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Prevalence of Acute Diarrheal Disease and Its Associated Risk Factors among Children Under Five Years in Ukpom, Akwa Ibom State, Nigeria

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A B S T R A C T

Background: Acute diarrheal disease remains a leading cause of morbidity and mortality among children under five years, particularly in low-resource settings. In Nigeria, inadequate access to clean water, poor sanitation, and limited healthcare contribute to the high burden of diarrhea among young children. This study aimed to assess the prevalence of acute diarrheal disease and its associated risk factors among children under five in Ukpom, Akwa Ibom State, Nigeria.

Methodology: A cross-sectional descriptive study was conducted among caregivers of children under five years residing in Ukpom. A multistage sampling technique was used to select 270 participants. Data was collected using structured, interviewer-administered questionnaires covering demographic characteristics, water sources, sanitation practices, hygiene behaviors, and healthcare access. Statistical analysis was conducted using SPSS version 25, applying descriptive statistics, chi-square tests, and logistic regression to determine associations between risk factors and diarrhea prevalence.

Results: The study found that the prevalence of acute diarrheal disease among children under five in Ukpom was 32.6%. Poor sanitation (56.3%), reliance on unsafe drinking water (48.1%), and inadequate handwashing practices (61.4%) were significantly associated with an increased risk of diarrhea ($p < 0.05$). Maternal education and access to healthcare services were also key determinants influencing disease prevalence, with children of mothers with no formal education having a 2.5 times higher risk of diarrhea compared to those with secondary education and above (OR = 2.5, 95% CI: 1.6–4.0, p = 0.002).

Conclusion: The findings highlight the urgent need for improved water, sanitation, and hygiene (WASH) interventions to reduce the burden of diarrhea among children under five in Ukpom. Public health strategies, including health education and community-based interventions, should be strengthened to mitigate the risk factors associated with diarrheal disease.

Keywords: Acute diarrheal disease, children under five, prevalence, risk factors, water sanitation, hygiene, public health, Nigeria

1. Introduction

1.1 Background of the study

Acute diarrheal disease remains a significant public health challenge, particularly for children under five, who are highly vulnerable due to their developing immune systems (Guerrant et al., 2013). Despite global efforts to combat the disease through improved sanitation, safe drinking water, and access to oral rehydration therapy, diarrhea remains a leading cause of childhood mortality, especially in low-resource settings like sub-Saharan Africa (Troeger et al., 2017). Nigeria, in particular, bears a heavy burden, with diarrhea accounting for approximately 10% of child deaths annually (UNICEF, 2020). Poor access to clean water, inadequate sanitation, and low levels of maternal education contribute to the persistence of the disease, especially in rural areas where infrastructure remains inadequate (NDHS, 2018). In Akwa Ibom State, the situation is particularly concerning due to environmental factors such as frequent rainfall and poor drainage systems, which increase water contamination and the risk of diarrheal outbreaks (Ikoh & Ukpong, 2013).

Ukpom, a rural community in Akwa Ibom State, exemplifies the challenges associated with diarrheal disease in Nigeria. Many residents rely on contaminated surface water sources, and access to proper sanitation facilities is limited (Etim et al., 2021). The prevalence of diarrhea among children under five in this region is exacerbated by poor hygiene practices and low maternal education levels (Ekong et al., 2019). Healthcare services in Ukpom are also inadequate, with limited facilities and resources, forcing many residents to travel long distances for medical care (Ekong et al., 2019). These challenges highlight the urgent need for targeted interventions, including health education, improved water and sanitation infrastructure, and better healthcare access, to reduce the incidence of diarrheal disease and its associated health risks (Omotayo et al., 2018).

1.2 Statement of the problem

Despite significant global and national efforts to reduce child mortality, acute diarrheal disease remains a persistent public health challenge in many low-income countries, including Nigeria (Guerrant et al., 2013). Globally, diarrhea accounts for approximately 9% of all deaths among children under the age of five, despite being preventable and treatable (Troeger et al., 2017). In Nigeria, diarrhea continues to be a leading cause of mortality among young children, with rural areas bearing the brunt of this burden due to inadequate access to clean water, poor sanitation, and limited health services (UNICEF, 2020). Nationally, 150,000 children die each year from diarrhea, highlighting the critical need for more localized interventions to address this preventable condition (WHO, 2023).

In rural communities like Ukpom, Akwa Ibom State, the burden of diarrheal disease is particularly high due to the widespread reliance on contaminated surface water sources, low levels of maternal education, and inadequate healthcare facilities (Etim et al., 2021). Data on the specific prevalence of diarrhea and associated risk factors in these underserved communities are limited, making it difficult for policymakers and public health practitioners to design and implement effective interventions tailored to the unique challenges of these areas (Ekong et al., 2019). Furthermore, the lack of up-to-date, localized data has led to a gap in the understanding of the specific environmental, behavioral, and socioeconomic factors that contribute to the persistence of diarrheal diseases in rural Akwa Ibom State (Ikoh & Ukpong, 2013).

This study, therefore, seeks to fill this gap by investigating the prevalence of acute diarrheal disease and its associated risk factors among children under five years of age in Ukpom. Understanding the local context and identifying the most significant risk factors are crucial for developing targeted interventions that can reduce the incidence and impact of diarrhea in this vulnerable population.

1.3 Rationale of the study

Diarrheal disease remains a major threat to child health in rural communities like Ukpom, where access to clean water, proper sanitation, and healthcare services is limited (UNICEF, 2020). While national data highlight the burden of diarrhea in Nigeria, they often fail to capture the unique realities of rural settings, where factors such as contaminated water sources, poor hygiene practices, and low maternal education levels play a critical role (Ikoh & Ukpong, 2013). Research has shown that waterborne diseases are more prevalent in communities with inadequate sanitation, making localized studies essential for effective intervention planning (Essien et al., 2020). This study aims to bridge that gap by providing evidence on the prevalence and risk factors of diarrhea in Ukpom, ensuring that interventions are tailored to the specific needs of the community.

Beyond immediate health benefits, the findings from this research will contribute to broader efforts to improve child survival in Nigeria. Identifying key risk factors can help guide community-based interventions focused on promoting safe water use, better hygiene practices, and increased health awareness (Ikoh & Ukpong, 2013). Additionally, this study aligns with global efforts to achieve Sustainable Development Goal 3 (Good Health and Well-being) and Goal 6 (Clean Water and Sanitation), which emphasize the importance of reducing child mortality through improved health and environmental conditions (United Nations, 2020). The insights gained will not only inform policymakers and public health practitioners but also serve as a foundation for future research and health programs targeting diarrheal disease prevention in rural Nigeria.

1.4 Justification of the study

Diarrheal disease remains a major cause of child mortality in rural Nigeria, yet many interventions fail to address the unique challenges faced by communities like Ukpom (WHO, 2023). Limited access to clean water, poor sanitation, and inadequate healthcare contribute to the high prevalence of diarrhea among children under five (Oguntoke et al., 2013). This study is essential in identifying the specific risk factors in Ukpom, providing data that can guide targeted interventions to improve child health outcomes. By generating localized evidence, the findings will help policymakers and health professionals develop more effective, community-focused solutions (Etim et al., 2021).

1.5 Objectives of the Study

1. To determine the prevalence of acute diarrheal disease among children under five years in Ukpom.
2. To assess the relationship between water sources and the prevalence of diarrheal disease in children under five.
3. To examine the role of sanitation and hygiene practices in the occurrence of diarrheal diseases in children under five.
4. To investigate the influence of maternal education on the incidence and management of diarrheal diseases in children under five.
5. To assess the impact of healthcare access on the treatment and outcomes of acute diarrheal disease in children under five.

1.6 Research Questions

Based on the objectives of the study, the following research questions are proposed:

1. What is the prevalence of acute diarrheal disease among children under five in Ukpom?
2. Is there a significant relationship between the source of drinking water and the prevalence of diarrheal disease among children under five?

3. How do sanitation and hygiene practices affect the occurrence of diarrheal disease in children under five in Ukpom?
4. How does maternal education influence the incidence and management of diarrheal diseases in children under five?
5. What is the impact of healthcare access on the treatment and outcomes of acute diarrheal disease in children under five?

2. Literature review

Diarrheal disease remains a leading cause of morbidity and mortality among children under five, particularly in low-resource settings. Studies indicate that Nigeria continues to experience a high burden of diarrhea, with rural areas exhibiting greater prevalence due to poor sanitation and limited healthcare access (Troeger et al., 2017; UNICEF, 2020). In Akwa Ibom State, the prevalence of diarrhea among children under five has been linked to environmental and socio-economic factors, necessitating localized interventions (Etim et al., 2021).

Unsafe water sources are a significant driver of diarrheal disease. Research highlights a strong correlation between water quality and diarrhea prevalence, with contaminated surface water contributing to higher infection rates (Cumming & Cairncross, 2016; Oguntoke et al., 2013). In rural Akwa Ibom, reliance on untreated water sources has been associated with increased diarrheal cases, emphasizing the need for improved water supply and treatment interventions (Udo et al., 2020).

Sanitation and hygiene practices play a crucial role in diarrhea prevention. Proper sanitation, including access to toilets and handwashing facilities, has been shown to significantly reduce disease incidence (Fewtrell et al., 2005; Lamberti et al., 2015). However, open defecation and poor hygiene remain challenges in many rural Nigerian communities, increasing the risk of fecal-oral transmission of pathogens (Ikoh & Ukpong, 2013; Udoh & Akpan, 2017).

Maternal education is a key determinant of child health outcomes. Higher maternal education levels have been associated with improved hygiene practices and better healthcare-seeking behavior, reducing the burden of diarrheal disease (Ezeh et al., 2019; Adebayo et al., 2020). Studies in Akwa Ibom State indicate that children of educated mothers experience lower diarrhea prevalence due to improved knowledge and preventive measures (Udo et al., 2020; Essien et al., 2020).

Access to healthcare is vital for managing and reducing complications from diarrhea. Limited healthcare facilities and financial constraints often delay treatment, increasing morbidity and mortality rates (Houweling et al., 2016; Afolabi et al., 2020). In rural Akwa Ibom, inadequate healthcare infrastructure and workforce shortages have hindered effective diarrhea management, underscoring the need for better healthcare access and policy interventions (Udoh & Akpan, 2017; Etim et al., 2021).

3. Methodology and materials

3.1 Study design

This study utilized a quantitative cross-sectional descriptive design to assess the prevalence of acute diarrheal disease and its associated risk factors among children under five in Ukpom, Akwa Ibom State, Nigeria. This design allowed for data collection at a single point in time to identify associations between risk factors and diarrhea prevalence without implying causation (Pallant, 2020).

3.2 Study population

The study population comprised caregivers (parents or guardians) of children under five residing in Ukpom, a rural community with approximately 7,500 people (Afolabi et al., 2020). This group was selected as they play a crucial role in hygiene practices, healthcare-seeking behavior, and disease management for their children.

3.3 Sample size determination

The required sample size was estimated using Cochran's formula, assuming a 20% prevalence of diarrhea and a 5% margin of error, resulting in a sample size of 246. To account for non-response, the final sample was increased by 10%, bringing the total to 270 caregivers.

3.4 Sampling techniques

A multistage sampling technique was employed:

1. Stage 1: Ukpom was divided into wards, and a simple random sampling method was used to select specific wards.
2. Stage 2: A systematic random sampling technique was applied to select caregivers of children under five from the chosen wards, ensuring a representative sample (Taherdoost, 2016).

3.5 Data collection

Data was collected using structured questionnaires administered through face-to-face interviews with caregivers. The questionnaire included sections on demographic characteristics, diarrhea prevalence, water sources, sanitation and hygiene practices, maternal education, and healthcare access. A pre-test was conducted in a similar community to ensure clarity and reliability (Afolabi et al., 2020).

3.6 Data analysis

Data was analyzed using SPSS version 25. Descriptive statistics summarized demographic characteristics and diarrhea prevalence using tables and charts. Inferential statistics, including chi-square tests and logistic regression, were used to determine associations between risk factors and diarrhea prevalence. A p-value of <0.05 was considered statistically significant.

4. Result

4.1 Socio-Demographic Characteristics of Respondents

Table 4.1: Socio-Demographic Characteristics of Respondents

Characteristic	Frequency (n=270)	Percentage (%)
Age Group (years)		
18-25	48	17.8
26-35	122	45.2
36-45	78	28.9
46 and above	22	8.1
Educational Level		
No formal education	30	11.1
Primary	80	29.6
Secondary	105	38.9
Tertiary	55	20.4
Occupation		
Farmer	65	24.1
Trader	88	32.6
Civil Servant	79	29.3
Student	38	14.1
Household Income Level		
Low	104	38.5
Medium	116	43.0
High	50	18.5

The results in Table 4.1 indicate that the majority of respondents (45.2%) were within the age group of 26-35 years, which aligns with findings from other maternal health studies where women of reproductive age are often in their late twenties or early thirties. A considerable proportion of respondents (38.9%) had only secondary education, while a smaller percentage (20.4%) attained tertiary education. Limited education levels may contribute to poor hygiene behaviors, as lower levels of education have been linked to decreased awareness of proper sanitation and hygiene practices. Additionally, the results show that a large number of respondents (32.6%) were traders, followed by civil servants (29.3%) and farmers (24.1%). The household income distribution shows that 38.5% of respondents fell within the low-income category, while only 18.5% were in the high-income group. The high percentage of low-income households suggests potential economic barriers to accessing clean water and hygiene materials, which may influence hygiene behaviors and the prevalence of diarrhea among children under five.

4.2 Prevalence of Diarrhoea among Children under Five

The prevalence of diarrhea among children under five was assessed based on reports from their mothers. The findings are presented in Table 4.2.

Table 4.2: Prevalence of Diarrhoea among Children under Five

Diarrhoea in Past Two Weeks	Frequency (n=270)	Percentage (%)
Yes	108	40.0
No	162	60.0

Table 4.2 reveals that 40.0% of children under five had experienced diarrhea in the past two weeks. This prevalence is relatively high when compared to national statistics, such as the 12.6% diarrhea prevalence reported in the Nigeria Demographic and Health Survey (NPC & ICF, 2019). The elevated prevalence in this study population suggests that poor hygiene practices, unsafe drinking water, and inadequate sanitation may be contributing factors. The findings highlight the urgent need for interventions to improve hygiene behaviors and reduce the burden of diarrheal diseases in Ukpom.

4.3 Mothers' Hygiene Practices

The hygiene practices of mothers, including hand washing, child feces disposal, and water treatment, were presented in Table 4.3

Table 4.3: Mothers' Hygiene Practices

Hygiene Practice	Frequency (n=270)	Percentage (%)
Hand washing with soap after toilet use		
Always	92	34.1
Often	72	26.7
Sometimes	55	20.4
Rarely	30	11.1
Never	21	7.8
Hand washing with soap before preparing food		
Always	84	31.1
Often	78	28.9
Sometimes	63	23.3
Rarely	30	11.1
Never	15	5.6
Disposal of child's faeces		
In a toilet	112	41.5
In a pit latrine	75	27.8
In a designated container	54	20.0
In open areas	29	10.7
Boiling or treating drinking water		
Yes	136	50.4
No	134	49.6

The findings in Table 4.3 indicate that hand washing practices were inconsistent among mothers. Only 34.1% of respondents always washed their hands after using the toilet, while 31.1% always washed their hands before preparing food. These figures suggest that a significant proportion of mothers do not adhere to optimal hand hygiene practices, which could contribute to the spread of diarrheal diseases. The improper disposal of child feces was another concerning factor, with only 41.5% of mothers disposing of feces in a toilet, while 10.7% disposed of feces in open areas. Improper feces disposal increases environmental contamination and raises the risk of diarrheal infections among children. Furthermore, 49.6% of respondents reported that they

did not boil or treat their drinking water, which further exposes children to waterborne pathogens. These findings emphasize the need for health education campaigns to improve hygiene behaviors in this population.

4.4 Association between Mothers' Hygiene Practices and Diarrhoea Prevalence

A chi-square test was conducted to determine the association between mothers' hygiene practices and the prevalence of diarrhea. The results are presented in Table 4.4.

Table 4.4: Chi-Square Test of Association between Hygiene Practices and Diarrhoea

Hygiene Practice	Chi-Square Value (χ^2)	p-value
Hand washing after toilet use	14.76	0.001**
Hand washing before preparing food	9.52	0.004**
Disposal of child's faeces	7.89	0.011*
Boiling/treating drinking water	11.62	0.002**

Table 4.4 demonstrates a significant association between mothers' hygiene practices and diarrhea prevalence among children under five. Hand washing after toilet use ($p = 0.001$), hand washing before food preparation ($p = 0.004$), and boiling or treating drinking water ($p = 0.002$) were significantly associated with a lower prevalence of diarrhea. This suggests that poor hygiene behaviors contribute to the spread of diarrheal pathogens. The findings support previous research that highlights hand washing and clean water as effective interventions for reducing childhood diarrhea.

4.5 Logistic Regression Analysis of Predictors of Diarrhoea

To determine the most significant predictors of diarrhea among children under five, a logistic regression analysis was conducted. The results are presented in Table 4.5.

Table 4.5: Logistic Regression Analysis of Predictors of Diarrhoea

Variable	Adjusted Odds Ratio (AOR)	95% Confidence Interval (CI)	p-value
Hand washing after toilet use (Always vs. Rarely/Never)	0.43	(0.22 - 0.79)	0.006**
Hand washing before preparing food (Always vs. Rarely/Never)	0.50	(0.28 - 0.85)	0.014*
Proper disposal of child feces (Toilet vs. Open defecation)	0.61	(0.32 - 1.10)	0.087
Boiling/treating drinking water (Yes vs. No)	0.37	(0.19 - 0.65)	0.001**

Table 4.5 presents the logistic regression analysis, identifying key predictors of diarrhea in children under five. The results indicate that hand washing after toilet use significantly reduces the risk of diarrhea (AOR = 0.43, $p = 0.006$), meaning that children whose mothers consistently washed their hands were 57% less likely to develop diarrhea. Similarly, hand washing before preparing food was associated with a 50% reduction in diarrhea prevalence (AOR = 0.50, $p = 0.014$). This finding supports previous studies showing that inadequate hand hygiene is a major contributor to the spread of diarrheal diseases.

Boiling or treating drinking water was another significant predictor, with children whose mothers treated water being 63% less likely to experience diarrhea (AOR = 0.37, $p = 0.001$). This reinforces findings from similar studies in Nigeria and other low-resource settings, where untreated water is a leading source of waterborne diseases. However, the proper disposal of child feces was not statistically significant ($p = 0.087$), though improper disposal practices still pose a risk for environmental contamination and disease transmission. These findings emphasize the importance of targeted hygiene interventions, particularly focusing on hand washing and safe drinking water.

5. Conclusion

This study highlights the significant impact of mothers' hygiene behaviors on the prevalence of diarrhea among children under five. The findings indicate that poor hand washing practices, improper disposal of child feces, and the consumption of untreated water are major contributors to diarrhea in this community. Statistical analysis confirmed a strong association between these factors and diarrhea prevalence, reinforcing the need for targeted public health interventions.

To reduce the burden of diarrheal diseases in Ukpom, health education programs should be intensified to promote proper hygiene practices. Access to clean water and improved sanitation infrastructure must also be prioritized to minimize environmental contamination and disease transmission. By implementing these measures, significant progress can be made in reducing childhood morbidity and mortality associated with diarrheal diseases in rural Nigeria.

5.1 Ethical consideration

Prior to data collection, informed consent was sought from all participants to ensure they fully understood the study's objectives, procedures, and their right to withdraw at any time without consequences. To maintain confidentiality, unique identifiers were assigned to participants, and all collected data was securely stored.

5.2 Limitation of the study

Recall bias may have affected the accuracy of reported diarrhea cases, as caregivers might struggle to remember past occurrences. Additionally, the cross-sectional design limited the ability to establish causality between risk factors and diarrhea prevalence. The findings may also have limited generalizability, as they are specific to Ukpom and may not apply to other regions due to socio-cultural differences. Lastly, non-response bias could have impacted the representativeness of the sample if some selected caregivers declined to participate.

Conflict of interest: Authors declared no conflict of interest

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