

Water Resources Management and Rural Development in Nsit Ubium Local Government Area, Akwa Ibom State, Nigeria

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Article History	Abstract
Original Research Article	<p><i>Water security remains a fundamental determinant of rural development in sub-Saharan Africa, where rural populations are disproportionately affected by inadequate access to safe and reliable water. This study examines the relationship between water resources management (WRM) and rural development in Nsit Ubium Local Government Area, Akwa Ibom State, Nigeria. A mixed-methods design combining household surveys (n = 384), laboratory-based water quality analysis, geospatial mapping, and institutional assessment was adopted. Descriptive statistics and Pearson correlation analysis were used to examine relationships between water variables and rural development indicators. Results indicate heavy dependence on unsafe surface water sources, significant seasonal variability, long distances to water points, and weak institutional coordination. Water quality parameters exceeded recommended safety standards in most surface sources. Statistical analysis shows strong relationships between water management variables and health outcomes, agricultural productivity, and household income. The study concludes that water insecurity in Nsit Ubium is primarily a governance and infrastructure management challenge rather than a problem of physical water scarcity. Integrated governance reforms, infrastructure investment, community participation, and sustainable water management strategies are essential for long-term rural development.</i></p> <p>Keywords: <i>Water resources management, rural development, water access, governance, Nigeria.</i></p>
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<p>Copyright © 2026 The Author(s): This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC BY-NC) which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use provided the original author and source are credited.</p> <p>Citation: Ansa, Iniubong E., Inyang, Josephine I., & Ituen, Uwem J. (2026). <i>Water resources management and rural development in Nsit Ubium Local Government Area, Akwa Ibom State, Nigeria.</i> UKR Journal of Arts, Humanities and Social Sciences (UKRJAHS), 2(6), 65-71.</p>	

1. Introduction

Water resources management plays a central role in shaping rural development outcomes, particularly in agrarian communities where livelihoods, food security, and household welfare depend directly on reliable access to clean and sufficient water (FAO, 2023; UNDP, 2022). Globally, pressures from climate change, population growth, urbanisation, and environmental degradation have intensified stress on water systems, increasing vulnerability in rural areas and deepening inequalities in access to safe water (UN-Water, 2023). Despite the international recognition of access to water as a fundamental human right, millions of rural households continue to experience chronic water insecurity, which undermines public health, agricultural productivity, and socio-economic development (WHO, 2022; World Bank, 2021). Empirical studies across sub-Saharan Africa consistently show that inadequate water access is directly linked to disease prevalence, reduced

labour productivity, food insecurity, and persistent rural poverty (IWMI, 2021; UNDP, 2023). In Nigeria, rural water systems remain characterised by inadequate infrastructure, weak institutional coordination, and poor maintenance regimes, limiting the sustainability and reliability of water supply systems (Nigerian Ministry of Water Resources, 2023; Adebayo & Hassan, 2022). These challenges are especially pronounced in rural local government areas where communities depend largely on surface water sources, shallow wells, and poorly regulated boreholes, exposing households to high contamination risks and seasonal scarcity (Iwugo & Okoye, 2021; Ogunbode et al., 2022; Abraham et al, 2025). Water insecurity in these contexts is therefore not only an environmental problem but also a structural development constraint that reinforces poverty, limits agricultural productivity, and weakens livelihood resilience (UNDP, 2022; World Bank, 2021).

Nsit Ubium Local Government Area of Akwa Ibom State presents a typical rural setting where abundant natural water resources coexist with poor access to safe and reliable water. Despite the presence of rivers, streams, and groundwater reserves, many communities continue to rely on unsafe water sources and poorly managed supply systems, reflecting governance and infrastructure deficits rather than physical water scarcity (Akwa Ibom State Government, 2023; Nsit Ubium Local Government Authority, 2023). This situation has direct consequences for public health, agricultural production, and household welfare, reinforcing vulnerability and limiting socio-economic opportunities at the community level (WHO, 2022; UNDP, 2023). This study therefore investigates the role of water resources management in shaping rural development outcomes in Nsit Ubium, focusing on four core dimensions: availability of water sources, water quality, water distribution systems, and governance structures.

By integrating spatial analysis, water quality assessment, household surveys, and institutional analysis, the study provides empirical evidence on how water management influences rural livelihoods, productivity, and community resilience. In doing so, it contributes to contemporary scholarship that positions effective water governance and sustainable management systems as foundational pillars of long-term rural development and structural transformation in developing economies (FAO, 2023; IWMI, 2021; UNDP, 2022).

Despite the abundance of surface and groundwater resources in Nsit Ubium Local Government Area, access to safe, reliable, and sustainable water remains severely limited for many rural communities (Akwa Ibom State Government, 2023; Nsit Ubium Local Government Authority, 2023). Households depend largely on unsafe surface water sources, shallow wells, and poorly regulated boreholes that are highly vulnerable to contamination and seasonal variability (Iwugo and Okoye, 2021; Ogunbode *et al.*, 2022). Water quality is compromised by high microbial loads, turbidity, and chemical deviations, exposing communities to serious public health risks and waterborne diseases (WHO, 2022; World Bank, 2021; Abraham *et al.*, 2025). In addition, long distances to water sources, poor infrastructure conditions, weak maintenance systems, and fragmented community management structures increase the daily burden of water access and reduce time available for productive activities such as farming, education, and income generation (UNDP, 2022; IWMI, 2021). These challenges are further compounded by weak institutional coordination, limited funding, low policy awareness, and the absence of structured governance and accountability

frameworks for water management (Adebayo and Hassan, 2022; Nigerian Ministry of Water Resources, 2023).

As a result, water systems in Nsit Ubium remain poorly managed, unsustainable, and unable to support long-term rural development. Water insecurity in the area therefore represents not only an environmental and infrastructural challenge but a structural development problem that undermines agricultural productivity, public health, household income, and community resilience (UNDP, 2023; UN-Water, 2023). Without integrated water governance, sustainable infrastructure investment, and participatory management systems, rural development efforts in Nsit Ubium remain fundamentally constrained (FAO, 2023; UNDP, 2022). The study seeks out to assess the availability and distribution of water sources in Nsit Ubium communities, to analyse water access patterns, infrastructure conditions, and maintenance systems in rural settlements and to examine the relationship between water resources management variables and rural development indicators such as health, agricultural productivity, household income, and welfare.

2. Literature Review

Water resources management is widely recognised as a foundational pillar of sustainable rural development, particularly in agrarian and resource-dependent communities where livelihoods, food systems, and household welfare are directly linked to water availability and quality. Contemporary scholarship emphasises that effective water management goes beyond physical water supply to include equitable distribution, water quality control, institutional coordination, governance structures, and long-term sustainability planning (FAO, 2023; UNDP, 2023). In rural contexts, weak water governance systems are consistently associated with declining agricultural productivity, heightened public health risks, reduced household incomes, and increased vulnerability to climate variability and environmental shocks (World Bank, 2021; UN-Water, 2023). Recent global assessments further demonstrate that water insecurity is increasingly driven by institutional and governance failures rather than absolute physical scarcity, especially in developing regions (UNDP, 2022; UN-Water, 2023). The Integrated Water Resources Management (IWRM) framework has emerged as a dominant paradigm for addressing water challenges through holistic, systems-based, and participatory approaches. IWRM emphasises the interdependence of water, land use, agriculture, ecosystems, governance systems, and livelihoods, while promoting decentralised management, stakeholder participation, and institutional integration (FAO, 2023; IWMI, 2021). Studies by Kumar and Singh (2024) in rural Ghana found that decentralised water governance and community engagement

significantly improved system sustainability and reduced conflict over shared water resources, reinforcing the practical value of IWRM principles in sub-Saharan contexts. Similarly, Moyo et al. (2023) in Zimbabwe noted that participatory water committees contributed to reduced downtime of boreholes and enhanced maintenance practices, highlighting how stakeholder involvement can strengthen service reliability over time.

A growing body of empirical literature across sub-Saharan Africa demonstrates that poor water quality and limited access are directly associated with increased disease prevalence, reduced labour productivity, food insecurity, and declining agricultural output (WHO, 2022; World Bank, 2021). Adetunji *et al.* (2023) in rural Kenya documented that households relying on unprotected surface water experienced significantly higher rates of diarrhoeal disease and malnutrition, corroborating global health literature on microbial contamination as a major driver of rural illness burdens. Balogun and Ojo (2025) similarly found in southwestern Nigeria that waterborne disease incidences were significantly higher in communities with degraded water sources, linking environmental contamination with reduced school attendance and labour productivity.

Long distances to water sources and seasonal unreliability also significantly constrain rural development outcomes. Research by Mensah and Yeboah (2024) in Ghana and Mugisha et al. (2023) in Uganda reported that travel time to distant water points reduced the time available for farming, education, and income-generating activities, particularly for women and children. These studies reinforce the current findings that spatial access barriers have direct socio-economic implications for rural livelihoods. Governance and institutional factors remain central in shaping water outcomes. Fragmented governance structures, weak inter-agency coordination, inadequate financing, limited technical capacity, and poor maintenance cultures consistently undermine the effectiveness of rural water interventions (UNDP, 2023; FAO, 2023). Okafor (2024) in southeastern Nigeria highlights how overlapping mandates and weak accountability mechanisms among local water agencies led to service failures and infrastructure decay, echoing this study's findings. Research by Nkosi et al. (2023) in South Africa further emphasised that community trusts and water committees were only effective where formal support and oversight mechanisms existed, indicating that institutional frameworks must be strengthened to sustain community-level gains.

The rural development literature increasingly conceptualises water as both a productive and social asset. Beyond domestic consumption, water access underpins irrigation, livestock production, agro-processing, small-

scale manufacturing, micro-enterprise development, and local value chains (FAO, 2023; IWMI, 2021). Studies by Sengupta et al. (2024) in Tanzania and Kamara and Koroma (2023) in Sierra Leone show that improved water access bolstered smallholder crop yields and enabled the growth of agro-based enterprises, contributing to broader rural economic diversification. Where water systems fail, rural economies stagnate, poverty deepens, livelihood diversification declines, and migration pressures intensify (World Bank, 2021; UNDP, 2022). Recent development theory positions water resources management as a structural driver of livelihood resilience, agricultural transformation, poverty reduction, and long-term rural sustainability rather than a sectoral service alone (UNDP, 2022; FAO, 2023). By integrating water quality assessment, spatial mapping, governance analysis, and livelihood impact analysis, this study advances a comprehensive understanding of water resources management as a central driver of rural development. In doing so, it aligns with contemporary research that positions effective water governance, participatory management systems, and sustainable infrastructure as foundational pillars of resilient rural transformation in developing economies (FAO, 2023; UNDP, 2023; UN-Water, 2023; Mensah and Yeboah, 2024).

3. Materials and Methods

3.1 Study Area

Nsit Ubium Local Government Area is situated in Akwa Ibom State, southern Nigeria, and represents a predominantly rural setting characterised by dispersed settlements and an agrarian economy. The area experiences a tropical climate with distinct wet and dry seasons, which supports the cultivation of staple and cash crops such as cassava, yam, maize, and oil palm. The region is naturally endowed with abundant surface and groundwater resources, including rivers, streams, boreholes, and wells, offering significant potential for domestic and agricultural water use.

Despite these natural advantages, access to safe and reliable water remains limited in many communities. Seasonal variability, inadequate infrastructure, and weak management systems constrain water availability, reliability, and quality. These challenges result in high dependence on unsafe water sources, long distances to water points, and fragmented community management arrangements, which collectively undermine public health, agricultural productivity, and overall household welfare. Consequently, water insecurity in Nsit Ubium reflects not only environmental and infrastructural limitations but also governance and management gaps that impede sustainable rural development (Akwa Ibom State Government, 2023; Nsit Ubium Local Government Authority, 2023).

3.2 Methods

A mixed-methods research design was adopted to generate complementary quantitative and qualitative data. Primary data were collected through: Household surveys on water access, use patterns, distribution challenges, and livelihood impacts. Geospatial mapping of water sources. Laboratory analysis of water samples to determine microbial and chemical quality. Key informant interviews with community leaders and institutional stakeholders.

Quantitative data were analysed using descriptive statistics and correlation analysis to examine relationships between water variables and rural development indicators. Qualitative data were analysed using thematic coding to identify governance challenges, community perceptions, and institutional gaps.

4. Results and Findings

Table 1: Types of Water Sources in Nsit Ubium Communities

Water Source Type	Percentage of Households (%)
Rivers/Streams	48
Shallow Wells	27
Boreholes	18
Rainwater Harvest	7

Source: Field data, 2026

Most households in Nsit Ubium rely on rivers and streams (48%) and shallow wells (27%), showing heavy dependence on surface water that is vulnerable to contamination and seasonal scarcity. Boreholes (18%) and rainwater harvesting (7%) are less common, highlighting limited access to safer and more reliable water sources.

Table 2: Water Quality Status of Major Water Sources

Parameter	Safe Standard	Observed Condition	Risk Level
Microbial Load	Low	High	Severe
Turbidity	Clear	High	High
pH Level	6.5–8.5	Deviations noted	Moderate
Chemical Content	Within limits	Exceeded in areas	High

Source: Field data (Laboratory), 2026

Water quality in Nsit Ubium is generally poor. Microbial load is high, posing severe health risks, while turbidity levels are elevated, reducing water clarity and safety. pH values show moderate deviations, and chemical content exceeds recommended limits in some areas, indicating widespread contamination and potential health hazards.

Table 3: Water Access and Distribution Characteristics

Indicator	Observation
Average distance to source	>1 km
Seasonal scarcity	High
Infrastructure condition	Poor
Maintenance systems	Weak
Community management	Fragmented

Source: Field data, 2026

Water access and distribution in Nsit Ubium face significant challenges. Households often travel more than 1 km to fetch water, and seasonal scarcity further limits availability. Infrastructure is generally in poor condition, maintenance systems are weak, and community management is fragmented, all of which undermine reliable water supply and increase the burden on households.

Table 4: Relationship Between Water Access and Rural Development Indicators

Variable	Relationship Strength	Impact Direction
Water quality – Health	Strong	Negative
Water access – Income	Moderate	Negative
Water access – Farming	Strong	Positive
Water access – Welfare	Strong	Positive

Source: Field data, 2026

The table shows that poor water quality has a strong negative impact on health, while limited water access moderately reduces household income. Reliable access to water strongly supports farming activities and overall household welfare. This demonstrates that water availability and quality are directly linked to key aspects of rural development, including health, productivity, and socio-economic well-being.

The findings reveal that most communities depend on unprotected surface water sources, while limited reliance on boreholes exists in specific locations. Water quality analysis indicates high microbial contamination and chemical deviations in surface water sources, posing

serious public health risks. Water distribution systems are characterised by long walking distances, seasonal scarcity, limited infrastructure, poor maintenance practices, and fragmented community management arrangements. Governance analysis reveals weak institutional coordination, low policy awareness, limited funding, and absence of structured maintenance frameworks. Statistical analysis confirms significant relationships between poor water quality, limited access, and reduced agricultural productivity, time use, household welfare, and livelihood resilience.

Relationship Between Water Management and Rural Development

Table 5. Correlation Between Water Variables and Rural Development Indicators

Variables	Health Status	Agricultural Productivity	Household Income
Water Quality	-0.68**	0.42*	0.35*
Distance to Source	-0.51**	-0.63**	-0.49**
Seasonal Reliability	0.59**	0.71**	0.54**

p < 0.05

** p < 0.01

Seasonal reliability demonstrates strong positive associations with productivity and income. The table presents the strength and direction of relationships between water management variables and rural development outcomes. Poor water quality is strongly negatively correlated with health (r = -0.68), indicating that higher contamination levels lead to worse health outcomes. Greater distance to water sources significantly reduces agricultural productivity (r = -0.63) and household income (r = -0.49), reflecting the time and effort spent accessing water. Seasonal reliability of water supply shows strong positive correlations with agricultural productivity (r = 0.71) and household income (r = 0.54), demonstrating that consistent and reliable water availability supports farming performance and economic well-being. Overall, these correlations confirm that effective water management is

critical for health, productivity, and livelihood resilience in rural communities.

4.1 Discussion

The findings of this study indicate that the objectives of examining water resources management and its influence on rural development in Nsit Ubium Local Government Area were largely achieved. The assessment of water availability and distribution revealed that households rely heavily on rivers and streams (48%), shallow wells (27%), and boreholes (18%), with minimal adoption of rainwater harvesting (7%). This pattern underscores limited access to safe and reliable water, consistent with previous observations that rural water systems in Nigeria suffer from inadequate infrastructure, seasonal variability, and weak management systems (Akwa Ibom State Government,

2023; Nsit Ubium Local Government Authority, 2023; Iwugo and Okoye, 2021).

Water quality analysis confirmed high microbial contamination, turbidity, and chemical deviations in surface water sources, demonstrating a direct risk to public health. The observed strong negative correlation between water quality and health outcomes ($r = -0.68$) validates concerns about waterborne diseases and aligns with findings by WHO (2022) and World Bank (2021), who report similar links between poor rural water quality and disease prevalence, reduced labour productivity, and diminished household welfare.

Analysis of water access patterns, infrastructure, and maintenance systems revealed long distances to water points, seasonal scarcity, poor infrastructure conditions, weak maintenance practices, and fragmented community management. Governance evaluation highlighted weak institutional coordination, low policy awareness, limited funding, and absence of structured management frameworks. These findings confirm that water insecurity in Nsit Ubium is primarily a governance and management issue rather than a physical scarcity problem, supporting the arguments of UNDP (2022, 2023), UN-Water (2023), and Adebayo and Hassan (2022).

The study also demonstrated significant relationships between water management variables and rural development indicators. Access to water positively influenced agricultural productivity and household welfare, while poor quality and long distances negatively impacted health and income, corroborating prior empirical work by Ogunbode et al. (2022) and Iwugo and Okoye (2021). This supports the conceptualisation of water as both a social and productive asset that underpins livelihoods, agricultural transformation, and poverty reduction (UNDP, 2022; World Bank, 2021).

Furthermore, the study's emphasis on governance reform and community participation aligns with the principles of Integrated Water Resources Management (IWRM) and community-based management frameworks, which advocate for decentralised governance, stakeholder engagement, and institutional coordination as central to sustainable water systems (FAO, 2023; IWMI, 2021). Recent studies by UNDP (2023) and UN Women (2022) reinforce the importance of participatory water governance in enhancing sustainability, social inclusion, and community ownership.

By integrating water quality assessment, spatial mapping, governance evaluation, and livelihood impact analysis, this study provides comprehensive empirical evidence linking water resources management to rural development outcomes. The results confirm that effective water

governance, infrastructure management, and participatory approaches are critical determinants of sustainable rural development in Nsit Ubium and similar sub-Saharan contexts. Overall, the study extends existing literature by demonstrating that water resources management is not a peripheral concern but a structural factor central to community resilience, agricultural productivity, and socio-economic transformation.

5. Conclusion

This study concludes that water resources management is a critical determinant of rural development in Nsit Ubium Local Government Area, shaping not only access to water but also the broader socio-economic conditions of rural life. Water insecurity undermines agricultural productivity, public health, income generation, and community resilience by constraining livelihoods, increasing vulnerability to disease, and weakening household economic stability. Addressing these challenges therefore requires an integrated and coordinated approach that combines sustainable infrastructure development, effective governance reform, active community participation, and long-term sustainability planning, ensuring that water systems are not only established but maintained, equitably managed, and aligned with wider rural development objectives. Given these findings, the study suggested that rural water infrastructure development should be strengthened through targeted rehabilitation of existing facilities and expansion of safe water points, establishing functional community water management committees with clear roles and accountability structures, implementing routine and decentralised water quality monitoring systems, improving institutional coordination through inter-agency collaboration and shared planning frameworks, promoting participatory water governance that actively involves local communities in decision-making, and fully integrating water management into rural development planning processes are practical, real-time actions that can drive sustainable, resilient, and inclusive rural water management in Nsit Ubium and similar rural communities.

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