

THE EFFECT OF IMPROVED WATER AND SANITATION ON HEALTH STATUS OF HOUSEHOLDS IN ZARIA LOCAL GOVERNMENT AREA, KADUNA STATE

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ABSTRACT

Water is a basic asset for man's wellbeing. Sanitation is one of the main dangers to public wellbeing in Nigeria because it is the fore most ignored sector. It is therefore important to understand the impacts of improved water supply and sanitation. To this end this research is thus aimed at investigating the effect of improved water supply and sanitation on health of populace in Zaria. This study analysed possible links between WASH variables such as, sources of water, faecal disposal facilities and known WASH related diseases that households are susceptible to. The study classifies source of water and faecal disposal facilities into improved/unproved water source/faecal disposal, and chi square test was performed to see if there is an effect on health. The result suggests that 74.5% of households with access to improved water sources reported suffering from one or more diseases. While this figure is lower than that for unimproved water sources, it is still high, suggesting that even improved water sources may not fully protect against disease transmission. 78.2% of respondents reported being affected by one disease or another in recent times. This high percentage indicates a significant burden of disease in the community, likely linked to poor sanitation, hygiene, and water quality. The unexpected results for improved toilet facilities warrant further investigation. Studies should assess the water quality at the point of use, other contributing factors, the functionality, accessibility, and usage patterns of improved toilets, as well as other contributing factors to disease prevalence.

Keywords: Water-Sanitation, wellbeing, Households, Diseases/Infections

INTRODUCTION

Water is a basic asset for man's wellbeing. It is required for a wide extend of purposes such as domestic, agrarian, economic activities and advancing good health (Douti *et al.*, 2023). In reality, deprived water quality and sanitation (personal and environmental) contribute much to worsening population health (Ezzati *et al.*, 2005). Over 10% of the world's populace lack access to adequate safe drinking water, with more than a third of the world's populace lacking access to improved sanitation facilities (Abanyie *et al.*, 2019). Be that as it may, colossal benefits are resulting from access to potable water in satisfactory amounts such as public health security, progressed school enrolment, heightened economic activities cannot be thought little of (Abanyie *et al.*, 2023)

Most expansive African cities are congested, due to urban attraction (Arimah, 2017). Small controlled urban development leads to destitute administration of strong and fluid squanders delivered by cities. This leads to numerous issues of sanitation. The sanitation in these cities is for the most part overwhelmed by self-refinement works. They regularly curb wastewater that streams down in living neighbourhood roads releasing solid foul odours (Strauss *et al.*, 2000). Besides, water meant for drinking is very often polluted because of drinking water linking with the sewage (Schwartzbrod, 1992).

Sanitation is one of the main dangers to public wellbeing in Nigeria because it is the most ignored sector (Ojelabi, 2020). With population estimation standing at 236,045,085 as of Friday, March 14, 2025, and midyear projection to be around 237,527,782 people (Worldometer, 2024). Nigeria faces challenges of access to potable drinking water, improved sanitation facilities, and tenable disposal of waste. It is disturbing that more than 40% of children beneath the age of five in Nigeria are undersized, whereas malnourishment due to deprived drinking water accounts for more than 50% of approximately 804,000 deaths recorded every year in Nigeria for the same age extend of children (Campbell, 2024) Beyond Nigeria, sanitation remains a worldwide worry, particularly in developing countries (Skolnik, 2015)

Sanitation alludes to guaranteeing hygienic drinking water, treatment and disposal of human feces and sewage (Dictionaries, 2025). Sanitation does not end at the aforementioned exercises; it extends to the public wellbeing activities that avoid human contact with excreta and hand washing exercises with soap. All the endeavours over point to secure human wellbeing by safeguarding a clean environment that prevents the causality or spread of infections, particularly through the feco-oral route.(Alliance, 2007).These illnesses include diarrhoea (the leading cause of malnutrition and stunted growth in children), cholera, ascariasis, hepatitis, polio, schistosomiasis, and trachoma. Other illnesses, particularly intestinal sickness, are one of the leading causes of mortality in Nigeria, which can be diminished radically through proper sanitation (Sindall *et al.*, 2021).To encourage sanitation, man has formulated a few innovations and approaches to advance a clean environment. Such approaches include container-based sanitation, community-led sanitation, environmental sanitation, biological sanitation, sustainable sanitation, onsite sanitation, and emergency sanitation. Once more, frameworks have been created to guarantee collection, storage, transportation, treatment, and

disposal or reuse of human waste. (Sindall *et al.*, 2021). This has brought about the sanitation value chain and sanitation economy as reuse innovation centres on nutrients, water, vitality, and organic matter contained in excreta and wastewater (Paranipe, 2017)

Ferronato and Torretta (2019) showed an illustration of the intricacy of the effect of infections in a worldwide setting which demonstrates that areas with low access to safe water are burdened by water-related, waterborne, water-based, and water-washed illnesses. Taking after this, broad studies have been conducted broadly. Researches in other nations have uncovered deprived access to consumable water in peri-urban areas (Jaren and Mondal, 2021). Coupled with this, a past study by Abanyie *et al.*, (2023) detailed that the area is characterized by poor sanitation and hygiene. In earlier study, Handan *et al.*,(2023) discovered that a good number of households (about 78%) in Zaria LGA have access to improved water source both for dinking and general domestic use. It was also discovered that about 78% of households have access to improved toilet facility, with most having the modern water closet systems inside their dwelling. Given the benefit of potable water and sanitation (Abanyie *et al.*, 2019), it is therefore important to understand the impacts of improved water supply and sanitation. To this end this research is thus aimed at investigating the effect of improved water supply and sanitation on health of populace in Zaria.

MATERIALS AND METHODS

Description of Study Area

The study area considered in this research is Zaria Local Government Area (LGA) located within the Zaria Township. Zaria LGA lies within the geographical coordinates of longitudes 7°36'0" W to 7°46'0" E and latitude 11°2'0" S to 11°12'0" N, consisting of 13 wards. Zaria LGA has an estimated population of about 810,000 (Population Stat, 2025) and has an average of 563 km² in area (Kaka Zenabu *et al.*, 2018).

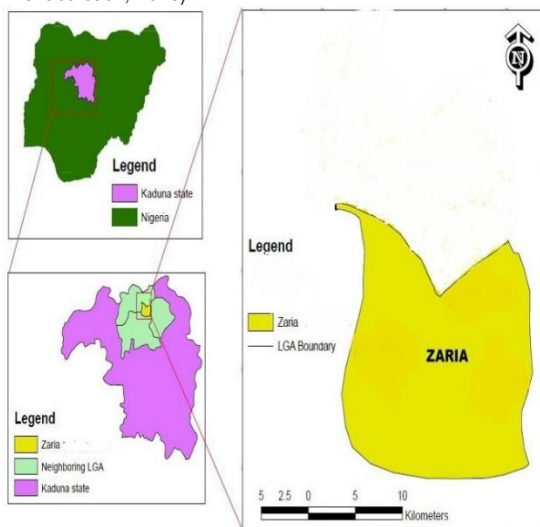


Figure 1: Map of the area of study (GADM, 2012).

Method

The survey is designed to be a cross-sectional survey using a multi-stage sampling design. The sampling plan for the survey aimed at generating point estimates of core indicators at state level. Although Slovin's sample size calculation was used, based on

population which generated a sample size of 384 with margin of error of 0.05. However, considering the scarce funding, the research is reduced to a minimum of 144.

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

The first stage involved the random selection of 12 Enumeration Areas (EAs) in Zaria LGA, from the Enumeration Area Demarcation (EAD) frame domiciled with Kaduna State Bureau of Statistics (KDBS). The second sampling stage involved the random selection of 16 households from the records of earlier listed household across the 12 EAs, to participate in the study. Interviewers were asked to speak to the head of the household or (if not available) asked for an adult who can answer questions about the subject of the research.

In connection to a recent study by Handan *et al.*,(2023), this study analyzed possible links between WASH variables such as, sources of water, faecal disposal facilities and known WASH-related diseases that households are susceptible to. The study classifies sources of water and faecal disposal facilities into improved/unimproved water source/faecal disposal facilities as recommended by the standards (World Health Organization, 2017).

The survey utilized the Electronic-questionnaire Data Collection (EDC) method, using the kobo-toolbox and data collected was analyzed using the International Business Machines Corporation's Statistical Package for the Social Sciences version 25 (IBM SPSS 25) software.

RESULTS

Coverage Analysis

The study sampled 196 households from 12EAs, and only 175 were successfully visited covered, with consented to interviews conducted in 174 households, showing a response rate of 88.8%.

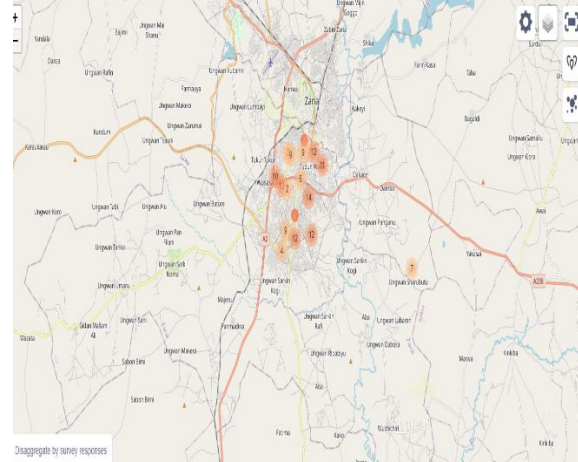


Figure 2. Heat map showing survey coverage.

Next the study assesses the respondent's knowledge on diseases that are connected to poor water and hygiene.

Table 1. Knowledge of Diseases Related to Water, Personal Hygiene and Sanitation

Type of Diseases	Responses	
	N	Percent
Diarrhoea	80	46.0%

Bloody Diarrhoea	7	4.0%
Acute watery Diarrhoea	7	4.0%
Typhoid	117	67.2%
Trachoma	3	1.7%
Intestinal parasites	8	4.6%
Cholera	112	64.4%
Malaria	123	70.7%
Pneumonia	13	7.5%
scabies	13	7.5%
others	11	6.3%

Source: Field Survey, (2023).

Tables 1 gives insight about the knowledge of the populace on disease related to contaminated water and poor hygiene. The result shows that the most popular WASH related diseases are malaria, typhoid and diarrhoea.

Table 2. Has any of your household member been affected by any disease mentioned above

Type of Diseases	Responses	
	N	Percent
Diarrhoea	39	28.5%
Bloody Diarrhoea	3	2.2%
Typhoid	101	73.7%
Trachoma	1	0.7%
Intestinal parasites	1	0.7%
Cholera	44	32.1%
Malaria	106	77.4%
Pneumonia	9	6.6%
scabies	3	2.2%

Source: Field Survey, (2023).

Table 2 above shows the households that have been affected by water-related sicknesses in recent times. The result reveals that in recent times, most households have been affected by typhoid, malaria. Quite a number have also suffered from diarrhoea and cholera. The other ailments are not so popular.

Relationship between water source and disease prevalence

Given below is any analysis that seeks to study the relationship between source of and occurrence of disease in Zaria LGA. This part first looks at the cross tabulation between water source which has been categorized into improved and unimproved against the category of households that have been affected by related disease.

Table 3. Category of water source and disease prevalence Cross tabulation

Category of water source	Has any of your household member been affected by any disease mentioned above			
			Total	Percent
	No	Yes		
Improved	35	102	137	78.7
Unimproved	2	35	37	21.3
Total	37	137	174	100
Percent	21.3	78.7	100	

Source: Field Survey, (2023).

Table 3 above shows a cross tabulation of water source and

disease prevalence, revealing that of the 78.7% of the respondent have been affected by one disease or the other in recent times. The result further shows that of the 137 household that have access to improved water 74.5% have suffer one ailment or the other, while for those are predisposed to unimproved water , the figure stands at 94.6%.

Table 4. Chi-Square Tests

	Value	P-value
Pearson Chi-Square	7.059 ^a	.008
N of Valid Cases	174	

Source: Field Survey, (2023).

Table 4 shows the result of a chi-square test for a relationship between access to improved water source and disease prevalence at 10% level of significance. The result suggest that source of water has a relationship with disease prevalence.

Relationship between toilet facility and disease prevalence

Given below is any analysis that seeks to study the relationship between type of toilet facility and prevalence of disease in Zaria LGA. Firstly, the analysis looks at the cross tabulation between toilet facility which has been categorized into improved and unimproved against the category of households that have been affected by related disease.

Table 5. Toilet facility type and disease prevalence Cross tabulation

Toilet facility type	Has any of your household member been affected by any disease mentioned above			
	No	yes	Total	Percent
Improved	26	110	136	78.2
Unimproved	11	27	38	21.8
Total	37	137	174	100
Percent	21.3	78.7	100	

Source: Field Survey, (2023).

Table 5 above shows a cross tabulation of toilet facility type and disease prevalence, revealing that of the 78.2% of the respondent have been affected by one disease or the other in recent times. The result further shows that of the 136 household that have access to improved toilet facility 80.9% have suffer one ailment or the other, while for those are predisposed to unimproved water , the figure stands at 71.1%.

Table 6. Chi-Square Tests

	Value	P-value
Pearson Chi-Square	1.714 ^a	.190
N of Valid Cases	174	

Source: Field Survey, (2023).

Table 6 shows the result of a chi-square test for a relationship between access to improved toilet facilities and disease prevalence at 10% level of significance. The result suggests that toilet facility type has no relationship with disease prevalence.

DISCUSSION

74.5% of households with access to improved water sources reported suffering from one or more diseases. While this figure is lower than that for unimproved water sources, it is still high, suggesting that even improved water sources may not fully protect against disease transmission. The extremely high disease

prevalence among households with unimproved water sources aligns with expectations, as unimproved water is a major risk factor for waterborne diseases. This result highlights the critical importance of access to safe water for preventing diseases.

78.2% of respondents reported being affected by one disease or another in recent times. This high percentage indicates a significant burden of disease in the community, likely linked to poor sanitation, hygiene, and water quality (Prüss *et al.*, 2002). 80.9% of households with access to improved toilet facilities reported suffering from one or more diseases. This is a surprisingly high figure, as improved toilet facilities are expected to reduce disease prevalence. The result suggests that even with improved sanitation infrastructure, other factors (such as water quality, hygiene practices, or environmental conditions) may still contribute to disease transmission.

The 71.1% disease prevalence among households with unimproved facilities aligns with expectations, as unimproved sanitation is a known risk factor for disease. However, the fact that this figure is lower than that for improved facilities requires further investigation. Possible reasons include behavioural factors: Households with unimproved facilities may adopt compensatory behaviours (e.g., boiling water, hand washing) that reduce disease risk.

Conclusion

The data highlights a high burden of disease in the community, with both improved and unimproved toilet facilities associated with significant disease prevalence. While improved sanitation is crucial, it must be part of a broader WASH strategy that addresses water quality, hygiene, and environmental factors to effectively reduce disease transmission.

The unexpected results for improved toilet facilities warrant further investigation. Studies should assess; The water quality at the point of use, as well as other contributing factors, The functionality, accessibility, and usage patterns of improved toilets, as well as other contributing factors to disease prevalence.

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