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Aetiology and Severity of Diarrhoea among Children Under Five in Uvwie Local Government Area, Delta State, Nigeria

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Abstract
In children under five, diarrhea is a prevalent health issue that causes avoidable morbidity and mortality worldwide. Unclean water and inadequate sanitation have long been linked to diarrhea. Given the government's and advocates' policies about cleanliness and health care, our goal is to assess the causes and severity of diarrhea in children under five in both urban and rural areas of the Uvwie Local Government Area. A systematic questionnaire was used to gather data from mothers of children under five who visited the Primary Health Care Centers in Alaka, Sedco, Ogbomoro, and Ohore. Based on a nearly equal distribution of 180 youngsters polled between February and June 2022, the findings were presented. Given that 67 children were surveyed during the study period, the findings demonstrated that diarrhea remains a significant health concern. In terms of mothers' educational attainment, 36.1% were illiterate, 31.7% had only completed primary school, 23.3% had completed secondary school, and 8.9% had completed higher education. The majority of moms (51.7%) worked for themselves, and many (42.8%) had low monthly incomes and limited access to pipe-borne water; in contrast, urban areas had better access than rural ones. Public health issues with open defecation remain serious. On the other hand, the chi-square test revealed no significant (>0.05) correlation between the communities' diarrheal incidence and the sort of water sources available. However, based on analysis using the Cohen's d Effect size, it seemed that rural communities had a larger average number of diarrhea cases (19.0) than urban communities (14.5). The effectiveness of food and water supplies, cleanliness, environmental sanitation practices, and health care delivery are all indirectly correlated with the occurrence of diarrhea.

Keywords: Diarrhoea, Defaecation, Sanitation, Hygiene, Healthcare

Introduction

Globally, diarrhea is a prevalent health issue that causes avoidable morbidity and mortality in children under five (Villavicencio et al., 2024). According to Lakew et al. (2024), diarrhea is defined as three or more loose stools per day, while the World Health Organization (WHO, 2007) defines it as the passing out of unformed, loose, watery stools more than three times per day. Children between the ages of 7 and 12 months were at much higher risk. It ranks as the second most common cause of death for kids under five (Okafor et al., 2022). Additionally, Manetu et al. (2021) found that diarrhea kills more young children than AIDS, measles, and malaria combined. Unclean water and inadequate sanitation have long been blamed for it. Given the government's sanitation and health care policies and advocacy efforts, our goal is to assess the causes and severity of diarrhea in children under five in Uvwie Local Government Area's urban and rural populations. Any of the following conditions, including bacterial infections, viruses, parasite infections, food allergies, intolerances, medication reactions, and intestinal illnesses such inflammatory bowel disease, can result in diarrhea. Rotavirus is the most frequent cause in youngsters (Das et al., (2024). Based on clinical symptoms and presentations, diarrhea is frequently categorized as either acute or chronic (Kombat et al., 2024). Acute diarrhea is therefore frequent and is believed to be the main cause of sickness, dehydration, and mortality in young infants. Chronic diarrhea, on the other hand, can result in a number of neurological and gastrointestinal problems that could affect a child's development. Increasing the frequency of bowel movements or stool is sometimes used as the major criterion to differentiate between acute

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diarrhea, which usually goes away on its own, and chronic diarrhea, which may need some form of treatment intervention (Kombat et al., 2024, Onoriasakpobare et al., 2024a).

Prolonged or severe diarrhea causes the feces to lose excessive amounts of moisture, salts, and minerals. This may lead to death. Poor sanitation and contaminated water have long been linked to it. Even with government health care policy and lobbying initiatives, diarrhea remains a major health concern. The purpose of this research is to assess the causes and severity of diarrhea in children under five in the communities of Uvwie Local Government Area, Delta State, Nigeria. In order to create focused solutions, it is essential to comprehend local risk variables. For the purpose of creating better prevention and treatment strategies, data regarding the causes of diarrhea-related fatalities in children under five years old is required (Black et al., 2024).

According to Asare et al. (2022), the incidence of diarrhea varies greatly and exhibits significant regional and temporal variability within and between nations. They pointed out that weather conditions were the main cause of these variances.

Materials and Methods

There are 180 kids in the study, and they are split nearly evenly between the urban and rural areas (40 kids from Alaka and Sedco and 50 kids from Ogbomoro and Ohore). There is a mixed gender distribution among the youngsters surveyed (around 80 female and 100 male). Structured questionnaires were used to gather data from mothers of children under five who visited the Primary Health Care Centers in Alaka, Sedco, Ogbomoro, and Ohore. The study was a cross-sectional survey that was carried out from February to June of 2022.Statistical analysis was conducted using the Chi-square test and t-test with Cohen's d effect size calculation. The variables that were evaluated included demographic data (age, gender, mother's education, occupation), water sources and sanitation practices, hygiene behaviors (hand washing), and the incidence and perceived causes of diarrhea.

Results

The findings were based on 180 children who were polled between February and June 2022, split almost evenly between rural (Ogbomor and Ohore) and urban (Alaka and Sedco) populations. In order to gather data, mothers of children under five years old were given standardized questionnaires. There was a mixed gender distribution with 44.4% female and 55.6% male. It was 3.2 years old on average.

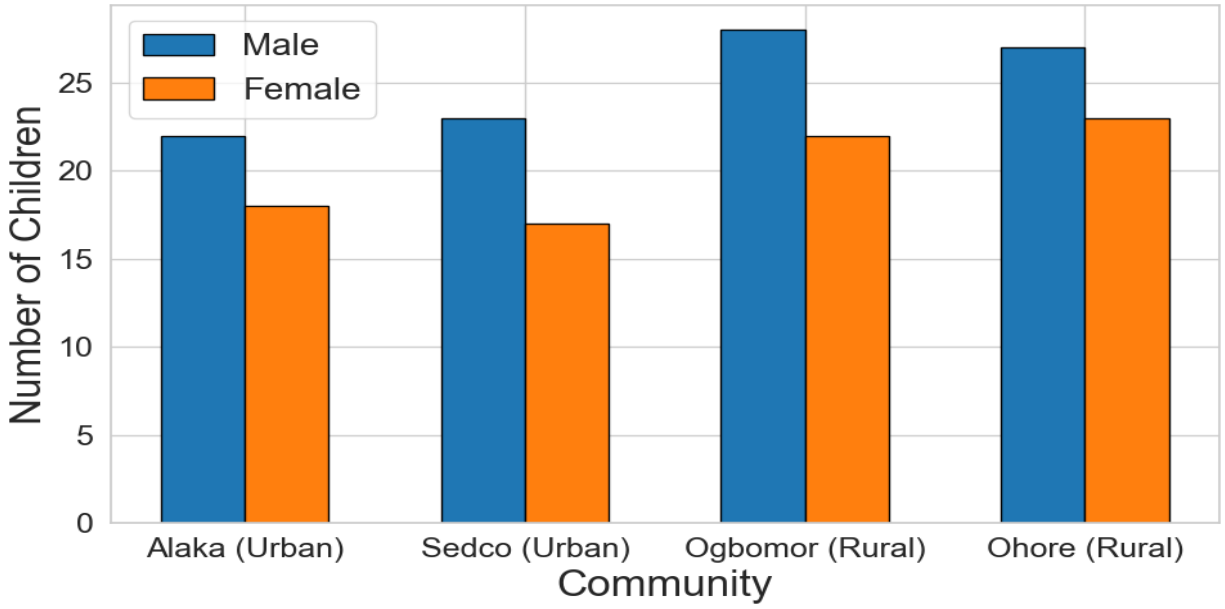

Figure 1: Gender Distribution for Children Across Communities

The majority of children surveyed were males (55.6%), and the average age of children was 3.2 years across all communities.

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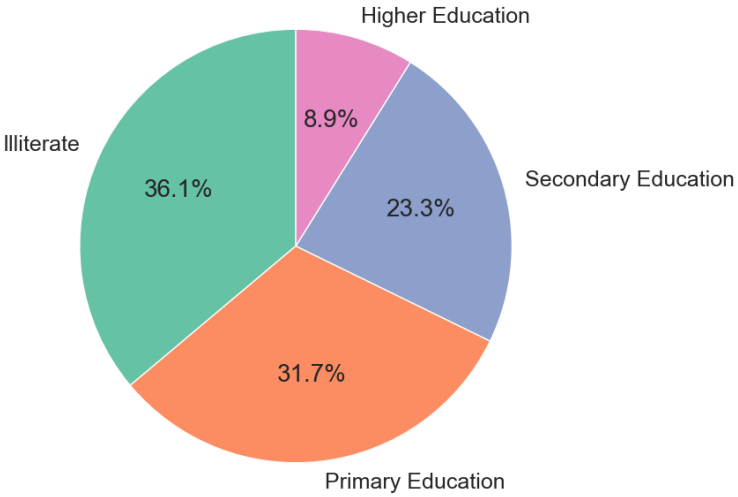

Figure 2 - Mother's Education Level
Most of the mothers had low educational levels, with 65 mothers being illiterate.

The most common occupation among mothers was self-employment (51.7%), followed by peasant farming (26.1%). Monthly family incomes were generally low, with 42.8% of families earning less than ₦50,000.

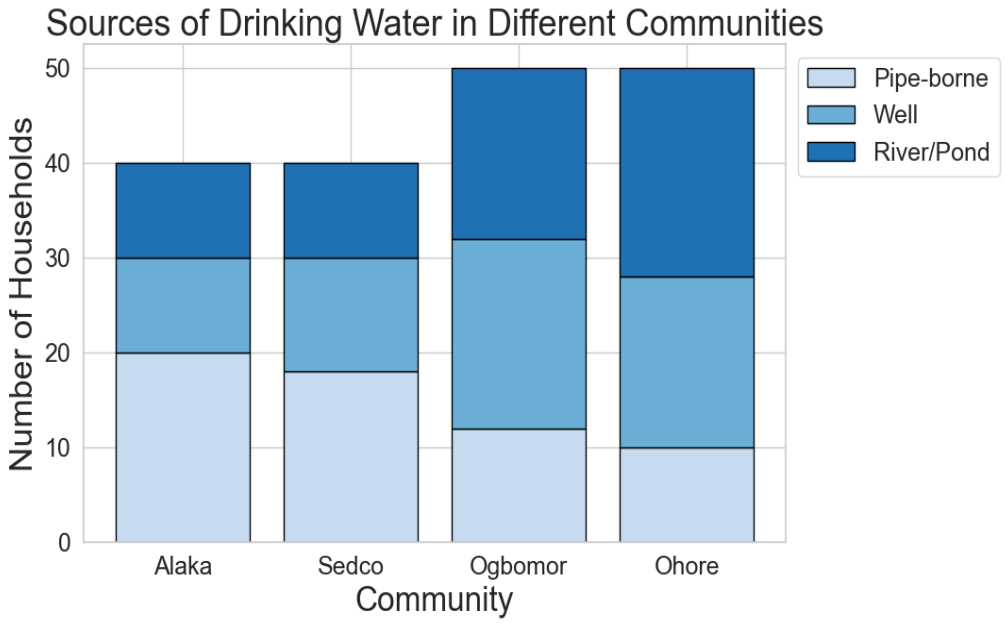

Figure 3 - Sources of Drinking Water in the Study Area

Access to pipe-borne water is relatively low in rural areas, with the highest reliance on well water (33.3%) and river/pond water (33.3%). In contrast, the urban areas (Alaka and Sedco) have better access to pipe-borne water, though the reliance on wells and rivers is still notable in the rural communities.

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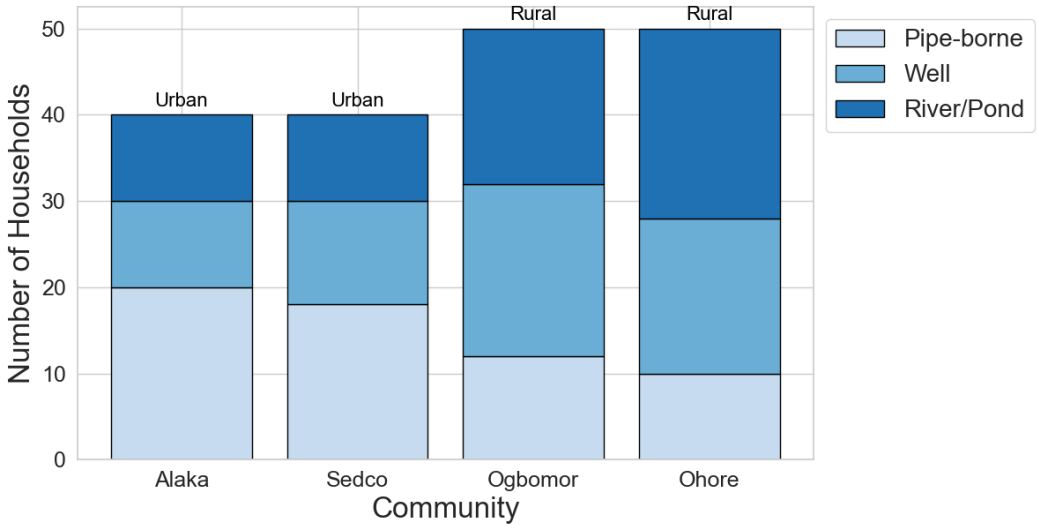

Figure 4: Access to Clean Water by Source

The chart demonstrates the disparity between urban and rural areas in access to clean water. Rural areas are more reliant on natural water sources like wells and rivers, which may increase the risk of waterborne diseases, including diarrhoea.

4.3 Hygiene and Sanitation Practices

Hygiene practices, particularly hand washing before meals, and sanitation practices, including the use of latrines and open defecation, are crucial for understanding diarrhoea risk factors.

Table 1: Sanitation and Hygiene Practices

Practice	Alaka (Urban)	Sedco (Urban)	Ogbomor (Rural)	Ohore (Rural)	Total (N = 180)
Handwashing Before Eating					
Yes (with water and soap)	20	22	10	12	64
Yes (with water only)	10	10	5	8	33
No	10	8	15	15	48
Sanitation Practices					
Use of Latrine	25	28	20	18	91
Open Defecation	12	10	18	22	62

Sanitation practices also showed a high prevalence of open defecation, particularly in rural areas (62 mothers), which is a significant public health concern.

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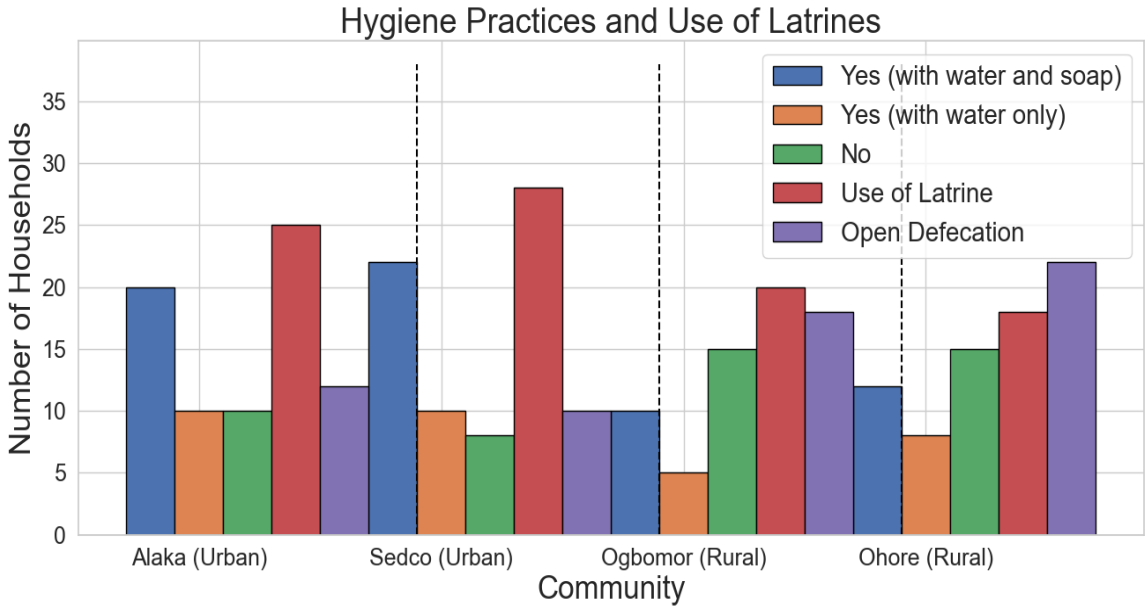

Figure 5: Hygiene Practices and Use of Latrines

Table 2: Sanitation Practices

Community	**Latrine Use**	**Open Defecation**
Alaka	25	12
Sedco	28	10
Ogbomor	20	18
Ohore	18	22

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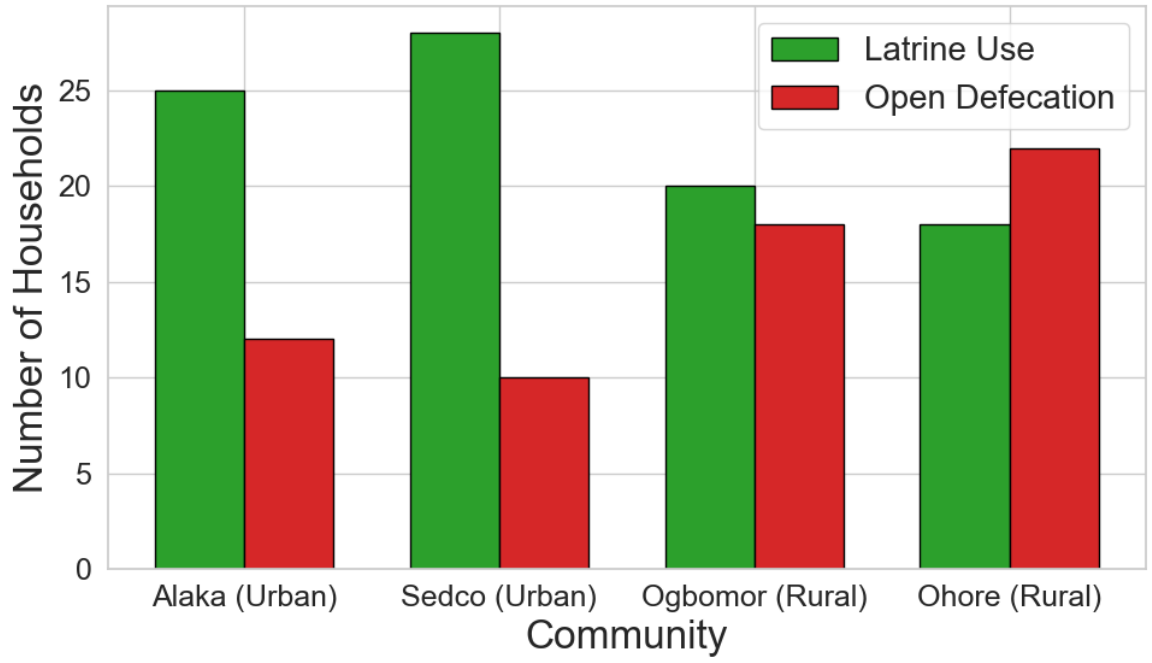

Figure 6 – Sanitation Practices

The chart above visually reflects the low use of latrines and high incidence of open defecation, particularly in rural communities, underlining the need for improved sanitation facilities and hygiene education.

Table 3: Handwashing Practices

Community	With Soap and Water	With Water Only	No Handwashing
Alaka	20	10	10
Sedco	22	10	8
Ogbomor	10	5	15
Ohore	12	8	15

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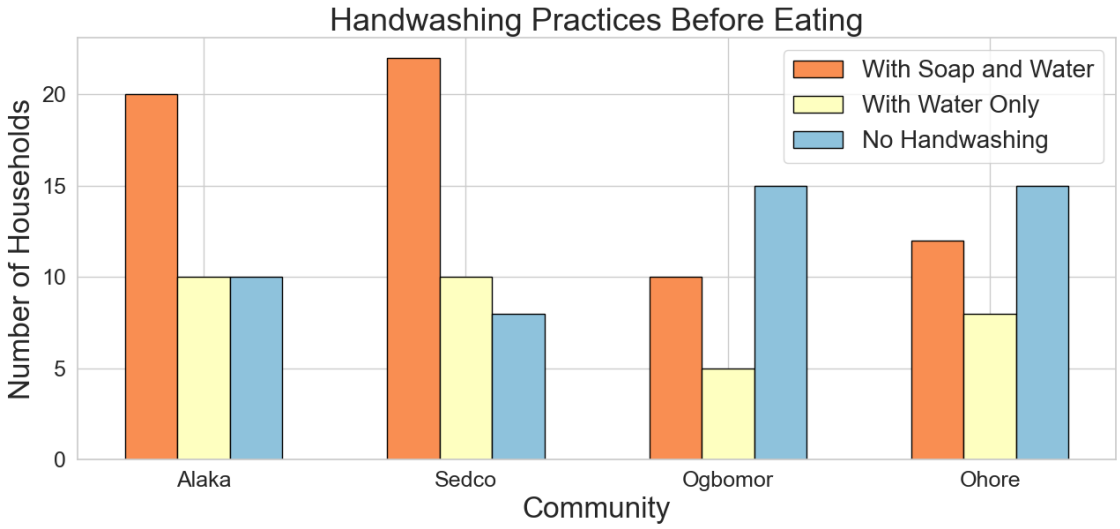

Figure 7: Hand washing Practices before Eating

Hand washing practices before eating were sub optimal, with only 35.5% of mothers consistently using water and soap before meals. This indicates a lack of hygiene awareness, which could contribute to diarrhoea transmission.

Table 4: Diarrhoea Incidence in the Past Year

Diarrhoea Incidence	Alaka (Urban)	Sedco (Urban)	Ogbomor (Rural)	Ohore (Rural)	Total (N = 180)
Yes	15	14	18	20	67
No	25	26	32	30	113

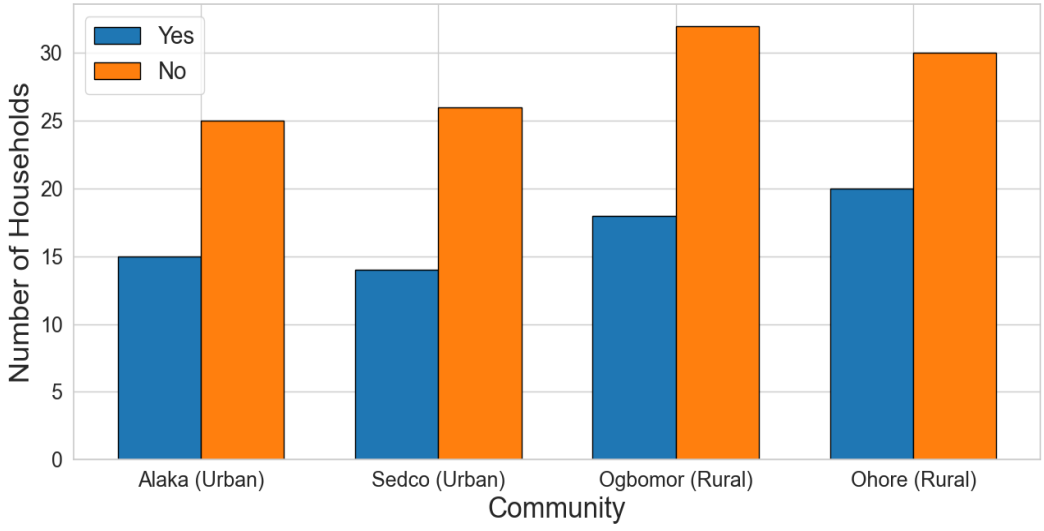

Figure 8: Diarrhoea Incidence in the Past Year

37.2% of the children surveyed (67 out of 180) had experienced diarrhoea in the past year, with a higher incidence in rural communities (Ogbomor and Ohore) compared to urban areas (Alaka and Sedco).

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This indicates a significant health burden, particularly in rural areas, where access to clean water and proper sanitation practices are more limited.

Table 5: Descriptive Statistics Summary

Parameter	**Alaka (Urban)**	**Sedco (Urban)**	**Ogbomor (Rural)**	**Ohore (Rural)**	**Total (N = 180)**
Total Number of Children Surveyed	40	40	50	50	180
Sex of Children					
Male	22 (55%)	23 (57.5%)	28 (56%)	27 (54%)	100 (55.6%)
Female	18 (45%)	17 (42.5%)	22 (44%)	23 (46%)	80 (44.4%)
Average Age of Children (Years)	3.2	3.1	3.3	3.4	3.2
Mother's Education Level					
Illiterate	8 (20%)	10 (25%)	22 (44%)	25 (50%)	65 (36.1%)
Primary Education	18 (45%)	14 (35%)	15 (30%)	10 (20%)	57 (31.7%)
Secondary Education	10 (25%)	12 (30%)	10 (20%)	10 (20%)	42 (23.3%)
Higher Education	4 (10%)	4 (10%)	3 (6%)	5 (10%)	16 (8.9%)
Mother's Occupation					
Self-employed	16 (40%)	18 (45%)	30 (60%)	29 (58%)	93 (51.7%)
Employed	8 (20%)	10 (25%)	10 (20%)	12 (24%)	40 (22.2%)
Peasant (Farmers)	16 (40%)	12 (30%)	10 (20%)	9 (18%)	47 (26.1%)
Family Monthly Income (NGN)					
<₦50,000	10 (25%)	12 (30%)	25 (50%)	30 (60%)	77 (42.8%)
₦50,000 - ₦100,000	20 (50%)	18 (45%)	15 (30%)	10 (20%)	63 (35%)
>₦100,000	10 (25%)	10 (25%)	10 (20%)	10 (20%)	40 (22.2%)
Access to Clean Water					
Pipe-borne Water	20 (50%)	18 (45%)	12 (24%)	10 (20%)	60 (33.3%)
Well	10 (25%)	12 (30%)	20 (40%)	18 (36%)	60 (33.3%)
River/Pond	10 (25%)	10 (25%)	18 (36%)	22 (44%)	60 (33.3%)
Sanitation Practices					
Use of Latrine	25 (62.5%)	28 (70%)	20 (40%)	18 (36%)	91 (50.6%)
Open Defecation	12 (30%)	10 (25%)	18 (36%)	22 (44%)	62 (34.4%)
Hand washing Before Eating					
Yes (with water and soap)	20 (50%)	22 (55%)	10 (20%)	12 (24%)	64 (35.6%)
Yes (with water only)	10 (25%)	10 (25%)	5 (10%)	8 (16%)	33 (18.3%)
No	10 (25%)	8 (20%)	15 (30%)	15 (30%)	48 (26.7%)

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Main Cause of Diarrhoea					
Poor Sanitation	15 (37.5%)	18 (45%)	30 (60%)	35 (70%)	98 (54.4%)
Unclean Water	10 (25%)	10 (25%)	12 (24%)	8 (16%)	40 (22.2%)
Worms	10 (25%)	8 (20%)	6 (12%)	5 (10%)	29 (16.1%)
Food Contamination	5 (12.5%)	4 (10%)	2 (4%)	2 (4%)	13 (7.2%)
Diarrhoea Incidence in the Past Year					
Yes	15 (37.5%)	14 (35%)	18 (36%)	20 (40%)	67 (37.2%)
No	25 (62.5%)	26 (65%)	32 (64%)	30 (60%)	113 (62.8%)
Breastfeeding Practices					
Exclusively Breastfed	15 (37.5%)	18 (45%)	30 (60%)	28 (56%)	91 (50.6%)
Mixed Feeding	25 (62.5%)	22 (55%)	20 (40%)	22 (44%)	89 (49.4%)
Vaccination Status					
Fully Vaccinated	30 (75%)	32 (80%)	35 (70%)	38 (76%)	135 (75%)
Partially Vaccinated	10 (25%)	8 (20%)	10 (20%)	8 (16%)	36 (20%)
Not Vaccinated	0 (0%)	0 (0%)	5 (10%)	4 (8%)	9 (5%)

Discussion

Lakew et al. (2024) state that despite government efforts, diarrhea continues to pose a significant health risk. Community-specific risk factors indicate that there is no one-size-fits-all solution to lower childhood diarrhea (Sadiq et al., (2022). According to UNICEF (2018 and 2024), diarrheal infections are also the greatest cause of death for children under the age of five. This is true even if there is a straightforward treatment for the sickness. In 2021, it is estimated to be responsible for almost 9% of all fatalities among children under the age of five worldwide. Very few instances of diarrhea require laboratory testing; the majority can be identified clinically (Viegelmann et al., 2021). The following are major risk factors: poverty, poor hygiene habits, inadequate sanitation facilities, poorer maternal education, and younger maternal age. Improved access to sanitary facilities and clean water, hand washing with soap, educational initiatives aimed at women with lower educational attainment, and raising awareness of zinc supplements (which is currently low) should be the top priorities of public health initiatives. In Ethiopia, childhood diarrhea was likewise linked to the mother's age (Fenta & Nigussie, 2021). Because hygiene practices are crucial in preventing infectious diseases, mothers' and caregivers' hygiene practices pose a risk for diarrheal illness. Since the home is the child's primary habitat and the site of the majority of transmissions, hygienic behavior adjustments can help reduce diarrheal illnesses.

Adenovirus, astrovirus, norovirus, and rotavirus were the most prevalent viral infections in children under five. Cryptosporidium, Giardia, and Entaomoeba species are parasite pathogens, whereas Shigella, Campilobacter, Salmonella enterica, and Echerichia coli are bacterial pathogens (Das et al., 2024). We learn from their work that rotavirus was the most common viral pathogen in children of all ages and in every WHO region, whereas entamoeba species and Giardia were common in children between the ages of three and five, with the former being a major cause of diarrhea in the Eastern Mediterranean region.Levine et al. (2017) further supported this by explaining that incorrectly classifying diarrhea based on vague definitions can result in erroneous estimates of prevalence and treatment coverage, which can then lead to improper resource allocation in settings with limited resources already in place. Additionally, it can lead to incorrect attribution of diarrhea exposures and diarrhea to health outcomes. Measles, malaria, pneumonia, and diarrheal illnesses are the four main infectious diseases that kill children under five (Ugboko et al., 2020, Onoriasakpobare et al., 2024b). However, they clarified that diarrhea in children under five in Africa has been linked to between 25% and 31% of the total burden.

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Improvements in drinking water quality, sanitation facilities, and hygiene habits, particularly in low- and middle-income countries, have been proposed by numerous research as an intervention to reduce childhood diarrhea (Manetu et al., 2021). This implies that unprotected water sources are susceptible to contamination. According to Diouf et al. (2014), hygiene education and point-of-use household water treatment methods like boiling can effectively reduce the prevalence of diarrhea. As a result, neither the sole use of improved water sources nor access to better sanitation significantly affected the prevalence of diarrhea in our study. Information on proper drinking water handling, including methods for cleaning water before use, is a component of the majority of hygiene education programs. Because of this, proponents of point-of-use water treatment interventions contend that even clean water from the source is highly susceptible to contamination by insanitary drawing or storage practices and should be treated immediately before consumption (Diouf et al., 2014).

Conclusion

The results of this study indicate that the prevalence of diarrhea is inversely correlated with the efficiency of health care delivery, environmental sanitation, food and water sources, and hygiene behaviors. The prevalence of diarrhea in the communities did not correlate with the type of water source used in a statistically meaningful way. This shows that factors including hygiene habits, sanitation practices, and other environmental conditions might have a greater impact on the incidence of diarrhea. Water sources are therefore not a significant contributing factor to the prevalence of diarrhea in these communities, according to our investigation. Based on the data, it shows that rural towns have a greater average number of diarrhea cases (19.0) than urban communities (14.5). At the 0.05 level, nevertheless, this difference is not statistically significant. The observed difference may be the result of random variation in the data, as indicated by the non-significant p-value, which is not strong enough to reject the null hypothesis despite the huge effect size. It may take a bigger sample size to reach statistical significance. Public health initiatives should prioritize expanding access to sanitary facilities and clean water, as well as encouraging hand washing with soap (Lakew et al., 2024). Additionally, in order to greatly enhance hand washing, safe water, hygiene practices, and the early detection of diarrheal symptoms, mothers—especially those with lower educational levels—should be the focus of teaching efforts. According to earlier research, rotavirus vaccine successfully prevents severe diarrhea (Fenta & Nigussie, 2021). Introduced in 1975, oral rehydration therapy has considerably decreased diarrheal mortality (Ademora et al., 2011).

Recommendations

1. Children older than six months may benefit from oral zinc therapy in terms of lessening the intensity and duration of their diarrhea, but children younger than six months may not benefit much from it (Lazzerini & Wanzira, 2016).
2. Co-trimoxazole and metronidazole, which could be empirically administered, were suggested by Udoh and Meremikwu. (2017) to be the first-line antimicrobial medicines for treating pediatric diarrhea. They also list ciprofloxacin, rifaximin, cefuroxime, ceftriaxone, tetracycline, penicillin, erythromycin, amoxicillin, ampicillin, and cefuroxime. In addition, they suggested parenteral ceftriaxone or ciprofloxacin therapy for patients of severe diarrhea.

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