# Scarcity Of Quality Water Supply as a Facility Management Challenge in Primary Health Care Centres in Nigeria: A Case Study of Anambra State

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***Abstract-*** ***This study evaluated scarcity of quality water supply as a facility management challenge in Primary Healthcare Centres in Nigeria: A Case Study of Anambra State. The study aimed to assess the extent of quality water scarcity in Primary Healthcare Centers (PHCs) in Anambra State, identify its causes, evaluate its effects on facility management, and propose improvement strategies. Using a descriptive research design, the study targeted 164 staff members from selected PHCs, with a sample size of 116 determined by the Taro Yamane formula. A multi-stage sampling technique combining stratified and convenience sampling was employed, and data were collected through structured questionnaires. Data analysis utilized descriptive statistics, focusing on mean scores and frequencies. Results showed significant scarcity of quality water, mainly due to inadequate government funding, poor infrastructure, erratic electricity, poor maintenance, limited local government support, and corruption, with all related items scoring means above the 2.50 cutoff. Water scarcity severely affected facility management, including infection control (mean = 3.93), service delivery efficiency (mean = 3.84), patient attendance (mean = 3.77), staff morale (mean = 3.65), operational costs (mean = 3.65), and infrastructure integrity (mean = 3.60). Recommended strategies include that the government should increase budgetary allocations for water infrastructure, healthcare facilities should adopt solar-powered boreholes, facility managers should implement regular maintenance schedules, and public-private partnerships with community involvement should be promoted to ensure sustainable water supply. The study concludes that a multi-faceted and coordinated approach involving funding, technology, governance, and local engagement is critical to resolving water scarcity challenges and enhancing healthcare delivery in PHCs across Anambra State.***

***Indexed Terms-*** ***Evaluation, Scarcity, Quality Water Supply, Facility Management, Challenge, Primary Healthcare Centers***

## I. INTRODUCTION

Background of the Study

Access to clean and safe water remains an essential foundation for human survival, health, and sustainable development. Globally, water is not only fundamental to hydration and sanitation but is deeply embedded in the socio-economic development of communities (Awuah & Bijimi, 2023; Fayomi et al., 2025). The availability of potable water directly contributes to education, livelihoods, and health, reinforcing the reality that water is life. According to Khanna et al. (2021), access to quality water is a recognized human right and a central component of public health. Numerous international frameworks, including the Sustainable Development Goals (SDGs), especially Goal 6, emphasize the necessity of clean water and sanitation for all by 2030 (Gbadegesin & Olayide, 2021; Fatunmibi, 2024). The intersection of water with public welfare is further amplified by its role in the prevention of water-borne diseases and the promotion of hygiene across all human settlements (Jesuyajolu et al., 2022; Abubakar, 2021). In the African context, particularly in countries like Nigeria, ensuring universal access to quality water is not only a public good but a vital necessity.

Within the realm of public health systems, the presence of quality water is indispensable to the functionality of medical facilities. Water plays a

crucial role in the delivery of health services, as it facilitates cleanliness, disinfection, surgical procedures, laboratory testing, patient care, and sanitation (Christian et al., 2024; Azeez et al., 2023). The World Health Organization (WHO) emphasizes that without access to clean water, health care institutions cannot maintain standard hygiene or control infections (Lateef & Mhlongo, 2021a). Moreover, water serves as an operational lifeline for sterilizing medical equipment, providing maternity care, and supporting daily facility operations (Daramola et al., 2023; Amadi et al., 2020). Croke and Ogbuoji (2023) further highlight that the absence of reliable water services can diminish the quality of health outcomes, particularly in maternal and child health services. Therefore, water is not merely an infrastructural need; it is a clinical imperative in ensuring that hospitals and clinics can meet the medical demands of their populations.

Building on this foundation, the absence or inadequacy of safe water supply introduces serious operational hindrances to the health care delivery system. Medical practitioners and facility managers often struggle to maintain infection control protocols, ensure adequate sanitation, or support emergency procedures without consistent water access (Ogundeji et al., 2023; Nwobodo & Chukwu, 2020). This challenge becomes even more severe in primary health care centres (PHCs), which are typically the first point of contact for millions of Nigerians seeking health interventions (Ogunyemi et al., 2024; Fayomi et al., 2025). According to Bishoge (2021) and Omoleke et al. (2021), the delivery of quality care is intricately linked to environmental hygiene, yet PHCs in water-stressed environments often lack the capacity to enforce basic sanitary conditions. Egbueri et al. (2024) observe that these deficiencies do not only affect clinical outcomes but also the morale and efficiency of health personnel tasked with delivering essential services. Consequently, water scarcity compromises both the structure and function of health institutions.

This growing concern also affects the governance and administration of health facilities, particularly in rural and peri-urban communities. Facility management in the health sector includes ensuring that physical and operational infrastructure supports effective service delivery (Balogun et al., 2021; Oyerinde & Jacobs, 2022). However, when water becomes unreliable or inaccessible, facility managers face the dual burden of improvisation and resource strain. Odjegba et al. (2021) assert that facility managers are often forced to divert limited budgets toward temporary water solutions, such as tanker services or borehole repairs, which may not be sustainable in the long term. This systemic challenge may lead to disjointed service delivery, increased operating costs, and elevated health risks (Nwakamma et al., 2024; Auwal et al., 2021). Furthermore, the stress associated with unreliable water supply often leads to the deterioration of facility morale, inefficiencies in emergency response, and loss of public trust.

Recognizing the broader implications of this issue, the integration of water supply considerations into the planning and operational structure of health care is paramount. A strategic response that aligns health facility development with water infrastructure planning is necessary to support resilience and sustainability (Lateef & Mhlongo, 2021b; Ogbonna et al., 2024). There is a growing body of research supporting the need for intersectoral collaboration between the health sector, water authorities, and local governments to ensure uninterrupted water supply to PHCs (Oyebode & Coker, 2021). The availability of adequate water resources not only enhances patient care but also promotes staff retention, improves public health indicators, and aligns with Nigeria's broader developmental goals.

Statement of the Problem

Despite the increasing recognition of water as a fundamental component of health care delivery, many primary health care centres (PHCs) in Nigeria, particularly in Anambra State, continue to operate under dire water-scarce conditions. Quality water supply is indispensable in the prevention of healthcare-associated infections, maintenance of sanitation, and the facilitation of medical procedures (Awuah & Bijimi, 2023; Daramola et al., 2023). However, several PHCs in rural and peri-urban areas are confronted with intermittent, inadequate, or entirely absent sources of safe water. This operational deficit not only undermines service delivery but threatens patient safety and the broader goals of

universal health coverage (Khanna et al., 2021; Abubakar, 2021).

In the context of Anambra State, this situation is particularly concerning. The state, with its rich cultural heritage and bustling commercial hubs, is also home to remote rural areas where access to piped water is minimal or non-existent (Egbueri et al., 2024; Onoh et al., 2022). Preliminary reports indicate that many PHCs in such areas rely on distant water sources or local streams, thereby exposing users to preventable infections and reducing operational efficiency (Isukuru et al., 2024; van der Heijden et al., 2022). The lack of a standardized water management framework within the state's health sector further exacerbates the problem, leaving facility managers with little guidance on resource allocation or intervention prioritization.

Aim of the Study

The main aim of this study is to evaluate scarcity of quality water supply as a facility management challenge in primary health care centres in Nigeria: a case study of Anambra State

Objectives of the study

1. Determine the extent of quality water scarcity encountered among Primary Healthcare Centers in Anambra State.
2. Identify the causes of quality water supply scarcity in Primary Healthcare Centers in Anambra State
3. Evaluate the extent scarcity quality water supply affects facility management in Primary Healthcare Centers in Anambra State.
4. Proffer strategies for improving quality water supply in Primary Healthcare Centers in Anambra State

Research Questions

This study was guided by the following questions:

1. What is the extent of quality water scarcity encountered among Primary Healthcare Centers in Anambra State?
2. What are the causes of quality water supply scarcity in Primary Healthcare Centers in Anambra State?
3. To what extent does scarcity of quality water supply affect facility management in Primary Healthcare Centers in Anambra State?
4. What are the strategies for improving quality water supply in Primary Healthcare Centers in Anambra State?

Research Hypotheses

The research hypothesis are:-

Null Hypotheses Ho: Persistent water supply inadequacies in Primary Health Care Centers does not have profound implications for maternal and child health services.

Alternate Hypotheses $H_A$: Persistent water supply inadequacies in Primary Health Care Centers have profound implications for maternal and child health services.

Significance of the Study

This study will contribute meaningfully to the improvement of healthcare delivery systems by exposing how essential water supply is to the management of primary health care centres. Findings will guide government health agencies in understanding the depth of water scarcity within the context of PHC operations, particularly in relation to hygiene practices and patient care delivery. This will enable the formulation of more effective health policies that prioritize infrastructural support for basic utilities like water.

Healthcare facility managers will benefit from the study as it will highlight practical gaps in facility maintenance and resource management. The outcome will equip them with empirical data necessary to advocate for better utility infrastructure and to adopt more efficient water supply management systems within their respective health institutions.

Public health professionals will gain a broader perspective on how infrastructural deficits, particularly water scarcity, influence health outcomes. The research will enrich their approach to community-based interventions and sanitation campaigns by emphasizing the operational link between water availability and quality health service delivery.

Policy makers and legislators at both state and federal levels will be informed about the strategic need to include water supply systems in the planning and execution of healthcare projects. The findings will assist in strengthening budgetary allocations, developing policies for integrated facility development, and promoting accountability in infrastructural maintenance.

Community stakeholders, especially those in Anambra State, will be better positioned to engage health authorities on issues concerning water provision in local clinics. The awareness created by this study will encourage community participation in advocating for better infrastructure and in supporting local development initiatives aimed at improving healthcare environments.

Researchers and academic scholars will find this study a useful addition to existing literature on facility management and health care system challenges in Nigeria. It will serve as a reference for future studies, particularly those focused on environmental determinants of health and infrastructure-related service delivery in low-resource settings.

## II. LITERATURE REVIEW

Causes of Quality water Supply scarcity in Primary Healthcare Centers in Nigeria

The scarcity of quality water supply in Primary Healthcare Centers (PHCs) in Nigeria is a multifaceted issue rooted in systemic, infrastructural, and socio-economic challenges. According to Abubakar (2021), the lack of reliable water infrastructure in many PHCs is a direct consequence of inadequate government funding and poor maintenance of existing facilities. Many healthcare centers rely on outdated or non-functional boreholes, which often fail to meet the water demands of both medical staff and patients. Adeniran et al. (2021) further highlight that the absence of sustainable water management policies exacerbates the problem, leaving PHCs dependent on irregular municipal supplies or unsafe alternative sources such as rivers and wells. This precarious situation is compounded by rapid urbanization, which strains already limited water resources and disproportionately affects rural and peri-urban healthcare facilities.

Another critical factor contributing to water scarcity in PHCs is the pervasive issue of poor governance and institutional inefficiencies. Amadi et al. (2020) argue that weak regulatory frameworks and fragmented responsibilities among government agencies lead to mismanagement of water resources. For instance, while the federal government may allocate funds for water projects, delays in disbursement and corruption often hinder implementation at the local level (Auwal et al., 2021). Additionally, the lack of coordination between the Ministry of Health and water authorities' results in disjointed efforts to address water supply challenges in healthcare settings. Balogun et al. (2021) emphasize that political instability and frequent changes in administrative leadership further disrupt long-term planning, leaving PHCs without sustainable water solutions.

Geographical and environmental factors also play a significant role in the water scarcity crisis faced by PHCs. In regions prone to drought or seasonal rainfall variations, water availability fluctuates drastically, making consistent supply difficult (Bishoge, 2021). Egbueri et al. (2024) note that groundwater contamination due to industrial pollution and poor sanitation practices further reduces the availability of safe water for medical use. In some cases, PHCs are forced to operate without functional water treatment systems, exposing patients and healthcare workers to waterborne diseases (Christian et al., 2024). The situation is particularly dire in conflict-affected areas, where damaged infrastructure and population displacement exacerbate water shortages.

Economic constraints further limit the capacity of PHCs to secure quality water supplies. Many healthcare centers operate on insufficient budgets, leaving little room for investment in water infrastructure (Daramola et al., 2023). Jesuyajolu et al. (2022) observe that the high cost of drilling boreholes or installing water treatment plants often exceeds the financial capacity of local health authorities. Consequently, PHCs resort to purchasing water from vendors, which is not only expensive but

also of questionable quality (Khanna et al., 2021). The reliance on external water sources introduces logistical challenges, particularly in remote areas where transportation costs are prohibitive.

Technological and operational deficiencies further aggravate water scarcity in PHCs. Many facilities lack the technical expertise to maintain water systems, leading to frequent breakdowns and prolonged downtime (Nwakamma et al., 2024). Ogunyemi et al. (2024) point out that the absence of trained personnel to manage water treatment and distribution systems results in inefficient use of available resources. Additionally, power outages disrupt water pumping operations, forcing PHCs to rely on generators, which are costly and unreliable (Oyebode & Coker, 2021). The cumulative effect of these challenges is a persistent gap between the water needs of PHCs and the available supply, undermining the quality of healthcare delivery.

Socio-cultural factors also influence water accessibility in PHCs. In some communities, traditional beliefs and practices discourage the use of modern water sources, leading to underutilization of installed facilities (Omoleke et al., 2021). Furthermore, gender dynamics often dictate water collection responsibilities, placing an additional burden on female healthcare workers who must secure water for clinical operations (Onoh et al., 2022). The lack of community engagement in water management initiatives further diminishes the sustainability of interventions, as local stakeholders are excluded from decision-making processes (Raji, 2023). Without addressing these underlying socio-cultural barriers, efforts to improve water supply in PHCs will remain incomplete.

Implications of scarcity of quality water supply on facility management of Primary Healthcare Centers

The scarcity of quality water supply in Primary Healthcare Centers (PHCs) poses significant challenges to facility management, with far-reaching implications for service delivery, infection control, and overall operational efficiency. According to Abubakar (2021), water is a critical determinant of healthcare quality, and its inadequacy compromises the ability of PHCs to meet basic hygiene standards. In settings where water supply is unreliable, facility managers face increased difficulties in maintaining sanitation protocols, which are essential for preventing healthcare-associated infections (Adejumo et al., 2023). The absence of clean water disrupts routine cleaning of medical equipment, floors, and patient care areas, thereby elevating the risk of pathogen transmission (Adeniran et al., 2021). This situation is further exacerbated in resource-constrained environments where alternative water sources may be contaminated, as noted by Amadi et al. (2020), leading to a higher prevalence of waterborne diseases among both patients and healthcare workers.

The operational functionality of PHCs is also severely impacted by water scarcity, as it limits the capacity to perform essential medical procedures. Auwal et al. (2021) emphasize that surgical and obstetric services, which require sterile conditions, become untenable without consistent access to clean water. Sterilization of instruments, handwashing, and wound care are compromised, undermining patient safety and clinical outcomes (Awuah & Bijimi, 2023). Furthermore, Azeez et al. (2023) highlight that water shortages force healthcare workers to ration available supplies, often prioritizing critical cases over routine hygiene practices, which can inadvertently propagate cross-contamination. Facility managers must navigate these logistical constraints while attempting to uphold minimal service standards, a challenge that Balogun et al. (2021) argue is often overlooked in healthcare policy discussions.

Infrastructure maintenance is another critical area affected by inadequate water supply, as the lack of water accelerates the deterioration of PHC facilities. Bishoge (2021) notes that plumbing systems, sanitation fixtures, and wastewater disposal mechanisms are prone to dysfunction when water flow is inconsistent. Christian et al. (2024) further explain that stagnant water in pipes due to irregular supply can foster bacterial growth, leading to biofilms that contaminate the entire water distribution system within the facility. This not only increases maintenance costs but also poses long-term risks to structural integrity (Croke & Ogbuoji, 2023). Daramola et al. (2023) add that frequent repairs and

replacements of water-dependent infrastructure divert limited financial resources away from other critical healthcare needs, creating a cycle of underinvestment and inefficiency.

The psychological and organizational burden on healthcare staff in water-scarce PHCs cannot be understated. Egbueri et al. (2024) observe that healthcare workers in such settings experience heightened stress due to the additional labor required to secure and manage water supplies. Ekenna et al. (2020) report that staff often resort to fetching water from external sources, which consumes time that could otherwise be dedicated to patient care. This strain contributes to burnout and reduced morale, ultimately affecting workforce retention and productivity (Ezeudu et al., 2022). Fatunmibi (2024) underscores that facility managers must address these human resource challenges while simultaneously ensuring that water scarcity does not erode the quality of care provided.

Patient satisfaction and trust in PHCs are also eroded when water scarcity leads to visibly poor hygiene conditions. Fayomi et al. (2025) argue that the perception of unclean facilities discourages community utilization of healthcare services, particularly in rural areas where alternative options may be limited. Gbadegesin & Olayide (2021) further note that repeated encounters with water-related service disruptions diminish public confidence in the healthcare system, exacerbating health disparities. Isukuru et al. (2024) posit that this loss of trust has long-term implications for healthcare-seeking behavior, as communities may delay or avoid treatment due to negative experiences.

Additionally, the broader public health implications of water scarcity in PHCs extend beyond the immediate facility environment. Jesuyajolu et al. (2022) warn that inadequate water supply in healthcare settings can amplify community-wide disease outbreaks, particularly in regions where PHCs serve as primary points of diagnosis and treatment. Khanna et al. (2021) link this to the inability of PHCs to implement effective infection prevention and control measures, which are contingent on reliable water access. Lateef & Mhlongo (2021a) stress that without systemic interventions, the compounding effects of water scarcity will continue to undermine the effectiveness of primary healthcare delivery, perpetuating cycles of poor health outcomes.

Strategies for improving quality water supply in Primary Healthcare Centers

Ensuring a reliable and high-quality water supply in Primary Healthcare Centers (PHCs) is a critical determinant of effective healthcare delivery, particularly in resource-constrained settings. According to Abubakar (2021), the absence of clean water in PHCs compromises basic hygiene practices, increasing the risk of healthcare-associated infections. This challenge is further exacerbated in rural and peri-urban areas where infrastructure deficits are prevalent, as noted by Adejumo et al. (2023). One key strategy involves the implementation of sustainable water infrastructure, including boreholes and rainwater harvesting systems, which can mitigate dependence on erratic municipal supplies. Adeniran et al. (2021) emphasize that such interventions must be complemented by routine maintenance protocols to prevent system failures, a factor often overlooked in low-resource contexts.

Another essential approach is the integration of water quality monitoring systems within PHCs to ensure compliance with safety standards. Amadi et al. (2020) argue that regular microbial and chemical testing of water sources is non-negotiable for safeguarding patient and staff health. This is particularly critical in regions where groundwater contamination from industrial or agricultural runoff is prevalent, as highlighted by Auwal et al. (2021). Furthermore, Awuah & Bijimi (2023) suggest that PHCs should adopt point-of-use water treatment technologies, such as chlorination or filtration systems, to address immediate contamination risks. These measures, however, require consistent funding and technical capacity, which remain significant barriers in many settings.

Capacity building for healthcare staff and facility managers is equally vital in sustaining water quality improvements. Balogun et al. (2021) stress that training programs on water safety planning and basic maintenance can empower local personnel to address

minor operational challenges proactively. This aligns with the findings of Bishoge (2021), who underscores the role of community engagement in fostering accountability for water resource management. For instance, involving local stakeholders in monitoring and reporting water supply issues can enhance responsiveness, as demonstrated in studies by Christian et al. (2024). Additionally, Croke & Ogbuoji (2023) advocate for the inclusion of water management modules in continuing education for healthcare workers to reinforce best practices.

Policy and governance frameworks also play a pivotal role in ensuring sustainable water supply in PHCs. Daramola et al. (2023) note that weak regulatory oversight often results in inequitable resource distribution, leaving rural PHCs disproportionately underserved. Strengthening intersectoral collaboration between health, water, and environmental agencies is crucial, as proposed by Egbueri et al. (2024). Ekenna et al. (2020) further recommend that governments prioritize PHCs in national water security agendas, backed by enforceable legislation and budgetary allocations. Such systemic reforms are necessary to address the structural inefficiencies identified by Ezeudu et al. (2022), particularly in regions where PHCs operate without reliable water access.

Innovative financing mechanisms can also bridge gaps in water infrastructure investment. Fatunmibi (2024) highlights the potential of public-private partnerships to mobilize resources for PHC water projects, particularly in urbanizing areas. Similarly, Fayomi et al. (2025) propose micro-financing models to support community-led water initiatives, which can be tailored to local economic conditions. However, Gbadegesin & Olayide (2021) caution that such models must be accompanied by robust oversight to prevent exploitation or mismanagement. The role of international donors and multilateral agencies in funding large-scale water interventions cannot be overlooked, as evidenced by Isukuru et al. (2024), though sustainability remains a concern when external support wanes.

Finally, leveraging technology for real-time water supply monitoring can enhance efficiency and accountability. Jesuyajolu et al. (2022) discuss the potential of sensor-based systems to detect leaks or contamination promptly, reducing downtime and health risks. This aligns with Khanna et al. (2021), who advocate for smart water management systems in PHCs to optimize resource use. Lateef & Mhlongo (2021a) further emphasize the need for adaptive technologies that account for local environmental conditions, such as salinity or heavy metal presence. These innovations, however, require substantial upfront investment and technical support, as noted by Lateef & Mhlongo (2021b), underscoring the importance of phased implementation strategies.

The integration of climate resilience into water supply planning is another critical consideration. Livingston (2021) warns that climate-induced water scarcity poses a growing threat to PHCs, particularly in arid and semi-arid regions. Nwakamma et al. (2024) recommend diversifying water sources, such as incorporating solar-powered desalination units, to mitigate climate risks. Similarly, Nwobodo & Chukwu (2020) stress the importance of disaster preparedness plans to ensure uninterrupted water access during extreme weather events. These measures are essential to safeguarding PHC operations against environmental shocks.

Community participation remains a cornerstone of sustainable water supply strategies. Ogbonna et al. (2024) argue that PHCs must collaborate with local leaders and civil society groups to foster collective ownership of water projects. Ogundeji et al. (2023) further suggest that community-based water committees can play a pivotal role in maintaining infrastructure and enforcing usage guidelines. This participatory approach aligns with the principles of decentralized governance advocated by Ogunyemi et al. (2024), though its success depends on cultural sensitivity and inclusivity.

Research and data-driven decision-making are equally vital for optimizing water supply interventions. Onoh et al. (2022) emphasize the need for localized studies to identify context-specific challenges and solutions. O.O. et al. (2024) further highlight the role of geospatial mapping in identifying PHCs with the greatest water access deficits, enabling targeted interventions. Such

evidence-based approaches are critical for maximizing the impact of limited resources.

The role of behavioral interventions in promoting water conservation and hygiene cannot be understated. Oyerinde & Jacobs (2022) demonstrate that staff and patient education campaigns can significantly reduce water wastage and contamination risks. Raji (2023) adds that such initiatives must be culturally adapted to ensure community buy-in, particularly in regions with entrenched practices. Uzuegbu et al. (2024) further advocate for the use of multimedia tools to disseminate hygiene education, leveraging local languages and relatable messaging. These efforts, combined with infrastructural improvements, can create a holistic framework for sustainable water access, as posited.

## III. METHODOLOGY

### Research Design

The descriptive research design was employed in this study. This design was used because it involves observing and describing the behaviour of the participants without influencing it in any way (Jongbo, 2018), which is useful for the study.

### Research Setting

The research was conducted in Primary Healthcare Centres (PHCs) located across Anambra State, Nigeria. Anambra State, situated in the southeastern region of Nigeria, comprises 21 local government areas with a diverse population that relies heavily on PHCs for basic health services, especially in rural and semi-urban communities. These PHCs serve as the first point of contact for primary healthcare delivery, providing essential services such as maternal and child health, immunization, disease prevention, and basic treatment. Given their critical role in the healthcare system, the availability and quality of essential resources, particularly water supply, directly impact the effectiveness of these centers. The state experiences infrastructural and resource challenges, including inconsistent water supply, which affects sanitation, infection control, and overall facility management within the PHCs. This research setting was chosen to provide an in-depth understanding of how water scarcity influences healthcare service delivery and facility management challenges in a typical Nigerian state with known resource constraints, making it a representative case for similar contexts across the country.

### Target Population

The target population for this study were staff of some selected primary health care centres in Anambra State. According to the most recent demographic data from some selected primary health care centres in Anambra State records, there are an estimated 164 staff of some selected primary health care centres in Anambra State. This population size was used to determine the sample size of the study.

### Sample Size

In this study, the researcher adopted the Taro Yamane (1967) formula for determining the actual sample size from the above noted population. Taro Yamane (1967) provides a simplified formula to calculate sample sizes

*Assumption:*
95% confidence level
P = .5

$$n = \frac{N}{1 + N(e)^2}$$

n = sample
N = population
e = error margin
n = sample
n=164/1+164(0.05)2
n=164/1+164(0.0025)
n=164/1.41
n= 116

Therefore, the sample size of this study was 116 participants.

### Sampling Technique

The sample size of the study was 116 staff of some selected primary health care centres in Anambra State, derived using Taro Yamane (1967) formula. Stratified sampling technique was adopted. The knowledge status of the staff served as the strata, while convenience sampling technique was used to select the individual respondents. This was done to

avoid bias in the distribution of the questionnaire to the respondents. The respondents were chosen based on criterias such as their willingness to participate.

Instruments for Data Collection

The research instrument used in this study is the questionnaire. A survey containing series of questions were administered to the enrolled participants. The questionnaire was divided into two sections, the first section enquired about the responses demographic or personal data while the second sections were in line with the study objectives, aimed at providing answers to the research questions. The questionnaire was a close-ended questionnaire. Participants were required to respond by placing a tick at the appropriate column.

Method of Data Collection

Data collection involved selected respondents who were briefed on the process. The researcher with the assistance of 20 trained research assistants, distributed a total of 116 questionnaires to the respondents. The data collection exercise was done in a conducive premises and ensured ease of distribution and collection. This approach aimed to facilitate an efficient and organized process.

Method of Data Analysis

The collected data was analyzed using both descriptive and inferential statistical techniques. Descriptive statistics, such as frequencies, and percentages in the 5 point likert scale format - Strongly Agree, Agree, Undecided, Disagree and Strongly Disagree, was used to summarize and present the demographic characteristics of the respondents and their opinions. The data was analyzed using statistical software such as SPSS (Statistical Package for the Social Sciences). The results was then presented in tables, charts, and graphs for easy interpretation

## IV. METHOD OF DATA ANALYSIS

The data analysis depicts the simple frequency and percentage of the respondents as well as interpretation of the information gathered.

DEMOGRAPHIC ANALYSIS

Table: Demographic Profile of the Respondents

| Demographic Variable | Categories | Frequency (f) | Percentage (%) |
|---|---|---|---|
| Gender | Male | 42 | 36.2% |
| | Female | 74 | 63.8% |
| Age | 18–25 years | 15 | 12.9% |
| | 26–35 years | 37 | 31.9% |
| | 36–45 years | 41 | 35.3% |
| | 46 years and above | 23 | 19.9% |
| Educational Qualification | SSCE | 10 | 8.6% |
| | OND/NCE | 28 | 24.1% |
| | HND/Bachelor's Degree | 56 | 48.3% |
| | Master's and above | 22 | 19.0% |
| Years of Work Experience | Less than 5 years | 20 | 17.2% |
| | 5–10 years | 47 | 40.5% |
| | 11–15 years | 29 | 25.0% |
| | Above 15 years | 20 | 17.2% |

Source: Field Survey, 2025

The demographic profile of the 116 respondents revealed that the majority were female (63.8%), indicating a female-dominated workforce in the primary healthcare sector in Anambra State. The largest age group was 36–45 years (35.3%), suggesting a mature and experienced population. Most respondents (48.3%) held HND or bachelor's degrees, reflecting a relatively high educational attainment among staff. In terms of work experience, the highest proportion (40.5%) had 5–10 years of service, showing a moderately experienced workforce capable of providing informed responses on facility challenges, including water scarcity.

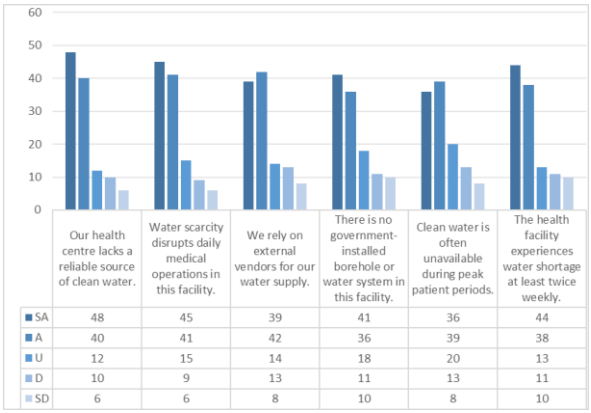
ANALYSIS OF RESEARCH QUESTION

Research Question 1: What is the extent of quality water scarcity encountered among Primary Healthcare Centers in Anambra State?

Table: Respondents' View on the Extent of Quality Water Scarcity in PHCs in Anambra State

| S/N | Statement | SA | A | U | D | SD | Mean |
|---|---|---|---|---|---|---|---|
| 1 | Our health centre lacks a reliable source of clean water. | 48 | 40 | 12 | 10 | 6 | 3.92 |
| 2 | Water scarcity disrupts daily medical operations in this facility. | 45 | 41 | 15 | 9 | 6 | 3.89 |
| 3 | We rely on external vendors for our water supply. | 39 | 42 | 14 | 13 | 8 | 3.70 |
| 4 | There is no government-installed borehole or water system in this facility. | 41 | 36 | 18 | 11 | 10 | 3.66 |
| 5 | Clean water is often unavailable during peak patient periods. | 36 | 39 | 20 | 13 | 8 | 3.64 |
| 6 | The health facility experiences water shortage at least twice weekly. | 44 | 38 | 13 | 11 | 10 | 3.78 |

Source: Field Survey, 2025




The analysis reveals that respondents widely agree that there is a significant scarcity of quality water supply across Primary Healthcare Centers in Anambra State. Statement 1, with a mean of 3.92, shows strong agreement that most PHCs lack a reliable source of clean water, while Statement 2 (mean = 3.89) highlights the disruptive effect of this scarcity on daily medical operations. In Statement 3, respondents confirmed dependency on external vendors for water supply, with a mean of 3.70, suggesting that self-sufficiency in water sourcing is uncommon. Statement 4 had a mean of 3.66, indicating that many facilities do not have government-installed water infrastructure like boreholes. The unavailability of clean water during high patient inflow was also confirmed in Statement 5 (mean = 3.64), while Statement 6 (mean = 3.78) showed that water shortages occur frequently, at least twice per week. All mean scores are above the cutoff point of 2.50, confirming that the extent of water scarcity in PHCs across Anambra State is high and a persistent operational challenge.

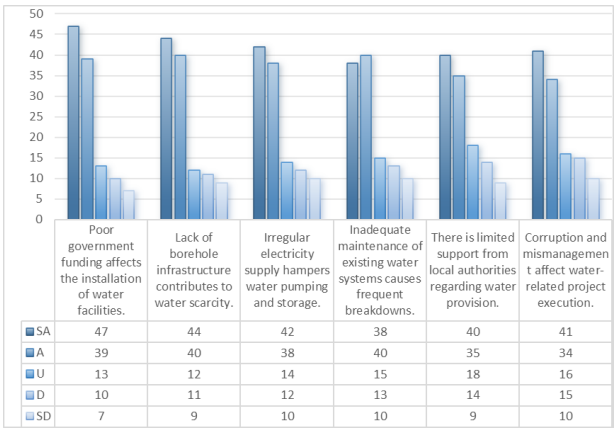
Research Question 2: What are the causes of quality water supply scarcity in Primary Healthcare Centers in Anambra State?

Table : Respondents' View on the Causes of Quality Water Scarcity in PHCs in Anambra State

| S/N | Statement | SA | A | U | D | SD | Mean |
|---|---|---|---|---|---|---|---|
| 1 | Poor government funding affects the | 47 | 39 | 13 | 10 | 7 | 3.88 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | installation of water facilities. | | | | | | |
| 2 | Lack of borehole infrastructure contributes to water scarcity. | 44 | 40 | 12 | 11 | 9 | 3.79 |
| 3 | Irregular electricity supply hampers water pumping and storage. | 42 | 38 | 14 | 12 | 10 | 3.70 |
| 4 | Inadequate maintenance of existing water systems causes frequent breakdowns. | 38 | 40 | 15 | 13 | 10 | 3.64 |
| 5 | There is limited support from local authorities regarding water provision. | 40 | 35 | 18 | 14 | 9 | 3.62 |
| 6 | Corruption and mismanagement affect water-related project execution. | 41 | 34 | 16 | 15 | 10 | 3.60 |

Source: Field Survey, 2025



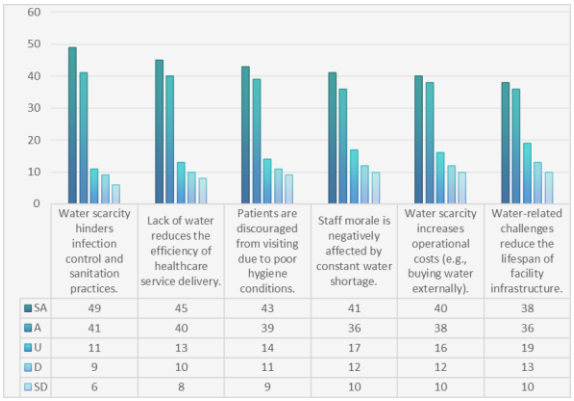

The analysis of the causes of water scarcity in Primary Healthcare Centers in Anambra State reveals multiple interrelated challenges. Statement 1 has the highest mean score of 3.88, indicating a strong consensus that poor government funding is a major hindrance to installing necessary water facilities. Statement 2 follows with a mean of 3.79, confirming that the absence of borehole infrastructure is a direct contributor to persistent water shortages. Respondents also agreed, with a mean of 3.70 in Statement 3, that irregular electricity supply impedes the pumping and storage of water, especially in areas reliant on electric-powered systems. Statement 4, with a mean of 3.64, points to the poor maintenance culture of existing water systems, leading to recurrent breakdowns. Limited local government support (mean = 3.62) and the influence of corruption and mismanagement in water-related projects (mean = 3.60) further underscore systemic weaknesses. All the items recorded means above the cutoff point of 2.50, highlighting that water scarcity in PHCs is driven by infrastructural inadequacy, poor governance, and institutional neglect.

Research Question 3: To what extent does scarcity of quality water supply affect facility management in Primary Healthcare Centers in Anambra State?

Table: Respondents' View on the Effects of Water Scarcity on Facility Management in PHCs in Anambra State

| S/N | Statement | SA | A | U | D | SD | Mean |
|---|---|---|---|---|---|---|---|
| 1 | Water scarcity hinders infection control and sanitation practices. | 49 | 41 | 11 | 9 | 6 | 3.93 |
| 2 | Lack of water reduces the efficiency of healthcare service delivery. | 45 | 40 | 13 | 10 | 8 | 3.84 |
| 3 | Patients are discouraged from visiting due to poor hygiene conditions. | 43 | 39 | 14 | 11 | 9 | 3.77 |
| 4 | Staff morale is negatively affected by constant water shortage. | 41 | 36 | 17 | 12 | 10 | 3.65 |
| 5 | Water scarcity increases operational costs (e.g., buying water externally). | 40 | 38 | 16 | 12 | 10 | 3.65 |
| 6 | Water-related challenges reduce the lifespan of facility infrastructure. | 38 | 36 | 19 | 13 | 10 | 3.60 |

Source: Field Survey, 2025



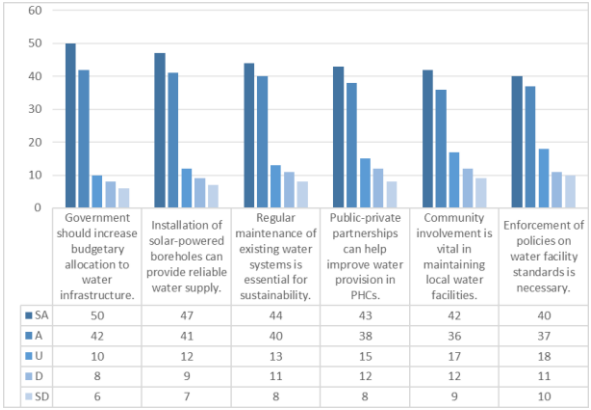

The findings indicate that the scarcity of quality water supply has a substantial negative impact on facility management within Primary Healthcare Centers in Anambra State. Statement 1 recorded the highest mean of 3.93, strongly suggesting that water scarcity significantly undermines infection control and sanitation standards, which are critical for patient safety and overall health outcomes. Statement 2 had a mean of 3.84, confirming that healthcare service delivery efficiency is diminished when water is unavailable. Statement 3 (mean = 3.77) shows that poor hygiene conditions caused by water shortages discourage patient visits, affecting the utilization of healthcare services. In Statements 4 and 5, both with means of 3.65, respondents indicated that the morale of healthcare workers is negatively impacted and that operational costs are increased due to the need to source water externally. Lastly, Statement 6 (mean = 3.60) reveals that ongoing water-related issues contribute to the deterioration of facility infrastructure. Since all mean scores are above the cutoff of 2.50, it can be concluded that water scarcity severely affects various aspects of facility management, including staff productivity, service delivery, cost-efficiency, infrastructure sustainability, and patient satisfaction.

Research Question 4: What are the strategies for improving quality water supply in Primary Healthcare Centers in Anambra State?

Table: Respondents' View on Strategies for Improving Water Supply in PHCs in Anambra State

| S/N | Statement | SA | A | U | D | SD | Mean |
|---|---|---|---|---|---|---|---|
| 1 | Government should increase budgetary allocation to water infrastructure. | 50 | 42 | 10 | 8 | 6 | 3.97 |
| 2 | Installation of solar-powered boreholes can provide reliable water supply. | 47 | 41 | 12 | 9 | 7 | 3.87 |
| 3 | Regular maintenance of existing water systems is essential for sustainability. | 44 | 40 | 13 | 11 | 8 | 3.78 |
| 4 | Public-private partnerships can help improve water provision in PHCs. | 43 | 38 | 15 | 12 | 8 | 3.72 |
| 5 | Community involvement is vital in maintaining local water facilities. | 42 | 36 | 17 | 12 | 9 | 3.66 |
| 6 | Enforcement of policies on water facility standards is necessary. | 40 | 3 | 1 | 1 | 10 | 3.63 |
| | | | 7 | 8 | 1 | | |

Source: Field Survey, 2025




The analysis shows that respondents strongly support a variety of strategies to address water supply challenges in Primary Healthcare Centers across Anambra State. The highest mean of 3.97 in Statement 1 reflects a strong consensus that increased government budgetary allocation to water infrastructure is a fundamental solution. Similarly, Statement 2 (mean = 3.87) indicates strong support for the use of solar-powered boreholes as a reliable and sustainable water source, particularly in areas with unstable electricity. Regular maintenance of water systems was also recognized as essential, with Statement 3 having a mean of 3.78. Respondents acknowledged the importance of involving external stakeholders, as seen in Statement 4 (mean = 3.72), which advocates for public-private partnerships. Community involvement in the management and upkeep of water facilities (mean = 3.66) and the enforcement of strict water facility policies (mean = 3.63) were also agreed upon as necessary strategies. All six statements recorded means above the 2.50 threshold, indicating widespread agreement that a multi-pronged approach involving funding, technology, governance, and local participation is required to sustainably improve the quality and reliability of water supply in Primary Healthcare Centers in Anambra State.

## CONCLUSION

In conclusion, the scarcity of quality water supply in Primary Healthcare Centers in Anambra State represents a critical challenge that severely hampers effective facility management and healthcare delivery. The study has established that the extent of water scarcity is significant and largely due to inadequate infrastructure, insufficient funding, poor maintenance culture, and governance challenges. The adverse impacts on sanitation, infection control, operational costs, staff morale, and patient patronage underscore the urgent need for systematic interventions. The findings affirm that without immediate and sustained actions to address water supply issues, the quality of healthcare services in PHCs will continue to deteriorate, thereby affecting public health outcomes. Addressing these challenges requires a coordinated effort from government agencies, healthcare administrators, community stakeholders, and development partners to implement sustainable water supply solutions.

## RECOMMENDATIONS

- The government should increase budgetary allocations specifically targeted at the installation and maintenance of water infrastructure in Primary Healthcare Centers to ensure consistent access to quality water.
- Healthcare facilities should adopt alternative water supply technologies such as solar-powered boreholes to mitigate the impact of unreliable electricity and guarantee sustainable water sources.
- Facility managers should establish regular maintenance schedules and protocols for existing water systems to prevent breakdowns and ensure longevity of water infrastructure.

There should be active collaboration through public-private partnerships and community involvement to foster shared responsibility and efficient management of water resources within healthcare facilities

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