

Households Access to Water, Sanitation and Hygiene Facilities in Some Selected Local Government Areas in Borno State, Northeast, Nigeria

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ABSTRACT

Borno State is among the states in Nigeria that is faced with numerous challenges related to sanitation and hygiene issues. Access to water, sanitation and hygiene (WASH) services are very crucial in influencing healthy conditions and general wellbeing of a society. The poor and unsafe access to WASH plays a key role in transmission of various diseases. This study sought to assess respondents awareness and practices in relation to access to water sources, treatment, storage, sanitation and personal hygiene in fifteen communities of three local government areas in three senatorial districts of Borno State employing structured questionnaires and site observations for data collection. The data were analyzed using percent and frequency distribution tables that exhibits percent differences of the variables.

The study identified various sources of water supply with boreholes (57.7%) as the major sources of drinking water supply been utilized in the area. The study also identified few participants (32.7%) got their water within 100 – 500meters distance and the study further demonstrates that majority of respondents (50.6%) do not treat their water before consumption. Findings also revealed majority of young girls (39.7%) and women (18.8%) were responsible for fetching water in households and with a relatively lower cost 25.3% of buying water and some of the participants even claimed the cost is cheap 23.9% for households. Water storage facility and collection, the study shows 38.2% of the respondents stored water in plastic covered container and 22.6% of respondents use cups with handle to draw water in households.

The result revealed that majority of the households 37.7% use private latrine and 31.2% use shared latrine. Respondents claimed lack of funds led to use of shared latrines, poor excreta disposal systems and high open field defecation practices. On the aspects of hygiene, children's faeces were mostly disposed into a toilet (54.1%) and use soap to wash hands after defecation (19.3%). The major diseases reported in the communities is typhoid (54.8%). Perception on exposed excreta of children, 43.9 % reported that children's faeces are harmful. Personal hygiene of the respondent's exhibits respondents had poor knowledge of hygiene with regards to hand washing hygiene, bathing, and clothes hygiene, irrespective of their educational level. The results show 26.1% of respondents reported use of soap as the major opinion in all the selected LGAs for the domestic washings. Despite WASH interventions which aim to prevent and control transmission of bacteria, viruses and parasites. The poor knowledge of hygiene and unsafe access to WASH plays a key role in transmission of various diseases. WASH interventions with regards to safe water, storage facility for portable water, latrines for sanitation and soap for hygiene, bath and hand washing. This findings will be a useful information on the consequences of poor hygiene practices and sanitation facilities for both residents and authorities. The study recommends that the data obtained can serve as a blueprint to government or private organizations working towards upgrading standard of WASH practices, which would assist in providing appropriate facilities towards enforcing safe hygiene practices across the communities and state at large.

Keywords: Knowledge, Practice, Water, Sanitation, Hygiene, Environment.

INTRODUCTION

United Nations General Assembly (UNGA) recognised the right to drinking water and sanitation as a human

right and called on states to intensify efforts to provide safe, clean, accessible and affordable drinking water and sanitation for all (UNGA, 2010). Global access to water, sanitation, and hygiene services plays a vital role in protecting the health and wellbeing of individuals and society (Olukanni, 2013; Olukanni and Okorie, 2015).

Access to safe and adequate water helps to promote hygiene practices, which helps to prevent diarrheal disease (WHO 2022). Globally, over 2 billion people live in water-stressed countries (WHO 2022), which is expected to be compounded in some regions due to climate change and population growth (Gebremichael *et al.* 2021). Without a safe drinking water supply, improved sanitation and effective hygiene practices in their households, children are at increased risk of disease and even death. More than 700 children under age five die every day from diarrheal diseases due to lack of access to WASH. Many acute respiratory infections, the leading cause of death for children under age five, can be prevented by hand washing. Poor WASH is responsible for an estimated 50% of child malnutrition (UN-Water), and WASH is also critical for the prevention of neglected tropical diseases (NTDs) that affect more than 1 billion people.

Safe drinking water is anonymously accepted as an international agenda and priority, which is evident from the MDGs and SDGs of the United Nations (UN) initiative and vision (MDGs7 and SDGs 6). Despite the MDGs effort, still many people lack access to safe drinking water, even lack access to basic water. Globally, more than 1 billion people do not have access to safe drinking water. According to the Third World Academy of Sciences (TWAS) report, contaminated/dirty water is killing more people than cancer, AIDS, wars or accidents. Population of the world is increasing and the available fresh water resources almost remain constant.

Sanitation refers to the hygienic means of protecting human contact from the dangers of waste to promote good health (Pati *et al.*, 2014). Sanitation includes the provision of facilities and services for the safe disposal of waste. Sanitation is one of the most basic services in human life. Inadequate sanitation is a major cause of disease worldwide and improving environmental sanitation is known to have a significant beneficial impact on health in both household and across communities (Philip, 2010). People's access to improved sanitation facilities that are basically designed to hygienically separate excreta from human contact was increased over (WHO, 2021; WHO & UNICEF, 2018). However, in 2020, 494 million people were still practising open defecation (WHO 2010). Of the world's seven billion people, six billion have mobile phones. Yet only 4.5 billion people have access to toilets or latrines; meaning is that two and a half billion people, mostly in rural areas, do not have proper sanitation. There are 1.1 billion people still defecating in the open. In many countries, 95 per cent or more of the poorest fifth of the population practices open defecation (www.unric.org, 2024).

In addition, 670 million people do not have handwashing facilities with soap and water (WHO 2010). Also, NEEDS (2007) recognized that good health is unobtainable unless the environments in which people live are healthy? Many of the diseases that affect Nigerians such as Malaria, Tuberculosis, and Dysentery are due to unhealthy environmentally sanitary condition. Also, hygiene refers to good practices that prevent disease and lead to good health, especially in terms of cleanliness, proper disposal of wastewater, and supply of clean drinking water, poor hygiene practices and inadequate sanitary conditions play major roles in the increased burden of communicable diseases within developing countries. Provision of adequate water supply, sanitation; hygiene and waste management have a number of positive effect (Murray and Lopez, 1996). WaSH practices include a supply of cleanwater for drinking, washing and cleaning, safe disposal of waste (toilets and garbage disposal), and health promotion activities promoting healthy practices among affected populations (UNDP, 2020 Goal 6). According to World Health Organization, potable water supply and sanitation is fundamental for living a healthy life. Sufficient and quality water supply is not only a vital environmental health necessity to live but plays significant roles in the socio-economic and political advancement of the human population. The WHO also notes that water and sanitation for communities and households do not only contribute to physical growth and human development but also people's socio-economic development. UNDP, 2020 Goal 6 reports that over 70 percent of the world population (about 5.2 billion people) who had safely managed drinking water in 2015, still lacked essential drinking water while 39 percent of the world population that had safe sanitation still lacked basic sanitation with worrisome statistics of about 892 million people still practicing open defecation.

WASH issues and challenges tend to be more pathetic in arid regions due to the extreme rainfall variability which has been worsened by climate change. This has resulted in desertification, drying of water bodies (ponds, streams and rivers), and growing water scarcity, thus increasing the challenges of providing adequate WASH services by national governments and other water service providers in the region (Ohwo and Agusomu, 2018). In addition, the unsuitable climate has consequently resulted in poor hydro-geologic formation in these arid zones due to low aquifer recharge thus, requiring huge capital which many in the communities cannot afford. This has further aggravated the challenges, thus, forcing communities mostly women and children trekking kilometers and spending hours searching for clean water (Adeleye *et al.*, 2014, USAID, 2019; Kurui *et al.*, 2019).

Yet today many people lack access to safe drinking water. An estimated hundreds of thousands do not have access to managed sanitation service and large inequality in access to basic services between the richest and poorest. In study area, access to appropriate WASH facilities remains an issue. The development and occurrence of water, sanitation, and hygiene problems has become more pronounced in recent years. This challenge focuses heavily on low income disadvantaged groups, such as the poor and disabled who make a significant contribution to the poverty cycle. Although recent time, Nigeria has made a giant stride in providing safewater and sanitation both in urban and rural areas. At the household in urban and rural levels, there are still exist great concerns about the adequate accessibility, and quality of water and use of the WASH facilities.

While it is critical to have good WASH practices for better health, there are existing gaps in relation to awareness, behavioural practices, accessibility, and availability to safe water and essential hygienic commodities (Mustapha *et al.*, 2022). Lack of WASH knowledge, unhygienic practices and poor attitudes towards WASH facilities often times are significant factors to water borne diseases prevalence in communities (Gebreyessus and Adem, 2018; Berheet *et al.*, 2020; Mustapha *et al.*, 2022; Mbuka - Nwosu, 2022). Very few studies have been conducted on households' limited access to drinking water and sanitation facilities in the study area. And these studies have reported divergent perspectives to WaSH issues. Most of the studies focused on sanitation facilities in IDPs Camps across the state (WSC, 2022; Tarek Jaber *et al.*, 2023; SNRA, 2024).

However, the critical issue surrounding its impacts and implications for the residents in the study area have not been dealt with. If the level of wash practices were known in the study area, this would be helpful to provides critical insights for policymakers, development agencies, and practitioners aiming to implement recovery-focused infrastructure interventions in fragile and crisis-affected settings on the sanitation facilities and awareness creation in the communities studied and state at large. Thus, this study aims to assess the level of awareness and practices of Water, Sanitation, and hygiene practices on (1) water sources of drinking and other purposes, (2) methods of water treatment (3) methods of collection and storage of drinking water (3) waste disposal operations, and personal and environmental hygiene practices and some related water borne diseases within the selected communities of the three local government areas in Borno State, Nigeria.

MATERIALS AND METHODS

Study Area

Borno State is located on longitudes 11° 30'E and 14° 45'; and latitudes 10° 15'N and 14° 60'N in Northeastern, Nigeria, with a land area of 72,152sq km and a population of 4,171,104, according to the last official census in 2006, with a density of 84.70/km². The state shares borders with the Adamawa to the south, Gombe to the southeast and Yobe State to the west. The eastern border forms part of the national border with Republic of Chad to the East, Niger Republic to the northern border and Cameroun to the northeastern border. Data was obtained through questionnaires administered in a households within the study area where the survey could be easily assessed as it is easier to meet people and interact.

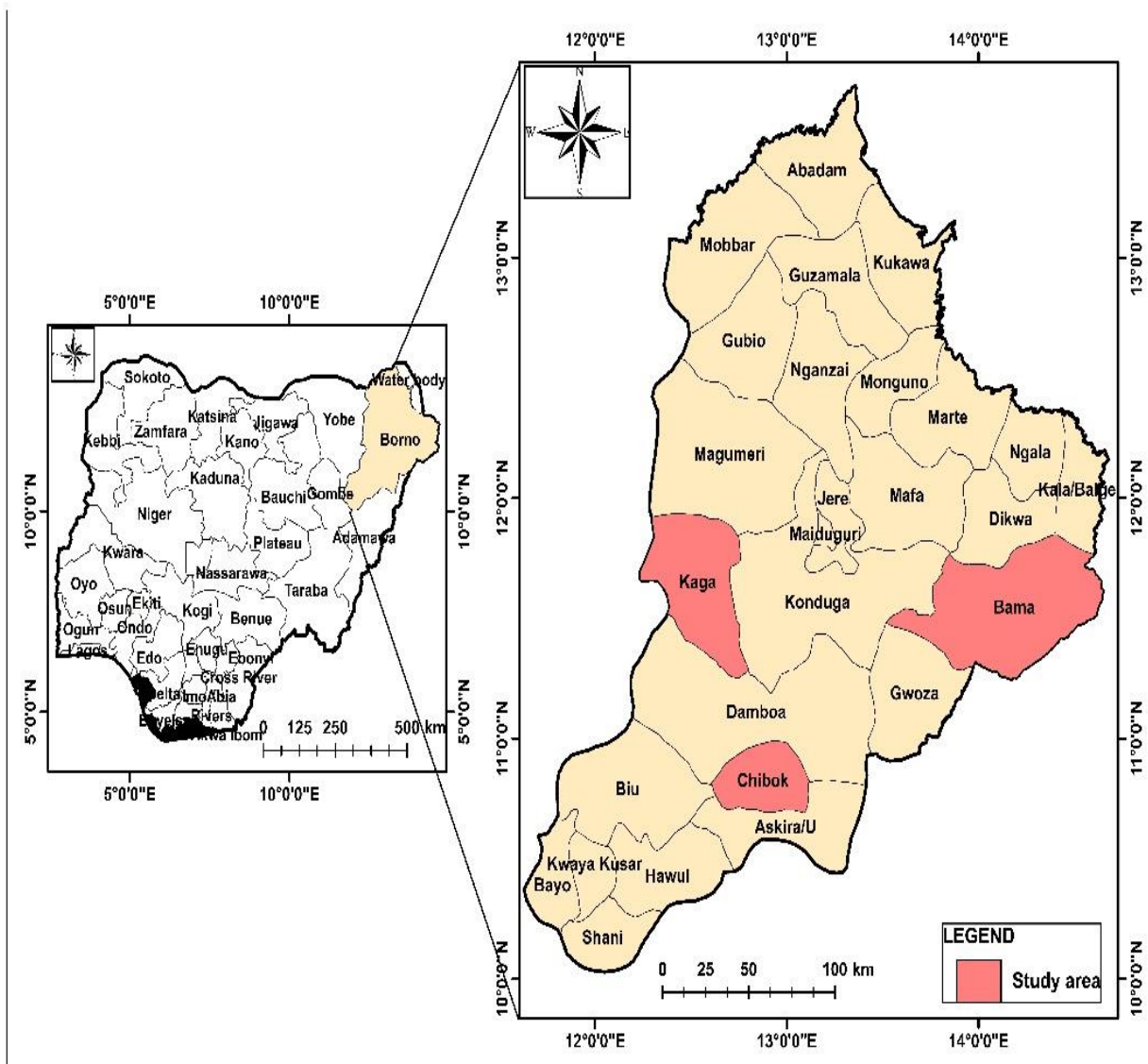


Figure 1 showing study area

Sample Design and Data Collection

A survey design was employed. Following the observed even challenges of water stress in Borno state, a local government area (LGA) was selected from each of the three senatorial zones using simple random sampling. Fifteen (15) communities were sampled in the three LGA from the three Senatorial Zones in the State. The number of communities randomly sampled from each local government was in accordance with proportional sampling. Thus, five communities (Kasugula, Old Bama, Buwor Tela, Shehuri and Goniri) from Bama LGA, five communities (Asur, kajjaf, Durba, Ndawak and Hembe) from Chibok LGA, and five communities (Ajari, Low cost, Lawanti, Majeri, and Mangeiri) from Kaga LGA, respectively in the three Senatorial Zones. At $p = 0.1$, a sample size of 140 was deduced from Bama LGA and 120 each from Chibok and Kaga LGAs fifteen communities were sampled from households using systematic random sampling (Yamane, 1967). Structured questionnaires were used to collect data.

Data was collected by administering structured questionnaire and spot check observations adapted based on UNHCR water, sanitation and hygiene survey standard questionnaire. The survey was both qualitative and quantitative by questionnaire administration and spot-check observations which involved observing and recording information on environmental conditions in the communities surveyed. The survey was classified into five significant sections, which were Section A respondents' demographic characteristics such as age, gender, marital status, religion, house hold size, children age 5 and below in the households, education and Area were collected. Section B, knowledge on sources of drinking water supply, sanitation and hygiene variables on drinking water sources, collection, storage, and treatment; Section C Sanitation (type of facility,

location, sharing of facility, cleaning, and emptying) Section D hygiene practices at household level were collected and Section F Spot check Observation of possible contamination of water sources by environmental condition. The population under study comprise of males and females from age 15 and above involved indifferent socio-economic activities in these locations. Assistance was given to those unable to read and write. A total number of three hundred and eighty (380) respondents were engaged in the study. This sample size was arrived from Yamane's formula for estimating sample sizes (Arthur and Imoro, 2021). Yamane formula:

$$n = N / (1 + Ne^2),$$

where n represent sample size,

N represent population size and

e represent the standard error (0.05).

Data Analysis

Data was analyzed through descriptive statistic tool in SPSS software (version 19) to obtain frequencies, percentages, as well as minimum and maximum values. Cross-tabulation and Pearson chi-square was used to compare the relationship between variables. Microsoft Excel was used to present data in charts and tables.

RESULT AND DISCUSSION

This section presents the results of the Water, Sanitation, and Hygiene practices survey that was conducted in the selected LGAs of Borno State. Tabulation of data was adopted for easy understanding, and comparison between the three (3) chosen LGAs. The results were presented through the use of frequency tables.

Section A: Demographic Characteristics of Respondents

This section presents the data on demographic characteristics of respondents interviewed in the fifteen communities of the three selected local government areas of Borno State.

Table 1: Demographic Characteristics of Respondents

Age Group	Frequency	Percentage (%)
0–17 years	3	0.8
18–24 years	32	8.4
25–34 years	117	30.8
35–44 years	103	27.1
45–54 years	54	15.5
55 years and above	66	17.4
Total	380	100

Gender	Frequency	Percentage (%)
Male	258	67.9
Female	122	32.1
Total	380	100

Marital Status	Frequency	Percentage (%)
Never Married	92	24.2
Married	247	65
Widowed	41	10.8
Total	380	100

Religion	Frequency	Percentage (%)
Islam	230	60.5
Christianity	150	39.5
Total	380	100

Household Members	Frequency	Percentage (%)
1–5 members	190	50
5–10 members	108	28.4
More than 10 members	82	21.6
Total	380	100

Children (Age 5 and Below)	Frequency	Percentage (%)
1–5 members	120	26.3
5–10 members	160	68.4
More than 10 members	20	5.3
Total	380	100

Education Level	Frequency	Percentage (%)
No Education	42	11
Islamic Education	49	12.9
Primary	85	22.4
Secondary	150	39.5
Tertiary	54	14.2
Total	380	100

Area	Frequency	Percentage (%)
Urban	57.3	15.1
Rural	42.7	11.2

Source: Field Survey, 2025

The data from table 2 firstly shows the distribution of respondents' age. Out of 380 respondents interviewed, the data demonstrated that 0.8% of the respondents are between 0 -17 years, 8.4% between 18-24 years, 30.8% between 25-34 years, and 27.1% between respondents aged 35-44 years, 15.5% represented 45-54 years and over 55-year-olds represents 17.4%, respectively. The result shows that majority of the respondent's age composition is between 25 – 44 years of age bracket which is quite similar in context to all the communities. This implies the dominance of the respondents by youth category of below the age of 45 years 66.3% (Table 1). These category of people who are productive and agile engaged in most of the activities of Wash in their respective areas and have assisted in providing information during administering the questionnaire based on their individual experiences. Also, the result revealed information on gender 67.9% of the respondents were male while 32.1% of the respondents were female. There are more males participated in the answering the questionnaire, suggesting balanced male involvement in evaluating WASH services. As heads of households in many communities, they mostly response to questions regarding infrastructure quality, water accessibility, and economic benefits. However, men may not fully capture the day-to-day challenges related to water collection, sanitation, and hygiene which are typically experienced by women and children. Regarding marital status of the respondents, the result further indicated majority of the participants 65% were married, while 24.2% were not married and 10.8% were widowed. Majority of the respondents 60.5% were Muslims while 39.5% were Christians. Data from Table 1 showed that majority of the respondents had received secondary education 39.5% while the 85% of the respondents had attended. The data further revealed those with tertiary education constitute 54%, and Islamic education 49% whereas respondents with no formal education were 42% respectively. Among the study respondents, about 37.3 (15.1%) lived in an urban area at the time of the survey, while 42.7 (11.2%) were in rural area.

Section B: Responses On Sources of Drinking Water Supply

This section present the responses of households on sources of drinking water as shown in Tables 2 - 7 below.

Table 2 Sources of Drinking Water for the Respondents

Sources of Drinking Water	Bama (%)	Chibok (%)	Kaga (%)	Total (%)
Boreholes	86.4	52.5	80.5	57.7
Well	13.6	32.5	7	14
Rainwater	0	4.2	2.5	1.8
Bottled water	0	10.8	0.5	3
River/Stream	0	0	5.5	1.4
Water truck	0	0	4	1.1
Other	0	0	0	0

Source: Field Survey, 2025

Response on Sources of Drinking Water

The primary sources of drinking water supply in households across the three local government areas surveyed were borehole 57.7%, wells 14%, bottled water 3%, rainwater 1.8%, river / stream 1.4% and water truck 1.1% were shown to be main sources from the responses in the questionnaire.

This analysis clearly demonstrates various sources of water supply have been generally utilized, especially borehole as most common source of water supply with 86.4% in Bama, 80.5% in Kaga and in 52.2% Chibok respectively. Nonetheless, the analysis also indicated a slight disparity in well water supply as 32.5% Chibok, recorded the highest number of wells, while Bama and Kaga were only 13.6% and 7% respectively.

Accessing improved water sources for drinking typically comes through boreholes, rather than piped connections. However, various sources indicate widespread challenges with infrastructure in the region. From

personal oral interview, it was gathered that the most used source of water supply are public boreholes initially provided by the governments, particularly through its agency Rural Water Supply and Sanitation Agency (RUWASSA) and local government councils. However, most of these water infrastructures were vandalized amidst the insurgency. But these infrastructures were rehabilitated by Non-Governmental Organization (NGOs) as well as well-meaning individuals. These interventions significantly improved access to clean water and sanitation for vast majority of the communities, contributing to better health outcomes, reduced disease transmission, and enhanced dignity and quality of life particularly for women, children, and other vulnerable groups. The solar-powered boreholes, in particular, offer a sustainable and energy-efficient solution, ensuring continuous access to water even in remote or off-grid communities. However, there are a few boreholes that are commercial and private that also supply drinking water in the neighborhood in all the communities. Considering the survey areas, the majority of the households have their water supplied by more than one sources of water supply. It is noteworthy that the categories are not exclusionary. The communities surveyed in all the LGAs have access to water from more than one water supply, considering as options public network, borehole, well and surface water. Findings from this study shows that majority of the residents relying on borehole as principal source of water supply is similar to that of Mbuka - Nwosu *et al.*, (2022) who stated that a large proportion of households (99.89% in the dry season and 99.56% in the wet season) in rural communities of Imo State use borehole water daily.

Table 3: Distance of water source from your households

Distance to Water Source	Bama (%)	Chibok (%)	Kaga (%)	Total (%)
Less than 100 meters	57	11.7	47.5	30.6
100 – 500 meters	20	54.1	50	32.7
500 meters – 1 kilometer	12	32.5	2.5	12.4
More than 1 kilometer	11	1.7	0	3.3

Source: Field Survey, 2025

The distance of water source from your households

The proportion of responses on the proximity of the water source to the households in Table 3 shows 32.7% of respondents get water from 100 meters – 500 meters away in all the three LGAs, This implies, varying distances, yet a relatively short distance across the LGAs with 54.1% in Chibok recorded the highest, while 50% in Kaga and 20% in Bama. The result also show majority of respondents 57% in Bama access water source within a closest distance of less than 100 meters, whereas 47.5% in Kaga and the least 11.7% in Chibok. Furthermore, 28.6% of households reported accessing water within 10 to 30 minutes of walking from their dwellings, while about 22.5% reported spending less than 10 minutes on foot to reach water sources and 21% of the respondents claimed 30 minutes – 1 hour in all the LGAs respectively.

This analysis demonstrates that households in Bama and Kaga LGAs have shortest possible distance to source of water when compared to Chibok as illustrated in (Table 3). Since the majority of the respondents get their water supply from public boreholes, which most times is available within the respondent's residence, this reduces the distance of getting water supply to the nearest distance. The long distances covered to access water by residents in Chibok LGA could lead to underusing this vital resource in their households. In this regard, sanitation could be undermined and this exacerbates the existing poor conditions of these residents. The links between affordable water, sanitation and poverty have been widely established and cannot be relegated by any society with a quest to achieve sustainable development (World Bank Group, 2018). Similarly, such distances could make a girl child more vulnerable to sexual abuse and its interconnected risks which impede achievement of her full human potential. Reducing the distance required to fetch water is associated with lower prevalence of diarrhea, improved nutrition, as well as reductions in under-five child mortality (Rabie and Curtis, 2006), possibly because it enables better hygiene practices (Sammelweis, 1983) and frees up time for child care or income generating activities (Blencowe *et al.*, 2011) , resulting in healthier children.

Table 4: Time it takes to get there, get water and come back

Time Duration	Bama (%)	Chibok (%)	Kaga (%)	Total (%)
Less than 10 minutes	47.1	10	28.3	22.5
10 minutes – 30 minutes	28.6	30	50	28.6
30 minutes – 1 hour	14.3	50	15	21
More than 1 hour	10	10	6.7	7

Source: Field Survey, 2025

Time it takes to get there, get water and come back

From Table 4 shows regarding time it takes to go to the water source, get water and come back, the respondents reported 28.6% get in 10 minutes – 30 minutes, 22.5% said in less than 10 minutes and 21% 30 minutes – 1 hour in all the LGAs respectively. The highest response on short time to get water was found in Bama 47.1% and longest time in Chibok 50% (Table 4). According to UNDP (2019), when a household spends at least 30 minutes' walk from home roundtrip in order to access domestic water, such a household is considered deprived in accessing domestic water supply, a limitation which undermines their ability to combat multidimensional poverty. The time spent and distance roundtrip does not only stress the individual in walking and conveying the water, but could degenerate to reluctance in fetching water. This is interconnected to underusing the resource and degenerates to problems of poor sanitation and human health, while increasing vulnerability to poverty. Findings from this study reveal that respondents from across the selected communities varies as response on short time to get water was found in Bama 47.1% and longest time in Chibok 50% (Table 4).

Table 5: How many trips do you make to the water source daily

Number of Trips	Bama (%)	Chibok (%)	Kaga (%)	Total (%)
1 trip	24.3	25.8	38	23.2
2 trips	57.9	60	41	41.8
3 trips	17.8	11.7	8	9.9
More than 3 trips	0	2.5	13	4.1

Source: Field Survey, 2025

Trips to the water source daily

Regarding the number of household's trip to the water source on daily basis, majority of the respondents 41.8% reported 2 trips, 23.3% one trip, 9.9% said 3 trips and only 4.1% said they get more than 3 trips daily.

Table 2: The cost of buying drinking water for household

Cost Category	Bama (%)	Chibok (%)	Kaga (%)	Total (%)
Expensive	16	20	16	13.7
Moderate	12	28	21	16.1
Cheap	30	20	41	23.9
No cost	42	32	22	25.3

Source: Field Survey, 2025

The Cost of Buying Water

Data on the cost of buying water for households in the survey areas revealed that majority of the respondents 25.3% buy water at no cost and 23.9% of the population reported the cost of buying water as cheap, while 16.1% of the respondents find it moderate. A least percent 13.7 of the respondents get their water supply at expensive rate. This result indicates a general lower cost of buying water for households in almost all the communities surveyed. This is due to the fact that private boreholes are the primary source of water supply to the respondents, which they arrive at no charge. However, water is meant to be cheap for all. The government still needs to improve water supply for all citizens.

Table 6: Duration of storing drinking water in your household

Duration	Bama (%)	Chibok (%)	Kaga (%)	Total (%)
1 day	40	20.8	41.7	27
2 days	44.3	64.2	43.3	39.9
5 days	15.7	15	4.2	9.2
7 days	0	0	5.8	1.5
Others	0	0	5	1.3

Source: Field Survey, 2025

Storage of drinking water for households

Results in Table 6 revealed the large number of respondents 39.9% reported they do stored their water for 2 days. This followed by 27% respondents who also reported storing water for only 1 day. Other responses reported 9.2% 5 days, 1.5% 7 days and 1.3% reported others. The contributing factor is the fact there is a constant supply of water from the public, private and commercial boreholes in all the communities surveyed in the three LGAs. This is due to continuous supply of water from solar power and rare generators.

Table 7: Persons responsible for fetching drinking water for the household

Category	Bama (%)	Chibok (%)	Kaga (%)	Total (%)
Girls (under 18 years)	50	48.2	52.5	39.7
Boys (under 18 years)	5	6.7	2.5	3.7
Women	22.9	34.2	14.2	18.8
Men	7.1	4.2	5	4.3
Water vendor	15	0	25.8	10.7

Source: Field Survey, 2025

Persons responsible for fetching drinking water for the household

The analysis in Table 7 reveals that persons responsible for fetching water in the households shows 39.7% girls under 18 years, 18.8% adult women, 10.7% water vendor, 4.3% boys under 18 years and 3.7% Adult men. Although, the practice of whom responsible for fetching water for the household vary among the LGAs. The highest number of girls under 18 years were recorded in Kaga 52.5%, while for boys under 18 years were seen in Chibok 6.7%. Also, adult women were mentioned in Chibok 34.2% and adult men in Bama 7.1%. Water vendors were mainly reported highest in Kaga 25.8%.

SECTION C: WATER TREATMENT METHODS AND RELATED ILLNESSES

Table 8: Water Treatment Methods and Related Illnesses

Water treatment for safe drinking				
Yes	32.9	54.2	20.8	28.4
No	67.1	45.8	79.2	50.6
Methods	of	water	treatment	
Boiling	44.3	15.0	25.0	22.2
Chlorination	41.4	33.0	66.0	36.9
Filtering	5.0	23.0	8.0	9.8
Strain with clothing material	5.0	21.0	1.0	7.1
Others	4.3	8.0	0.0	3.2
Last	time	of	water	treatment
Previous day	3.6	32.5	2.5	10.2
Less than a week	8.6	16.7	4.2	7.8
Less than a month	17.1	14.2	17.5	12.8
More than a month	25.0	8.3	60.0	24.6
Don't remember	45.7	28.3	15.8	23.6
Have you experience any illnesses in your households in the past 6 months				
Yes	59.0	62.0	16.7	36.2
No	41.0	38.0	83.3	42.7
If	yes,	specify	the	illnesses
Diarrhea	7.1	4.2	12.3	6.2
Cholera	1.4	32.5	1.7	9.4
Typhoid	91.5	41.6	75.0	54.8
Hepatitis A	0.0	0.0	8.3	2.2
Others	0.0	21.7	2.7	6.4

Source: Field Survey, 2025

Response on Water treatment for safe drinking

From Table 8 responses to water treatment by the respondents in all the LGAs revealed more than half 50.6% of the households reported did not treat their water before use. The vast majority of respondents that get their water from boreholes and wells water sometimes do not address the water treatment because they assume that the borehole and wells water is already clean for usage. Accessing improved water sources for drinking typically comes through hand pumps or boreholes, rather than piped connections. However, various sources indicate widespread challenges with infrastructure in all the communities surveyed due to partially functionality or not functional boreholes or hand pumps and most privately constructed water sources are not adequately designed to eliminate contamination. While some proportion of respondents 28.4% said they always treat the water through boiling. The highest 79.2% was found in communities under Kaga L.G.A and the least 45.8% was in Communities under Chibok L.G A. Other persons who were unsure stated that they buy sachet water rather than drink the borehole water because they are not sure of the pure nature of the borehole water source.

Methods of water treatment

The data revealed that the practice of chlorination of water was seen higher 36.9% among the selected communities in all the three L.G.As to make water safe (Table 8). Other methods of water treatment in the areas shows boiling 22.2%, through filtration 9.8%, strain with clothing material only 7.1% and others 3.2%. These methods were common in all communities in the three selected LGAs and were visible practices to most households. Certain proportion of respondents even reported that they do not practice any of the water

treatment methods and that water they used was already clean and safe and to them treated water did not taste good therefore, avoiding any form of treatment.

Last time of water treatment

Regarding responses on when last they treated water for safe drinking, the households' responses were more than one month 24.6%, less than a month 12.8%, previous day 10.2% and less than a week 7.8%, and some respondents don't remember 23.6%. Although, there were interventions by UNICEF, ICRC and Borno State rural water Supply and Sanitation (RUWASSA). A significant observation from the data is that unsafe water sources were predominant before this WASH intervention. Since the data indicates some communities relied on open wells 14% and rivers/streams 1.4% and water truck 1.1% as other sources of drinking water. These sources are typically unprotected and highly susceptible to contamination, particularly during the rainy season when runoff can carry fecal matter, debris, and other pollutants into the water supply. This situation posed a high baseline risk of waterborne diseases such as cholera, typhoid, and diarrhea within the affected communities. High rates of unimproved water usage for drinking is generally due to accessing water from unprotected wells in most LGAs.

Have you experience any illnesses in your households in the past 6 months

Majority of the respondents 42.7% reported they did not experience any illnesses related to water treatment in their households in last six months. However, some respondents 34.2% said yes their households witnessed some illnesses during the last six months. If yes, specify the illnesses experienced in the selected communities in the three LGAs in the last six months, the responses were Typhoid 54.8%, Cholera 9.4%, others 6.4%, Diarrhea 6.2%, and Hepatitis 2.2%. These illnesses experience in some of the communities were not unconnected with the activities of households contaminating sources of water. Despite majority of the population accessing the main source of drinking water from improved sources, the level of spread of Typhoid in all the LGAs as shown in Table 8 raises major concerns about water quality and contamination. This large outbreak could be attributed to widespread contamination of sources.

Section D: Storage Of Household Drinking Water Facility

Table 9: Storage of Household Drinking Water Facility

Storage Facility Type	Bama (%)	Chibok (%)	Kaga (%)	Total (%)
Open container	20.0	16.7	8.0	11.8
Plastic covered container	37.1	48.3	59.9	38.2
Clay pots with cover	32.9	35.0	18.0	22.6
Clay pots without cover	10.0	0.0	3.0	3.4
Iron buckets without cover	0.0	0.0	9.0	2.3
Plastic buckets with tap	0.0	0.0	3.0	0.9
Basin without cover	0.0	0.0	0.0	0.0
Others	0.0	0.0	0.0	0.0

Table 2: Items Used in Fetching Drinking Water from Storage Facility

Item Used	Bama (%)	Chibok (%)	Kaga (%)	Total (%)
Cup with handle	60.7	62.5	66.7	50

Cup without handle	27.1	19.1	30.8	20.3
Calabash	7.9	11.7	2.5	5.8
Bowl	4.3	6.7	0	2.9
Others	0	0	0	0

Table 3: Frequency of Cleaning Water Storage Container

Cleaning Frequency	Bama (%)	Chibok (%)	Kaga (%)	Total (%)
Every day	37.1	19.2	31	23
Before fetching water	11.4	61.6	28	26.6
When dirty	48.6	19.2	41	28.6
Never	2.9	0	0	0.8

Table 4: Perceived Quality of Safe Drinking Water

Quality Indicator	Bama (%)	Chibok (%)	Kaga (%)	Total (%)
Visually clear	65	54.2	15	35.3
Sweet taste	10.7	19.2	15.8	12
Odourless	16.4	13.3	69.2	26
Salty	5	8.3	0	3.5
Free from germs	2.9	5	0	2.1
If animals can drink	0	0	0	0
Others	0	0	0	0

Source: Field Survey, 2025

Type of drinking water storage facility

From Table 9 responses from households shows that majority of the facilities used for storing drinking water were 38.2% plastic covered container, 22.6% clay pots with cover, 11.8 open container, 3.4% clay pots with cover, 2.3% Iron buckets container without cover and 0.9% plastic buckets with tap. Water storage facility that mentioned often by respondents in all the surveyed LGAs was plastic covered container. Nonetheless,

majority of the respondents used clay pots with cover in Chibok 35%, which is slightly similar to what is obtainable in Bama 32.9%.

Item used in fetching drinking water from storage facility

A closer look at the responses regarding items used in fetching drinking water from the storage facility, the analysis shows cups with handle 50%, cups without handle 20.3%, calabash 5.8% and bowl 2.9%. The items used in fetching water were mostly kept on the storage container or hung on the wall. These practices of using different common containers look similar in all the selected LGAs as depicted in Table 9. The result indicates that most of the communities in all the LGAs reported cup with handle is the most common item used in fetching water for drinking in majority of households. Perhaps, it is important to note that using a container with handle can helps in promoting the quality and safety of water for drinking.

Cleaning water storage container

The response about cleaning of storage containers, vast majority of respondents 28.6% said they clean their water storage facility when dirty was seen higher in all the LGAs , while those who reported cleaning the water storage facility before fetching water is 26.6% as shown in Table 9. Cleaning of the storage facilities was done daily 23% and never 0.8%. Again, the frequency of cleaning varied widely across the LGAs.

Quality of safe drinking water

From the results, the respondents clearly mentioned their views regarding qualities of safe drinking water such as visually clear 35.3%, Odourless 26%, sweet taste 12%, salty 3.5% and free from germs 2.1% in all the communities surveyed. The primary source of water for households determines the quality of water used by the household. This, in turn, affects the amount of water intake available to members of the household. From the result it shows borehole is the dominant source of drinking water for the households. As such, least problem of water quality related issue from the sources. The widespread access to improved water sources, particularly boreholes, is likely to result in lower rates of waterborne illnesses, better hygiene practices, and overall enhanced health outcomes. Moreover, the reduced need to travel long distances to fetch water may significantly lessen the burden on women and children, who are typically responsible for water collection. This change could translate into greater time for education, economic activity, and personal wellbeing, thereby contributing to long-term community development and resilience.

Means of transportation used in fetching the water

Results concerning the means of transportation used in fetching water in the household shows majority of the respondents 62.3% reported by bicycle. This followed by pay others 40.6%, by foot 33.4%, animal or drawn cart 18.3%, and motor vehicle 14.2% as shown in Table 9. The results exhibit bicycle as means of transport in Chibok LGA, while respondents in Bama and Kaga reported utilizing foot as the major means of transporting water in their areas (Table 9). Most of the households mentioned that their transport means was bicycle, however, frequently employed was by foot in Kaga 54% and the least was motor vehicle reported also in Kaga.

Section E: Sanitation Facility of the Hosueholds

Table 10: Sanitation Facility of the Households

Type of Toilet Facility	Bama (%)	Chibok (%)	Kaga (%)	Total (%)
Private latrine	60	30	53.3	37.7
Shared latrine	35.7	36	46.7	31.2
Communal toilet	0	28	0	7.4
Open defecation	4.3	3	0	1.9
Others	0	3	0	0.8

Table 4: Perceived Quality of Safe Drinking Water

Quality Indicator	Bama (%)	Chibok (%)	Kaga (%)	Total (%)
Visually clear	65	54.2	15	35.3
Sweet taste	10.7	19.2	15.8	12
Odourless	16.4	13.3	69.2	26
Salty	5	8.3	0	3.5
Free from germs	2.9	5	0	2.1
If animals can drink	0	0	0	0
Others	0	0	0	0

Table 3: Number of Households Sharing the Facility

Number of Households Sharing	Bama (%)	Chibok (%)	Kaga (%)	Total (%)
1–2 households	67.9	65.8	56	50.6
3–5 households	25	34.2	16	19.8
More than 5 households	7.1	0	28	9.2

Table 4: Views About Cover of the Facility

View	Bama (%)	Chibok (%)	Kaga (%)	Total (%)
Always	47.9	56.7	18	32.3
Sometimes	42.9	25.8	66.6	35.6
Never	9.2	17.5	4	8.1
Don't know	0	0	11	2.9

Sanitary facility

The situations of sanitation facilities across the three local government areas under study were analyzed. The analysis revealed majority of the households 37.7% use private latrine and 31.2% use shared latrine. While, 7.4% of the households use communal toilets as well as 1.9% and 0.8% of households use open defecation and others respectively. The overall situation for sanitation is more concerning still. Use of unimproved sanitation appears to be common across the communities in the three senatorial zones. Access to sanitation continues to be diminished due to wear and tear of emergency-type construction, continuous displacements and seasonal flooding, all of which contribute to higher open defecation rates, reduced levels of hand washing practices, the

adoption of negative coping mechanisms and associated loss of dignity and gender-based violence risks. It is important to note that sanitation needs for persons with special needs, women and children to ensure safety and equitable access are a critical gap compounded by overcrowding and financial constraints to construct sanitation facilities have been the major impediments. However, this is not withstanding water and sanitation are essential in ensuring healthy living (WHO & UNICEF, 2017).

Toilet facility shared among households

Regarding the household latrine accessibility, approximately 38.4% of households reported sharing latrines with others, while 35.5% households reported not sharing their latrines. The most commonly reported types of latrines were pit latrines 37.7%. The data indicate a high proportion of respondents used shared toilet facilities. Some of these toilets facility may be structurally improved, shared facilities are generally considered unimproved by global standards due to concerns over privacy, cleanliness, and maintenance. Shared use can increase the risk of disease transmission and may compromise the safety and dignity of users, particularly in overcrowded or underserved areas. Sharing sanitation facilities is common especially in Bama 63.6% and Kaga 46.7%, where the data further revealed majority of households shared with at least one other household. These combined sanitation conditions pose a high risk of adverse public health outcomes. Limited access toilet facility as has been consistently shown by the responses, heightening the risk of communicable disease outbreaks and public health crises (UNDP, 2021). The practice of shared toilet facility has placed a strain on already underdeveloped services, including water and sanitation infrastructure (UNDP, 2021).

Number of households share the facility

Regarding household latrine accessibility, findings show 50.6% households shared latrines ranged 1 - 2 and 19.8% reported more than 5 households shared the toilet facility, while only 9.2% households shared toilet facility among 3 -5 households. These combined sanitation conditions pose a high risk of adverse public health outcomes. The prevalence of shared toilet facility practice suggests that basic sanitation infrastructure was either inaccessible or unaffordable for a significant portion of the population in all the communities across the LGAs. Hence, households resorted to using shared facilities.

Views about cover of the facility

Regarding views about covering of the toilet facility among the households in all the three LGAs, result reveals 35.6% reported they cover toilet facility sometimes while 32.3% opined they cover their toilet facility always. The analysis also revealed 8.1% of the households in all the said never they cover their toilet facility and 2.9% reported they don't even know about it.

Section F: Perception Of A Good Toilet, Type and Preferred Ownership

Table 11: Perception of a Good Toilet, Type and Preferred Ownership

Perception Category	Bama (%)	Chibok (%)	Kaga (%)	Total (%)
Privacy	17.9	42	7	17.6
Safety	53.6	30	64	38.8
Prevent disease	25.7	14	19	15.4
Easy to use	2.8	14	10	7.1

Table 2: Type of Toilet Preferred

Toilet Type	Bama (%)	Chibok (%)	Kaga (%)	Total (%)
Flush	40.7	33	31.5	27.7

Traditional pit	54.3	60	59.2	45.7
Others	5	7	9.5	5.7

Table 3: Affordability of Preferred Toilet Type

Response	Bama (%)	Chibok (%)	Kaga (%)	Total (%)
Yes	63.6	81.7	64.2	55.1
No	33.6	18.3	35.8	23.1

Table 4: Views About Exposed Excreta of Children

View	Bama (%)	Chibok (%)	Kaga (%)	Total (%)
Harmful	70	49.2	47.5	43.9
Harmless	1.4	20	42.5	16.8
Don't know	28.6	30.8	10	18.3

Perception of a Good Toilet, Type and Preferred Ownership

The analysis on the responses of households across the LGAs about a good toilet, the type of toilet and preferred ownership in Table 11.

Perception of a good toilet

The analysis regarding perception of a good toilet across the three LGAs, 38.8% of the respondents expressed their opinion that safety were the most responses. The respondents also reported privacy 17.6%, disease prevention 15.4% and easy to use 7.05% were the responses.

Type of toilet preferred

The data regarding preferred toilet type, respondents reported traditional pit 45.7% was the most preferred type of toilet in all the communities of the three selected LGAs. Some respondents reported they preferred flush toilet 27.7% and 5.7% preferred other toilets.

Affordability of preferred toilet type

Information on affordability of preferred toilet type, 55.1% respondents said yes they could afford the preferred toilet type and only 23.1% said they could not afford the preferred type of toilet facility.

Views about exposed excreta of children

The information about respondent's perception on exposed excreta of children, 43.9 % reported that children's faeces are harmful while 16.8% reported children's faeces are harmless and 18.3% reported don't even know about it. The practice of exposed excreta is only harmful to the people living in that locality, but also exposes the water sources, especially the surface water sources such as ponds and lakes in the rural communities are at the risk of contamination and health related issues.in the environment at large.

SECTION G: PRACTICE OF PERSONAL HYGIENE

Table 12: Practice of Personal Hygiene

Hygiene Practice	Bama (%)	Chibok (%)	Kaga (%)	Total (%)
Use of soap	23	44.2	32	26.1
Washed clothes	10	15	16	10.8
Took my bath	7	15.8	5.3	7.4
Washed hands after preparing food	11	4.2	6.7	5.8
Washed hands before feeding child	10	3.1	7	5.3
Washed hands before eating	5	3.5	8	4.3
Washed hands after defecation	34	14.2	25	19.3
Time to Wash Hands	Bama (%)	Chibok (%)	Kaga (%)	Total (%)
Before meal	33.6	60.8	50	38
After meal	17.1	7.5	9.2	8.9
After defecation	25	24.2	21.3	18.6
After cleaning children's faeces	19.3	5	11.5	9.4
Others	5	2.5	8	4.1
Item Used	Bama (%)	Chibok (%)	Kaga (%)	Total (%)
Water only	22.9	28.3	21	19
Water and soap	60.7	55.3	71	49.2
Water with ashes	11.4	10	5	6.9
Sand and water	5	6.2	3	3.7
Others	0	0.2	0	0.1
Response	Bama (%)	Chibok (%)	Kaga (%)	Total (%)
No	64.3	59.2	61.7	48.7
Yes	35.7	40.8	38.3	30.2
Hygiene Practice	Bama (%)	Chibok (%)	Kaga (%)	Total (%)
Bathing	52.9	51	64	44.2
Weaving/Cutting hair	22.1	18	12	13.7
Washing clothes	18.6	28	20	17.5
Cutting nails	6.4	3	4	3.5

Personal Hygiene

Data about personal hygiene of the respondent's exhibits respondents had poor knowledge of hygiene with regards to hand hygiene, bathing, and clothes hygiene, irrespective of their educational level. The results show 26.1% of respondents reported use of soap as the major opinion in all the selected LGAs for the domestic washings. The respondents also reported washing hands after defecation 19.3%, washed clothes 10.8%, and taking bath 7.4%, washing hands after preparing food 5.8%, washing hands after feeding child 5.3%, and the

least reported was washing hands before eating 4.3%. It was noticeable that most respondents did not received any special training on hygiene yet observed some recommended hygienic practices.

Health Consequences of poor hygiene lead to the transmission of pathogens through faecal-oral pathway. Diseases transmitted via the faecal pathway are diarrheal and other diseases. In this study, hand washing practice before meal was least in this study. Critical hand washing was preferred as the best washing practices but it was not high in this study. The study revealed that personal hygiene with regards to hand hygiene (washing with soap and clean fingernails) and regular bathing were not properly been practiced by the households. The result shows. This is incongruent with the report by OCHA (2004) stated that colossal number of people practiced good hygiene, which revealed that more than half (54%) of the global population maintained good personal hygiene.

Important time to wash hands

Regarding important time to wash hands, the analysis shows majority opinion among the respondents from the study LGAs claimed to wash hands before meal 38%, after defecation 18.6% and after cleaning children's faeces 9.4%. Small percent or respondents admitted to wash hands after meal 8.9% and others 4.1%. Improved hand hygiene has been recognized as an essential public health measure. Thus, proper hand washing remains the most effective way of removing germs and harmful bacteria from our hands. This, in turn, helps to prevent the spread of diseases and keeps our environment safe, fresh, and clean.

Opinion on items for washing hand after cleaning child defecation

The opinion of the respondents regarding washing their hands after cleaning child defecation, the result shows on average, 49.2% reported using water and soap, those who said only water 19%, water and ashes 6.9%, 3.7% sand and water 3.7% and others 0.1%.

Functional hand hygiene facility within 5 meters of latrine

Regarding functional hygiene facility within 5 meters of latrine in households, majority 48.7% reported yes while 30.2% said there was no functional hand hygiene facility within the short distance.

Hygiene practices

Awareness of personal hygiene practice in households, the result shows close to 44.2% of the respondents reported bathing, 17.5% washing clothes, 13.7% weaving and or cutting of hair and 3.5% cutting of nails were practices referred to as household and environmental hygiene by the respondents. This level of awareness is common to all the studied LGAs as shown in Table 12.

Section H: Site Check Observations

This section presents information on physical observations around the compound.

Table 13: Type of faeces around the premises

Type of Faeces	Bama (%)	Chibok (%)	Kaga (%)	Total (%)
Infant/young children's faeces	34.3	35	28.3	25.7
Adult's faeces	20	21.7	23.4	17.1
Cow dung/other animal excreta	45.7	43.3	48.3	36.1
Toilet Type	Bama (%)	Chibok (%)	Kaga (%)	Total (%)
Traditional pit toilet	59.3	56.7	50	43.7
Dig, defecate and bury in soil	5	11.7	7	23.7
Improved pit toilets	18.6	23.3	21	16.6

VIP toilets	5	8.3	7	5.3
Water closet toilets	12.1	0	15	7.1
Place of Defecation	Bama (%)	Chibok (%)	Kaga (%)	Total (%)
Around the house	10.7	20.8	27.5	15.5
In the potty/chamber pot	12.1	10.8	4.2	0.7
In the toilet	20	31	50	26.6
In the pampers	54.3	36.7	7.5	25.9
Within the compound	2.9	0.7	15	4.9
Others	0	0	0	0
Disposal Method	Bama (%)	Chibok (%)	Kaga (%)	Total (%)
Dropped into a toilet facility	62.9	72.5	70.3	54.1
Eaten by animals	9.3	5.5	4.2	5
Buried in the soil	8.6	5	9.7	6.1
Thrown into the bush	1.4	7.8	2.8	3.2
Disposed with solid waste	16.4	8	10.8	9.3
Do nothing / left it there	1.4	1.2	2.2	1.3

Source: Field Survey, 2025

Site check observations

Type of faeces around the premises

During the survey, most commonly observed faeces in the premises of the households and water sources are 31.6% Cow dungs/other animal excreta, 25.7% Infant / young children's faeces and 17.1% adults' faeces. It also observed that during the survey of the communities in the three LGAs, Cow dung / other animal excreta were commonly practice in Kaga 48.3% and Infant / children's faeces were conspicuous seen in the premises in Bama, while adult's faeces was prevalent in Kaga.

Type of toilet observed in households

Physical observations shows traditional pit toilet system 43.7% were the most common form of basic toilet facility observed in households, use by nearly a half of total population in all the communities of the three LGAs. This is because. These facilities are used because they are not expensive, with maintenance at ease and some respondents cannot afford standard toilets facilities.

The check observations further reveals dig, defecate and burry in soil 23.7%. Toilet facility is not commonly available in these communities to the global standard, likely because majority of the population lives in traditional buildings which have not been constructed with modernized toilet facilities. However, the data indicates those use improved pit toilets 16.6%, while water close toilets 7.1% and VIP toilets 5.3%. The result shows Bama having the highest number of households using the Traditional pit toilet while improved pits and VIP toilets were both highest in Chibok 23.3% and 8.3% while water close toilet were observed to be 15% and 12.1% in Kaga and Bama LGAs respectively. Although the pits latrine represent a step up from open defecation, many pit latrines are unimproved or poorly constructed. These conditions pose hygiene and safety risks, especially in areas prone to flooding or with high water tables, where contamination of groundwater is a concern.

Children under-5 defecation

Regarding children's under - 5 defecation, it was observed that children's defecate in the toilet 26.6% is the most common practice observed, which similar in all the areas surveyed. Those defecate in pampers 25.9%,

around the house 15.5% in the potty or chamber pot 7.1% and within the compound 4.9%. The result further demonstrates defecation in pampers is most common in Bama 54.3%, Chibok 36% and Kaga 7.5%. Also, defecation in the toilets were more frequent in Kaga 50%, Chibok 31%, and Bama 20% respectively. Around the house 27.5% and within the compound 15% were both common in Kaga. The use of potty/chamber pot is more frequent in Bama 12.1%) and Chibok 10.8%. Despite the widespread use of unimproved facilities, the proportion of households using open defecation is generally low 4.9% within compounds across the three LGAs. This result is consistent with the outcome of research by IMPACT, 2021 which very low percent of open defecation by residents in Borno State.

Understanding of disposal of children's faeces

The descriptive analysis on perception of respondent's shows 54.1% reported dropped into toilet facility and was the commonest disposal method in all the communities surveyed. Disposed with solid waste 9.3% and some respondents 6.1% claimed that they buried in the soil. In the households, 5% said eaten by animals, 3.2% and thrown into the bush and do nothing or left it there were 1.3% respectively. This system of waste disposal implies that it does not only destroy the aesthetics of the environment, but it also attracts vectors of various diseases, which can pose a severe health risk to the residents of such locality because it causes serious air and water pollution in the environment.

DISCUSSIONS

The overall analysis of WASH practices in the study areas show various sources of water for water supply across the selected L.G.As communities. This implies various sources of water supply in the study communities are generally utilized equally across the selected communities of three senatorial zones of Borno State. Clean source of drinking water is essential to healthy living (IWA/WHO, 2011). In the study area, water supply has been insufficient in all communities surveyed, Water, sanitation and hygiene (WASH) conditions are being driven by the ongoing insurgency, climate change and desertification, and associated displacement. This is likely driven by poor access to improved sanitation, water quality issues, and low levels of access to basic hygiene.

However, this narrative have been changed with increased community participation and the perceived inclusiveness of the intervention programs by NGOs and private individuals such as such as I.C.R.C in Bama, MOI in Kaga and others in providing water supply facilities such as solar powered bore holes, hand dug wells, hand washing facilities among others in the surveyed areas (Figure 2, 3 & 4). However, these facilities are inadequate and functional because of the intervention programs across the communities. Thus, these communities now largely depend on relatively protected boreholes for drinking water supply. These interventions significantly improved access to clean water and sanitation for hundreds of thousands of residents, contributing to better health outcomes, reduced disease transmission, and enhanced dignity and quality of life particularly for women and children.

The solar-powered boreholes, in particular, offer a sustainable and energy-efficient solution, ensuring continuous access to water even in remote or off-grid communities. This report on the use of protected bore holes and hand dug wells is contrary to studies in arid regions by Mustapha *et al.*, (2022); Kurui *et al.*, (2019) and Morales *et al.*, (2020), where most communities consumed unprotected springs, subterranean water and unprotected wells as their major water source.

The study shows large participation of young girls and boys in fetching water in this study is consistent to the practice in Nigeria and in many African countries, where women and children were mainly the group responsible for fetching water (Mustapha *et al.*, 2022; Adeleye *et al.*, (2014), Across the studied communities, children and women's involvement in water fetching was essentially based on cultural practices. The water stress in the study area has subjected many young girls and women in the communities to hardship of water fetching as it affects many of their other livelihood activities (Adeleye *et al.*, 2014).

This study demonstrates that various storage facilities were used and that storage facilities were mostly covered by majority of the respondents. The findings show most commonly used facility is plastic cover

container. This is similar to reports by Reddy *et al.* (2017); Pradhan *et al.* (2018); and Semugabo *et al.* (2019) and Sridhar *et al.* (2020). Household water collection and storage practices are integral to safeguarding waterborne disease infections (Mbuka-Nwosu *et al.*, 2022).

General perception regarding items used in fetching drinking water from storage facility shows quite a large number of respondents reported cups with handles (50%) were mainly used to fetch water as, which is critical in avoiding tendencies of household water recontamination (Edokpayi *et al.*, 2018). The result shows very low perception of cleaning storage facility as vast majority of respondents 28.6% said they clean their water storage facility when dirty was seen higher in all the LGAs, uncovered and uncleansed storage containers make water vulnerable to contamination and diseases (Meierhofer *et al.*, 2019).

This study shows various methods were used for water treatment. Chlorination was the commonest method used among households (36.9%) while 22.2% of respondents used boiling method because it was relatively cheap and quite effective especially in the rural areas. 9.8% of participants stated they practices treating their water through filtration method. This method was relatively cheap and quite effective, particularly with less turbid water (Okwadha and Ahmed, 2017), therefore, preventing the outbreak of bacterial diseases (Huq *et al.*, 2010).

The study also shows responses on water treatment practices were generally low as most participants did not treat their household's water for drinking. The absence of home treatment practices is consistent with many communities across developing countries, as shown by various researchers (SNRA, 2024; Mustapha *et al.*, 2022; Mbuka-Nwosu *et al.*, 2022; Genet and Desta, 2017; Bitew *et al.*, 2017), especially in the rural areas. The practice was however, less frequent in the study areas as quite a large proportion has not treated water for more than a week, similar to Mustapha *et al.* (2022) report. Improvements in drinking water through household water treatment can significantly reduce waterborne disease infection and transmission among people (WHO/UNICEF, 2019). Most respondents stated the reason for not treating their water for drinking, replied that water was clean and safe to drink.

The study shows lack of unimproved toilet facilities in the study areas have led participants to the improper practice of open defecation both in communities and at households, which is a serious public health and environmental consequences (Bawankule *et al.*, 2017). The study identified some environmental sanitation facility challenges such as shared household toilet facilities, inconsistency in cleaning, and odour from the toilet facility within households. This is congruent to studies in developing countries (Orimoleye *et al.*, 2015; Reddy *et al.*, 2017) that shows the practice of improper excreta disposal, especially around water sources that may dispose communities to water disease (Okullo *et al.*, 2017).

This is not unconnected with low income level of most respondents was the reason for unavailability of improved toilets. This assertion agrees with the results of Sridhar *et al.* (2020). Poverty is one of the major barriers to WASH access and affordability among people (NSC, 2022). Although children's faeces were largely perceived harmful, children were commonly defecating around the houses and the faeces were disposed improperly in the bush. This finding is similar a study by Sridhar *et al.* (2020) in Kaduna, Northwestern Nigeria, where majority disposed children's faeces in a toilet facility. However, it sharply contradicts the report of Mustapha *et al.* 2022 in Sokoto, Semi-Arid, Northwestern Nigeria.

Regarding personal hygiene practice, this study shows a very low level hygiene practice, as few participants responses indicates using water and soap for hand washing after defecating and cleaning children's faeces, which could transmit disease and cause illness (Dey *et al.*, 2019). This findings contradicts other studies in Nigeria by Mustapha *et al.* (2022) in Sokoto, Sridhar *et al.* (202) in Kaduna; Miner *et al.* (2016) in Jos and Orimoleye *et al.* (2015) in Ibadan in which hand washing with soap was largely practiced.

This finding revealed a low level of knowledge of household and environmental hygiene in the study areas, as quite a large number of respondents clean their compounds. However, indiscriminate dumping was a common waste disposal practice and water stagnation within and around water points was largely reported and observed. The stagnant water could lead to proliferation of mosquitoes and consequently occurrences of high malaria as perceived in the communities. Also, in the study areas, majority of the respondents said typhoid and

diarrhea were the common perceived household and communities' illnesses across the surveyed areas. This could be attributed to bad environmental hygiene practices such as water stagnation around the premises and the high use of water from unsafe sources of unprotected wells, this in tandem with low level practice of effective water treatment practices.

CONCLUSION

This study established that water supply is fairly adequate largely due to involvement of Non-Governmental Organizations and private individuals on intervention programs that provides vast majority of the people with water supply from boreholes. This could be attributed to solar powered boreholes from interventions that constantly pumping water from the boreholes to the overhead tanks is still a significant issue. These WASH intervention programs have immensely contributed to public health, social stability, and resilience in semi-arid Borno. The analysis reveals that inadequate infrastructure is key to persistent WASH challenges, particularly across all the surveyed communities, resulting to poor health conditions and bad economic opportunities. The knowledge and practice of Water, Sanitation and Hygiene (WASH) in the surveyed areas is still poor. The knowledge of WASH and practices of Water, Sanitation and Hygiene (WASH) at those selected communities are critically poor.

The results of this study have well provided useful information on the consequences of poor hygiene practices and sanitation facilities for both residents and authorities. The data can serve as a blueprint to the government or private organizations working towards upgrading the standard of WASH practices in the state. It will also help in identifying gaps and challenges in the provision of Water, Sanitation, and Hygiene practices and offer recommendations.

RECOMMENDATIONS

1. There is need for collaborative effort that encourages participation of government, private sector partners and local communities to invest in water infrastructure, enhance sanitation services, and support hygiene education initiatives.
2. Public and private stakeholders should advocate and encourage community participatory sanitation and hygiene practice activities at households, community and state at large.
3. A behavioural change is needed among residents to have the knowledge of good WASH practices. WASH education and financial empowerment are necessary towards protecting public health in the study area. .
4. The need for construction of standardized latrines and hygiene education for community members to help them develop good hygiene practices, particularly for women and children responsible for water collection.
5. Installation and setting up of maintenance and management systems for drinking water points and the implementation of hygiene and sanitation trainings as well as close collaboration with local authorities for the management and maintenance of the installed systems.
6. Seasonal monitoring of water sources and consumption patterns would help assess variability and risk throughout the year.

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