

# Diarrheal Disease Burden and Risk Factors Among Under-Five Children in Moro Local Government Area, Kwara State, Nigeria

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## Abstract:

### ➤ *Background:*

Diarrheal disease is still a major public health concern, particularly among children under-five in low-resource areas. It is responsible for high rate of illness and deaths of children mainly in developing countries.

### ➤ *Objectives:*

To determine the prevalence and associated risk factors of Diarrheal disease among children under five years of age in selected communities in Moro Local Government Area, Kwara State, Nigeria.

### ➤ *Methods:*

This descriptive cross-sectional study was conducted in three communities in Moro LGA, Kwara State, Nigeria. It included 410 caregivers of children under five years. A multi-stage sampling technique was used to select participants. Data were collected using a pretested, semi-structured, interviewer-administered questionnaire. Analysis was performed with SPSS version 26.0. Descriptive statistics and chi-square tests ( $p < 0.05$ ) were employed.

### ➤ *Results:*

Two-week prevalence of diarrhea was 22.2% ( $n = 91$ ). Among affected children, 80.2% had 2–3 episodes, with 66.3% exhibiting fever and 70.0% showing signs of dehydration. Environmental risk factors included the use of untreated well water (44.6%) and uncovered water storage (31.7%). Only 53.7% of households had hand-washing facilities. While 87.8% of caregivers sought medical care, only 34.2% did so immediately. Antibiotic use (56.1%) was more common than the use of oral rehydration solution (ORS) (34.4%) and Zinc tablet (9.4%). Households with more than three under-five children had poorer hygiene and higher diarrhea prevalence due to resource constraints and caregiver fatigue.

### ➤ *Conclusions:*

Significant associations were found with socio-demographic factors, environmental risks, and poor hygiene practices. Healthcare-seeking behavior was high (87.8%), but gaps existed in ORS use and preparation. Recommendations include improving water safety, sanitation, caregiver education, and adherence to WHO guidelines for diarrheal management.

**Keywords:** Diarrhea, Healthcare-Seeking behavior, Hygiene, Malete, Nigeria, Prevalence, Sanitation, Under-five children.

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## I. INTRODUCTION

Diarrheal diseases remain a significant public health issue, resulting in 1.7 billion cases and 325,000 deaths per year among children aged less than five years, with a substantial proportion of cases recorded in sub-Saharan Africa (1,2,3). The contribution of diarrheal disease among children under five years in Nigeria constitutes 16% of the mortality rate, with 0.27 DALYs lost per 1,000 under-five children, and a prevalence rate of 2% in Kwara State (4,5). Sanitation and access to potable water have been noted to contribute to the high burden of morbidity and mortality associated with this condition, in addition to socioeconomic factors (6,7,8). Various factors, such as environmental, socio-economic, and behavioral factors, have been identified as potential determinants of diarrheal diseases (1,9). Lack of clean water supply and poor sanitation increase susceptibility to the condition, while maternal education has proven to be an essential determinant, with mothers being more knowledgeable about how to avoid or control childhood diarrheal disease (1,9). Other socio-economic factors include poverty and overcrowding (10,11). Addressing these factors is vital to reducing diarrheal morbidity and mortality in vulnerable populations, thereby underscoring the need for this study.

The main objective of this study was to determine the prevalence, associated risk factors, hygiene practices, and health care seeking behaviors for children aged five years and below with diarrheal disease in Moro Local Government Area (LGA), Kwara State, Nigeria. Specifically, the study was conducted to address the significant burden of diarrheal disease among children under five in three communities where data is lacking. The study is also expected to generate important evidence for addressing the modifiable risk factors, provide knowledge for designing relevant health educational campaigns, strengthen the primary health care system in Moro LGA, formulate policies on how resources should be allocated, and achieve the international child survival goals (12,13). Based on this background, the following hypothesis is made for this study: there is no significant relationship between socio-demographic characteristics and the prevalence of diarrhea diseases among children aged five years and below in selected communities within Moro LGA of Kwara State, Nigeria.

## II. MATERIALS AND METHODS

### ➤ *Study Design and Setting:*

This study adopted a community-based cross-sectional research design and was conducted in three communities (Asomu, Malete, and Elemere) in Moro Local Government Area, Kwara State, Nigeria. The LGA is a rural setting with a population of approximately 206,000, where agriculture (mainly fish farming) is the primary economic activity. The area has healthcare facilities, including primary health centers and hospitals, and is characterized by vulnerable socioeconomic groups and ethnic diversity.

### ➤ *Participant Selection and Sample Size Determination:*

For the study, a total of 410 respondents were selected as the study population. These were mothers or fathers of children below five years living in the selected communities for  $\geq 6$  months, available on the day of the survey, and who gave their informed consent to participate in the study. A multi-stage sampling technique was adopted in this study, where the following criteria were used: 1) Simple random sampling of wards ( $n=3$ ); 2) systematic random sampling of communities ( $n=1$ ) within wards; 3) systematic random sampling of households in communities. The sample size was determined based on a prevalence rate of 62.4% from a previous study (12), 95% confidence level, and 5% margin of error. Based on the calculations, a minimum of 361 respondents was required, which was adjusted to 410 for increased power.

### ➤ *Instrument for Data Collection:*

A semi-structured, pretested questionnaire was used for data collection. The questionnaire was divided into five main parts: A) Socio-demographic data; B) Prevalence of diarrheal disease among children aged five years and below; C) Factors influencing the occurrence of diarrheal disease; D) Hygiene and sanitation practices of caregivers; E) Healthcare seeking practices related to diarrheal disease. The tool was validated and prepared in the English language and translated into the Yoruba language for data collection. It was then translated back to the English Language before data entry. Data collection took four weeks from February 2026 to March 2026 and was done through face-to-face interviews of respondents carried out by nine research assistants (3 per selected community). The questionnaire takes about 25 - 30 minutes to be completed by the research assistant.

### ➤ *Analysis of Data:*

All collected data were coded and analyzed using Statistical Package for Social Sciences Software (SPSS v26). Descriptive statistics (tables and charts) were used in the presentation of respondent characteristics, prevalence rate, and practices. Associations between variables such as prevalence of diarrhea and demographic characteristics, hygiene practices, etc., were tested using the chi-square test at 95% confidence level.

### ➤ *Ethical Considerations:*

The study was approved by the Ethical Review Committee of the Kwara State Ministry of Health (ERC/MOH/2026/02/596), Ilorin. Voluntary participation was assured, and informed consent was obtained from the caregivers of children aged five years and below in the selected communities at the onset of the survey. Anonymity and confidentiality of all data collected were guaranteed for the whole duration of the study.

## III. RESULTS

### ➤ *Sociodemographic Profile:*

About two-thirds were female (58.3%), married (57.3%), and within the age range of 30 and above (35.1%). Educationally, a significant proportion of caregivers had secondary (36.8%) and tertiary (42.2%) education, and more

than half are farmers by occupation (56.1%), as shown in Table 1.

➤ *Prevalence of Diarrhea:*

The prevalence of diarrhea in two weeks was 22.2%, and the majority of the children affected had diarrhea for 2–3 times (80.2%), which lasted for 2–3 days (48.3%). Over two-thirds of the children having diarrhea also presented symptoms of fever (66.3%) and dehydration (70.0%) as indicated in Table 2.

➤ *Factors Related to Diarrhea:*

Almost half of the study participants (44.6%) mainly use well water as a source of their drinking water, and more than half of such respondents keep them in open containers (31.7%). In addition, more than a third of the study participants (40.7%) did not treat their water, and those who did (59.3%) treated them by boiling (75.7%). More than two-thirds of the mothers (66.1%) gave exclusive breastfeeding to their child and 89.3% initiated complementary feeding after six months, as seen in Table 3.

➤ *Hygiene and Sanitation Practices:*

As shown in Table 4, the majority (92.7%) of the caregivers have access to toilet facilities in their households, but a significant number of respondents still practice open defecation (11.7%) or other unsafe faeces disposal, like using

the bush (5.6%). Only about half (53.7%) of households had handwashing facilities, and among these, only about one third (28.8%) used soap and water (Figure 1). Overall, close to two-thirds (56.5%) of caregivers demonstrated good hygiene and sanitation practices, and more than one-third (43.4%) had poor practices. (Figure 2).

➤ *Healthcare Seeking Behavior and Home Management Practices:*

Most caregivers (87.8%) sought healthcare during their child’s last diarrhea episode, primarily at primary health centers (60.8%), and close to one third (27.5%) opted for private clinics. Only a third (34.2%) sought care immediately; most delayed for at least one day (58.6%), and more than half (56.1%) got antibiotic treatment for the diarrhea, followed by oral rehydration salts (34.4%), and less than one tenth (9.4%) used zinc tablets. Notably, only one third (34.9%) of caregivers knew how to prepare ORS, despite the majority (94.6%) reporting prior health education, as shown in Table 5.

Significant associations were found between hygiene practices and caregiver sex, marital status, education level, and community (p = 0.001), as shown in Table 6, and between prevalence of diarrhea and sociodemographic characteristics, as seen in Table 7.

Table 1 Respondents’ Socio-Demographic Characteristics N= 410

Characteristics	Frequency (%)
<b>Age groups</b>	
Below 25	136 (33.2)
25 – 29	130 (31.7)
30 and above	144 (35.1)
<b>Sex</b>	
Male	171 (41.7)
Female	239 (58.3)
<b>Marital status</b>	
Single	83 (20.2)
Married	235 (57.3)
Widowed	33 (8.0)
Divorced	10 (2.4)
Separated	49 (12.0)
<b>Educational level</b>	
None	46 (11.3)
Primary school	40 (9.8)
Secondary school	151 (36.8)
Tertiary education	173 (42.2)
<b>Occupation</b>	
Civil servant	43 (10.5)
Personal business	40 (9.8)
Housewife	27 (6.6)
Farming	230 (56.1)
Artisan	70 (17.1)
<b>Religion</b>	
Islam	225 (54.9)
Christianity	165 (40.2)
Traditional	20 (4.9)
<b>Community</b>	

Elemere	215 (52.4)
Malete	57 (13.9)
Asomu	138 (33.7)

Table 2 Prevalence of Diarrhea N= 410

Responses	Frequency (%)
<b>Child has had diarrhea in the past 2 weeks</b>	
Yes	91 (22.2)
No	319 (77.8)
<b>Number of diarrhea episodes N = 91</b>	
1	10 (11.0)
2 – 3	73 (80.2)
More than 4	8 (8.8)
<b>Period of the most recent episode</b>	
1 day	168 (41.0)
2 – 3 days	198 (48.3)
4 – 5 days	44 (10.7)
<b>Diarrhea was accompanied by:</b>	
Vomiting	
Yes	64 (15.6)
No	346 (84.4)
Fever	
Yes	272 (66.3)
No	138 (33.7)
Dehydration (e.g., sunken eyes, dry mouth, etc.)	
Yes	287 (70.0)
No	123 (30.0)

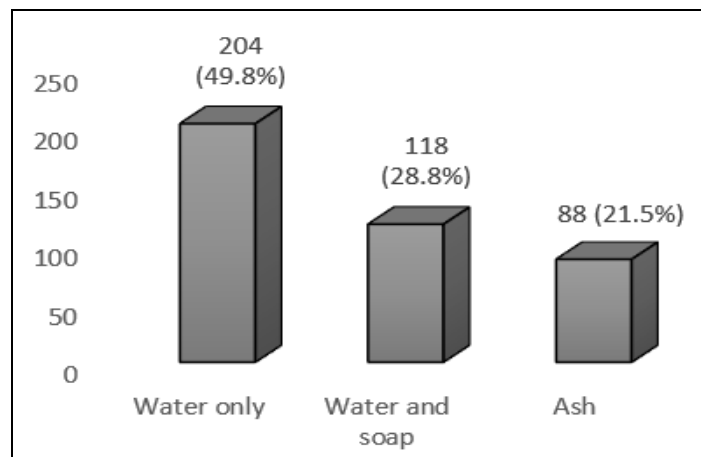


Fig 1 Materials Used for Hand Washing by Caregivers

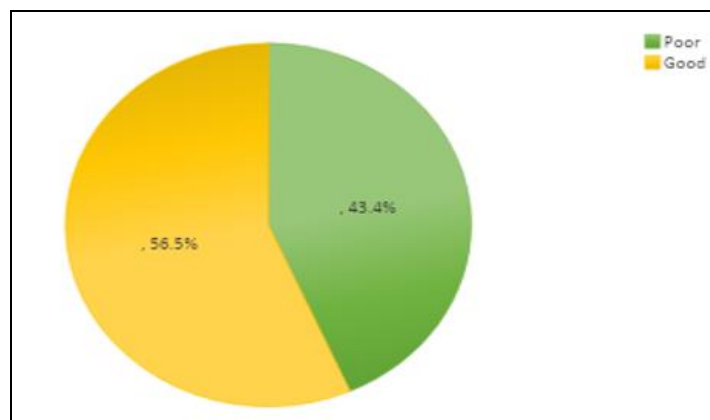


Fig 2 Hygiene and Sanitation Practices

Table 3 Factors Associated with Diarrhea N= 410

Responses	Frequency (%)
<b>Main source of drinking water</b>	
Tap/Borehole	116 (28.3)
Well	183 (44.6)
River/stream	38 (9.3)
Sachet/Bottled water	73 (17.8)
<b>Treats drinking water</b>	
Yes	243 (59.3)
No	167 (40.7)
<b>Method of water treatment N = 243</b>	
Boiling	184 (75.7)
Filtration	15 (6.2)
Chlorination	9 (3.7)
<b>Storage for drinking water</b>	
Covered container	280 (68.3)
Uncovered container	130 (31.7)
<b>Child was exclusively breastfed for the first 6 months</b>	
Yes	271 (66.1)
No	139 (33.9)
<b>Age of introduction of complementary feeding (in months)</b>	
3	3 (0.7)
4 – 5	41 (10.0)
6 and above	366 (89.3)

Table 4 Hygiene and Sanitation Practices N= 410

Responses	Frequency (%)
<b>Have access to a toilet facility</b>	
Yes	380 (92.7)
No	30 (7.3)
<b>Type of toilet facility used in household</b>	
Water closet	281 (68.5)
Pit latrine	106 (25.9)
Bush	23 (5.6)
<b>Method of disposal of faeces</b>	
Flush toilet	296 (72.2)
Pit laterine	66 (16.1)
Open Defecation	48 (11.7)
<b>Have hand washing facility at home</b>	
Yes	220 (53.7)
No	190 (46.3)
<b>Time of hand washing</b>	
After using the toilet	280 (68.3)
Before preparing food	65 (15.9)
Before feeding child	65 (15.9)
<b>Frequency of cleaning child's feeding utensils</b>	
After every use	250 (61.0)
Occasionally	152 (37.1)
Rarely	8 (2.0)
<b>Disposal site of household waste</b>	
Designated refuse dump	231 (56.3)
Backyard	93 (22.7)
Bush	43 (10.5)
Others	43 (10.5)

Table 5 Healthcare-Seeking and Home Management Practices N= 410

Responses	Frequency (%)
<b>Sort healthcare during the last episode of your child’s diarrhea</b>	
Yes	360 (87.8)
No	50 (12.2)
<b>Place of health service N = 360</b>	
Primary health center	219 (60.8)
Private clinic	99 (27.5)
Pharmacy	30 (8.3)
Traditional healer	3 (0.8)
Home care	9 (2.5)
<b>Period after onset of symptoms before seeking care</b>	
Immediately	123 (34.2)
After 1 day	211 (58.6)
After 2 – 3 days	24 (6.7)
After more than 3 days	2 (0.6)
<b>Treatment given</b>	
ORS	124 (34.4)
Zinc tablets	34 (9.4)
Antibiotics	202 (56.1)
<b>Increased the child’s fluid intake during the illness</b>	
Yes	349 (85.1)
No	61 (14.9)
<b>Continued feeding the child during diarrhea</b>	
Yes	335 (81.7)
No	75 (18.3)
<b>Knows how to prepare ORS at home</b>	
Yes	143 (34.9)
No	267 (65.1)
<b>Once received health education on diarrheal disease prevention</b>	
Yes	388 (94.6)
No	22 (5.4)
<b>Place of training N = 388</b>	
Health facility	124(32.0)
Community program	87 (22.4)
Media	137 (35.3)
Others	40 (10.3)

Table 6 Association Between Socio-Demographic Characteristics and Hygiene and Sanitation Practices

Variables	Hygiene and Sanitation Practices		Total	χ <sup>2</sup>	p-value
	Yes (%)	No (%)			
<b>Age</b>				2.562	0.278
Below 25	62 (45.6)	74 (54.4)	136		
25 – 29	49 (37.7)	81 (62.3)	130		
30 and above	67 (46.5)	77 (53.5)	144		
<b>Sex</b>				12.136	<b>0.001</b>
Male	57 (33.3)	114 (66.7)	171		
Female	121 (50.6)	118 (49.4)	239		
<b>Marital status</b>				49.269 <sup>f</sup>	<b>0.001</b>
Single	50 (60.2)	33 (39.8)	83		
Married	114 (48.5)	121 (51.5)	235		
Widowed	9 (27.3)	24 (72.7)	33		
Divorced	0 (0.0)	10 (100.0)	10		
Separated	5 (10.2)	44 (89.8)	49		
<b>Educational level</b>				10.958 <sup>f</sup>	<b>0.025</b>
None	16 (35.0)	30 (65.0)	46		
Primary school	19 (47.5)	21 (52.5)	40		
Secondary school	80 (53.0)	71 (47.0)	151		

Tertiary education	63 (36.4)	110 (63.6)	173		
<b>Occupation</b>					
Civil servant	20 (46.5)	23 (53.5)	43		
Personal business	13 (32.5)	27 (67.5)	40		
Housewife	26 (96.3)	1 (3.7)	27		
Farming	17 (29.3)	41 (70.7)	58		
Artisan	25 (35.7)	45 (64.3)	70		
Other	77 (44.8)	95 (55.2)	172		
<b>Religion</b>				10.467 <sup>f</sup>	<b>0.001</b>
Islam	112 (49.8)	113 (50.2)	225		
Christianity	62 (37.6)	103 (62.4)	165		
Traditional	4 (20.0)	16 (80.0)	20		
<b>Under 5 children</b>				39.384 <sup>f</sup>	<b>0.001</b>
1	67 (46.9)	76 (53.1)	143		
2	69 (60.0)	46 (40.0)	115		
3	42 (31.6)	91 (68.4)	133		
4	0 (0.0)	19 (100.0)	19		
<b>Age of the under-five child in the household (in months)</b>				0.165	0.921
6 and below	31 (41.3)	44 (58.7)	75		
7 – 12	102 (43.8)	131 (56.2)	233		
More than 12	45 (44.1)	57 (55.9)	102		

*f* – Fisher’s exact value

Table 7 Association Between Socio-Demographic Characteristics and Prevalence of Diarrhea

Variables	Prevalence of Diarrhea		Total	χ <sup>2</sup>	p-value
	Yes (%)	No (%)			
<b>Age</b>				9.665	<b>0.008</b>
Below 25	25 (18.4)	111 (81.6)	136		
25 – 29	41 (31.5)	89 (68.5)	130		
30 and above	25 (17.4)	119 (82.6)	144		
<b>Sex</b>				0.064	0.801
Male	39 (22.8)	132 (77.2)	171		
Female	52 (21.8)	187 (78.2)	239		
<b>Marital status</b>				28.556 <sup>f</sup>	<b>0.001</b>
Single	17 (20.5)	66 (79.5)	83		
Married	60 (25.5)	175 (74.5)	235		
Widowed	3 (9.1)	30 (90.9)	33		
Divorced	8 (80.0)	2 (20.0)	10		
Separated	3 (6.1)	46 (93.9)	49		
<b>Educational level</b>				18.050 <sup>f</sup>	<b>0.001</b>
None	3 (6.5)	43 (93.5)	46		
Primary school	3 (7.5)	37 (92.5)	40		
Secondary school	33 (21.9)	118 (78.1)	151		
Tertiary education	52 (30.1)	121 (69.9)	173		
<b>Occupation</b>				40.709 <sup>f</sup>	<b>0.001</b>
Civil servant	13 (30.2)	30 (69.8)	43		
Personal businesses	4 (10.0)	36 (90.0)	40		
Housewife	18 (66.7)	9 (33.3)	27		
Farming	9 (15.5)	49 (84.5)	58		
Artisan	22 (31.4)	48 (68.6)	70		
Other	25 (14.5)	147 (85.5)	172		
<b>Religion</b>				6.086 <sup>f</sup>	<b>0.044</b>
Islam	60 (26.7)	165 (73.3)	225		
Christianity	29 (17.6)	136 (82.4)	165		
Traditional	2 (10.0)	18 (90.0)	20		
<b>Community</b>				21.610 <sup>f</sup>	<b>0.001</b>

Elemere	30 (14.0)	185 (86.0)	215		
Maleta Safari	19 (39.6)	29 (60.4)	48		
Isale gbari	4 (44.4)	5 (55.6)	9		
Asomu	38 (27.5)	100 (72.5)	138		
<b>Under 5 children</b>				9.453 <sup>f</sup>	<b>0.022</b>
1	37 (25.9)	106 (74.1)	143		
2	32 (27.8)	83 (72.2)	115		
3	18 (13.5)	115 (86.5)	133		
4	4 (21.1)	15 (78.9)	19		
<b>Age of the under-five child in the household (in months)</b>				6.718	<b>0.035</b>
6 and below	22 (29.3)	53 (70.7)	75		
7 – 12	55 (23.6)	178 (76.4)	233		
More than 12	14 (13.7)	88 (86.3)	102		
<b>Sex of the child</b>				0.172	0.679
Male	53 (22.9)	178 (77.1)	231		
Female	38 (21.2)	141 (78.8)	179		

<sup>f</sup> – Fisher’s exact value

#### IV. DISCUSSION

This study examined the incidence and associated factors of diarrhea diseases in children below the age of five years in selected communities in Moro LGA of Kwara State, Nigeria. The demographic profile of the respondents shows that the majority were female (58.3%), married (57.3%), and within the age range of 30 and above (35.1%). This is similar to findings by Workie et al. (12) and Desmennu et al. (13), which showed that women, especially married ones, serve as primary caregivers responsible for child hygiene and nutrition. Educationally, a significant proportion of caregivers had secondary (36.8%) and tertiary (42.2%) education, indicating a moderately literate population. However, higher education levels did not always correspond with better child health outcomes. This aligns with Desmennu et al. (13), who reported that while maternal education improves awareness of diarrheal disease prevention, socio-cultural and structural barriers often limit behavioral change and health outcomes.

The two-week prevalence of diarrhea was 22.2%, comparable to findings in the Awi Zone, Ethiopia (23.1%) by Adam Birhan et al. (14) and in Niger (21%) by Koko et al. (15). Most affected children had 2–3 episodes (80.2%) lasting 2–3 days (48.3%), showing diarrhea’s recurrent nature and the likelihood of repeated exposure to contamination sources. Furthermore, more than two-thirds of the diarrhea episodes were accompanied by fever (66.3%) and signs of dehydration (70.0%), which are signs of moderate to severe diarrhea as per WHO guidelines (1). Timely diagnosis and treatment are essential to avoid more complex complications such as malnutrition and death. There were several significant relationships noted in this study linking diarrhea prevalence and caregivers’ age, marital status, educational qualification, occupation, religion, community, and number of under-five children. It is noteworthy that children of divorced mothers (80.0%) and those with tertiary education (30.1%) had higher prevalence rates, which could suggest better symptom recognition and accurate reporting, as noted

by Mekonnen et al. (16), who emphasized that informed caregivers may identify and report illnesses more accurately.

Findings on sources of drinking water revealed that close to half of households used well water, 28.3% use tap or borehole water, and only 17.8% used sachet or bottled water. Despite this, 40.7% did not treat their water, highlighting a major risk for waterborne infections. Adamu et al. (17) emphasized that even borehole water can be unsafe if mishandled or improperly stored. Although 59.3% treated their drinking water, primarily through boiling, many still stored drinking water in uncovered containers, raising contamination risks. This is against the recommendations of UNICEF (18), which underscores the importance of post-treatment water safety and storage. Feeding practices were largely positive as more than two-thirds (66.1%) of mothers exclusively breastfed their child, while the majority (89.3%) also initiated complementary feeding at six months or later. These practices are in line with WHO recommendations (1) and are known to lower the risk of gastrointestinal infection. Nonetheless, the 33.9% who did not exclusively breastfeed remain more vulnerable to diarrhea, a point stressed by Workie et al. (12), who noted the protective value of exclusive breastfeeding.

Despite 92.7% of households having toilet facilities, 11.7% still practiced open defecation or unsafe feces disposal. Pit latrines (25.9%) and uncovered water storage containers contribute to unhygienic environments. Similar patterns were found in a study by Ndueso et al. (19), which linked inadequate sanitation and hygiene to increased diarrheal prevalence among children under five in Nigeria. Only 53.7% of households had handwashing facilities, and among these, 49.8% used water alone, and 21.5% used ash (Figure 1). Although ash is traditionally used in many communities, it is less effective than soap. This echoes findings from Thiam et al. (20), who reported a strong correlation between inconsistent handwashing practices and diarrhea incidence in children under five.

As shown in Figure 2, close to half (43.4%) of caregivers still had poor hygiene practices. This showed a need for continuous hygiene education, particularly for households with low income or education levels. Most caregivers (87.8%) sought healthcare during diarrhea episodes, with 60.8% attending primary health centers and 27.5% opting for private clinics. However, most are delayed for at least one day, which accentuates the risk of dehydration and other complications. This trend is similar to observations made by Kombat et al. (21) and Bando et al. (22) in Ghana. In this study, hygiene practices were significantly associated with caregiver sex, marital status, education level, and community ( $p = 0.001$ ). It was also found that households with more than three under-five children had poorer hygiene and higher diarrhea prevalence, likely due to resource constraints and caregiver fatigue, similar to a pattern reported by Adam Birhan et al. (14).

Use of antibiotics (56.1%), followed by ORS (34.4%), and Zinc tablet (9.4%) formed the common mode of treatment adopted for diarrhea. However, this contradicts the guideline recommended by the World Health Organization (WHO) (1), which advocates the use of ORS and Zinc tablet for most diarrhea cases, and reserves antibiotics for confirmed bacterial infections. Over-reliance on antibiotics, as also observed by Thiam et al. (20), contributes to antimicrobial resistance risks. It was noted that only 34.9% of caregivers knew how to prepare ORS, despite 94.6% reporting prior health education. This suggests gaps in practical skill transfer wherein information may be delivered, but not adequately understood or retained. Health education from facilities (32.0%) and media (35.3%) is common but may lack interactivity, which limits effectiveness, as pointed out by Mekonnen et al. (16).

## V. CONCLUSION

It was concluded that the two-week diarrhea prevalence of 22.2% that is mostly accompanied by fever and dehydration, indicates the severity of diarrhea in these communities. Strong connections were noted between the occurrence of diarrhea among children and some socio-demographic factors like marital status, level of education, occupation, religion, under-five children in the household, and the communities of the caregivers. Risk factors related to the environment included the presence of contaminated sources of drinking water, insufficient water purification procedures, and poor sanitation.

Although over half of caregivers practiced good hygiene, many still exhibited poor practices, which were linked to higher diarrhea rates. Female caregivers and residents of Malete demonstrated better hygiene behaviors. Healthcare-seeking behavior was generally high (87.8%), but delays were common, and antibiotics were used more frequently than ORS, contrary to WHO recommendations. Additionally, only a third of caregivers knew how to prepare ORS, pointing to gaps in practical health knowledge. These findings call for targeted interventions to improve hygiene, water safety, and caregiver education to reduce diarrheal disease in children aged five years and below

It is, thus, recommended that access to safe drinking water sources, such as boreholes and rehabilitation of existing water systems, should be prioritized. Efforts should also be directed toward the construction of improved sanitation facilities, including household and public toilets, in both rural and peri-urban communities to eliminate open defecation and reduce fecal-oral disease transmission. Healthcare providers should be trained on strict adherence to the WHO guidelines on diarrhea treatment.

In addition, caregivers should be educated on how to treat all drinking water through boiling or filtration and to store it in clean, covered containers to prevent contamination. Regular and culturally appropriate health education campaigns should be institutionalized to promote awareness of diarrheal disease prevention. These campaigns should focus on hygiene promotion, safe water handling, food hygiene, and appropriate childcare practices.

### ➤ *Limitations of the Study*

Several limitations affected the outcome of this research. The first one relates to possible recall bias in the collection of data because caregivers might provide inaccurate information regarding past diarrheal disease episodes and their sanitary practices during the past two weeks. Another limitation relates to self-reporting bias because participants can state only the information that makes them look good. Cross-sectional research does not allow for establishing strong connections between variables. Finally, this paper cannot report lab results, which leads to misdiagnosis, as diarrhea cases were diagnosed based only on the perception of the caregiver.

To address these limitations, the recall period was shortened to not more than two weeks, and confidentiality of the information was emphasized to reduce social desirability bias. Findings were interpreted as associations due to the cross-sectional design, with some triangulation for validation. A diverse sample will enhance generalizability within selected communities, and a standardized case definition with structured symptom checklists will improve the accuracy of Diarrheal case identification, with diagnostic validation for a subsample if feasible.

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### ➤ *Competing Interests*

No conflicts of interest were reported by the authors of this paper.

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