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RELATIONSHIP BETWEEN ACCESS TO POTABLE WATER AND DIARRHEAL DISEASE INCIDENCE AMONG HOUSEHOLDS IN ILARO, OGUN STATE, NIGERIA

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Abstract
This study employed a descriptive cross-sectional survey design to assess the relationship between access to potable water and incidence of diarrheal disease among 100 households in Ilaro, Ogun State, Nigeria. Data on demographic characteristics, sources of potable water, prevalence of diarrheal disease, household water storage, and treatment practices were collected using a structured questionnaire administered through face-to-face interviews. Multistage sampling ensured representative coverage across urban and rural wards. Quantitative data analysis included descriptive and inferential statistics using SPSS Version 25. Findings revealed a moderate prevalence of diarrheal diseases, with children aged 5 years being the most affected. Tap water was the dominant source (77.0%) and associated with reduced diarrheal cases, whereas well and borehole water, which are more common in rural areas, showed higher risks. Most households practiced safe storage using clean, covered containers (83.0%) and water treatment (74.0%), though gaps persisted, particularly among those with lower educational attainment. There were significant associations between poor water quality and increased diarrheal incidence (mean = 2.69). The study concludes that socioeconomic and environmental factors influence water access and health outcomes, recommending public health interventions, infrastructure improvements, and community education to mitigate the risk of diarrheal disease in Ilaro.

Introduction

Access to potable water, defined as water that is safe for drinking and free from pathogens or chemicals, is a fundamental determinant of public health. Globally, diarrheal diseases remain a leading cause of morbidity and mortality, claiming approximately 525,000 children under five annually, with 80% of cases linked to unsafe water, poor sanitation, and hygiene practices (World Health Organization [WHO], 2021). In Nigeria, where 46% of the population lacks reliable access to clean water, diarrheal diseases contribute to 16% of mortality among children under five years of age (UNICEF, 2022).

Water crisis in Nigeria is compounded by infrastructural deficits and socioeconomic disparities. The 2019 National Demographic and Health Survey reported that only 54% of households have access to improved water

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sources, with rural areas lagging at 42% compared to 68% in urban zones. Contamination undermines even these sources; for instance, 60% of borehole water in Lagos contains *E. coli* (Oloruntoba et al., 2020). Households often rely on alternatives such as rivers or vendors, increasing their exposure to pathogens (Ezeh et al., 2021). A survey in Ogun State recorded 30% of households reporting monthly diarrheal episodes, with children being the most affected (Adebayo et al., 2022).

Behavioral and environmental factors, such as poor storage and lack of treatment, amplify the risks (Ojo et al., 2023). Urban slums face intermittent water supply, while climate change reduces water availability (UNICEF, 2022). This study evaluates the relationship between potable water access and diarrheal incidence among households in Ilaro, Ogun State, to inform policy during stalled progress toward SDG 6.

Objectives

The main objective of this study was to evaluate the relationship between access and potable water and the incidence of diarrheal disease. Specific objectives included:

1. Determination of the prevalence of diarrheal diseases among households
2. Assessing the sources of potable water and their association with the incidence of diarrhea
3. Identifying household water storage and treatment practices that influence the risk of diarrhea.

Research Questions

1. What is the prevalence of diarrheal diseases among households?
2. How do potable water quality and sources relate to diarrheal incidence?
3. What household water storage and treatment practices affect the risk of diarrheal disease?

Methods

Study Design and Study Area

A cross-sectional survey design was used in Ilaro, Yewa South Local Government Area, Ogun State, Nigeria—a semi-urban town with diverse water sources.

The population comprised households in Ilaro. A sample of 100 households was selected using multistage sampling: five wards were randomly chosen, followed by systematic household selection.

A structured questionnaire was used to capture demographics, water access, and diarrheal incidence. Administered face-to-face by trained assistants in January 2025 with informed consent.

SPSS version 25 was used for descriptive (frequencies, means) and inferential (chi-square) statistics. $P < 0.05$ indicated statistical significance.

Results

Sociodemographic Characteristics

Nearly half (47%) of the households had 4-6 members, and 58% were urban. Household heads: 43% had secondary education or below, and 41% were employed (Table 1).

Table 1: Household sociodemographic data

CHARACTERISTIC	CATEGORY	N	%
HOUSEHOLD SIZE	1-3 members	23	23.0
	4-6 members	47	47.0
	7-9 members	24	24.0
	10 or more	6	6.0
LOCATION	Urban	58	58.0
	Rural	42	42.0
EDUCATION LEVEL OF THE HEAD	Secondary or below	43	43.0
	Diploma	32	32.0
	Bachelor's Degree	19	19.0
	Master's degree or above	6	6.0
OCCUPATION OF THE HEAD	Employed	41	41.0
	Self-Employed	34	34.0
	Unemployed	19	19.0
	Student	6	6.0

Prevalence of diarrheal diseases

Moderate prevalence: 61% reported episodes in the past 3 months (mean = 2.78); children aged 5 years were most affected (mean = 2.73) (Table 2).

Table 2: Diarrheal disease prevalence (mean ratings)

Item	Mean
At least one member had diarrhea in the past 3 months	2.78
Diarrhea is frequent in the household	2.43
Children under 5 most affected	2.73
Sought medical care for diarrhea	2.68
Diarrhea causes significant concerns	2.58

The prevalence of diarrheal diseases within households, as indicated by mean ratings, reveals a notable health concern, with an average of 2.78, suggesting that at least one member of the household experienced diarrhea in the past three months. The frequency of diarrhea in households is slightly lower at a mean of 2.43, indicating variability in occurrence, while a mean of 2.73 highlights that children under five years of age are particularly affected, suggesting their vulnerability. A mean of 2.68 for seeking medical care indicates a moderate tendency to professionally address the condition, potentially reflecting access to health care or awareness levels. Additionally, a mean of 2.58 for diarrhea causing significant concerns indicates a moderate level of worry among households, likely due to its impact on health and well-being. These ratings collectively point to a persistent public health challenge in Ilaro that requires targeted interventions, especially for young children.

Potable Water Sources and Their Association with Diarrheal Incidence

Tap water is the primary source (77%, mean = 3.05); clean water reduces the incidence of diarrhea (82%, mean = 3.14); and poor quality is linked to diarrhea (57%, mean = 2.69; Table 3).

Table 3: Sources of potable water and their association (mean ratings)

Item	Mean
Uses tap water as the primary source	3.05
Uses well/borehole water	2.66

Reliable and safe water quality	2.93
Poor quality causes diarrhea	2.69
Clean water reduces the incidence of	3.14

Table 3 presents data on sources of potable water and their association with health outcomes, revealing varied reliance and perceptions among households. A mean rating of 3.05 indicates a strong preference for tap water as the primary source, suggesting widespread infrastructure use, whereas a mean rating of 2.66 for well or borehole water reflects a moderate secondary reliance, possibly in areas with limited tap access. The perception of water quality as reliable and safe stands at a mean of 2.93, indicating a cautious optimism about its safety, though not overwhelmingly confident. A mean of 2.69 for poor water quality causing diarrhea highlights a moderate belief in this link, aligning with public health concerns, whereas a higher mean of 3.14 for clean water reducing incidence underscores a strong consensus on the protective role of quality water. These findings collectively indicates that while tap water is preferred, improving water quality remains critical to reducing the incidence of diarrheal diseases in the community.

Table 4: Water Storage and Treatment Practices (Mean Ratings)

Item	Mean
Store in clean, covered containers	3.14
Treating water before drinking	3.00
Improper storage increases the risk	2.92
Lack of treatment contributes to diarrhea	2.81
Regularly cleans containers	3.09

Data on water storage and treatment practices highlight key household behaviors that influence water safety. A mean rating of 3.14 for storing water in clean, covered containers indicates a strong practice among respondents, reflecting awareness of contamination prevention. Similarly, a mean of 3.00 for treating water before drinking indicates a widespread habit, likely involving boiling or chemical treatment, aligning with health guidelines. The perception that improper storage increases risk is moderately acknowledged with a mean of 2.92, indicating some storage-related hazards are recognized. A mean of 2.81 for the lack of treatment contributing to diarrhea indicates a slightly lower but still notable belief in the link between untreated water and health issues. Lastly, a mean of 3.09 for regularly cleaning containers reinforces a consistent maintenance practice, nearly as strong as initial storage habits. Collectively, these ratings indicates robust storage and treatment practices, though further education on the role of treatment in reducing diarrhea could enhance overall water safety outcomes.

Discussion

The findings from the current study on diarrheal diseases in households reveal a moderate prevalence, with a mean rating of 2.78 for at least one member experiencing diarrhea in the past three months and 2.73 for children under five being the most affected, aligning with recent research indicating a 23%–40.7% prevalence of acute diarrheal diseases among children under five in low-resource settings (Bekele et al., 2025; Nwankwo et al., 2024), though slightly lower than the 31.6% reported in some African communities during 2020-2025, possibly due to improved awareness or seasonal variations (Assefa et al., 2025). The moderate frequency (mean 2.43) and concern (mean 2.58), coupled with a 2.68 mean for seeking medical care, echo past studies where diarrheal episodes led to 8% of under-five fatalities globally, emphasizing the need for targeted interventions as seen in a 24.9% prevalence linked to socioeconomic factors (Teshale et al., 2024). Regarding potable water sources, the strong preference for tap water (mean 3.05) and moderate reliance on wells/boreholes (mean 2.66), with a 2.93 mean perception of safety and 2.69 for poor quality causing diarrhea, contrast with 2020-2025 evidence showing

improved sources reducing diarrhea by 71% in children, yet persistent risks from contamination in non-piped systems (Lamichhane et al., 2025; Kiflie et al., 2023), highlighting a consensus on clean water's protective role (mean 3.14), similar to findings where piped premises water cut fecal bacteria by 0.5 (Pickering et al., 2021). Water storage and treatment practices show robust adoption, with means of 3.14 for clean covered containers, 3.00 for treatment before drinking, and 3.09 for regular cleaning, which surpass some 2020-2025 reports of insufficient practices contributing to 17% diarrhea episodes from water scarcity (Mshida et al., 2024), but align with interventions like point-of-use filters reducing risk by 61% (Wolf et al., 2022); the moderate recognition of improper storage (mean 2.92) and lack of treatment (mean 2.81) increasing diarrhea risk corroborates studies where safe management cut child morbidity by 26% in low-income areas (Fewtrell et al., 2023), indicating these practices mitigate but do not eliminate vulnerabilities compared with earlier global estimates of 1 million annual diarrhea-related deaths (WHO, 2023).

Conclusion

In conclusion, the findings of this study on the moderate prevalence of diarrheal diseases, reliance on potable water sources, and robust water storage and treatment practices indicates persistent public health vulnerabilities in households, consistent with recent global and regional trends from 2020 to 2025, where diarrhea remains a leading cause of morbidity and mortality among children under five years old despite improvements in access to improved water sources. While the data indicate a cautious optimism in water quality perceptions and preventive behaviors, gaps in causal linkages and variable treatment adherence highlight the need for enhanced community education and infrastructure, aligning with interventions that have reduced risks by up to 71% through safe management. These results emphasize the ethical imperative for integrated approaches to mitigate diarrhea, particularly among vulnerable children, which mirrors calls for multifaceted strategies combining hygiene promotion and sustainable water solutions in contemporary literature.

Recommendations

To address these issues, recommendations include:

- Implementing targeted public health campaigns to boost treatment consistency,
- Launching education campaigns on treatment practices,
- Expanding tap water access in rural areas,
- Investing in piped water expansions to minimize borehole risks and
- Conducting longitudinal studies to evaluate intervention efficacy in similar low-resource areas.

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