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Factors Influencing Outbreak of Diarrhoea among Children under the age of five years in Borno State

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Abstract

Introduction: Diarrhoea infection has been recognized as one of the world's leading causes of morbidity and mortality, resulting in over two million deaths per year, especially children in resource-limited countries
Aim: To assess the factors influencing the outbreak of diarrhoea among under-five Children in Borno State.
Methods: A cross-sectional community study was conducted in a sample of 400 households in Borno State. A multistage random sampling technique was used to select mothers of under-five-year-old children. Data was collected with the aid of an interviewer-administered questionnaire. Univariate and multivariate analyses were done to determine the relationships between the potential associated factors and diarrheal diseases.
Results: The significant positive associates of a high incidence of diarrhoea were increased number of under-five-children (OR=1.289, 95% CI=1.016-1.635, P= 0.037), polygamous families (OR=2.004, 95% C.I=1.321-3.040, p=0.001), non-attendance of antenatal care by mothers (OR= 2.312, 95% C.I.= 0.996-5.365, p = 0.041), sharing toilets (OR=3.352, 95% C.I=2.190-5.131,P<.001), using water from vendors (OR= 5.172, 95% C.I.=1.354-19.765, p =0.022) and disposal of refuse on the street (OR= 2.868, 95% C.I.=1.597-5.151, p<.001) . In contrast, mothers with higher educational qualifications (OR=0.121, 95% C. I=0.030-0.485, p =0.003) and the use of piped underground reservoir water (OR=6.25, 95% C.I.=1.536-25.425, p = 0.015) were identified as factors that significantly reduced the likelihood of diarrhoea outbreaks.
Conclusion: Our study has shown that non-attendance of antenatal care by mothers, toilet sharing, poor sources of drinking water, and refuse disposal methods are significant associates of diarrhoea outbreaks. These findings underscore the importance of improving antenatal care attendance, sanitation facilities, and waste management practices to reduce the incidence of diarrhoea.

KEY Words: Diarrhoea, Under-five Children, Predictors, Borno State.

Introduction

Diarrhoea continues to be a major public health problem for children worldwide. It consistently ranks among the top five causes of illness and death in children under the age of five, and it puts a significant strain on healthcare systems.[1,2] According to the World Health Organisation (WHO), diarrhoea is defined as the occurrence of three or more loose or watery bowel movements in 24-hour period.[3] In low and middle-income countries (LMIC), this condition accounts for over 90% of fatalities among children under the age of five. Specifically, South Asia and sub-Saharan Africa (SSA) together contribute 88% of deaths in this age group.[4] Sub-Saharan Africa, particularly Nigeria, saw the highest proportion (42%) of deaths attributed to diarrhoeal disease. This can be attributed to the inadequate hygiene and sanitation practices prevalent in the region.[5]

As of recent, data has shown that Nigeria experienced one of the highest numbers of rotavirus-related

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deaths among children under the age of five years, accounting for 30% of all global rotavirus deaths in this age range.[6] Documented evidence indicates that Nigeria has a daily loss of approximately 2,300 children under the age of five years due to mortality.[7] The largest prevalence of this unfortunate occurrence is observed in the North Eastern states, accounting for 35%, while the lowest prevalence is found in the southwest, at 1%.8 This places the country as the second most significant contributor to the global under-five mortality rates.[9]

Over the past few decades, the federal government and multiple non-governmental organisations have collaborated extensively to alleviate the burden. One of the various initiatives includes the incorporation of the rotavirus vaccine into the nation's routine immunisation schedule. The newest ranking by the International Vaccine Access Centre shows that Nigeria has dropped from the 2nd to the 4th position in terms of the largest number of child deaths due to diarrhoea.[10] Pakistan, Bangladesh, and India are ahead of Nigeria in this ranking. Notwithstanding the implemented measures, recent statistics from Borno state indicate that there was a total of 2,685 cases of diarrhoea and 137 related deaths across 14 Local Government Areas.[11]

It is regrettable to observe that if prompt action is not taken to reduce these crucial numbers, the achievement of the third goal of Sustainable Development Goals (SDGs), which aims to eliminate preventable deaths of newborns and children under five by 2030, may become unattainable.[12] This study aims to evaluate the factors contributing to diarrhoea in children under the age of five in Borno State.

Methods and Materials

The study was conducted in Jere and Biu local government areas of Borno State. Jere is in the central senatorial district while Biu is in the southern senatorial district of Borno state with headquarters in Khaddamari and Biu respectively. The commonly spoken languages in the study area are Hausa, Kanuri, and English. Borno State has been the epicentre of insurgency in the northeast which has forced a lot of people to leave their ancestral homes to settle in the city of Maiduguri which is secured by the military. The two local governments were chosen for the study because they were the worst hit by a recent outbreak of diarrhoea diseases.[11] The study adopted a community cross-sectional survey design to recruit 400 under-five mothers living in Jere and Biu local government areas.

Sample size

The sample size for the study was calculated using the formula:

$n=Z^2pq/d^2$

n= desired sample size

z = the standard normal deviate which corresponds to 95% confidence interval (normally set at 1.96)

p = the prevalence of diarrhoea as obtained from a similar study[13] is 38.4% (i.e. 0.384).

q = 1 −p = 61.6% (i.e. 0.616)

d = degree of precision (0.05)

$n= (1.96)^2 x\ 0.384\ x\ 0.616 / (0.05)^2$

n= 363

A 10% (36.3) non-response rate was calculated and added to bring the sample size to 400.

Sampling technique

A multistage sampling method was used. A three-stage approach was used to determine the households and participants selected for the study. In stage one, six wards were selected randomly (ballot method) from the available 12 and 11 wards in Jere and Biu respectively.[14] In the second stage, for convenience purpose, three streets each were randomly selected (ballot method) in each of the six wards. In stage three, houses and participants were selected using a convenient sampling technique. From each of the selected houses, one mother of an under-five child who met the inclusion criteria and was willing to participate was recruited into the study.

Inclusion criteria

All mothers of under-five children, residents in the study area, who consented to participate in the study were eligible

Exclusion criteria

Nulliparous women, women who did not have under-five children, and women who outside the reproductive age group were excluded from the study.

Data Collection

Data collection was achieved with the aid of a structured, validated, interviewer-administered close-ended questionnaire. This was developed from the insights provided by previous studies.[15,16] The self-

developed questionnaire contained 24 items that assessed the predisposing factors to diarrhoea. The questionnaire had two sections. Section A with seven questions addressed the respondents' sociodemographic characteristics such as the mother's age, the total number of children, occupation, tribe, religion, level of education, and antenatal attendance. Section B comprised 17 questions that elicited responses on the predisposing factors to diarrhoea. The face and content validity of the questionnaire were evaluated by three experts who are specialists in public health. They attested to the face and content validity of the developed questionnaire. The questionnaire was pretested in Dalori in Konduga local government of Borno state using a test-retest method. Structural validity was evaluated through factor analysis, according to the degree of similarity between the hypothetical structure of the questionnaire conceived by the researcher and the actual observed data. The correlation coefficient for each item and its related domain were calculated and obtained by the correlation coefficient model to show the structural validity. The reliability of the instrument was determined using a test-retest method yielding Cronbach's α coefficient of 0.85.[17]

The self-developed questionnaire was interview-administered by the researchers and three research assistants who were trained in the rudiments of data collection. Respondents who matched the inclusion criteria were approached in their homes, informed about study's goal and invited to participate.

Based on each participant's preference, the survey interview was conducted by one of the researchers using either English, Kanuri, or Hausa language. The researcher who administered the survey was a native Kanuri speaker and proficient in Hausa and English. Data collection was conducted between April and May 2024 and all measurements were completed at the participants' home.

Data Analysis and Presentation

The information collected was analysed in line with the research objectives and the information given by the respondents in the questionnaires with the aid of Statistical Package for Social Sciences (SPSS) version 23.0 software. The normality (Kolmogorov-Smimove) test demonstrated that the data was normally distributed. Categorical variables were analysed using basic frequencies and proportions. The association between categorical variables and the outbreak of diarrhoea was determined using the Chi-square, and Fisher's exact tests The results were considered significant when the P-value was <0.05 at a 95% confidence interval (CI). Categorical variables with significant associations were further subjected to logistic regression analysis.

Ethical Consideration

Ethical clearance was obtained from the Research Ethics Committee of the Borno State Ministry of Health (Reg, Number: NHREC/23/12/2011). Participation was voluntary through duly signed informed consent; participants had the freedom to withdraw or decline participation even after signing the consent form should they have a change of mind without consequences, respondents were not allowed to write their names on the questionnaire to ensure the enforcement of anonymity. The data collection was void of the possibility of tracing the participants' identities through personal responses.

Results

Table I presents data analysis from 400 participants, examining the association between the sociodemographic factors of respondents and the outbreak of diarrhoea. One hundred and seventy-nine (44.75%) had a history of diarrhoea while 221 (55.25%) had no history diarrhoea significant association was found between the type of family (monogamy, polygamy, single parent) and the incidence of diarrhoea ($P < 0.001$). Polygamous families showed a higher rate of diarrhoea (45.8%). A significant association was also observed between the mother's educational qualification and diarrhoea ($P < 0.001$). Higher rates of diarrhoea were found in children whose mothers had primary or Quranic education compared to those with secondary or tertiary education. In addition, a significant association was found between the number of under-five children in a family and outbreaks of diarrhoea ($P<0.036$)

Table II presents the association between selected environmental and behavioural factors and the incidence of diarrhoea among a sample population. There is a significant association between antenatal attendance and the outbreak of diarrhoea ($P < 0.05$), with a higher incidence (n=163, 91.1%) in those who did not attend antenatal care. There is a significant association between the type of toilet and the

Table I: Association between Socio-demographics Factors and Outbreak of Diarrhoea

	Diarrhoea				
Factors	Yes (179) n (%)	No (221) n (%)	Total (400) N (%)	Test statistic	P-value
Religion				**0.037**	**0.847**
Islam	163 (91.1)	200 (90.5)	363 (90.8)		
Christianity	16 (8.9)	21 (9.5)	37 (9.2)		
Marital status				**2.055**	**0.584**
Married	163 (91.1)	207 (93.7)	370 (92.5)		
Single	6 (3.4)	3 (1.4)	9 (2.2)		
Widowed	7 (3.9)	7 (3.2)	14 (3.5)		
Divorced	3 (1.7)	4 (1.8)	7 (1.8)		
Type of family				**12.809**	**<0.001***
Monogamy	86 (48.0)	145 (65.6)	231 (57.8)		
Polygamy	82 (45.8)	69 (31.2)	151 (37.8)		
Single parent	11 (6.1)	7 (3.2)	18 (4.5)		
Ethnicity				**12.569**	**0.083**
Kanuri	51(28.5)	50 (22.6)	101 (25.2)		
Hausa	42 (23.5)	40 (18.1)	82 (20.5)		
Marghi	9 (5.0)	16 (7.2)	25 (6.2)		
Bura	25 (14.0)	56 (25.3)	81 (20.2)		
Babur	16 (8.9)	26 (11.8)	42 (10.5)		
Fulani	18 (10.1)	14 (6.3)	32 (8.0)		
Shuwa	6 (3.4)	7 (3.2)	13 (3.2)		
Goza	12 (6.7)	12 (5.4)	24 (6.0)		
Qualification of mother				**28.678**	**<0.001***
Primary	29 (16.2)	20 (9.0)	49 (12.2)		
Secondary	53 (29.6)	69 (31.2)	122 (30.5)		
Tertiary	11 (6.1)	52 (23.5)	63 (15.8)		
Quranic	79 (44.1)	76 (34.4)	155 (38.8)		
No formal education	7 (3.9)	4 (1.8)	11 (2.8)		
Occupation				**6.211**	**0.098**
Housewife	76 (42.5)	86 (38.9)	162 (40.5)		
Civil servant	6 (3.4)	21 (9.5)	27 (6.8)		
Trading	93 (52.0)	110 (49.8)	203 (50.8)		
Housekeeping	4 (2.2)	4 (1.8)	8 (2.0)		
Age of mother	29.10 ±7.20	29.43 ±6.26	0.33	**0.491**	**0.624**
Number of U5 children	2.19 ±0.87	2.01 ±0.80	0.18	**2.104**	**0.036***

*Statistic: Person's Chi-square. Fisher's Exact Test was interpreted for an expected count of <5 while Yate's Continuity was interpreted for the degree of freedom of 1. Statistic: Independent Samples T-test for Age and number of <5 children. *Signifies significant*

Table II: Association between Selected Environmental and Behavioural Factors, and Outbreak of Diarrhoea

	Outbreak of Diarrhoea				
Factors	Yes (179) n (%)	No (221) n (%)	Total (400) N (%)	χ^2	P-value
Lag in Antenatal attendance				**3.997**	**0.046***
Yes	163 (91.1)	212 (95.9)	375 (93.8)		
No	16 (8.9)	9 (4.1)	25 (6.2)		
Type of toilet				**33.857**	**<0.001***
Unimproved	126 (70.4)	90 (40.7)	216 (54.0)		
Improved	53 (29.6)	131 (59.3)	184 (46.0)		
Toilet shared				**30.988**	**<0.001***
Yes	92 (51.4)	53 (24.0)	145 (36.2)		
No	87 (48.6)	168 (76.0)	255 (63.8)		
Source of water				**10.713**	**0.030***
Borehole	115 (64.2)	154 (69.7)	269 (67.2)		
Water vendor	30 (16.8)	29 (13.1)	59 (14.8)		
Pipe underground reservoir	20 (11.2)	16 (7.2)	36 (9.0)		
Sachet water	3 (1.7)	15 (6.8)	18 (4.5)		
Well	11 (6.1)	7 (3.2)	18 (4.5)		
Refuse disposal				**37.068**	**<0.001***
On the street/gutter	34 (19.0)	24 (10.9)	58 (14.5)		
Burning on the street	63 (35.2)	31 (14.0)	94 (23.5)		
Paying *Almajiri*	82 (45.8)	166 (75.1)	248 (62.0)		

*Statistic: Person's Chi-square. Fisher's Exact Test was interpreted for an expected count of <5 while Yate's Continuity was interpreted for the degree of freedom of 1 *signifies significant*

outbreak of diarrhoea (P < 0.001), with higher rates (n=126,70.4%) observed among those using unimproved toilets. There is also a significant association between toilet sharing and the outbreak of diarrhoea (P < 0.001), with higher rates (n=92,51.4%) among those who share toilets. Similarly, there is a significant association between the source of water and the outbreak of diarrhoea (P < 0.05), with variations in diarrhoea incidence based on different water sources. There is a significant association between refuse disposal methods and the outbreak of diarrhoea (P < 0.001), with higher rates observed in those using less sanitary methods like burning on the street (n=63,35.2%) and paying Almajiri to dispose of (82,45.8%).

Table III shows that each additional child under five years of age significantly increases the odds of a diarrhoea outbreak by 28.9% (OR= 1.289, 95% CI =1.016-1.635, P= 0.037). Mothers from polygamous families significantly have twice higher odds of diarrhoea outbreaks compared to monogamous families (OR = 2.004, 95% C.I=1.321-3.040, p-value = 0.001) while single-parent families are significantly 2.65 times more likely to have diarrhoea outbreaks compared to monogamous families (OR = 2.650, 95% C.I. =0.990-7.091, p-value = 0.045). Having tertiary education significantly reduces the likelihood of diarrhoea outbreaks by 88.9% (OR = 0.121, 95% C. I=0.030-0.485, p-value = 0.003). Not attending antenatal care by the mothers significantly increases the likelihood of diarrhoea outbreaks 2.312 times compared to those who had antenatal care (OR = 2.312, 95% C.I. = 0.996-5.365, p-value = 0.041). Using unimproved toilets significantly increases the odds of diarrhoea outbreaks 3.46 times compared to the use of improved toilets (OR = 3.460, 95% C.I. = 2.277-5.258, p-value <.001). Under-five children of women who share toilets are significantly more likely to have diarrhoea outbreaks compared to those who do not (OR = 3.352, 95% C.I. = 2.190-5.131, p-value = <.001). The following sources of water significantly increased the likelihood of

Table III: Logistic Regression Analysis of Significant Factors Associated with Outbreak of Diarrhoea

Significant Factors	B	S.E.	Wald	df	p-value	OR	95% C.I. for OR	
							Lower	Upper
No of U5	0.254	0.121	4.360	1	0.037	1.289	1.016	1.635
Type of family								
Polygamy	0.695	0.213	10.683	1	0.001	2.004	1.321	3.040
Single parent	0.974	0.502	3.763	1	0.045	2.650	.990	7.091
Monogamy	RC							
Qualification								
Primary	-0.188	0.691	0.074	1	0.785	.829	.214	3.209
Secondary	-0.823	0.653	1.591	1	0.207	.439	.122	1.578
Tertiary	-2.113	0.709	8.876	1	0.003	.121	.030	.485
Quranic	-0.521	0.647	0.648	1	0.421	.594	.167	2.111
No formal education	RC							
Antenatal attendance								
No	0.838	0.429	3.809	1	0.041	2.312	.996	5.365
Yes	RC							
Type of toilet								
Unimproved	1.241	0.213	33.832	1	<.001	3.460	2.277	5.258
Improved	RC							
Toilet shared								
Yes	1.210	0.217	31.007	1	<.001	3.352	2.190	5.131
No	RC							
Source of water								
Borehole	0.326	0.288	1.280	1	0.021	3.734	1.056	13.202
Water vendor	0.515	0.357	2.078	1	0.022	5.172	1.354	19.765
Piped underground reservoir	-1.317	0.644	4.180	1	0.015	6.25	1.536	25.425
Well	0.744	0.499	2.223	1	0.017	7.857	1.651	37.404
Sachet water	RC							
Refuse disposal								
On the street/gutter	1.054	0.299	12.431	1	<.001	2.868	1.597	5.151
Burning on the street	1.414	0.258	30.152	1	<.001	4.114	2.483	6.816
Paying *Almajiri*	RC							

RC: Reference category

diarrhoea: borehole (OR = 3.734, 95% C.I. =1.056-13.202, p-value = 0.021), water from vendors (OR = 5.172, 95% C.I.= 1.354-19.765, p-value = 0.022), well water (OR = 7.857, 95% C.I. = 1.651-37.404, p-value = 0.017) while using piped underground reservoir water significantly reduces the likelihood of diarrhoea outbreaks (OR=6.25, 95% C.I.=1.536-25.425, p-value = 0.015). Disposal of refuse on the street/inside the gutters (OR = 2.868, 95% C.I. =1.597-5.151, p-value <.001) and burning refuse on the street (OR = 4.114, 95% C.I. = 2.483-6.816, p-value <.001) increases the likelihood of diarrhoea outbreaks.

Discussion

The study evaluated the influence of socio-demographic, environmental, and behavioural factors on the occurrence of diarrhoea in children under the age of five years in Borno State. The analysis conducted revealed distinct risk factors for diarrhoeal diseases, and numerous variables in our study demonstrated a robust association with instances of diarrhoea.

The study found a significant association between diarrhoea and both the composition of the household and the number of children under the age of five that the mother has. Children from polygamous homes and single-parent households had an elevated susceptibility to getting diarrhoea in comparison to children from monogamous families. This may be attributed to the fact that in polygamous families, the number of children per household is often higher, which can lead to diluted parental attention and inadequate supervision of hygiene practices (e.g., handwashing, food preparation, and sanitation). Conversely, in single-parent households, especially those led by mothers with multiple responsibilities, there may be less time for child care, including ensuring proper hygiene and sanitation. Another plausible reason may be poor sanitation and overcrowding. Overcrowding is more common in polygamous homes, increasing the risk of faecal-oral transmission of diarrhoeal pathogens due to shared living spaces, improper waste disposal, and inadequate toilet facilities. In the same vein, Single-parent households, especially in low-income settings, may lack adequate sanitation infrastructure, increasing children's exposure to contaminated environments. Previous studies conducted in Nepal and Bangladesh support the notion that children residing in monogamous households with a smaller number of under-five children are likely to have a reduced likelihood of experiencing diarrhoea.[18,19]

The results of this study on maternal education emphasize a significant association between mothers' educational attainment and diarrhoea. Mothers with lower levels of education increase the likelihood of their children experiencing episodes of diarrhoea. This can be attributed to the fact that educated mothers are more likely to understand and practice proper hygiene, such as handwashing with soap, safe food handling, and household sanitation, reducing the risk of diarrhoea. Whereas mothers with lower education levels may lack awareness about contamination routes, leading to poor hygiene practices. Another plausible reason may be the socio-economic status and living conditions of the mothers. Higher education often correlates with better job opportunities and higher income, allowing for

improved living conditions, better sanitation, and access to healthcare. Conversely, mothers with lower education may live in overcrowded, unsanitary environments with poor access to clean water and sanitation facilities, increasing diarrhoea risk. This finding supports the results of studies conducted in Nigeria, Ghana, Egypt, and Zimbabwe where it was reported that children under the age of five, whose mothers have a lower level of education, experience frequent episodes of diarrhoea.[20,16,21,22] The educational attainment of the mother contributes to her understanding of sanitary practices, infant feeding, and supplementary sanitation measures, all of which are crucial determinants of childhood diarrhoea. This discovery provides additional support for the claim that "Literacy is a significant factor in determining the health of any population." Women who have received a formal education possess a greater comprehension of personal cleanliness, nutrition, and have a more extensive understanding of how to navigate the healthcare system.[20] Mothers who attended antenatal clinics for care during their prenatal time dramatically reduced the chances of their children experiencing episodes of diarrhoea. This could be attributed to the fact that the health education provided to mothers during antenatal clinic visits likely imparts knowledge on sanitary behaviours, child feeding, and supplementary sanitation measures, which are crucial factors in preventing childhood diarrhoea.

We found a strong association between the practice of sharing toilets and the occurrence of diarrhoea episodes. Children under the age of five years whose mothers use communal bathrooms were much more prone to experiencing diarrhoea outbreaks compared to those whose mothers have access to private restrooms. This may not be unconnected to the fact that communal bathrooms are used by multiple households, increasing the likelihood of feacal matter contamination on surfaces, door handles, and water sources. Similarly, poorly maintained communal toilets may have faecal residues, overflowing waste, or inadequate handwashing facilities, making it easier for pathogens to spread. Similar findings were reported in South Africa, where the usage of communal latrines was associated with an increased likelihood of experiencing incidents of diarrhoea compared to using private latrines.[23] Users may be exposed to contaminants through contact with surfaces in a sanitation facility. Similarly, the act of coming into contact with door handles and railings in public areas results in the transfer of disease-causing microorganisms originating from feaces.[24] The main factors contributing to diarrhoeal illnesses related to shared sanitation are contact with surfaces contaminated with these bacteria and the high excretion rates by affected persons. Young children who do not personally use these common facilities may potentially be indirectly affected.

Our investigation found a strong association between the water source and the occurrence of diarrhoea. The utilisation of borehole water, water obtained from vendors, and well water greatly enhances the probability of diarrhoea outbreaks. Nevertheless, the utilisation of piped subterranean reservoir water greatly diminishes the probability of diarrhoea epidemics. A strong association between borehole water sources and the occurrence of diarrhoea in this study could be due to microbial contamination. Boreholes can be contaminated with faecal bacteria (e.g., Escherichia coli, Salmonella, Shigella) and viruses from nearby pit latrines, sewage systems, or agricultural runoff if the borehole is not properly sited or constructed. Contaminants can seep into groundwater due to poorly sealed boreholes, cracks in the borehole casing, or shallow water tables. This conclusion is corroborated by a prior study conducted in Kano.[20] The absence of available clean drinking water significantly contributes to the spread of diarrhoeal disorders as contaminated water serves as a breeding ground for bacteria that cause diarrhoea. The high population density contributes to the elevated microbiological contamination of water used for residential purposes, resulting in inadequate waste management and potential water pollution.[24] Children living in households that rely on unimproved water sources such as unprotected wells, unprotected springs, surface water, and sachet water are more susceptible to experiencing episodes of diarrhoea.

In our investigation, we also found a notable association between the methods used for disposing of garbage and the occurrence of diarrhoea outbreaks. Improperly discarding waste on the street or in the gutters, as well as burning waste on the street, heightens the probability of diarrhoea outbreaks. This finding is consistent with the reports in Kano.[20] An epidemiological association exists between hygiene and overall health, as well as between effective waste disposal and the occurrence of diarrhoea.[25] Flies are a

recognised method of transmitting rotavirus, an infectious agent that causes diarrhoea. They can come into direct touch with faecal waste and then physically transfer it to food, water, or objects.

Limitations

There are certain constraints in our investigation. All instances of diarrhoea were based on self-reported information and were not verified through diagnostic testing. Hence, the actual number of infection cases may be lower than the stated figure. In addition, this study did not consider the hygiene behaviour of the children, such as handwashing before eating and after using the toilet, nail trimming, nail-biting and thumb-sucking habits, as well as the consumption of water and snacks in preschool, and food purchased from street vendors. None inclusion of immunisation history of rotavirus vaccine is another limitation of this study. Rotavirus is the commonest aetiologic agent of childhood diarrhoea and is not strictly related to poor hygiene alone. It would have been useful information to know if the unimmunised under-five years children were at increased risk of acute watery diarrhoea.

Conclusion

The study found that families with more children under the age of five, polygamous families, single-parent families, mothers who do not attend antenatal care, households using unimproved toilets, households sharing toilets, households using borehole water, households using water from vendors, households disposing of refuse on the street or inside gutters, and households burning refuse on the street. These factors were identified as positive associates of high incidences of diarrhoea. Nevertheless, it was shown that mothers with higher levels of education and the utilisation of piped underground reservoir water in the family were associated with a notable decrease in the probability of experiencing diarrhoea outbreaks.

Recommendation

The government should implement appropriate policies to promote female education to attain positive health outcomes for children in the future. Healthcare practitioners and environmental officers should actively strive to enhance antenatal care attendance, sanitation facilities, and waste management procedures in order to decrease the occurrence of diarrhoea. Families should ensure regular water testing, proper borehole construction, improved sanitation, and health education on safe water handling can help reduce the incidence of diarrheal diseases in such communities.

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