to cover large portions of the deficits, suggesting that the primary impediment to universal access is inefficiency, not resource limitation.

Second, is the decline of service quality. The average hours of supply decreased from 16 hours in 2009 to 14 hours in 2022. This signifies erosion of service reliability, implying that even where coverage exists, the availability component of the human right to water is compromised.

While the Operational and Maintenance (O&M) Coverage remained stable around 100% - 101%, this indicates that Water Service Providers are recovering operational costs adequately. However, the failure to simultaneously address high NRW and deteriorating services hours suggests that utilities are structurally optimized for operational stability and short-term survival, prioritizing cost recovery over infrastructure efficiency improvements and service expansion to marginalized areas. This trend confirms a structural management deficit where expansion for the poor is deprioritized in favor of maintaining operational stability for existing customers, thereby preserving the status quo of unequal access.

Table1. Selected National Water Sector Key Performance Indictors (2009 to 2022)

YEAR	WATER COVERAGE (%)	SANITATION (%)	NRW (%)	HOURS OF SUPPLY	O&M COVERAGE (%)	STAFF PRODUCTIVITY
2009	46	19	45	16	102	8
2013	53	16	42	14	103	6
2018	58	17	47	14	101	7
2022	62	17	45	14	101	6

Source: Analysis of Water Data KPI (WASREB)

3.2 Urban Inequality: Informality, Cartelization, and Non-Revenue Water

Ledant (2013) observes that, rapid urbanization in Kenya, particularly in cities like Nairobi, allows stark socio-economic differences to translate directly into unequal and inequitable water consumption and access. The entrenched infrastructural inequality inherited from colonial planning ensures that low-income settlements face unique and compounding challenges.

3.3 Water as a Human Right

Human Rights-based approaches emphasize universality, equity, and state obligation (Gleick, 1998; UN, 2010). However, critics argue that legal recognition alone is insufficient without institutional and financial capacity (Bakker, 2012).

3.4 Political Economy of Water Access

Empirical studies show strong links between water access and income, governance quality, and public investment (Estache & Kouassi, 2002; Herrer, 2019). Governance failures often translate into exclusionary service delivery.

3.5 Background of the Study

Kenya's water sector operates within a devolved governance framework, with counties responsible for service provision. While devolution aimed to enhance equity and accountability, outcome have varied significantly across regions. Counties with stronger revenue bases and governance systems tend to exhibit higher access rates, while poorer and rural counties lag behind (WASREB, 2022). Understanding these, disparities require an empirical examination of structural determinants.

4.0 Theoretical Framework

The study draws on an integrated political economic framework to explain persistent inequalities in water access in Kenya despite constitutional recognition of water and human right. Structural inequality theory posits that access to essential services is shaped by entrenched economic hierarchies and path- dependent institutional arrangements, rather than by legal entitlements alone (Tilly, 1998). Institutional governance theory further emphasizes that the effectiveness of regulatory and administrative systems is conditional on material and fiscal capacity (North 1990). As a result, governance quality cannot independently guarantee equitable water access unless complemented by adequate financing and technical capability. Further, the framework is informed by the capability approach and political ecology of water. The capability approach conceptualizes access to water as a foundational human capability that enables health, dignity, and economic participation, highlighting the gap between formal rights and substantive realization in low-capacity contexts (Sen, 1999). Political ecology underscores that water scarcity and access inequalities are socially produced outcomes shaped by power relations, investment priorities, and spatial marginalization rather than purely natural or technical factors (Bakker, 2010, 2023). Under fiscal federalism, devolution assigns services delivery responsibilities to counties without

equalizing fiscal capacity, thereby reinforcing income-based disparities in access (Oates, 1999).

In this view, water inequalities is a produced phenomenon resulting from social and structural choices.

5.0 Research Problem

Despite constitutional guarantees, access to water in Kenya remains uneven and socially stratified. The extent to which income, governance quality, and infrastructure investment shape water access outcomes remains under-examined empirically.

6.0 Research Objectives

1. To determine the extent to which county-level income predicts water access.
2. To examine the impact of governance and infrastructure investment on water availability.
3. To examine the role of urbanization and gendered household structures in water access inequalities.

7.0 Research Questions

1. How significant is the relationship between household income and water access across Kenya counties?
2. Does urbanization facilitate or hinder equitable water distribution when other factors are controlled?
3. To what extent does government influence the realization of the right to water?

8.0 Methodology

8.1 Data Source

The study utilizes the Kenyan Water Access Dataset covering 46 counties. Stata data analysis tool was utilized for data cleaning, descriptive statistics, and Multiple Linear Regression (OLS). Although Kenya has 47 counties, the analytic dataset contains 46 observations. This is explained by exclusion of Nandi County due to missing information for a least one merged covariate, and the regression was estimated on complete cases.

8.2 Data

Cross –sectional county –level dataset comprising:

- Water Coverage
- Income per capita
- Governance score
- Infrastructure investment
- Urbanization rate
- Female –headed households
- Population density

8.3 Empirical Model

$$\text{Access}_i = \beta_0 + \beta_1 \text{Icome}_i + \beta_2 \text{Governance}_i + \beta_3 \text{Infrastructure}_i + \beta_4 \text{Urbanization} + \beta_5 \text{Female HH} + \beta_6 \text{Demo} + \epsilon$$

9.0 Data Analysis and Findings

9.1 Descriptive Statistics

The study utilized a dataset of 46 Kenyan Counties to examine the distribution of water access. Table 2 presents the summary statistics, highlighting the significance disparities in water service delivery and economic capacity across the country.

The statistics reveals substantial inter-county disparities in both water access and its structural determinants. Average water access across the 46 counties stand at 52.2%, with a wide range from 25% to 91%, underscoring pronounced spatial inequality in water service delivery. Similarly, county income levels exhibit large variation (mean =36.7; range 17-65), reflecting uneven economic capacity across devolved units. Governance score and infrastructure investment also display considerable dispersion, suggesting that counties differ markedly in institutional quality and fiscal commitment to water services

Table 2: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Access	46	52.23913	15.17481	25	91
Income	46	36.67391	11.05954	17	65
Governance	46	58.32609	12.45446	37	88
Infrastruct~e	46	2500.000	929.2769	1000	5200
Urbanization	46	37.45652	18.54928	15	100

Female_HH	46	34.15217	2.890347	30	42
Pop_Density	46	514.5435	1249.064	4	6250

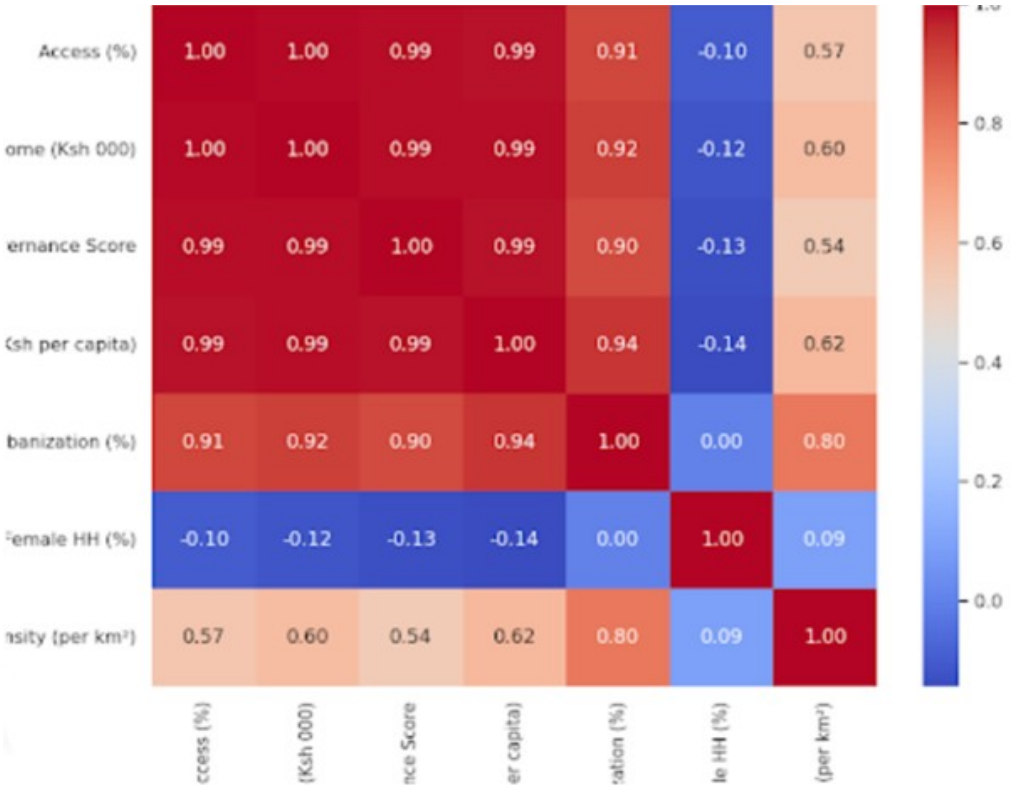
9.2 Correlation Analysis

The correlation matrix (fig 1) reinforces these descriptive patterns by revealing extremely strong linear associations between water access, income, and governance quality. Most notably, the correlation coefficient between income and water access of 0.999, suggests that a perfect positive relations, implying that counties with higher average incomes consistently exhibit higher levels of water access, while poorer counties remain structurally disadvantaged.

From a political economy perspective, this near- perfect correlation suggests that economic power functions as a gatekeeper to water access, transforming what is constitutionally framed as universal right into an income mediated privilege. Rather than water access being weakly or moderately related to income, the observed correlation indicates systematic stratification, where income almost deterministically predicts service outcomes.

Governance quality is also strongly correlated with both income and access, highlighting institutional complementarity. Wealthier counties tend to have stronger governance structures; this has potential to likely influence planning for infrastructure delivery. This clustering of advantages suggests that inequality in water access is cumulative rather than random, which is consistent with structural inequality and political ecology theories advanced in the study,

Fig: 1, Correlation Matrix of Water Access Factors



9.3 Regression Results

To determine the independent effects of these variables, an Ordinary least squares (OLS) regression was performed. The R – squared of 0.99, indicates that approximately 99.9% of the observed variation in county –level water access explained by structural variable, that is income, governance, infrastructure investment, urbanization, female-headed households and population density. As indicated in table 3, the overall significance

(Prob > F =0.000) confirms that the explanatory variable jointly exert a highly significant influence on water access outcomes. The high R – squared suggests that water access in Kenya is predictable based on socio-economic and institutional characteristics. This can be construed to imply that, access to water is structurally engineered.

The dominance of income within this model conjectures economic capacity is the central axis around which water access revolves. When governance quality, infrastructure investment, and demographic factors are controlled, income remains statistically significant at $p < 0.001$, with a positive coefficient. This finding implies that higher income counties are systematically better placed to mobilize resources, maintain

infrastructure, and exert political advantage that translates directly into higher access levels.

The multivariate regression results indicate an exceptionally high explanatory power, with an R- squared of 0.999, meaning that nearly all observed variation in county-level water access is explained by the included structural variables. While such a high value is rare in social science applications, it reflects the highly structured nature of water access outcome in Kenya rather than a statistically anomaly.

Income emerged as the dominant predicator of water access, retaining a large and statistically significant coefficient even when governance quality, infrastructure investment, and demographic factors are controlled. This finding suggests that economic capacity constitutes that foundational condition upon which other determinants operate. Counties with higher income levels are better positioned to mobilize resources, maintain infrastructure, and exert political influence that translate into improved service delivery.

Governance quality and infrastructure investment are also statistically significant, however, their interpretation require consciousness due to substantial multicollinearity with income. Rather than functioning as independent levers, these variables capture complementary dimensions of the same underlying structural capacity. Wealthier counties tend to score higher on governance metrics and invest more in infrastructure. While poorer counties face simultaneous deficit across all three dimensions. Once income is controlled, governance coefficients may partly reflect regulatory intensity or reporting transparency rather than pure service-enhancing effects.

The extremely high overall model fit therefore indicates that water access in Kenya is not randomly distributed nor weakly associated with socio-economic factors. Instead, it is almost determined by a tightly coupled political-economic structure in which income, institutional quality, and infrastructure co-evolve. From a right- based perspective, this result is normally troubling: if access outcomes are nearly deterministic functions of structural capacity, constitutional guarantees alone are insufficient to ensure equitable realization of the right to water.

Table 3: OLS Regression Results (Stata Output)

Source	SS	df	MS	Number of obs	=	46
Model	10352.4118	6	1725.40197	F(6, 39)	=	6541.22
Residual	10.2936458	39	.263939636	Prob > F	=	0.0000
				R-squared	=	0.9990
				Adj R-squared	=	0.9988
Total	10362.7054	45	230.282343	Root MSE	=	.51375

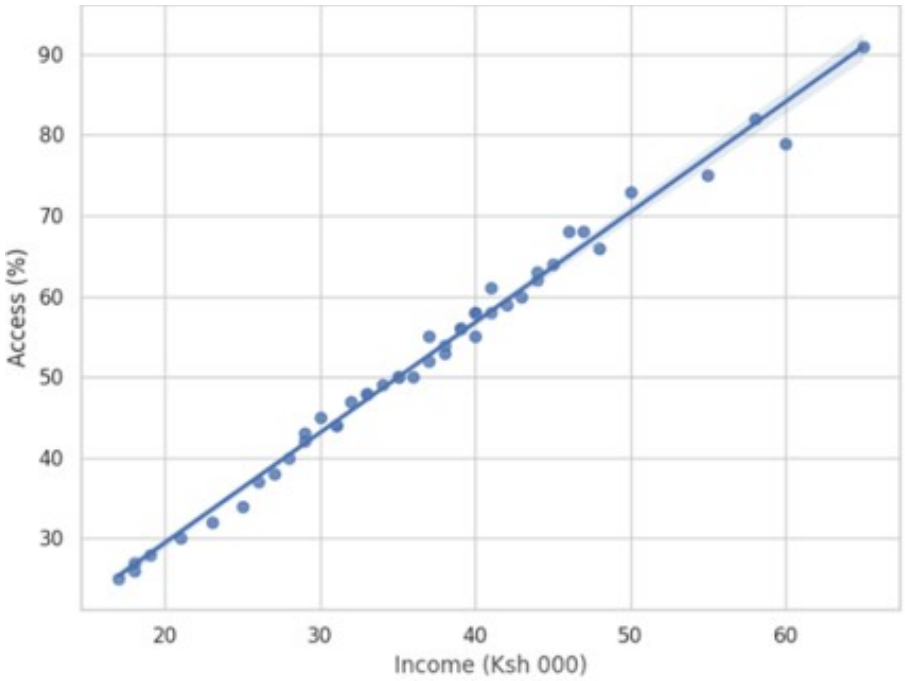
Access	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Income	1.541482	.0603513	25.54	0.000	1.419411	1.663553
Governance	-.7733139	.0756105	-10.23	0.000	-.9262502	-.6203775
Infrastruct~e	.0114846	.0011566	9.93	0.000	.0091452	.013824
Urbanization	-.1166249	.0240596	-4.85	0.000	-.1652899	-.0679599
Female_HH	.3084126	.0324368	9.51	0.000	.2428026	.3740226
Pop_Density	-.0010772	.000149	-7.23	0.000	-.0013786	-.0007758
_cons	6.488938	1.609285	4.03	0.000	3.233887	9.743989

10.0 Discussion

The study sets out to interrogate whether access to water in Kenya functions as a realizable human right or as a socio-economic privilege mediated by structural factors. The findings provide strong and consistent evidence that water access outcomes are overwhelmingly shaped by income, governance quality, infrastructure investment, and demographic structure, rather than by legal entitlements alone.

The correlation analysis reveals a strong positive association between county income and water access, approaching a perfect linear relationship. This suggests that economic capacity is not merely one of several determinants, but rather a foundational condition upon which water access is built. In practical terms, counties with higher income levels achieve higher access rates, while low-income counties remain persistently underserved.

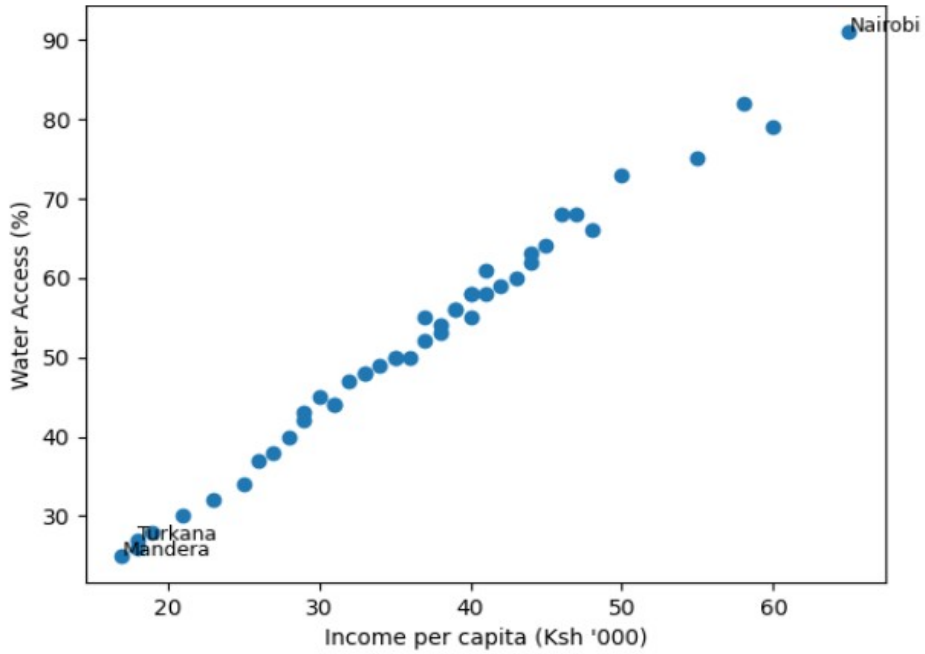
Fig 2: Relationship between Income and Water Access



10.1 County-Level Outliers and Structural Polarization

Figure 4 below plots county-level water access against income per capita, highlighting Nairobi, Turkana, and Mandera as illustrative outliers, Nairobi occupies the upper-right extreme of the distribution, combining the highest income levels with near-universal water access. In contrast, Turkana and Mandera lie at the lower-left tail, characterized by persistently low incomes and limited water coverage. The spatial separation of these counties reinforces the argument that water access in Kenya is structurally polarized along economic and institutional lines rather than randomly distributed. Even within a devolved governance framework, historically marginalized counties remain locked into low –access equilibria, while economically dominant counties consolidate advantage. This pattern is consistent with structural inequality theory and the political ecology of water, which emphasize cumulative advantage and path dependency in service provision (Tilly, 1998; Bakker, 2010; Sen, 1999).

Fig; 3. County- Level Water Access vs Income: Selected Outlier Counties



Second, governance quality emerged as a statistically significant predictor of water access, though the negative coefficient in the multivariate model once income and infrastructure are controlled. This result likely reflects institutional endogenety and collinearity between income, governance, and investments. Wealthier counties tend to score higher on governance metrics, but once fiscal and infrastructure effects are netted out, governance alone may proxy regulatory rigidity, reporting standards, or accountability mechanisms that expose service gaps rather than conceal them. This implies that governance matters most in interaction with economic and financial capacity, rather than in isolation.

Infrastructure investment displays a positive and significant relationship with access. However, the magnitude of the income coefficient relative to infrastructure spending suggests that investment effectiveness itself is income –conditioned. Wealthier counties are able to plan, co-finance, and maintain infrastructure, while poorer counties face binding fiscal and technical constraints.

The demographic variables further underscore the structural nature of inequity. Urbanization and population density exhibits negative association with access, indicating that rapid urban growth. This finding challenge the assumption that urbanization automatically improves service delivery. Conversely, the positive association with female –headed households' conjectures the gendered burden and responsibility of water access within the African context.

The R-squared of 0.999 indicates that nearly all observed variation in water access across counties is explained by the structural variables. This level of explanatory power suggests that water access in Kenya is a systematically determined, not accidental or random. From a right based perspective, this is problematic, if access outcomes are almost predictable based on income and institutional capacity, then constitutional guarantees alone are insufficient to ensure universality, since water access is effectively embedded within and constrained by Kenya's broader political and economic structure.

11.0 Policy Recommendations

In light of the findings, realization of the constitutional obligation of ensuring right to water in Kenya requires structural, redistributive, and governance oriented interventions, rather than incremental or purely technical solutions.

a) Strengthen Redistributive Fiscal Transfer in the Water Sector

Given the dominant role of income in determining access, national government should enhance equalization-oriented transfers to water-poor counties. Existing mechanism such as the Equalization Fund and conditional grants should be explicitly linked to water access deficits, with allocation formulas weighted by poverty, aridity and baseline coverage gaps.

b) Ring-Fence and Target Pro-Poor Infrastructure Investment

Infrastructure financing should prioritize marginal rural counties and informal urban settlements, where returns to investment in terms of access gains are likely to be highest. Ring-fencing funds for last –mile connectivity, small systems, and rehabilitation of aging infrastructure can help counteract the income bias revealed in the regression results.

c) Align Governance Reforms with Fiscal and Technical Capacity

Governance improvements must be paired with capacity building and financial support. Strengthen regulation, accountability, and performance monitoring through institutions such as WASREB should go hand-in-hand with technical assistance and predictable funding to avoid over-burdening weaker counties.

b) Mainstream Equity and Gender Consideration

The gendered dimension of water access highlighted by the results warrant targeted interventions that reduce the disproportionate burden by women. Policies should mainstream gender-responsive budgeting, community participation, and household-level support mechanism within county water programs

12. 0 Conclusion

This study provides empirical evidence that access to water in Kenya is overwhelmingly shaped by structural economic and institutional factors, rather than by legal recognition alone. Using county-level data and regression analysis, the findings demonstrate that income, governance, and infrastructure investment jointly explained nearly all variation in water access across the country.

The results challenge the assumption that constitutional guarantees automatically translates into equitable outcomes. Instead, they reveal a persistent gap between normative right and material realities, where water access remains closely tied to economic power, fiscal capacity, and spatial inequality. In this context, the right to water risks becoming symbolic unless accompanied by deliberate redistributive and institutional reform.

By empirically grounding the debate on water ad a right versus a privilege, this study contributes to broader discussions on social rights realized in devolved and unequal settings. Ultimately, achieving universal and equitable access to water in Kenya will require confronting the underlying structures that reproduces inequality by not merely expanding infrastructure, but reshaping the political economy within which water services are delivered.

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