



## JOURNAL OF COMMUNITY MEDICINE AND PRIMARY HEALTH CARE

### ORIGINAL ARTICLE

#### Household Sanitation Facilities and Prevalence of Childhood Diarrhoea in a Rural Community of Oyo State, Southwest Nigeria

Aremu AO,<sup>1</sup> Akanbi IM,<sup>1</sup> Idowu A,<sup>1</sup> Mbonu CO,<sup>1</sup> Adeniran IA,<sup>1</sup> Alabi TD,<sup>1</sup> Ajisafe TL,<sup>1</sup> Ahossinme HET,<sup>1</sup> Amu OO,<sup>1</sup> Omotoso MO,<sup>1</sup> Omoyinmi OB,<sup>1</sup> Olaogun OM,<sup>1</sup> David BD,<sup>1</sup> Adeagbo AM,<sup>1</sup> Abiodun MT,<sup>1</sup> Ekomaye OM,<sup>1</sup> Akinjare OV.<sup>1</sup>

<sup>1</sup> Department of Community Medicine, College of Health Sciences, Bowen University, Iwo

#### Keywords

Sanitation,

Diarrhoea,

Services,

Childhood,

Household

Article History  
Date received: 25/04/2025  
Date accepted: 23/07/2025

#### ABSTRACT

**Background:** Childhood diarrhoea disease continues to pose a huge public health burden in most developing nations, including Nigeria. We estimated the prevalence and determinants of childhood diarrhoea and examined its associations with household sanitation services in Oyo State, Nigeria

**Methods:** This was a cross-sectional study conducted in January 2025 among 426 consenting female caregivers of under-five children who were selected using a cluster sampling method. A pretested questionnaire was used for data collection. Univariate, bivariate, and multivariate analyses were conducted at a 5% level of statistical significance. Ethical approval was obtained to conduct the study.

**Results:** The respondents had a mean age of  $27.2 \pm 11.3$  years. Childhood diarrhoea was observed in 20.2% of participants, and open defecation was practiced by 20.6% of the population. Approximately 44.6% of households had access to basic sanitation, and 23.0% had access to safely managed sanitation services. Households practicing open defecation reported a significantly higher prevalence (85.8%) of childhood diarrhoea compared to a prevalence of 25.0% in households with safely managed sanitation facilities ( $p=0.001$ ). The determinants of household basic sanitation services included educational status (Adjusted Odds Ratio [AOR]=33.75; 95% Confidence Interval [CI]=12.74 - 41.59), occupation (AOR=14.86; 95% CI=7.24-16.86), and family income (AOR=9.28; 95% CI=3.53-20.28).

**Conclusion:** Sanitation services were sub-optimal in the study setting and socio-economic factors predicted access to basic sanitation among study participants. Stakeholders should collaborate effectively to increase the proportion of households equipped with basic sanitation in rural communities, thereby reducing the incidence of childhood diarrhoea.

**Correspondence to:**  
Idowu A

Email: [idajibola@yahoo.com](mailto:idajibola@yahoo.com)

## Introduction

Diarrhoeal disease remains a major cause of childhood morbidities and mortalities in most developing nations, such as Nigeria. According to the World Health Organization (WHO) report for 2024, diarrhoea is estimated as the third most common cause of death in children aged 1-59 months and about 1.7 billion cases of the disease are diagnosed each year globally.<sup>1</sup> The report equally demonstrated that diarrhoea kills at least 443,832 under-five children and an additional 50, 851 children aged 5 to 9 years annually across the countries of the world.<sup>1</sup> According to the United Nations Children's Fund (UNICEF), diarrhoea is one of the most common causes of childhood deaths globally, causing at least 9.0 % of all childhood deaths in 2021 worldwide.<sup>2</sup> This implies that at least 1,200 young children die daily and about 444,000 children die annually from diarrhoea-related complications.<sup>2</sup> Childhood diarrhoea is widespread in sub-Saharan Africa (SSA). Analysis of Demographic and Health (DHS) reports from 34 countries estimated the prevalence of childhood diarrhoea at 18.4% in 2023.<sup>3</sup> A similar study estimated the prevalence of childhood diarrhoea in sub-Saharan Africa (SSA) at 15.3% in 2021. Furthermore, SSA was rated by UNICEF as having one of the highest childhood diarrhoea disease burdens globally.<sup>2</sup>

According to the 2018 Demographic and Health (DHS) report for Nigeria, the prevalence of childhood diarrhoea was estimated at 13.0%, with notable regional and rural-urban disparities in distribution.<sup>4</sup> In a study conducted in northern Nigeria (2017), the prevalence of childhood diarrhoea was estimated at 21.1%.<sup>5</sup> A similar study in Enugu, Southeast Nigeria, estimated childhood diarrhoea prevalence at 10.7% in 2020.<sup>6</sup> However, a study conducted in Ibadan, Southwest Nigeria, in 2020 revealed that the prevalence of childhood diarrhoea was as high as 55.0%.<sup>7</sup> Diarrhoea disease is estimated

as the third most common cause of under-five mortalities in Nigeria, accounting for 12.4% of all childhood deaths.<sup>8</sup> Studies have also reported that childhood diarrhoeal disease is largely preventable with adequate Water, Sanitation, and Hygiene (WASH) facilities and practices. A study demonstrated that sharing of toilet facilities between households was a risk factor, while proper hand washing before eating and after defecating was a protective factor against childhood diarrhoeal disease in Nigeria.<sup>6</sup> According to the WHO/UNICEF, sanitation services are grouped into five categories, ranging from open defecation to safely managed sanitation services.<sup>9</sup> According to the 2022 report of WASH National Outcome Routine Mapping (WASHNORM), only 67% of surveyed individuals had access to basic water supply and water services were adjudged as safely managed in 13.0% of Nigerian households. Similarly, only 46.0% of Nigerian households were estimated to have access to basic sanitation services, of which 18.0% were said to have been safely managed. Meanwhile, 23.0% of households practiced open defecation, and barely 17.0% had access to basic hygiene services.<sup>10</sup> The report also indicated that only 29.2% of the population of Oyo State had access to basic sanitation services, while at least 53.7% of them practised open defecation, and as many as 43.0% of households used unimproved toilet facilities.<sup>11</sup> To achieve the ambitious goal of an Open Defecation Free (ODF) status in Oyo State by 2028, evidence-informed decisions are crucial.<sup>12</sup> In most rural areas of Nigeria, the lack of access to improved sanitation facilities remains a persistent challenge, disproportionately affecting vulnerable groups, including young children.<sup>11</sup> Studies indicate that rural households in Nigeria often rely on substandard sanitation options, such as open defecation and pit latrines, which increase the risk of faecal contamination and related health

hazards.<sup>7, 13, 14</sup> Despite national and international initiatives aimed at enhancing sanitation as a fundamental aspect of public health, there is paucity of data examining the connection

between household sanitation practices and diarrhoea disease prevalence in rural Nigerian communities.

**TABLE 1: Socio-Demographic Characteristics of Respondents**

| Variables                             | Frequency<br>N = 426 | Percent<br>% |
|---------------------------------------|----------------------|--------------|
| <b>Age (Years)</b>                    |                      |              |
| <20                                   | 42                   | 9.9          |
| 20-29                                 | 180                  | 42.2         |
| 30-39                                 | 164                  | 38.5         |
| 40-49                                 | 40                   | 9.4          |
| Mean Age ( $\pm$ ) SD 27.2 $\pm$ 11.3 |                      |              |
| <b>Level of Education</b>             |                      |              |
| No formal Education                   | 26                   | 6.1          |
| Primary                               | 180                  | 42.3         |
| Secondary                             | 176                  | 41.3         |
| Tertiary                              | 44                   | 10.3         |
| <b>Occupation</b>                     |                      |              |
| Student/Full-time <u>house wife</u>   | 105                  | 24.6         |
| Artisan                               | 88                   | 20.7         |
| Farming/Petty Trading                 | 211                  | 49.5         |
| Civil Servant                         | 20                   | 4.7          |
| Professionals/Business Tycoon         | 2                    | 0.5          |
| <b>Religion</b>                       |                      |              |
| Christianity                          | 269                  | 63.2         |
| Islam                                 | 143                  | 33.6         |
| African Traditional                   | 14                   | 3.2          |
| <b>Tribe</b>                          |                      |              |
| Yoruba                                | 412                  | 96.7         |
| Igbo                                  | 6                    | 1.4          |
| Hausa                                 | 8                    | 1.9          |
| <b>Marital Status</b>                 |                      |              |
| Single                                | 38                   | 8.9          |
| Married                               | 356                  | 83.6         |
| Separated                             | 29                   | 6.8          |
| Widowed                               | 3                    | 0.7          |
| <b>Average monthly income (naira)</b> |                      |              |
| <30, 000.00                           | 174                  | 40.8         |
| 30, 000.00-100, 000.00                | 191                  | 44.8         |
| >100,000.00                           | 61                   | 14.4         |

Existing studies tend to combine data from both rural and urban areas, thereby obscuring the unique challenges and sanitation requirements of rural populations. Addressing these disparities necessitates localized research that offers context-specific insights into the health burdens associated with sanitation in rural environments. Furthermore, diarrhoea diseases are largely preventable through simple, evidence-based interventions, such as access to improved sanitation facilities and hygiene education. This study aimed to address the knowledge gap by examining the role of household sanitation facilities and diarrhoea prevalence among children under five in a rural community of Oyo State. The study objectives were to estimate the prevalence of diarrhoea, identify determinants of sanitation, and describe associations between

diarrhoeal occurrences and sanitation services in a rural community of Oyo State, Nigeria.

## Methods

The study was conducted in Oko, a rural community located in the Surulere Local Council Development Area (LCDA) of Oyo State, Nigeria. Using a national growth rate of 2.2%, the projected population of the LCDA was estimated to be 222,600 in 2020.<sup>15</sup> The prominent tribe in the Oko community is the Yoruba, although other ethnicities, such as Fulani, Hausa, and Igbo, also reside in the population. Its inhabitants mainly practice Christianity, Islam and Traditional religions. The primary occupation in the community is farming, while some individuals are civil servants, and others are engaged in artisanry and small-scale trading.

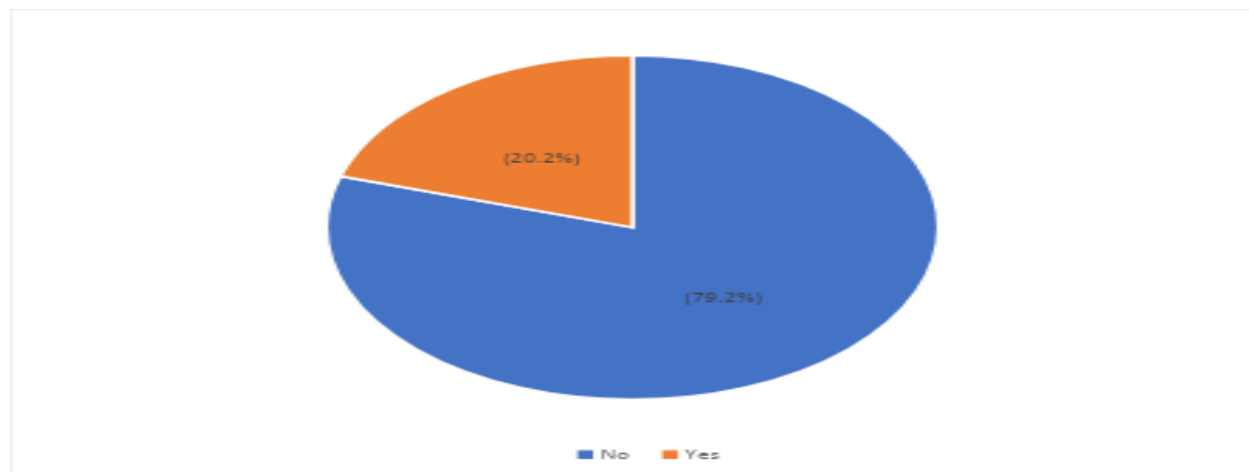


**Figure 1: Prevalence of diarrhoea disease among under-five children within two weeks preceding the study**

**Study Design:** The study employed a descriptive cross-sectional design, with data collected quantitatively in January 2025.

**Study Population:** The study population consisted of 426 caregivers of under-five children residing in Oko community, Surulere Local Government Area of Oyo state

**Inclusion Criteria:** All caregivers who had resided in the study setting for at least six months and had at least one child under the age of five in their household were eligible for recruitment into the study.

**Exclusion Criteria:** Caregivers whose children under five had a severe immune compromising

health condition that could have predisposed them to intractable diarrhoea were excluded from the study.

**Sample Size determination:** The sample size was calculated using the Leslie Kish formula for estimating single proportions in a population exceeding 10,000. The standard normal deviate was taken as 1.96 and the margin of error was 5.0%. Based on a past Nigerian study, we assumed that 21.1% of children in the study setting would have experienced diarrhoeal disease.<sup>6</sup> The non-response rate was assumed to be 10% and was adjusted accordingly. The result was then multiplied by 1.5 to account for potential cluster effects. Therefore, the minimum sample size required for the study was estimated at 426.

**Sampling Technique:** The Cluster sampling technique was used in recruiting eligible respondents. The sampling frame consisted of four clusters, which were defined as four quadrant divisions of the community, based on the major roads within the community. Two of the four quadrants were chosen using a simple random method. The selected areas were Ogbomoso and Ejigbo Roads. All households with eligible respondents were visited for interviews.

**Data Collection:** A semi-structured, pre-tested, interviewer-administered questionnaire was used for data collection. The questionnaire was developed after reviewing relevant literature on the subject matter.<sup>6,16,17</sup> The questionnaire consists of 3 sections. Section A collected information on the socio-demographic characteristics of respondents, Section B collected information about the experiences of diarrhoea disease among children under five in the households, and Section C assessed respondents' household sanitation facilities. The

questionnaire was translated into the Yoruba language for respondents who preferred to communicate in their native language; a back-translation into English was performed to preserve the original meanings of the questions asked. A group of ten medical students who were on a rural posting during the study implementation were trained by the principal investigator and assisted with data collection. The training lasted three days, accompanied by practical demonstrations on questionnaire administration in a typical rural Nigerian community.

**Pretesting:** The questionnaire was pre-tested among caregivers of children under five in the Ejigbo community, a community different from the study area. This process helped to standardize the data collection instrument and to ensure its internal validity. During this stage, feedback from respondents and data collectors was carefully reviewed and analyzed. Questions that were unclear or ambiguous were rephrased to ensure they were easy to understand. The average time it took respondents to complete the questionnaire was also ascertained.

**Data Management:** Each questionnaire was thoroughly vetted for errors from the field to ensure completeness before data were entered into the Statistical Package for the Social Sciences (SPSS) version 26.0 for analysis. Categorical data were summarized using percentages and presented in tables and charts (bar and pie charts), while continuous data were summarized using mean and standard deviation. Pearson's chi-square test was used to compare categorical variables, and a binary logistic regression model was built to identify socio-demographic determinants of sanitation services in the study setting. The level of statistical significance was set at a p-value less than 0.05.

**TABLE 2: Households' Sanitation Facilities/Services**

| Variables                                                                                                | Frequency (426) | Percentage (%) |
|----------------------------------------------------------------------------------------------------------|-----------------|----------------|
| <b>Self-rating of household sewage disposal method</b>                                                   |                 |                |
| Very Good                                                                                                | 40              | 9.4            |
| Good                                                                                                     | 66              | 15.5           |
| Average                                                                                                  | 120             | 28.2           |
| Poor                                                                                                     | 200             | 46.9           |
| <b>Toilet availability in the household</b>                                                              |                 |                |
| Yes                                                                                                      | 250             | 58.7           |
| No                                                                                                       | 176             | 41.3           |
| <b>Types of Available Toilets</b>                                                                        | n=250           |                |
| Bucket Latrine                                                                                           | 10              | 4.0            |
| Overhung Latrine                                                                                         | 41              | 16.4           |
| Pit Latrine Without Slab                                                                                 | 59              | 23.6           |
| VIP latrine                                                                                              | 62              | 24.8           |
| Water Closet                                                                                             | 78              | 31.2           |
| <b>Available facilities for proper handwashing after use of toilets</b>                                  | n=250           |                |
| Yes                                                                                                      | 193             | 77.2           |
| No                                                                                                       | 57              | 22.8           |
| <b>Perceived time when handwashing is necessary*</b>                                                     | n=426           |                |
| After using the toilet                                                                                   | 143             | 33.6           |
| After handling a child's faeces                                                                          | 136             | 31.9           |
| After handling uncooked meat in the market                                                               | 98              | 23.0           |
| Before cooking                                                                                           | 49              | 11.5           |
| <b>Households Sanitation Services used by respondents</b>                                                | n=426           |                |
| Defecation behind the house, in the bush or nearby river (Open Defecation)                               | 86              | 20.6           |
| Used pit latrine without slab, overhung latrine or bucket latrine (Unimproved Sanitation)                | 27              | 6.3            |
| Used VIP latrine or Water closet shared with other households (Limited Sanitation)                       | 23              | 5.4            |
| Used VIP latrine or Water closet not shared with other households (Basic Sanitation)                     | 190             | 44.6           |
| Used VIP latrine or Water Closet which is not shared but regularly evacuated (Safely Managed Sanitation) | 100             | 23.1           |

## Key Variables

**Diarrhoea Disease:** This was defined as the passage of at least two episodes of loose stools per day by a child within two weeks before the survey. Response was dichotomous “Yes” or “No”

**Household Sanitation Facility Types:** The UNICEF/WHO sanitation ladder was used in categorizing sanitation services in households visited.<sup>18</sup> Defecation around the house, nearby bushes, or bodies of water was categorized into “Open Defecation” and coded with zero. Defecations into pit latrines without slabs, overhung latrines, or bucket latrines were

categorized as “Unimproved Sanitation” and coded as 1. The use of a Pit latrine with a slab, a Ventilated Improved Pit (VIP) latrine, or a Water closet, but shared with other households, was grouped as “Limited Sanitation” and coded as 2. Possession of VIP latrine or Water Closet not shared with other households was grouped as “Basic Sanitation” and coded as 3, while possession of Water Closet toilets which were regularly evacuated and not shared with other households was categorized as “Safely Managed Sanitation Services” and coded as 4.

## Ethical consideration

Ethical approval for the study was obtained from the Ethical Review Committee of Bowen

University Teaching Hospital, Ogbomoso, Oyo State, Nigeria (NHREC/12/04/2012; BUTH/REC-2436). Permission to conduct the research was also obtained from the community head of the study area. Written informed consent was obtained from participants after the study's objectives were clearly explained to them. Participation was entirely voluntary, and participants were informed of their right to withdraw from the study at any point they felt uncomfortable with the interview process. To ensure confidentiality, responses provided by participants were kept strictly private, and the questionnaires were anonymized by using codes instead of names. Data collected during the study were securely entered into a computer system accessible only to the principal investigator.

## Results

All the eligible respondents satisfactorily completed the questionnaire (100% response rate). Table 1 shows that 180 (42.2%) of the respondents were 20-29 years of age, while their mean age was  $27.2 \pm 11.3$  years. Most respondents, 180 (42.3%), had primary education, while 211 (49.5%) of them were farmers or petty traders. Two hundred sixty-nine (63.2%) of the respondents were Christians, and 412 (96.7%) of them belonged to the Yoruba ethnic group. Three hundred and fifty-six (83.6%) of the respondents were married and 191 (44.8%) of them earned 30,000.00-100,000.00 naira (\$19.5-65.0) as monthly family income. Figure 1 shows that 85 (20.2%) of children under five in the study population had diarrhoea within two weeks preceding the survey.

In Table 2, 200 (46.9%) of the respondents rated their faecal disposal methods as poor, despite 250 (58.7%) of them stating that they had toilets in their households. Upon further inquiry, the

types of sanitation facilities in these households included water closets (31.2%), ventilated improved pit latrines (24.8%), pit latrines without slabs (23.6%), overhung latrines (16.4%), and bucket latrines (4.0%). Of the households with sanitation facilities, 193 (77.2%) reported having handwashing facilities; however, less than half (33.6%) of the study population understood that handwashing is necessary after defecation. Regarding the grading of Sanitation Services in the study setting, 46.7% of the respondents practiced Open Defecation, 6.3% had unimproved sanitation services, and 5.4% had limited sanitation services. Less than half, 190 (44.6%) of the respondents had Basic Sanitation Services, while less than a quarter of them, 100 (23.1%) had Safely Managed Sanitation Services in their households.

Table 3 shows that the occurrence of childhood diarrhoea in households was significantly associated with the types of sanitation facilities. Among respondents who engaged in open defecation, 85.8% reported experiencing childhood diarrhoea, in contrast to 25.0% in households where sanitation was effectively managed. ( $p=0.001$ ).

In Table 4, respondents with tertiary education were 34% more likely to possess household basic sanitation services compared to those with no formal education (AOR=33.75; 95%CI=12.74-41.59). Civil servants/business owners/professionals were 15 times more likely to possess household basic sanitation services compared to students or full-time housewives (AOR=14.86; 95%CI=7.24-16.86). Additionally, respondents living in households with a monthly family income of at least 100,000.00 naira (\$65.0) were 9 times more likely to have access to basic sanitation compared with those with less

than 30,000.00 naira (\$19.5) (AOR=9.28; 95% CI=3.53-20.28).

**Table3: Association of Households Sanitation Facilities with Childhood Diarrhoea Episodes**

| Sanitation service types | Household's recent childhood diarrhoea episodes |                        | Total      | X <sup>2</sup><br>df=4<br>P<0.001 |
|--------------------------|-------------------------------------------------|------------------------|------------|-----------------------------------|
|                          | Yes<br>N=274 (64.3%)                            | No<br>N=152<br>(35.7%) |            |                                   |
| Open Defecation          | 151(85.8)                                       | 25(14.2)               | 176 (41.3) | 161.078 <sup>a</sup>              |
| Unimproved Sanitation    | 49(67.1)                                        | 24(32.9)               | 73 (17.1)  |                                   |
| Limited Sanitation       | 56(52.8)                                        | 50(47.2)               | 106(24.9)  |                                   |
| Basic Sanitation         | 8(25.8)                                         | 23(74.2)               | 31(7.3)    |                                   |
| Safely Manged Sanitation | 10(25.0)                                        | 30(75.0)               | 40(9.4)    |                                   |

X<sup>2</sup>=Chi-Square df=degree of freedom a=Likelihood Chi-Square

## Discussion

The prevalence of childhood diarrhoea disease was high in the study, as close to a quarter of children under five were reported to have developed the disease within two weeks preceding the survey. Our finding aligns with previous Nigerian studies. For instance, a study reported a childhood diarrhoea prevalence of 38.6% in Edo State, South-South Nigeria, while another study reported a diarrhoea prevalence of 21.1% among infants in Kaduna State.<sup>6,19</sup> However, diarrhoea prevalence in the current study was higher than the national prevalence of 13% recorded for Nigeria in the 2018 Demographic and Health Surveillance.<sup>5</sup> The discrepancy could have been that the current study was entirely conducted in a rural community, where a preponderance of factors facilitate the occurrence of childhood diarrhoea disease compared to urban areas, which were included in the national data.

Sanitation services were suboptimal in the study setting, as less than half of the households visited had basic sanitation, and less than one-quarter of them had safely managed sanitation services. In addition, nearly a quarter of

caregivers in our study setting practiced open defecation, with a lower proportion residing in households with unimproved sanitation services. Our results are not far from those of the 2019 Nigerian WASHNORM report, which found that less than half (44.0%) of households in Nigeria had access to basic sanitation, while 23.0% of the population practiced open defecation. In the same report, Oyo State was ranked among the states in Nigeria with the poorest access to basic sanitation and ranked fifth among the states with the highest open defecation rates.<sup>13</sup> A statistically significant association was found between the availability of household sanitation services and the occurrence of diarrheal disease in the study population. Above three-quarters of those who practiced open defecation reported childhood diarrhoea, whereas the disease was reported in one-quarter of households with safely managed sanitation services.

Governments at all levels should put in more effort to eliminate open defecation in Nigeria as a whole and in rural Nigerian communities specifically. The Vision of the Oyo State Rural Water Supply and Sanitation Agency (OYORUWASSA) to ensure universal coverage

of the state with smart (Sato Pan) toilets by 2028 should be pursued with greater enthusiasm.<sup>12</sup> Implementing this will reduce human contact with faecal matter, thereby decreasing the rate of childhood diarrhoea cases in the state.

Being educated, being a civil servant/business owner, and earning more as a family's monthly income were the determinants of the availability of basic sanitation services in the study setting. These findings are consistent with reports from previous studies. A study identified educational attainment as one of the strongest determinants of basic sanitation coverage in Ethiopia.<sup>20</sup> Additionally, a study revealed that educational attainments and occupational types were among the factors that influenced access to improved sanitation in rural communities of southern Ghana.<sup>21</sup> A study reported that education, income, and occupation were among the determinants of household access to basic sanitation in Ethiopia. Another study identified education and the wealth index as factors influencing access to WASH among children in Nigeria.<sup>22, 23</sup> Therefore, there is a need for the Nigerian government to improve the overall socio-economic well-being of rural residents. Education raises awareness and helps people understand the benefits of basic sanitation, while sufficient family income provides households with the financial means to purchase sanitation hardware.

**Study limitation:** This study may have been affected by social desirability bias, as respondents may have provided information that they believed was socially acceptable regarding their sanitation practices. Interviewers' extra inspection of household sanitation might have lessened this bias.

**Conclusion:** Childhood diarrhoea was common in the study setting and prevalence was significantly linked to household sanitation services. Sanitation services were sub-optimal in the study setting, and availability was significantly associated with the socioeconomic conditions of the people. There is a need to implement multi-pronged, cost-effective interventions to eradicate open defecation and improve access to basic sanitation in rural communities, thereby reducing the prevalence of childhood diarrhoea in Nigeria as a whole. There is a need for sanitation policy reviews and enforcement, repackaging and upscaling of the existing Community-Led Total Sanitation (CLTS) program, provisions of sanitation hardware and massive awareness campaigns regarding the health hazards of poor sanitation in rural Nigerian communities.

**Acknowledgment:** The Authors wish to express their gratitude to the people of the Oko community for permitting this research to be conducted within their households.

**Conflict of Interest:** None

**TABLE 4: Socio-economic Factors Influencing Availability of Basic Sanitation Services in Respondents' Households**

| Variable                                       | Basic Sanitation Services present in the household |                 | Total | $\chi^2$ (df)              | p-value | AOR    | 95%CI           |
|------------------------------------------------|----------------------------------------------------|-----------------|-------|----------------------------|---------|--------|-----------------|
|                                                | Yes<br>N= 290(%)                                   | No<br>N= 136(%) |       |                            |         |        |                 |
| <b>Age (years)</b>                             |                                                    |                 |       | 105.24<br>(2)              | 0.3118  |        |                 |
| <20                                            | 10 (23.8)                                          | 32 (76.2)       | 42    |                            |         | RC     |                 |
| 20-39                                          | 95 (52.8)                                          | 85 (47.2)       | 180   |                            |         | 23.197 | 0.299 – 63.124  |
| ≥ 40                                           | 185 (90.7)                                         | 19 (9.3)        | 204   |                            |         | 15.103 | 0.149 – 54.975  |
| <b>Gender</b>                                  |                                                    |                 |       | 0.123<br>(1)               | 0.726   |        |                 |
| Male                                           | 88 (69.3)                                          | 39 (30.7)       | 127   |                            |         | 0.472  | 0.173 – 1.289   |
| Female                                         | 202 (67.6)                                         | 97 (32.4)       | 299   |                            |         | RC     |                 |
| <b>Level of education</b>                      |                                                    |                 |       | 68.951 <sup>†</sup><br>(3) | < 0.001 |        |                 |
| No formal education                            | 25 (96.2)                                          | 1 (3.8)         | 26    |                            |         | RC     |                 |
| Primary                                        | 84 (46.7)                                          | 96 (53.3)       | 180   |                            |         | 17.705 | 10.502 – 20.870 |
| Secondary/Tertiary                             | 181 (82.3)                                         | 39 (17.7)       | 220   |                            |         | 33.754 | 12.740 – 41.588 |
| <b>Religion</b>                                |                                                    |                 |       | 24.183<br>(2)              |         |        |                 |
| Christianity                                   | 148 (80.9)                                         | 35 (19.1)       | 183   |                            | 0.0761  | 16.560 | 0.841 – 50.213  |
| Islam                                          | 92 (64.3)                                          | 51(35.7)        | 143   |                            | 0.0429  | 24.142 | 0.432 – 47.301  |
| Traditional                                    | 35 (35.0)                                          | 65 (65.0)       | 100   |                            |         | RC     |                 |
| <b>Marital status</b>                          |                                                    |                 |       | 74.076<br>(4)              | 0.6010  |        |                 |
| Single                                         | 11 (28.9)                                          | 27 (71.1)       | 38    |                            |         | 8.357  | 0.072 – 15.125  |
| Married                                        | 155 (60.5)                                         | 101 (39.5)      | 256   |                            |         | 4.168  | 0.261 – 12.636  |
| Separated                                      | 124 (96.1)                                         | 5 (3.9)         | 129   |                            |         | 5.890  | 0.961-10.746    |
| Widowed                                        | 0 (0.0)                                            | 3 (100.0)       | 3     |                            |         | RC     |                 |
| <b>Occupation</b>                              |                                                    |                 |       | 74.055<br>(4)              | < 0.001 |        |                 |
| Student/full time wife                         | 99 (94.3)                                          | 6 (5.7)         | 105   |                            |         | RC     |                 |
| Farming/Petty trading                          | 33 (36.7)                                          | 57 (63.3)       | 90    |                            |         | 2.156  | 0.432 – 10.993  |
| Artisan                                        | 138 (65.4)                                         | 73 (34.6)       | 211   |                            |         | 0.519  | 0.073 – 3.705   |
| Civil Servants/Business tycoons/ professionals | 20 (100.0)                                         | 0 (00.0)        | 20    |                            |         | 14.852 | 7.239-16.863    |
| <b>Average month income (Naira)</b>            |                                                    |                 |       | 78.675<br>(2)              | < 0.001 |        |                 |
| <30,000.00                                     | 85 (48.9)                                          | 89 (51.1)       | 174   |                            |         | RC     |                 |
| 30,000-100,000.00                              | 55 (60.4)                                          | 36 (39.6)       | 91    |                            |         | 2.012  | 0.518 – 10.725  |
| ≥100,000.00                                    | 150 (93.2)                                         | 11 (6.8)        | 161   |                            |         | 9.284  | 3.532 – 20.276  |

*F*=Fischer exact test used  $\chi^2$ =Chi squared test df=degree of freedom AOR=Adjusted Odds Ratio CI=Confidence Interval RC=Reference Category

**Authorship:** AAO conceptualized the research idea, AIM coordinated data collection and data analysis, IA reviewed the initial manuscript for important intellectual content, MCO, AIA, ATD, ATL, AHET, AOO, OMO, OOB, OOM, DBD, and AAM participated in data acquisition as well as drafting of the manuscript. All authors read and approved the final version of the manuscript for publication.

## References

1. World Health Organization. Diarrhoeal Disease. [cited 2025 Mar 20]. Available from: <https://www.who.int/news-room/fact-sheets/detail/diarrhoeal-disease>
2. United Nations Children's Fund. Diarrhoea - UNICEF DATA. [cited 2025 Mar 20]. Available from: <https://data.unicef.org/topic/child-health/diarrhoeal-disease/>
3. He Z, Ghose B, Cheng Z. Diarrhoea as a Disease of Poverty Among Under-Five Children

in Sub-Saharan Africa: A Cross-Sectional Study. 2023. Doi:10.1177/00469580231202988

4. Demissie GD, Yeshaw Y, Aleminew W, Akalu Y. Diarrhoea and Associated Factors Among Under-five Children in sub-Saharan Africa: Evidence from Demographic and Health Surveys of 34 sub-Saharan countries. PLoS One. 2021;16(9). doi: 10.1371/journal.pone.0257522.
5. National Population Commission (NPC) [Nigeria] and ICF. 2019. Nigeria Demographic and Health Survey 2018. Abuja, Nigeria, and Rockville, Maryland, USA: NPC and ICF.
6. David DM, Faisal IT, Taophic SA. Prevalence and Determinants of Diarrhoea among Infants in Selected Primary Health Centres in Kaduna North Local Government Area, Nigeria. Pan Afr Med J .2017;28:109. doi: 10.11604/pamj.2017.28.109.8152.
7. Nwokoro UU, Ugwa O, Onwuliri CD, Obi IF, Ngozi MO, Agunwa C. Water, sanitation and hygiene risk factors associated with

diarrhoea morbidity in a rural community of Enugu, South East Nigeria. *Pan Afr Med J* .2020;37:115. doi: 10.11604/pamj.2020.37.115.17735.

8. Nwokocha ES, Chukwudeh O, Ukwandu D. Prevalence and The Social Contexts of Childhood Diarrhoea in Ibadan Slums, Southwest Nigeria. *African J Gender, Soc Dev (formerly J Gender, Inf Dev Africa)*. 2020;9(3):11–34.

9. Statista. Nigeria: main causes of infant mortality | Statista. [cited 2025 Mar 20]. Available from: <https://www.statista.com/statistics/1172807/main-causes-of-infant-mortality-in-nigeria/>

10. World Health Organization/United Nations Children’s Fund. Five years into the SDGs: Progress on Household Drinking Water, Sanitation and Hygiene. Launch version July 12, Main report Progress on Drinking Water, Sanitation and Hygiene. 2020. 1–164 p. [cited 2025 Jun 27]. Available from: <http://apps.who.int/bookorders>.

11. Ministry of Water Resources (FMWR), Government of Nigeria, National Bureau of Statistics

(NBS) and UNICEF. 2020. Water, Sanitation and Hygiene: National Outcome Routine Mapping (WASH

NORM) 2019: A Report of Findings. FCT Abuja. Nigeria

12. Oyo State. [Accessed 2025 Jun28]. Available from: <https://old.oyostate.gov.ng/oyo-state-rural-water-supply-and-sanitation-agency-ruwassa/>

13. Federal Ministry of Water Resources (FMWR), Government of Nigeria, National Bureau of Statistics

(NBS) and UNICEF. 2020. Water, Sanitation and Hygiene: National Outcome Routine Mapping (WASH

NORM) 2019: A Report of Findings. FCT Abuja. Nigeria

14. Akoteyon IS. Inequalities in Access to Water and Sanitation in Rural Settlements in Parts of Southwest Nigeria. *Ghana J Geogr*. 2019;11(2):158–84.

15. City Population. Oyo (State, Nigeria) - Population Statistics, Charts, Map and Location. [cited 2025 April]. Available from: [https://citypopulation.de/en/nigeria/admin/NGA\\_031\\_\\_oyo/](https://citypopulation.de/en/nigeria/admin/NGA_031__oyo/)

16. Abubakar IR. Access to Sanitation Facilities Among Nigerian Households: Determinants and Sustainability Implications. *Sustain*.2017.;9(4):547. Doi: doi:10.3390/su9040547

17. Imarhiagbe EE, Eghomwanre AF. Assessment of Water, Sanitation and Hygiene Conditions in Selected Markets in Benin City Assessment of Water, Sanitation and Hygiene Conditions in Selected Markets in Benin City, Nigeria. *Appl. Sci. Environ. Manage*. 2023; 27 (6) 1229-1235.

18. World Health Organization/United Nations Children’s Fund. Sanitation | JMP. [cited 2025 Mar 27]. Available from: <https://washdata.org/monitoring/sanitation>

19. Irelosen AK, Paul I, Noel U. Prevalence and Determinants of Diarrhoea Disease amongst Under-Five Children Attending Immunization Clinic in a Secondary Health Facility in Benin City. *Endocrinol Metab Nutr*. 2022;1(2):1–6.

20. Voice of Nigeria. Oyo State Government, UNICEF Set to Eradicate Open Defecation – Voice of Nigeria. [cited 2025 Mar 30]. Available from: <https://von.gov.ng/oyo-state-government-unicef-set-to-eradicate-open-defecation/>

21. Tefera T, Alemu T, Alano A. Determinants of Basic Sanitation Service Coverage Among Households in Shashogo District, Hadiya Zone, Central Ethiopia: A Case Control Study. *Environ Health Insights*. 2024. doi/10.1177/11786302241282378

22. Akpakli DE, Manyeh AK, Akpakli JK, Kukula V, Gyapong M. Determinants of Access to Improved Sanitation Facilities in Rural

Districts of Southern Ghana: Evidence from Dodowa Health and Demographic Surveillance Site. *BMC Res Notes*. 2018; 11(1): 473. doi:10.1186/s13104-018-3572-6

23. Alemu ZA, Kidane AW, Liyew EF, Mengistu B, Genanew TZ, Adugna EA, et al.

Households' Access to Basic Sanitation Services and Associated Factors in Geshiyaro Project Study Sites in Ethiopia. *Discov Sustain*. 2024;5(1):200. doi:10.1007/s43621-024-00420-