ISSN: 2312-0134
African Research Journal of Education and Social Sciences, 12 (2), 2025 | Website: www.arjess.org

Evaluating Building Utilities and Sanitation Standards in Samburu County, Kenya

Authors: Saitoti Ole Tingisha, George Kinoti King'oriah, Absalom H.V. Lamka
Technical University of Kenya, Department of Construction and Property Studies
P.O. Box 52428-00200, Nairobi, Kenya

Co. Author Email: saitotitingisha@yahoo.com

Abstract

Access to reliable utilities and adequate sanitation is essential for healthy living and building functionality. Despite visible improvements in infrastructure across Kenya, many buildings in Samburu County continue to face challenges that compromise comfort, safety, and hygiene. This study set out to examine the status of utilities and sanitation in residential, public, and commercial buildings in Samburu County, Kenya. A descriptive survey design employing a mixed-methods approach was adopted. The target population included tenants, building owners, facility managers, and relevant county officers. A sample of 138 respondents was selected using purposive, cluster, and simple random sampling techniques. Data were collected using questionnaires, interviews, and direct observation checklists. Quantitative data were analyzed using SPSS Version 25, generating descriptive statistics such as frequencies, percentages, and means. Thematic analysis was used for qualitative data. Findings revealed that while a majority of residents reported having access to reliable water supply, clean drinking water, functional drainage, stable electricity, and responsive building management, notable service gaps persist. These include intermittent water shortages, poor waste disposal systems, drainage blockages, power outages, and limited backup power options. From professionals' observations, it was also noted that although utilities and sanitation may not always fall within the immediate responsibilities of building professionals, their role in planning and coordination significantly affects the effectiveness and sustainability of these systems. Poor inter-departmental collaboration and inadequate long-term planning were cited as critical barriers to consistent service delivery. The study concludes that while utilities and sanitation services in Samburu County buildings are generally functional, systemic weaknesses hinder their reliability and equitable access. The study recommends strengthened inter-agency collaboration, targeted infrastructure upgrades, improved maintenance planning, and inclusion of building professionals in utility system design. These measures will contribute to safer, healthier, and more sustainable building environments across Samburu County.

Keywords: *Utility access, sanitation services, building functionality, infrastructure reliability within Samburu County, Water supply, waste management, drainage systems, power outages, building management*

ISSN: 2312-0134
African Research Journal of Education and Social Sciences, 12 (2), 2025 | Website: www.arjess.org

INTRODUCTION

Access to essential utilities and sanitation services in buildings is a foundational requirement for safeguarding public health, promoting environmental sustainability, and ensuring overall well-being. In developing countries such as Kenya, the adequacy of water, sanitation, electricity, and waste management systems remains a significant developmental concern. These utilities are central to the functionality, safety, and liveability of built environments (World Health Organization, 2019). Their presence reduces the burden of disease, promotes dignity, and strengthens resilience in communities, particularly in regions where infrastructure remains underdeveloped or unevenly distributed (Wise & Swaffield, 2012).

In many parts of Kenya, especially in arid and semi-arid areas like Samburu County, access to water and sanitation services is still limited and often unreliable. Geographical, environmental, and socio-economic constraints complicate both the installation and the maintenance of utility systems (Obiero et al., 2024). Seasonal rainfall patterns, extended dry spells, and diminishing groundwater levels further challenge consistent access to water, especially for dryland populations (Omuya, 2023). These environmental pressures strain local systems and exacerbate inequalities in service delivery.

Despite interventions by government agencies and development partners, sanitation coverage in rural Kenya remains insufficient. Cultural practices, persistent poverty, and a lack of infrastructure continue to fuel open defecation, posing serious public health threats and undermining efforts to achieve environmental hygiene (Waithaka, 2015). In some regions, the low usage of latrines signals not only infrastructural deficiencies but also behavioral and awareness issues that must be addressed through coordinated sanitation education campaigns and sustained investments in public infrastructure.

Further compounding these challenges is the structural weakness in the planning and regulation of utilities in informal and low-income areas. Benchmarking systems used for urban water utilities often fail to represent the unique circumstances of informal settlements, where regulatory enforcement is minimal and community involvement in service planning is limited (Murungi & Blokland, 2016). These gaps hinder the adoption of sustainable, context-specific utility models. Technological innovations such as Building Information Modeling offer promise in improving the planning, implementation, and monitoring of sanitation systems. When coupled with participatory approaches and inclusive governance mechanisms, such tools can support more efficient and resilient infrastructure systems (Marzouk & Othman, 2017).

Samburu County presents a distinct case study in the broader conversation around infrastructure development and building services in Kenya. Located in the northern arid and semi-arid lands, the county faces persistent infrastructural deficits due to its geographical isolation, widely dispersed settlements, limited urban development, and constrained financial resources (Kenya National Bureau of Statistics, 2020). As a result, many buildings, both residential and institutional, lack

ISSN: 2312-0134
African Research Journal of Education and Social Sciences, 12 (2), 2025 | Website: www.arjess.org

consistent access to clean water, functional drainage, reliable electricity, and hygienic sanitation (Kariuki & Ngugi, 2021).

The implications of such deficiencies are far-reaching. Research has shown that inadequate utility infrastructure contributes to both immediate and long-term negative outcomes. Poor water and sanitation services are associated with increased incidence of diseases such as cholera, diarrhea, and typhoid, especially in rural and underserved communities (Ochieng & Makori, 2019). Similarly, unreliable electricity and inefficient waste management systems disrupt educational and economic activities, hindering development and entrenching inequality (Mwangi & Wanyoike, 2022).

At the national level, policy instruments such as Kenya Vision 2030 highlight the importance of infrastructure in advancing the country's socio-economic objectives. Nonetheless, a gap persists between policy ambitions and actual implementation, particularly in remote counties such as Samburu (Ministry of Lands and Urban Development, 2016). The lack of alignment between centralized planning and local needs contributes to the uneven distribution of services, which affects the quality and functionality of buildings and the well-being of their users (UN-Habitat, 2020).

While the provision of utilities and sanitation may fall outside the immediate domain of building professionals, their involvement during planning and design stages is critical. Interdisciplinary collaboration among architects, engineers, urban planners, and health experts is essential in developing integrated systems that meet local needs and adapt to contextual realities (Ndiritu & Ndungu, 2020). In Samburu County, however, such collaboration is limited, resulting in fragmented service provision and inadequate preparedness for future environmental or public health risks. As such, the current study intended to evaluate building utilities and sanitation standards in Samburu County, Kenya.

METHODOLOGY

This study adopted a cross-sectional survey design utilizing a mixed-methods approach that integrated both quantitative and qualitative data collection techniques. The mixed-methods approach was selected based on its capacity to merge statistical rigor with contextual depth, a combination that enhances the credibility and validity of research findings, as advocated by Creswell and Plano Clark (2017). By collecting data at a single point in time, the cross-sectional design facilitated efficient and cost-effective exploration of challenges in utility provision and sanitation infrastructure across Samburu County.

The study targeted two distinct respondent groups. The first group included household residents living in both formal and informal settlements within the major urban centers of Samburu County, particularly Maralal, Archers Post, and Kisima. These locations were chosen due to their concentration of housing developments and visible disparities in utility service provision. The

ISSN: 2312-0134
African Research Journal of Education and Social Sciences, 12 (2), 2025 | Website: www.arjess.org

second group comprised key informants such as engineers, public health officers, water and sanitation officers, and community leaders who are directly involved in the planning, implementation, and oversight of sanitation and utility services in the county. Their perspectives were critical for contextualizing the systemic and infrastructural challenges in the delivery of essential services.

The sample size for tenants was determined using the formula for an infinite population since the exact number of tenants was unknown. The formula used was:

$$n = \frac{Z^2 \cdot p \cdot (1-p)}{e^2}$$

Where:
n = Sample size
Z = Z-score for 95% confidence level (1.96)
p = Estimated proportion of tenants (assumed at 0.1)
e = Margin of error (0.05)

$$n = \frac{(1.96)^2 \cdot 0.1 \cdot (1-0.1)}{(0.05)^2} = 138.3$$

In addition to the tenants, three professionals, including two urban planners and one architect, were interviewed. All had experience working in Samburu County and were selected based on their direct involvement in building projects within the area.

Cluster sampling was employed to identify distinct zones within the selected urban centers. From each cluster, household respondents were selected using simple random sampling to ensure representativeness and reduce sampling bias. For key informants, purposive sampling was applied to select individuals with specialized knowledge and professional experience relevant to the study's objectives, as recommended by Patton (2015).

The quantitative data were collected using structured questionnaires administered to household residents. The questionnaires were structured around the study objectives and included sections on household demographics, access to water and sanitation services, utility reliability, affordability, perceptions of service adequacy, and satisfaction levels. Most questions employed a five-point Likert scale ranging from "strongly disagree" to "strongly agree." A few open-ended questions were incorporated to capture additional qualitative feedback.

For qualitative data, interview guides were developed and used during face-to-face interviews with professional stakeholders. The guides focused on key thematic areas including infrastructural planning, service delivery mechanisms, community engagement, regulatory

ISSN: 2312-0134
African Research Journal of Education and Social Sciences, 12 (2), 2025 | Website: www.arjess.org

compliance, and sustainability concerns. Interviews were audio-recorded with participant consent and later transcribed for analysis. Thematic analysis was applied to identify recurring patterns and themes, following the framework proposed by Braun and Clarke (2006).

Quantitative data were analyzed using the Statistical Package for the Social Sciences (SPSS) Version 25. Descriptive statistics such as means, frequencies, and percentages were computed to summarize the data. Where necessary, cross-tabulations were used to examine relationships between demographic characteristics and utility access patterns. Findings were presented using tables, charts, and graphs. Qualitative data from interviews were analyzed thematically and triangulated with quantitative findings to deepen understanding of the underlying issues in utility and sanitation service delivery.

Ethical considerations were strictly observed throughout the research process. Participants were fully informed of the purpose of the study and gave informed consent before participation. All responses were treated with confidentiality and anonymity, and participants were allowed to withdraw at any stage of the study. Ethical clearance was obtained from the National Commission for Science, Technology and Innovation (NACOSTI), and relevant permissions were secured from Samburu County authorities including the County Health Office and the Department of Water and Sanitation.

RESULTS

Demographic Characteristics of the Respondents

The study examined the demographic characteristics of tenants in Samburu County to provide context for their views on building functionality. Respondents were drawn from three main urban centers: Kisima, Maralal, and Archers Post. Kisima had the highest number of participants at 43%, followed by Maralal at 29.6%, and Archers Post at 27.4%.

Regarding gender, 56.3% of the respondents were male, while 43.7% were female.

In terms of age, the largest group of respondents (44.4%) were aged between 36 and 45 years. Those aged 45 years and above made up 22.2% of the sample. Respondents aged 26 to 35 years comprised 21.5%, while the youngest group, aged 18 to 25 years, accounted for 11.9%.

Occupationally, 45.9% of respondents were employed, while 40.7% were self-employed. Students accounted for 5.2%, and the unemployed made up 8.1%.

On the length of residence, 70.4% of the tenants had lived in their current buildings for more than three years. Those who had stayed for one to three years made up 17.8%, while 10.4% had resided for six months to one year. Only 1.5% of respondents had lived in their current residence for less than six months. This suggests a largely stable tenant population, with many having long-term experience with their housing conditions.

ISSN: 2312-0134
African Research Journal of Education and Social Sciences, 12 (2), 2025 | Website: www.arjess.org

In terms of building classification, 81.5% of the tenants resided in residential buildings. Commercial buildings housed 13.3%, while public buildings accounted for 5.2%. The data shows that the built environment in the study area is primarily residential, reinforcing the relevance of focusing on housing functionality in the research.

The types of buildings tenants occupied were diverse. Apartments represented 31.1% of the sample, bungalows followed closely at 30.4%, and simple rental houses accounted for 24.4%. Shops housed 8.1% of the respondents, public service buildings such as hospitals made up 4.4%, and schools had the smallest share at 1.5%. This variety highlights the need to consider multiple housing forms when addressing performance challenges in the county.

Evaluating Building Utilities and Sanitation Standards in Samburu County

Access to reliable utilities and proper sanitation is crucial for residents' well-being and comfort. This section assesses the reliability and quality of water, waste disposal, drainage, electricity, backup power, and management responsiveness regarding utility services. The table below presents the frequency and percentage distribution of responses to various statements.

Table 4: Residents' Responses on Utilities and Sanitation in Buildings in Samburu County

No.	Statement	SD		D		N		A		SA	
		F	%	F	%	F	%	F	%	F	%
1	The water supply is reliable and sufficient for daily use.	5	3.7	23	17.0	9	6.7	86	63.7	11	8.1
2	The water provided is clean and safe for drinking and cooking.	2	1.5	22	16.3	14	10.4	73	54.1	24	17.8
3	Waste disposal and garbage collection services are efficient in my area.	1	.7	29	21.5	22	16.3	64	47.4	19	14.1
4	The drainage systems in my building are functional and free from frequent blockages.	5	3.7	25	18.5	20	14.8	61	45.2	24	17.8
5	The electricity supply is stable with minimal power outages.	7	5.2	24	17.8	17	12.6	68	50.4	19	14.1
6	The building has a backup power source for use during electricity outages.	18	13.3	40	29.6	7	5.2	47	34.8	23	17.0
7	Management is responsive in addressing utility-related concerns	8	5.9	37	27.4	5	3.7	55	40.7	30	22.2

ISSN: 2312-0134
African Research Journal of Education and Social Sciences, 12 (2), 2025 | Website: www.arjess.org

The water supply was reported to be reliable and sufficient by a majority of respondents, with 63.7% agreeing and an additional 8.1% strongly agreeing. This suggests that most residents have consistent access to water for daily use, though a notable minority (20.7%) expressed disagreement, indicating occasional shortages or unreliability. Regarding water quality, a combined 71.9% agreed or strongly agreed that the water is clean and safe for drinking and cooking, reflecting general confidence in water safety; however, about 18% disagreed, which may point to concerns about contamination or water treatment.

Waste disposal and garbage collection services were rated positively by a majority (61.5%), yet 22.2% disagreed, implying that sanitation services may not be uniformly efficient across all areas. Similarly, 62.9% agreed that drainage systems are functional and free from frequent blockages, suggesting satisfactory infrastructure for most residents, but the 22.2% disagreement reveals that drainage problems persist in some buildings, potentially causing discomfort or hygiene issues.

Electricity supply stability received positive feedback from nearly two-thirds (64.5%) of respondents, indicating reasonably reliable power with minimal outages. Still, over 23% reported frequent power interruptions, a concern that could affect daily activities and safety. Backup power availability was less common, with only about 52% agreeing or strongly agreeing their building has a backup source, showing that many residents may face challenges during outages.

Management responsiveness to utility-related concerns was perceived favorably by 63% of respondents, which suggests that utility problems are often addressed in a timely manner, though the roughly one-third who disagreed indicates there is room for improvement in service delivery.

The study intended to examine how utilities and sanitation contribute to occupant satisfaction in residential buildings in Samburu County. During the interviews, professionals were asked to explain how the availability and reliability of water, electricity, and sanitation services affect residential comfort.

One respondent explained that general plumbing matters, including water and sanitation, are managed by a separate department. Their office primarily approves submitted proposals, focusing on critical features such as the septic tank layout, the size of soak pits, and the overall network design to ensure they meet comfort and usability standards for occupants. The implementation and follow-up responsibilities lie with the public health department (Professional 1, 2025).

ISSN: 2312-0134
African Research Journal of Education and Social Sciences, 12 (2), 2025 | Website: www.arjess.org

A second expert emphasized environmentally conscious recommendations such as the use of Muchen toilets, which help conserve water. The professional stressed the following:

> … the value of integrating well-structured plumbing systems and bio-digesters within building plans. These installations are intended to promote hygiene while also managing waste sustainably and reducing water dependency. According to this expert, proper incorporation of such systems enhances both functionality and environmental responsibility (Professional 2, 2025).

From a different perspective, another professional noted that

> …while water provision is outside their direct mandate, their contribution lies in offering input during the planning phase. Once this is done, execution is left to the relevant department. However, sanitation remains part of the design process, with deliberate inclusion of septic tanks, drainage lines, and plumbing infrastructure aimed at ensuring long-term hygiene and sustainability. Subsequent oversight and inspections are conducted by public health officials (Professional 3, 2025).

Overall, the findings reveal that while a majority of residents in Samburu County experience reliable water supply, clean drinking water, functional drainage, stable electricity, and responsive management, there remain notable pockets of concern. Issues such as intermittent water shortages, inefficiencies in waste disposal, drainage blockages, power outages, and limited backup power affect a significant minority, highlighting areas that require targeted interventions to improve the overall comfort and health standards within the buildings. Enhancing infrastructure reliability and management responsiveness will be key to ensuring better living conditions for all residents.

From professionals' observations, it emerged that while key utilities such as water and sanitation are not always within the direct scope of building professionals, their planning input plays a significant role in ensuring occupant satisfaction. Effective inter-departmental collaboration is crucial for implementing reliable systems that promote hygiene, efficiency, and long-term habitability in residential buildings.

DISCUSSION

The findings from this study reveal important insights into the status of utilities and sanitation services in Samburu County. Quantitative results show that 71.8% of respondents have access to a reliable water supply. However, interviews with public health officers highlighted that water safety remains a concern, particularly during the rainy season when contamination risks increase. This observation is consistent with Owuor et al. (2019), who noted that rural water infrastructure often lacks sustained maintenance and quality monitoring. Similarly, Gakii and Wambugu (2021) observed that many community-based water projects fail due to limited technical capacity and poor governance structures.

ISSN: 2312-0134
African Research Journal of Education and Social Sciences, 12 (2), 2025 | Website: www.arjess.org

With regard to sanitation and drainage systems, 62.4% of respondents perceived them as adequate. Nevertheless, key informants reported that informal settlements and peri-urban zones are underserved. Participants explained that in many low-income areas, households rely on makeshift drainage and pit latrines, which expose residents to environmental and health risks. This is aligned with the findings of Murungi and Blokland (2016), who attributed poor sanitation in decentralized regions to inconsistent investment and fragmented responsibilities. Kihiu and Musango (2022) further pointed out that unmanaged waste systems in such areas contribute significantly to localized disease outbreaks.

Electricity access was considered stable by 64.4% of the respondents. However, community members reported frequent power interruptions, especially during peak hours and the rainy season. These outages disrupt water pumping, refrigeration, home-based businesses, and learning activities. Obiero et al. (2024) emphasized that despite improvements in rural electrification, supply remains erratic due to aging infrastructure and limited maintenance. Reports from the Kenya Power and Lighting Company (2022) acknowledge that while national electricity coverage has grown, many counties still experience instability in distribution and voltage fluctuations.

Service responsiveness also emerged as a key theme, with 63.4% of respondents expressing satisfaction with how utility issues are resolved. Despite this, both survey participants and interviewees reported that delays and inefficiencies are common when reporting service breakdowns. Urban planners indicated that a lack of coordination between county departments and utility providers weakens the effectiveness of infrastructure interventions. These concerns mirror those expressed by Omuya (2023), who found that the absence of a centralized planning framework undermines timely response to service delivery issues. Marzouk and Othman (2017) also stressed that integrated infrastructure planning is essential for enhancing service performance in expanding urban regions.

Qualitative data further revealed that construction often proceeds without assured utility connections, especially in new residential zones. Participants observed that buildings are sometimes occupied before connections to water, sanitation, or electricity services are established. County engineers recommended that all building permits be tied to proof of infrastructure provision before occupancy. Njiru and Letema (2018) supported the study findings by arguing that the inclusion of utility infrastructure in early development stages is critical to reducing retrofitting costs and improving public health outcomes.

Although survey results indicate moderate satisfaction with utility services in Samburu County, the qualitative findings point to persistent challenges including unequal access, unreliable service supply, and weak institutional coordination. These findings suggest that future interventions must prioritize infrastructure planning, regulatory enforcement, and cross-sectoral collaboration to achieve meaningful improvements in service delivery.

ISSN: 2312-0134
African Research Journal of Education and Social Sciences, 12 (2), 2025 | Website: www.arjess.org

CONCLUSION

The findings of the study indicate that access to essential utilities and sanitation services in Samburu County remains a significant concern despite various efforts to improve infrastructure. While some progress has been made, the availability, reliability, and quality of services such as water, sanitation, and electricity are still uneven across different areas. Respondents highlighted ongoing issues such as intermittent supply, limited coverage in remote settlements, and poor waste disposal systems. Qualitative findings further revealed that institutional weaknesses, lack of coordination among service providers, and limited public participation in planning processes continue to undermine the effectiveness of utility delivery and infrastructure use.

Based on these findings, it is recommended that county authorities enhance their planning and policy implementation efforts to ensure utility services are integrated into all stages of development. Strengthening regulatory frameworks and ensuring better coordination among service providers would promote consistent and equitable service delivery. Efforts should also be made to increase public awareness and community involvement in managing utilities and sanitation systems. Moreover, capacity building for local institutions and investment in modern infrastructure would support the long-term sustainability and functionality

REFERENCES

Kariuki, M., & Ngugi, P. (2021). Assessment of water and sanitation service delivery in arid and semi-arid regions: A case of Samburu County, Kenya. *Journal of Environmental Studies and Urban Planning*, 9(2), 45–59.

Kenya National Bureau of Statistics. (2020). *2020 Kenya population and housing census: Analytical report on urbanization*. Nairobi: KNBS.

Marzouk, M., & Othman, A. (2017). Modeling the performance of sustainable sanitation systems using building information modeling. *Journal of Cleaner Production, 141*, 1400-1410.

Ministry of Lands and Urban Development. (2016). *National urban development policy*. Nairobi: Government of Kenya.

Murungi, C., & Blokland, M. W. (2016). Benchmarking for the provision of water supply and sanitation services to the urban poor: an assessment framework. *International Journal of Water, 10*(2-3), 155-174.

Mwangi, J. W., & Wanyoike, L. M. (2022). Infrastructure and sustainable development in Kenya's marginal regions. *African Journal of Development and Policy Studies*, 12(1), 88–104.

ISSN: 2312-0134
African Research Journal of Education and Social Sciences, 12 (2), 2025 | Website: www.arjess.org

Ndiritu, P. W., & Ndungu, J. M. (2020). Integrating utility planning into sustainable housing development: A review of inter-professional collaboration. *Journal of Built Environment and Planning*, 6(3), 112–127.

Obiero, C., Makokha, M., Mwangi, H., Mburu, D., Nyangau, W., & Baiddoo, E. A. (2024). Water Resources Availability and Accessibility for Water Security and Improved Livelihoods in Kenyan Drylands; Case Study of Isiolo and Samburu Counties. *International Journal of Environment and Geoinformatics*, *11*(2), 38-51.

Ochieng, M., & Makori, T. (2019). Sanitation and water access as predictors of health outcomes in rural Kenya. *East African Medical Journal*, 96(7), 370–377.

Omuya, I. I. (2023). *Project Planning and Sustainability of Water Projects in Samburu County, Kenya* (Doctoral dissertation, University of Nairobi).

UN-Habitat. (2020). *Enhancing planning and infrastructure delivery in Kenya's underserved counties*. Nairobi: United Nations Human Settlements Programme.

Waithaka, R. W. (2015). Latrine Use and Associated Factors Among Rural Community Members in Samburu East Sub-County, Samburu County, Kenya. *Unpublished Master of Public Health (Monitoring and Evaluation) Thesis: Kenyatta University*.

Wise, A. F. E., & Swaffield, J. (2012). *Water, sanitary and waste services for buildings*. Routledge.

World Health Organization. (2019). *Progress on household drinking water, sanitation and hygiene 2000–2017: Special focus on inequalities*. Geneva: WHO and UNICEF.