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Beyond Water Points: Water Accessibility, Household Wellbeing, and Service Governance in Kiryandongo Refugee Settlement, Uganda

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Water insecurity in refugee settlements undermines health, dignity, protection, and everyday well-being, yet access is often assessed mainly through infrastructure coverage. This article examines the relationship between water accessibility and refugee wellbeing in Kiryandongo Refugee Settlement, Uganda. Using a descriptive cross-sectional mixed-methods design, the study surveyed 285 refugee households and generated qualitative data through 13 focus group discussions with Water User Committee/community representatives and three key informant interviews with UNHCR, the Office of the Prime Minister, and Kiryandongo District Local Government. Quantitative data were analysed using frequencies and percentages, while qualitative data were analysed thematically. Findings show that water access is constrained by insufficient water points, poor perceived cleanliness, reduced water quantities, long queues, ageing infrastructure, household water costs, maintenance contributions, low groundwater quality, population growth, and financing gaps. Seventy percent of respondents reported that available taps and boreholes were insufficient; 78% expressed concerns about water cleanliness; 75% reported reduced water for drinking; 81% reported reduced water for personal hygiene; and 100% reported increased queuing time. Affordability was also critical: 90% incurred costs to access water, 100% agreed that refugees sought employment to buy water, and 69% considered maintenance contributions burdensome. The article argues that water accessibility is a multidimensional determinant of refugee wellbeing, requiring integrated infrastructure investment, water-quality monitoring, affordability protection, transparent maintenance financing, and stronger institutional coordination.

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INTRODUCTION

Access to safe, sufficient, physically accessible, affordable, and acceptable water is a fundamental condition for human survival, dignity, public health, and socioeconomic wellbeing. Water is required for drinking, cooking, bathing, washing clothes, cleaning utensils, sanitation, food preparation, domestic care, menstrual hygiene, and disease prevention. In humanitarian settings, and particularly in refugee settlements, water accessibility is not merely an infrastructure or service-delivery matter. It is a core protection, health, dignity, and development concern. Humanitarian standards emphasise that crisis-affected populations should have equitable access to sufficient quantities of safe water for drinking, cooking, and personal and domestic hygiene (Sphere Association, 2018), while the human right to water and sanitation reinforces the normative importance of safe and affordable water access (United Nations, 2010).

The importance of water accessibility is particularly pronounced among refugees because displacement often disrupts livelihoods, separates families, weakens household assets, increases dependence on humanitarian systems, and exposes people to

overcrowded or underserved living environments. Refugees frequently arrive in host countries after conflict, persecution, food insecurity, loss of property, and psychosocial trauma. In such conditions, access to basic services such as water, sanitation, shelter, health care, and education becomes essential for restoring dignity and supporting household recovery (UNHCR, 2021; Walther et al., 2020). Where water is inadequate, unsafe, distant, unreliable, or unaffordable, refugee households may experience poor hygiene, waterborne disease risks, time poverty, school absenteeism, household stress, increased expenditure, and conflict or frustration at water points (Cronin et al., 2008; Calderón-Villarreal et al., 2019; Morris-Iveson & St John Day, 2021).

Uganda provides an important context for examining the relationship between water accessibility and refugee wellbeing. The country is widely recognised for its progressive refugee policy framework, under which refugees are generally hosted in settlements rather than closed camps and may access land, basic services, and some livelihood opportunities. However, progressive refugee policy does not automatically ensure adequate service delivery. Refugee-hosting districts often experience pressure on water systems,

schools, health facilities, roads, land, forests, and local government capacity. Studies of refugee water supply in Uganda show that infrastructure constraints, high maintenance costs, shared use of water sources, and transitions toward utility-based service delivery can create equity, affordability, and accountability challenges (Andreasi Bassi et al., 2018; Allen & Muturi, 2020).

Kiryandongo Refugee Settlement illustrates these issues. The settlement hosts refugees from countries including South Sudan and the Democratic Republic of Congo and depends on a combination of partner-supported pump stations, hybrid piped systems, boreholes, hand pumps, deep wells, and National Water and Sewerage Corporation water points. However, the study found that the existence of multiple water sources does not necessarily mean that water is adequate, safe, affordable, or reliable. The settlement's water system is constrained by population growth, low groundwater yield, poor perceived water quality, household costs, maintenance requirements, and institutional financing challenges. Key informant evidence indicated that refugee numbers increased from about 80,000 to 106,996 by June 2024, overstressing water systems designed for a smaller population.

This article examines water accessibility and refugee wellbeing in Kiryandongo Refugee Settlement. It is guided by three research questions: What is the level of water accessibility among refugees in Kiryandongo Refugee Settlement? What challenges affect water accessibility in the settlement? To what extent do existing water sources enhance water accessibility and refugee wellbeing? The article argues that water accessibility should be understood as a multidimensional condition involving availability, adequacy, quality, physical access, reliability, affordability, infrastructure functionality, and institutional management. It further argues that refugee wellbeing is shaped not only by whether water sources exist, but also by whether households

can obtain sufficient, clean, affordable, and reliable water without excessive time burden, household expenditure, health risk, or stress.

The article contributes to refugee studies and humanitarian WASH scholarship in three ways. First, it provides settlement-specific evidence from Kiryandongo, a refugee-hosting context that has received less focused scholarly attention than larger settlements such as Bidi-Bidi, Rhino Camp, Imvepi, Nakivale, and Rwamwanja. Second, it links water accessibility to refugee well-being through household-level statistics and qualitative institutional evidence. Third, it frames water access as a systemic problem involving infrastructure, population pressure, affordability, groundwater quality, maintenance, and institutional governance.

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Water Accessibility as a Multidimensional Concept

Water accessibility is not limited to the physical presence of a water source. A refugee household may live near a borehole, tap, or piped system but still experience poor access if water is unsafe, insufficient, intermittent, costly, overcrowded, poorly maintained, or socially difficult to use. Humanitarian and development literature, therefore, treats water access as a multidimensional condition involving availability, quality, distance, queuing time, affordability, reliability, infrastructure functionality, and institutional management (WHO & UNICEF, 2017; Sphere Association, 2018; UNHCR, 1992).

This multidimensional understanding is important because conventional measures of access can sometimes overstate actual household water security. A settlement may appear adequately served when counted in terms of water points, boreholes, or infrastructure coverage, yet households may still experience long waiting times, low quantities, unsafe water, or the inability to pay. In this sense, the literature increasingly

distinguishes between formal access and effective access. Formal access refers to the existence of infrastructure, while effective access refers to whether households can obtain sufficient, safe, reliable, and affordable water in ways that support health, dignity, and daily wellbeing.

In humanitarian settings, minimum water standards are often discussed in relation to litres per person per day, although actual needs vary by climate, household size, health status, sanitation arrangements, and domestic responsibilities. UNHCR and Sphere guidance commonly refer to benchmarks of approximately 15–20 litres per person per day in emergency settings (UNHCR, 1992; Sphere Association, 2018). These standards are useful for planning and emergency response, but they do not fully capture the lived experience of water access in protracted refugee settlements. In long-term displacement contexts, access is also shaped by payment systems, infrastructure maintenance, population growth, governance arrangements, and household livelihood constraints. Where available water falls below minimum standards, households may ration water, reduce hygiene practices, use unsafe sources, or spend excessive time searching and queuing for water (Morris-Iveson & St John Day, 2021; Vivar et al., 2019).

Refugee Well-Being and Access to Basic Services

Refugee wellbeing includes physical health, psychological stability, dignity, safety, household welfare, social participation, access to services, and the ability to pursue a meaningful life in displacement. Wellbeing in refugee contexts is shaped by living conditions, legal status, social support, family separation, livelihood opportunities, and access to essential services (Walther et al., 2020). Water accessibility is one of the critical pathways through which settlement conditions affect wellbeing because water is directly connected to hygiene, nutrition, sanitation, disease prevention, domestic labour, childcare, and household dignity.

Existing studies show that inadequate water access affects wellbeing through several channels. Adequate water supports personal hygiene, food preparation, domestic cleaning, sanitation, disease prevention, and dignity. Conversely, inadequate water increases vulnerability to diarrhoeal diseases and other hygiene-related illnesses, reduces time for school and livelihood activities, increases household stress, and forces families to spend scarce income on water (Cronin et al., 2008; Calderón-Villarreal et al., 2019; Behnke et al., 2024). However, much of the literature tends to examine these outcomes separately, focusing either on health, infrastructure, affordability, or governance. Fewer studies bring these dimensions together to show how water access simultaneously affects household wellbeing while also reflecting broader service-governance challenges within refugee settlements.

Water Quality, Hygiene, and Health

Water quality is central to wellbeing because physically available water may still be unusable or unsafe. Refugee households often assess water quality by colour, smell, taste, turbidity, and whether water causes illness. However, water that appears clean may still contain harmful pathogens. In congested settlements, unsafe water and inadequate hygiene can increase the risk of diarrhoeal diseases, cholera, typhoid, skin infections, and other water-related conditions (WHO & UNICEF, 2017; Cronin et al., 2008; Calderón-Villarreal et al., 2019).

The health-focused literature is useful because it demonstrates the direct relationship between unsafe water and disease risk. However, a purely health-centred approach may understate the social and governance dimensions of water insecurity. For example, households may knowingly use water they perceive as unsafe when the safer source is too expensive, too far, too crowded, or unreliable. This suggests that water quality cannot be analysed independently of affordability, time burden,

infrastructure reliability, and institutional accountability.

Affordability and Household Water Insecurity

Affordability is a major dimension of water accessibility in protracted refugee settings. When refugees must pay for water, buy water from nearby taps, pay transport costs, or contribute to maintenance fees, water access becomes linked to household income and livelihood insecurity. In such circumstances, households may reallocate money away from food, soap, health care, education, or transport to obtain water (Sabir, 2016; Vivar et al., 2019; Aceng et al., 2025).

This affordability dimension is especially important in settlements where water systems are shifting from purely humanitarian provision toward utility-supported or cost-recovery models. While such models may improve long-term sustainability, they may also deepen inequality if poor households cannot consistently pay for water. The literature, therefore, presents a policy tension: sustainable water systems require financing, but household-level water security requires that costs do not exclude vulnerable users. This tension is central to understanding water access in Kiryandongo, where refugees interact with both humanitarian-supported systems and paid National Water and Sewerage Corporation water points.

Gender, Time Use, and Water Collection

Water collection is often gendered. In many refugee, rural, and low-income settings, women and girls carry primary responsibility for household water collection and domestic water management (UNICEF, 2021; Sphere Association, 2018). When water points are distant, congested, unreliable, or costly, women and girls may spend long hours walking, queuing, and carrying water. This can reduce time for education, livelihood activities, childcare, rest, community participation, and safety.

The gendered literature is important because it moves the analysis beyond water quantity to the

unequal distribution of water-related burdens within households. However, gendered time-use burdens are often treated as a secondary effect rather than a central dimension of water access. In refugee settlements, time spent collecting water is not merely an inconvenience; it is a welfare cost that may affect schooling, income generation, safety, psychosocial wellbeing, and household care responsibilities. This study, therefore, treats time, distance, and queuing not only as logistical issues but also as wellbeing and equity concerns.

Institutional Water Governance in Refugee Settlements

Water accessibility in refugee settlements depends not only on infrastructure but also on institutional arrangements. Water systems require planning, financing, construction, operation, maintenance, quality monitoring, tariff regulation, accountability, and community engagement. In Uganda, refugee water systems often involve the Office of the Prime Minister, UNHCR, district local governments, humanitarian partners, water user committees, utilities, and refugee community structures.

Allen and Muturi (2020) show that the transition of water supply management to utilities in Ugandan refugee settlements raises important questions about equity, community participation, water user fees, and affordability. Utility-based systems may support long-term sustainability, but they can create exclusion risks if vulnerable households cannot pay. This argument is particularly relevant to Kiryandongo because the settlement combines humanitarian-supported water systems with National Water and Sewerage Corporation water points, where refugees pay per jerrycan.

The governance literature is therefore valuable in showing that water access is produced through institutions, not merely through infrastructure. However, existing studies often focus on policy and management arrangements without sufficiently connecting these arrangements to household-level wellbeing. Conversely, household-level studies

may document water hardship without fully explaining how service-governance arrangements produce or reduce such hardship. This study responds to that limitation by linking household experiences of water access to the governance and institutional conditions under which water services are provided.

Synthesis and Research Gap

The reviewed literature establishes that water accessibility in refugee settlements is multidimensional, affecting health, dignity, household welfare, gendered labour, affordability, and service governance. However, three important gaps remain. First, geographically, there is limited settlement-specific evidence on how water access challenges are experienced in Kiryandongo Refugee Settlement, despite its relevance as one of Uganda's long-standing refugee-hosting areas. Second, contextually, much of the humanitarian water literature is grounded in emergency standards and infrastructure coverage, yet Kiryandongo represents a protracted displacement setting where water access is shaped by population pressure, payment arrangements, institutional coordination, and the transition toward more formalised service systems. Third, analytically, previous studies often examine water quantity, water quality, affordability, gendered collection burdens, or governance separately. Less attention has been given to how these dimensions interact to shape household wellbeing.

This study addresses these gaps by examining water accessibility beyond the mere presence of water points. It analyses how refugees experience water in terms of availability, reliability, affordability, quality, distance, queuing time, and governance. By linking these dimensions to household wellbeing and service-governance arrangements, the study contributes a more integrated understanding of water insecurity in a protracted refugee settlement context.

Systems Theory

This study is grounded in systems theory, associated with Von Bertalanffy (1968), which views social phenomena as systems made up of interacting and interdependent components. Systems theory is useful because water accessibility in refugee settlements cannot be explained by a single variable. It is shaped by the interaction of infrastructure, groundwater conditions, population size, household income, institutional coordination, funding, maintenance, community management, water quality, and humanitarian policy.

Systems theory is particularly appropriate for this study because the problem of water access in Kiryandongo is not merely technical. It is produced by the interaction of household, infrastructural, environmental, financial, and institutional factors. Population growth increases demand. Increased demand overstretching water points. Overstretched systems lead to longer queues, reduced quantities, breakdowns, higher maintenance needs, and household costs. Poor groundwater quality increases treatment costs and reduces user trust. Household poverty limits the ability to pay. Institutional financing constraints affect maintenance and expansion. These interactions show why improving water accessibility requires integrated action rather than isolated interventions.

The systems perspective, therefore, strengthens the study by explaining why water access should be analysed as part of a broader service-delivery system. It also supports the study's focus on both household wellbeing and service governance. Rather than treating water points as isolated facilities, the study examines how infrastructure, institutions, affordability, quality, and household coping strategies interact to shape refugees' everyday experience of water access in Kiryandongo.

METHODOLOGY

Research Design

The study adopted a descriptive cross-sectional mixed-methods design. The descriptive design was appropriate because the study sought to examine the level of water accessibility, identify challenges affecting access, and assess how existing water sources influence refugee wellbeing in Kiryandongo Refugee Settlement. The cross-sectional design enabled the study to capture household water-access conditions and experiences at a specific point in time.

A mixed-methods approach was used because water accessibility has both measurable and experiential dimensions. Quantitative household survey data generated descriptive evidence on water availability, adequacy, quality, cost, queuing time, and infrastructure conditions. Qualitative data from focus group discussions and key informant interviews provided deeper explanations of household experiences, coping strategies, institutional constraints, and service-governance issues. The integration of quantitative and qualitative evidence strengthened the study through methodological triangulation.

Study Area

The study was conducted in Kiryandongo Refugee Settlement in Bweyale Town Council, Kiryandongo District, Uganda. The settlement was selected because it hosts a substantial refugee population, including refugees from South Sudan and the Democratic Republic of Congo, and continues to experience water-access challenges despite the presence of government, humanitarian, community, and water-sector interventions. Kiryandongo was therefore considered suitable for examining the relationship between water accessibility, household wellbeing, and service governance in a protracted refugee-settlement context.

Study Population and Sample

The study targeted refugee households, Water User Committee representatives, and key institutional actors involved in settlement management and water service delivery. A total of 311 participants took part in the study. These included 285 refugee household respondents, 23 Water User Committee representatives, and 3 key institutional informants from UNHCR, the Office of the Prime Minister, and Kiryandongo District Local Government. All targeted participant categories were reached, resulting in a 100% response rate.

The household sample of 285 respondents was considered adequate for a descriptive cross-sectional survey because it was large enough to generate stable percentage distributions on key water-access indicators while remaining feasible within the study's time and logistical constraints. Statistically, a household sample of this size provides an acceptable level of precision for estimating simple proportions in a field-based settlement study, especially where the purpose is descriptive rather than causal inference. The qualitative sample was justified by the need to obtain information-rich perspectives from actors directly involved in water access, community water management, and institutional service provision. The focus group discussions and key informant interviews were continued until the main themes became recurrent and no substantially new issues were emerging.

Sampling Strategy

The study used a combination of household-based sampling and purposive sampling. Refugee households were selected because households are the primary units through which water access is experienced, managed, and translated into wellbeing outcomes. Water User Committee representatives were purposively included because of their role in community-level water governance, reporting, maintenance coordination, and accountability. Institutional informants were also

purposely selected because they had direct knowledge of settlement management, WASH coordination, water infrastructure, utility transition, financing, and service-delivery arrangements.

This sampling strategy was appropriate because the study required both household-level data and institutional-level explanations. Household respondents provided evidence on everyday water access and wellbeing, while Water User Committee members and institutional actors provided insights into governance, infrastructure functionality, maintenance, and system capacity.

Data Collection Methods

The study used four data collection methods. First, a structured household questionnaire was administered to refugee household respondents. The questionnaire collected quantitative data on demographic characteristics, adequacy of water taps and boreholes, water cleanliness, quantity of water fetched for drinking and hygiene, queuing time, ageing infrastructure, household water costs, cost of a 20-litre jerrycan, employment status in relation to ability to buy water, and monthly maintenance contributions.

Second, focus group discussions were conducted with refugee representatives and Water User Committee representatives. These discussions generated community-level perspectives on water adequacy, reliability, queuing, affordability, water quality, coping strategies, household stress, hygiene, and social effects of water-access constraints.

Third, key informant interviews were conducted with institutional actors responsible for settlement management and water service provision. The interviews focused on water infrastructure, pump stations, National Water and Sewerage Corporation water points, groundwater quality, financing, maintenance, utility transition, institutional coordination, and the capacity of existing water systems.

Fourth, a documentary review was used to supplement the primary data. Relevant documents were reviewed to provide contextual information on water service provision, settlement management, and humanitarian water-access standards.

Measurement of Variables

Water accessibility was measured using indicators related to adequacy, availability, quality, affordability, reliability, time burden, and infrastructure capacity. These included adequacy of water taps and boreholes, cleanliness of water, amount of water fetched for drinking, amount of water fetched for personal hygiene, queuing time, ageing water infrastructure, household expenditure on water, cost of a 20-litre jerrycan, employment status in relation to the ability to buy water, monthly maintenance contributions, and the perceived capacity of existing water systems.

Refugee wellbeing was examined through practical outcomes linked to water access. These included personal hygiene, sanitation, vulnerability to disease, household stress, time use, livelihood participation, household expenditure, dignity, and social relations. These indicators were selected because they reflect the ways in which water access affects everyday household welfare in refugee settlements.

Data Analysis

Quantitative data were coded, entered, cleaned, and analysed using IBM SPSS Statistics, version 31. The analysis mainly involved descriptive statistics, particularly frequencies and percentages, because the study sought to summarise household-level water-access conditions and related wellbeing outcomes.

Qualitative data from focus group discussions and key informant interviews were transcribed, organised, and analysed thematically using manual coding matrices. Thematic analysis focused on recurring patterns related to infrastructure adequacy, water quality, population pressure,

affordability, queuing time, institutional arrangements, water-source capacity, hygiene, household expenditure, maintenance, and water governance.

The quantitative and qualitative findings were integrated during interpretation. Quantitative results showed the distribution and magnitude of key water-access challenges, while qualitative findings explained the social, household, and institutional meanings behind those patterns. This integration enabled the study to connect numerical trends with lived experience and institutional explanations.

Ethical Considerations

The study observed key ethical principles throughout the research process. Permission was obtained from the relevant authorities before data collection. Participants were informed about the purpose of the study, the voluntary nature of participation, and their right to withdraw at any stage without penalty. Informed consent was obtained before questionnaires, focus group

discussions, and key informant interviews were conducted.

Confidentiality and anonymity were maintained by avoiding the use of personal identifiers in the presentation of findings. Participants' views were handled respectfully, and the data were used only for academic purposes. These ethical considerations were especially important because refugees are a potentially vulnerable population and may fear that participation, refusal, or critical responses could affect their access to services. The study therefore emphasised voluntary participation, respectful engagement, cultural sensitivity, and protection of participants from harm.

RESULTS

Response Rate and Respondent Categories

The study reached all targeted respondent categories, yielding a complete response rate across the household survey, focus group discussions, and key informant interviews.

Table 1: Response Rate

Category of respondents	Targeted number	Number reached	Response rate
Refugee household respondents	285	285	100%
Water User Committee representatives	23	23	100%
Key institutional informants	3	3	100%
Total	311	311	100%

Source: *Field data*

As shown in Table 1, the study generated evidence from household, community, and institutional levels. This allowed the analysis to connect household experiences of water access with community water management and institutional service-delivery perspectives.

Demographic Characteristics of Household Respondents

Table 2 presents the demographic characteristics of the 285 household survey respondents.

Table 2: Demographic Profile of Household Respondents

Variable	Category	Frequency	Percentage
Gender	Male	73	26%
	Female	212	74%
Age	Less than 25 years	39	14%
	25–34 years	131	46%
	35–44 years	99	35%
	45–54 years	10	4%
	55 years and above	6	2%
Education	Certificate and below	274	96.1%
	Diploma	5	1.8%
	Bachelor's degree	4	1.4%
	Other	2	0.7%
Years in settlement	1–3 years	36	13%
	4–6 years	205	72%
	7–9 years	34	12%
	10 years and above	10	4%
Household size	1–3 members	72	25%
	4–6 members	69	24%
	7–9 members	106	37%
	10 and above members	38	13%
Total		285	100%

Source: Field data. Note: Percentages are rounded and may not sum exactly to 100.

Table 2 shows that most household respondents were female, relatively young to middle-aged adults, had low formal education, and had lived in the settlement for 4–6 years. Household sizes were generally large, with half of the respondents living in households of seven or more members. These characteristics are important because household

size, gender roles, income opportunities, and education can influence how water access is experienced, managed, and converted into household wellbeing.

Level of Water Accessibility

Table 3: Level of Water Accessibility among Refugee Households

Indicator	Response pattern	Frequency	Percentage
Available taps and boreholes are enough.	Disagree	199	70%
	Neutral	43	15%
	Agree	43	15%
Water remains clean throughout the year	Strongly disagree	78	27%
	Disagree	145	51%
	Neutral	39	14%
	Agree	23	8%
Water fetched for drinking has reduced.	Neutral	70	25%
	Agree	178	62%
	Strongly agree	37	13%
Water fetched for personal hygiene has reduced	Neutral	55	19%
	Agree	145	51%
	Strongly agree	85	30%
Queuing time has increased.	Agree	107	38%
	Strongly agree	178	62%

Source: Field data

Table 3 indicates that water access in Kiryandongo was constrained across several dimensions. Most respondents considered available taps and boreholes insufficient, reported concerns about water cleanliness, and indicated that water fetched for drinking and personal hygiene had reduced. Queuing time was the most widely reported constraint, with all respondents agreeing or strongly agreeing that waiting time at water points had increased.

Qualitative findings supported these patterns. Institutional respondents reported that the settlement had seven operational motorised partner-

supported pump stations and two National Water and Sewerage Corporation water points, but noted that the combined yield remained inadequate for the population served. Focus group participants also raised concerns about the physical appearance of water from some boreholes, including reports of brown or dirty water that had to be left to settle before use. These findings suggest that access challenges were not limited to the number of water points but also involved quality, reliability, waiting time, and adequacy of supply.

Infrastructure, Affordability, and Household-Level Constraints

Table 4: Infrastructure, Affordability, and Household-Level Constraints

Challenge indicator	Response pattern	Frequency	Percentage
Water sources are getting old.	Disagree	69	24%
	Neutral	35	12%
	Agree	107	38%
	Strongly agree	74	26%
Households incur costs to access water.	Neutral	29	10%
	Agree	213	75%
	Strongly agree	43	15%
Refugees seek employment to buy water.	Agree	178	62%
	Strongly agree	107	38%
The monthly maintenance contribution is high.	Neutral	89	31%
	Agree	182	64%
	Strongly agree	14	5%

Source: *Field data*

Table 4 shows that water access was also shaped by infrastructure ageing, household costs, livelihood pressure, and maintenance contributions. Nearly two-thirds of respondents agreed or strongly agreed that water sources were getting old, while 90% reported that households incur costs to access water. All respondents agreed or strongly agreed that refugees seek employment to buy water, and more than two-thirds considered monthly maintenance contributions high.

Qualitative evidence linked these constraints to population growth, limited system capacity, and the cost of accessing cleaner or more reliable water. Key informants reported that the refugee population had increased from about 80,000 to 106,996 by June

2024, increasing demand on systems that were already limited in yield and coverage. Some respondents also reported paying for water from nearby tap owners or National Water and Sewerage Corporation water points, while still contributing to community maintenance costs.

Existing Water Sources and Their Capacity to Enhance Wellbeing

Kiryandongo Refugee Settlement was served by several types of water sources, including partner-supported pump stations, hybrid piped systems, National Water and Sewerage Corporation water points, boreholes, hand pumps, and deep wells.

Table 5. Existing Water Sources Reported in Kiryandongo Refugee Settlement

Type of water source/system	Description from field findings	Implication for water accessibility
Partner-supported pump stations	Operational motorised pump stations supported by WASH partners	An important source of settlement water, but the yields are insufficient for the population
Hybrid piped water systems.	Systems powered by solar energy and generators to pump underground water into reservoirs	Improve distribution where functional, but requires fuel, power, maintenance, and treatment.
NWSC water points	Water points connected to the National Water and Sewerage Corporation systems.	Improve access for nearby households, but require payment per jerrycan.
Boreholes and hand pumps	Used by refugees in different clusters; some are manually operated	Provide direct access, but may be affected by distance, low yield, water quality, and maintenance needs
Deep wells	Operated using solar power with generator backup	Support water supply but depend on energy, maintenance, and groundwater conditions.

Source: Field data from KIIs and FGDs, adapted from Table 31.

Table 5 shows that Kiryandongo had a diversified water-supply system. However, the presence of multiple source types did not eliminate household water insecurity. Partner-supported pump stations and hybrid piped systems contributed to supply but were constrained by yield, energy requirements, maintenance needs, treatment costs, and groundwater conditions. Boreholes, hand pumps, and deep wells provided additional access but were affected by quality concerns, low yield, distance, and functionality challenges. NWSC water points improved access for some households, but introduced affordability concerns because users had to pay per jerrycan.

Overall, the results indicate that existing water sources contributed to basic access but did not consistently provide adequate, clean, reliable, affordable, and timely water for refugee households. Their capacity to enhance wellbeing was therefore limited by the interaction of infrastructure condition, groundwater quality, population pressure, system maintenance, energy requirements, institutional financing, and household affordability.

DISCUSSION

Infrastructure Presence does not Equal Water Accessibility

The findings show that the presence of water infrastructure does not automatically translate into effective household access. Although Kiryandongo has pump stations, hybrid piped systems, boreholes, hand pumps, deep wells, and NWSC water points, households continued to experience inadequate supply, poor perceived quality, long queues, and water-related costs. This confirms the distinction between formal access and effective access. Formal access refers to the existence of water points, while effective access depends on whether households can obtain sufficient, safe, reliable, affordable, and timely water.

This finding is consistent with humanitarian and WASH literature, which treats water access as multidimensional rather than merely infrastructural (WHO & UNICEF, 2017; Sphere Association, 2018; UNHCR, 1992). In Kiryandongo, therefore, water accessibility cannot be assessed by counting water sources alone. It must be understood through the combined effects of availability, adequacy, quality, affordability, distance, queuing time,

infrastructure functionality, and institutional management.

Water Quality, Trust, and Household Wellbeing

Water quality emerged as a major determinant of household wellbeing. Respondents' concerns about dirty or brown water suggest that water access is shaped not only by physical availability but also by acceptability and trust. Even where water is available, households may avoid or limit use if they perceive it to be unsafe. Where alternatives are costly, poorer households may continue using sources they distrust, thereby increasing inequality in exposure to health risks.

This finding supports studies showing that unsafe or unacceptable water in refugee and low-income settings can increase vulnerability to diarrhoeal diseases, skin infections, and other hygiene-related conditions (Cronin et al., 2008; Calderón-Villarreal et al., 2019; Behnke et al., 2024). It also shows that perceived quality matters for behaviour. Households may spend additional time settling water, searching for alternative sources, or buying water from paid taps. Water quality, therefore, affects health, domestic labour, expenditure, and confidence in service systems.

Reduced Water Quantities and Hygiene-Related Wellbeing

The reported reduction in water fetched for drinking and personal hygiene shows that water insecurity affects both survival needs and broader wellbeing. When households receive less water than they require, they are likely to prioritise drinking and cooking over bathing, laundry, cleaning utensils, handwashing, and sanitation. Such rationing undermines hygiene, dignity, household cleanliness, and disease prevention.

This finding is important because humanitarian water standards often focus on minimum litres per person per day, yet household wellbeing depends on how water is actually used across competing needs. Reduced quantities may therefore produce hidden

welfare losses even when households continue to access some water. In Kiryandongo, declining water quantities were not merely a supply problem; they were connected to hygiene practices, disease vulnerability, household stress, and dignity.

Queuing Time as a Hidden Cost of Water Insecurity

Queuing time was one of the strongest findings in the study. Long waiting time at water points transforms water access into a time and opportunity cost. A water point may be geographically close, but if users spend long periods waiting, access remains burdensome. Queuing, therefore, functions as a hidden form of water insecurity.

This burden is likely to be gendered. Since most respondents were women, and because women and girls commonly carry primary responsibility for domestic water collection in many low-income and humanitarian settings, increased queuing time may reinforce gendered time poverty (UNICEF, 2021; Sphere Association, 2018). Time spent waiting for water reduces time available for childcare, schooling, income-generating activities, rest, social participation, and household care. In this sense, queuing time should be treated as a core measure of water accessibility, not as a minor inconvenience.

Affordability and Unequal Access to Safer Water

Affordability emerged as a central axis of water insecurity. The findings show that many households incur costs to access water, seek employment in order to buy water, and experience monthly maintenance contributions as burdensome. This indicates that water access in Kiryandongo is mediated by household purchasing power. Water is therefore not only a service-delivery issue but also a livelihood and welfare issue.

The affordability challenge is especially significant in protracted refugee settlements, where households often have limited income opportunities and may depend on humanitarian assistance, casual labour,

or informal livelihoods. When households must pay for water, water competes with food, soap, health care, education, transport, and other basic needs. This supports the wider literature on household water insecurity, which shows that water costs can force households to make difficult trade-offs between water and other welfare needs (Vivar et al., 2019; Morris-Iveson & St John Day, 2021; Stoler et al., 2020).

Affordability is also closely linked to water quality. Some households buy water because they distrust free or nearby sources. However, poorer households may be unable to pay for cleaner or more reliable alternatives. This produces a layered inequality: better-quality water becomes more accessible to households with higher incomes, while poorer households remain dependent on sources they consider unsafe or unacceptable.

Service Governance and the Utility-Transition Dilemma

The findings also point to a governance dilemma in refugee water provision. Utility-based systems such as NWSC water points may improve technical management, reliability, and long-term sustainability. However, payment requirements can exclude vulnerable households if affordability safeguards are weak. This confirms concerns in the literature that the transition from humanitarian water provision to utility-managed systems can create tensions between sustainability, cost recovery, equity, and community participation (Allen & Muturi, 2020).

In Kiryandongo, this dilemma is visible in the coexistence of partner-supported systems, community-managed sources, and paid utility-connected water points. Each model contributes to water access, but each also carries limitations. Partner-supported systems may face financing and maintenance constraints. Community-level sources may suffer from ageing infrastructure and quality concerns. Utility-based systems may improve service formalisation but introduce cost barriers.

Effective water governance, therefore, requires balancing sustainability with social protection for households that cannot pay.

A Systems Interpretation of Water Insecurity in Kiryandongo

The findings align with systems theory. Water insecurity in Kiryandongo is not produced by one isolated factor. It results from the interaction of population growth, low groundwater potential, ageing infrastructure, inadequate yield, perceived poor water quality, household poverty, payment systems, maintenance contributions, institutional financing constraints, and service-governance arrangements.

This systems perspective explains why single interventions may have limited effects. Adding water points may reduce distance and queuing, but may not solve water quality concerns. Improving treatment may increase costs if financing is weak. Utility-based supply may improve sustainability, but may deepen exclusion if poor households cannot pay. Maintenance contributions may support functionality, but may burden households where income is limited and accountability is weak.

Improving water accessibility in Kiryandongo, therefore, requires integrated action. Water access must be addressed as a service system involving infrastructure, financing, water quality monitoring, affordability protection, population planning, institutional coordination, community participation, and household vulnerability. Existing water sources support basic survival, but their contribution to wellbeing remains constrained when water is insufficient, distrusted, costly, delayed, or poorly maintained.

Policy Implications

The findings have several implications for refugee water governance in Uganda and other protracted displacement contexts.

First, water-access monitoring should move beyond infrastructure coverage. The Kiryandongo case

shows that water points may exist while access remains inadequate. Monitoring frameworks should therefore include adequacy, quality, queuing time, affordability, functionality, reliability, household water quantities, and user perceptions of safety.

Second, water planning should be based on updated and forward-looking population data. Infrastructure that was adequate for a smaller settlement population may become insufficient as refugee numbers increase. Water-system design should therefore incorporate refugee inflows, household size, settlement expansion, and contingency capacity.

Third, water quality should be treated as a core accessibility indicator. Water that is dirty, brown, hard, salty, or distrusted cannot fully support wellbeing, even if it is physically available. Routine testing, treatment, public communication, and community reporting systems are necessary to strengthen trust and reduce health risks.

Fourth, affordability safeguards are essential in utility-transition models. The shift toward NWSC or other utility-based systems may support long-term sustainability, but payment requirements can exclude vulnerable households. Tariff systems, subsidies, exemptions, water vouchers, or lifeline water quantities should be considered for households with limited income, large dependents, elderly members, persons with disabilities, or chronic illness.

Fifth, maintenance systems should combine technical sustainability with social accountability. Community maintenance contributions may help keep water systems functional, but they should be transparent, affordable, and clearly linked to service improvements. Water User Committees should be supported to improve reporting, accountability, community feedback, and coordination with institutional actors.

Sixth, water governance should be gender-sensitive. Since water collection burdens often fall heavily on

women and girls, interventions should reduce queuing time, improve proximity, enhance safety around water points, and consider the effects of water collection on schooling, livelihoods, rest, childcare, and household wellbeing.

Finally, improving water accessibility requires an integrated systems approach. Infrastructure expansion alone is insufficient unless accompanied by quality monitoring, maintenance financing, affordability protection, population-responsive planning, community participation, and stronger coordination among OPM, UNHCR, district authorities, utilities, WASH partners, and refugee leadership structures.

CONCLUSION

This article examined water accessibility and refugee wellbeing in Kiryandongo Refugee Settlement, Uganda. The findings show that although several water sources exist in the settlement, their presence does not automatically translate into safe, sufficient, reliable, affordable, and timely access for refugee households. Water insecurity was reflected in inadequate taps and boreholes, poor perceived water cleanliness, reduced water for drinking and hygiene, increased queuing time, ageing infrastructure, water-related household costs, livelihood pressure, and maintenance contributions.

The study concludes that water accessibility in Kiryandongo is a multidimensional wellbeing and governance issue rather than merely a technical WASH concern. The capacity of existing water systems to enhance refugee wellbeing is limited by the interaction of infrastructure constraints, low yields, groundwater conditions, affordability barriers, water-quality concerns, population pressure, maintenance challenges, and institutional arrangements. These interacting factors affect hygiene, household expenditure, time use, dignity, disease risk, livelihood participation, and social stability.

Improving refugee wellbeing therefore, requires a systems-oriented response. Infrastructure expansion should be accompanied by routine water-quality monitoring, affordability safeguards, transparent maintenance financing, meaningful community participation, stronger institutional coordination, and long-term population-responsive planning. In protracted displacement settings, safe and adequate water is not only a humanitarian necessity; it is a foundation for health, dignity, household stability, livelihood resilience, and peaceful coexistence.

The study has several limitations. First, it was conducted in one refugee settlement, and the findings should therefore be interpreted in relation to the Kiryandongo context rather than generalised mechanically to all refugee settlements in Uganda. Second, the cross-sectional design captured water accessibility at one point in time and could not fully assess seasonal or long-term changes. Third, some findings relied on self-reported perceptions, which are important for understanding lived experience but may differ from technical measurements of water quality, system yield, or flow rates. Fourth, the study did not include laboratory water-quality testing or clinical health measurements; therefore, health-related claims are framed as wellbeing and risk implications rather than direct epidemiological outcomes. Finally, because the study used descriptive statistics and qualitative evidence, it does not claim inferential statistical causality but demonstrates practical associations between water accessibility and refugee wellbeing.

Future research should compare multiple refugee settlements in Uganda to assess whether the patterns observed in Kiryandongo reflect wider structural challenges in refugee water governance. Longitudinal studies are also needed to examine seasonal and long-term changes in water availability, queuing time, water quality, and coping strategies. Further studies should combine household surveys with water-quality testing, flow-rate measurements, and litres-per-person-per-day estimates. Research should also examine how

utility-based water-service models affect vulnerable groups, including female-headed households, large households, elderly persons, persons with disabilities, and households with limited livelihood opportunities.

RECOMMENDATIONS

Expand and Rehabilitate Water Infrastructure

The Government of Uganda, UNHCR, Kiryandongo District Local Government, the Ministry of Water and Environment, WASH partners, and development actors should prioritise the expansion and rehabilitation of water infrastructure in Kiryandongo Refugee Settlement. The finding that most respondents perceived existing taps and boreholes as insufficient, while many also described water sources as ageing, points to the need for additional water points, rehabilitation of old systems, improved pumping capacity, expanded storage, and stronger distribution networks.

Infrastructure planning should be guided by current and projected settlement population, household size, water demand, groundwater potential, and system functionality. Expansion should therefore not only increase the number of water points but also improve reliability, yield, proximity, and equitable distribution across settlement clusters. Rehabilitation should prioritise ageing and frequently breaking systems so that existing infrastructure can contribute more effectively to safe, adequate, and timely household water access.

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