Prevalence and Factors Associated With Diarrheal Diseases Among Children Below Five Years in Selected Slum Settlements in Entebbe Municipality, Wakiso District, Uganda

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Research Article

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Abstract

Background: Despite global interventions to prevent and control diarrhea, it still remains a public health problem leading to childhood morbidity and mortality majorly in developing countries. In Uganda, diarrhea is amongst the five leading causes of under-five mortality, contributing to more than 140,000 deaths every year and this accounts for 7.1% of all under-five mortalities in Uganda. Efforts to prevent and lower diarrheal diseases need to be informed by data on determinants of diarrhea. The study assessed factors associated with diarrheal diseases among children below five years in selected slum settlements in Entebbe municipality, Wakiso District, Uganda.

Methods: The study employed a cross-sectional study design covering 384 randomly selected households having children < 5 years old in the study area using quantitative research methods. Data was collected using close-ended questionnaires and diarrhea disease history was captured for the last month before the survey. Bivariate and multivariate logistic regression analyses was to identify the risk factors associated with childhood diarrhea considering a 95% confidence interval and $p < 0.05$.

Results: Diarrhea disease in children among the selected slum settlements in Entebbe municipality was found to be at 62.4%. Access to water from a protected water source (deep well and borehole), presence of a vent in toilets, age, and child birth weight were found to be significantly associated with diarrheal diseases among children below five years.

Conclusion: The prevalence of childhood diarrhea among children < 5 years of age in selected slums of Entebbe municipality was found high. Use of water from a protected source, presence of a vent in toilets, age, and child birth weight were identified as predictors of diarrhea occurrence. These findings implied that community health education is urgently needed for fighting childhood diarrhea in the study area to eliminate the predisposing factors to diarrhea.

Background

Diarrhea remains a leading cause of mortality and morbidity despite global efforts like provision of water, promotion of breastfeeding, and proper hygiene to control its prevalence. It accounts for 3.6% the global burden of disease (1) and one of leading killer with 8% mortality among all deaths in children below 5 years globally(2) and 21% in developing countries. (3). The number of deaths due to diarrhea is even higher than death due to diseases like AIDS, malaria, and measles amongst the susceptible groups. Every year, 760,000 children die from diarrhea, which is equivalent to 2195 children dying every day or losing nearly 32 school buses full of children every day (4).

In Uganda, diarrhea remains among the five leading causes of under-five mortality, accounting for 8% of the 85000 under five children mortality(3), and a national prevalence of 20% among children under 5 years(5).Northern Uganda however reports diarrheal prevalence ranging from 29.1–41.3% (6)

According to UDHS report (7), 17% of the total population in Entebbe municipality is children below 5 years. 1490 homesteads in the municipality use unprotected water sources while 11,535 households use nonimproved toilet facilities for human waste disposal(8) risking diarrheal diseases.

Methods

Study area

Geographically, the study was carried out in Busambaga and Kitubulu slum settlement villages in Entebbe municipality in Wakiso district in Uganda. Entebbe municipality lies at $0^{o}.04^{o}$N, $32^{0}.28^{0}$E on the peninsula of Lake Victoria, approximately 37km southwest of Kampala, Uganda's capital, covering a total area of 56.2 km^2, out of which 20km^2 is water. (www.mirror.unhabitat.org)

Entebbe municipality forms part of the 16 administrative units of Wakiso District. It has a total of 10,217 children under 5years and majority of the people are small scale subsistence farmers(8). Additionally, the municipality has 1490 homesteads with unprotected water sources while 11,535 households utilize nonimproved toilet facilities for human waste disposal(8). Kitubulu and Busambaga are some of the informal resettlement areas in the municipality and they are reported to have the highest burden of children under 5 years diagnosed with diarrheas in the municipality. (Entebbe Hospital HMIS, 2017).

Research Design And Methodology

The study was conducted using a cross-sectional study design employing quantitative study approaches in two slum settlements purposively selected out of 3slum settlements in Entebbe municipality. Entebbe municipality where Kitubulu and Busambaga settlements are found, has a total of 10,217 number of children under 5years (8) and. Using the sampling framework provided by Cochran (Cochran, 1977), a sample size of 384 respondents was considered for the study but samples drawn from each cluster for inclusion into the study. Using clustering techniques, the population was clustered into settlements, that is; Kitubulu and Busambaga settlement, from which households were selected using convenience sampling based on the inclusion criteria. Only children below 5years from households where a mother or caretaker was present was considered in the study and in households where more than one child below 5years existed, a lottery method was used to select one. Trained research assistants administered the questionnaires and the dependent variable was the occurrence of diarrhea among children below 5years within a month before the study. The The case definition for an episode of diarrhoea was 3 or more episodes of diarrhoea in a 24hour period.

Data Analyses

Descriptive analyses using frequency and percentages were used to summarize the independent and dependent variables using SPSS version 22. Multivariant logistic regression was used to obtain the

associations between diarrhea among children below 5 years and associated factors. The adjusted odds ratios [AORs] of diarrhea with 95% confidence interval [CIs] and P-value < 0.05 were used to describe associations. First, we conducted bivariate analyses to determine the associations between diarrhea and other associated factors using chi-square and binary logistic regression. Only significant variables with p values less than 0.05 in bivariate analyses were included in the final multivariable logistic regression.

Results

Prevalence of diarrheal diseases

From the 378 children below 5years that were surveyed, the study indicates that majority 236(62.4%) of the children below 5years in the village slum settlements of Entebbe municipality had suffered from diarrhea the past 1month before the study was carried out and only 142(37.6%) had not suffered from diarrhea the previous month. This is as shown in **Fig. 1** below.

Factors Associated With Diarrhea Disease:

Of the 384 households that were included in the survey, the majority 245(64.8%) of the mothers were below 30years of age and 228 (60.3%) of them had attained formal education. Consequently, 336(89.9%) were stay home mothers with 197(52.1%) as house wives and 36.8% carrying out home based jobs and 185(49.0%) of those who earned salary were getting below 250,000 Uganda shillings.

Majority of children below 5years 255(67.5%) lived in big families of more than 4 people in a home with 320 (84.7%) of the homes visited having between 1–4 children below 5years. Majority of the homes 346(91.5%) had permanent structures with 223(59.0%) of the homes having poor general homestead sanitation. Water for domestic use was obtained from treated water sources (taps), 237(62.7%) and 97(25.7%) from protected sources (boreholes and deep wells) predominantly.

369(97.6%) of the homes in the study had access to latrines with the majority 296(78.3%) of them being shared. It was also revealed that 195 (51.6%) of the latrines had houseflies around them, 151(39.9%) had lid covers, while only 32(8.5%) had vet pipes and clean toilets

234(61.9%) of mothers/guardians used separate feeding utensils for the baby while 250(66.1%) of the children below 5years had their bottles boiled before feeding them and 317 (83.9) of mothers never practiced proper hand washing.

With regards to the children, 207(54.7%) of the children in the study were below 3years with 234 (61.9%), having normal birth weight (2.5-3.9kg). 230(60.8%) were weaned at an early age and 334(88.4%) of the children were initiated to complementary feeding at 6months and above with only 237(62.7%) having fully completed their rotavirus immunization. At bivariant level analysis, the following were found significantly associated with the occurrence of diarrhea among children below 5 years in the study area:

Among social demographic factors, Family size (X^2 = 7.147, df = 1, p-value = 0.008) and number of children in a homestead (X^2 = 8.534, df = 2, P-value = 0.014). Among environment-related factors, source of water ($\chi 2$ = 26.318, df = 2, $p < 0.001$) and latrine related factors, the presence of latrine ($\chi 2$ = 6.356, df = 2, $p < 0.001$) and latrine cleanliness ($\chi 2$ = 24.026, df = 2, $p < 0.001$) were significantly responsible for diarrhea.

Furthermore, behavior factors like Using separate feeding utensils for the baby ($\chi 2$ = 29.666, df = 1, $P < 0.001$), and boiling of feeding utensils in water ($\chi 2$ = 28.806, df = 1, $P < 0.001$) and hand washing behavior ($\chi 2$ = 13.903 df = 1, $P < 0.001$) were significantly associated. Additionally, child factors like age (χ^2 = 15.204, df = 2, $P < 0.001$), Birth weight (χ^2 = 35.288, df = 2, $P < 0.001$) cessation of breastfeeding (χ^2 = 24.178, df = 1, $P < 0.001$) and rotavirus (χ^2 = 23.868, df = 2, $P < 0.001$) were also significantly associated with diarrhea.

Factors that were significant at bivariant analysis were subjected further to multivariant analysis using forward selection analysis. Family size, maternal handwashing behavior, water source, child's age, birthweight, and toilet cleanliness were statistically significant contributors to diarrhea.

Children residing in large families (AOR = 2.224 95% C.I 1.183–4.182, p = 0.013) had a 2.224 times increased risk of suffering from diarrhea compared to the counterparts in small families whereas improper maternal handwashing (AOR = 4.645 955C.I 1.910-11.296, p = 0.001) contributed to 4.645 higher odds compared to those with proper handwashing behaviors.

Obtaining water from a protected water source (AOR = 0.265, 95% CI 0.108–0.650, p = 0.004) was associated with a 73.5% reduction in diarrhea disease when compared with unprotected water sources like lakes and shallow wells. Regarding child factors, being 3 years and above (AOR = 0.513, 95%CI 0.294–0.895, p = 0.019) was protective against diarrhea with 0.513 reduced odds when compared to those below 1 year of age. Furthermore, being born with a normal birthweight (2.5-3.9kgs) (AOR = 0.125, 95% CI 0.034–0.456, P = 0.002) was also associated with 87.5% reduced diarrhea chances when compared to low-birth-weight children. The study as well found that having a vent piped toilet (AOR = 0.503, 95% C.I 0.281-0.900, P = 0.021) was protective against diarrhea among children below 5 years with 0.503 times of odds reduction when compared to toilet having lid covers in slum settlements in Entebbe municipality. This is as shown in Tables 1 and 2

Table 1
A table showing the results of bivariant logistic analysis of factors associated with diarrhoea among children below 5 years in slum settlements in Entebbe municipality, Uganda.

	Frequency				
Category	**No diarrhoea N (%)**	**Diarrhoea N (%)**	**X^2**	**Df**	**P-value**
Demographic factors					
Age (years)					
Less than 20	24(16.9)	53(22.5)	8.792	4	0.067
20–25	23(16.2)	24(10.2)			
26–30	53(37.3)	68(28.8)			
30–35	18(12.7)	47(19.9)			
Above 35	24(16.9)	44(18.6)			
Level of education					
Non-formal	49(34.5)	101(42.8)	2.545	1	0.111
Formal	93(65.5)	135(57.2)			
Employment					
House wife	79(55.6)	118(50.0)	2.639	2	0.267
Home based employment	45(31.7)	94(39.8)			
Working away from home	18(12.7)	24(10.2)			
Mother/guardians Income (Ugandan shillings)					
None	58(40.8)	93(39.4)	5.388	4	0.250
50,000- 150,000	22(15.5)	49(20.8)			
150,000-250,000	47(33.1)	67(28.4)			
250,000- 350,000	13(9.2)	16(6.8)			
Above 350,000	2(1.4)	11(4.7)			
Residential house					
Temporary	17(12.0)	15(6.4)	3.608	1	0.057
Permanent	125(88.0)	221(93.6)			

Where: * p- value less than 0.05

	Frequency				
Family size					
Small	58(40.8)	65(27.5)	7.147	1	0.008*
Large	84(59.2)	171(72.5)			
Number of children					
1 to 2	91(64.1)	121(51.3)	8.534	2	0.014*
3 to 4	38(26.8)	70(29.7)			
5 and above	13(9.2)	45(19.1)			
Homestead sanitation factors					
General homestead sanitation					
Good	63 (44.4)	92(39.0)	1.062	1	0.303
Poor	79(55.6)	144 (61.0)			
Water related factors					
sources of water for domestic use					
Open source	26(18.3)	18(7.6)			
Protected	50(35.2)	47(19.6)	26.318	2	0.000*
Treated water	66(46.5)	171(72.5)			
Latrine related factors					
Presence of toilet/latrine					
Yes	135(95.1)	234(99.2)	6.356	1	0.012*
No	7(4.9)	2(0.8)			
Sharing of toilets					
Yes	112(78.9)	184(78.0)	0.043	1	0.836
No	30(21.1)	52(22.0)			
Toilet type					
Local latrine	125(88.0)	212(89.8)	0.298	1	0.585
VIP toilet	17(12.0)	24(10.2)			
Cleanliness					
Where: * p- value less than 0.05					

	Frequency				
Lid cover	79(55.6)	72(30.5)			
Has VIP and clean	11(7.7)	21(8.9)	24.026	2	0.000*
Houseflies	52(36.6)	143(60.6)			
Number of people sharing					
None	28(19.7)	49(20.8)			
1–3	43(30.3)	87(36.9)	4.678	3	0.197
4–6	41(28.9)	46(19.5)			
Above 6	30(21.1)	54(22.9)			
Feeding related factors					
Use separate feeding utensils for the baby					
No	79(55.6)	65(27.5)	29.666	1	0.000*
Yes	63(44.4)	171(72.5)			
Boil of feeding equipment					
No	72(50.7)	56(23.7)	28.806	1	0.000*
Yes	70(49.3)	180(76.3)			
Hand washing behaviour					
Improper	185(78.4)	132(93.0)	13.903	1	0.000 *
Proper	51(21.6)	10(7.0)			
Child factors					
Age (years)					
Less than 1	5(5.5)	5(2.1)			
1.0 -2.9	91(64.1)	106(44.9)	15.204	2	0.000*
3 and above	46(32.4)	125(53.0)			
Birth weight (kgs)					
Low birth weight	19(13.4)	6(2.5)			
Normal weight	100(70.4)	134(56.8)	35.288	2	0.000*
Where: * p- value less than 0.05					

	Frequency				
Big baby	23(16.2)	96(40.7)			
Cessation of Breastfeeding					
Early weaning	109(76.8)	121(51.3)	24.178	1	0.000*
Not early weaning	33(23.2)	115(48.7)			
Introduction of mixed feeds					
Less than 6 months	18(12.7)	26(11.0)	0.237	1	0.626
6 months and above	124(87.3)	334(88.4)			
Rotavirus immunization					
Not immunised	4 (2.8)	22(9.3)			
Partial	27(19.0)	88(37.3)	23.868	2	0.000*
Complete	111(78.2)	126(53.4)			
Where: * p- value less than 0.05					

Table 2
A table showing Multivariant Logistic Regression of Factors Associated with Diarrhea among Children

	Diarrhoea status		COR (95%CI)	AOR (95%CI)
	Yes	No		
	N (%)	N (%)		
Social Demographic factors				
Family size				
Small	65(27.5)	58(40.8	-1-	-1-
Large	171(72.5)	84(59.2)	1.816(1.170–2.820)	2.224(1.183–4.182) *
Environmental factors				
Hand washing behaviour				
Proper	51(21.6)	10(7.0)	-1-	-1-
Improper	185(78.4)	132(93.0)	3.639(1.782–7.429)	4.645(1.910-11.296) *
Water source				
Open source	26(18.3)	18(7.6)	-1-	-1-
Protected water source	50(35.2)	47(19.6)	0.267(0.137–0.519)	0.265(0.108–0.650) *
Treated water	66(46.5)	171(72.5)	0.363(0.222–0.592)	1.034(0.505–2.117)
Age of the child				
Less than 1 year	5(2.1)	5(5.5)	-1-	-1-
1.0 to 2.9 years	27(11.4)	38(26.8)	0.368(0.102–1.330)	0.290(0.047–1.794)
3years and above	79(33.5)	53(37.3)	0.261(0.144–0.475)	0.513(0.294–0.895) *
Birth weight				
Low birth weight	6(2.5)	19(13.4)	-1-	-1-
Normal weight	134(56.8)	100(70.4)	.0.076(0.027–0.211)	0.125(0.034–0.456) *
Big baby	96(40.7)	23(16.2)	0.321(0.190–0.542)	0.508(0.262–0.986)
Cleanliness of toilet				
Has cover lid	72(30.5)	79(55.6)	-1-	-1-
Has VIP	21(8.9)	11(7.7)	0.311(0.211–0.520)	0.503(0.281-0.900) *
Houseflies	143(60.6)	52(36.6)	0.694(0.313–1.538)	0.990(0.303–2.973)
Key * P- value less than 0.05				

Discussion

The study assessed the prevalence and factors associated with diarrheal diseases among children below 5 years in selected slum settlements in Entebbe municipality, Wakiso district, Uganda. There was an overall period prevalence of 62.3% of diarrheal diseases in the month preceding the study. This shows a very high diarrheal burden among the children in slum settlements. This could be attributable to the lack of basic amenities for proper health and considerable independence where they play unsupervised within the community environment which is highly prone to high level of contamination (9).

The findings are consistent with the 2017 WHO report that 50% of the 2 million deaths worldwide are due to watery diarrhea, 15% persistent diarrhea, and 35% due to dysentery. (WHO, 2017)

The findings are way higher than that observed in Senegal 26% (range : 7.1-43.43.6),(9) South Africa 15.3% (range: 8.6–24.2%)(10) and Nepal 40.2%(11). the observed difference could be because of the study duration where other studies used 2 weeks compared to the one month used in this current study.

The study showed a significant relationship with family size, maternal handwashing behavior, source of water, child age, birthweight, and toilet type. The study showed a 2.224 increased risk for diarrhea among children residing in large families (AOR = 2.224 95% C.I 1.183–4.182, p = 0.013) when compared to those in small families. This is because there is a higher likelihood of infective diarrhea spread from agents being easily transmitted from one person to another, especially in large families increasing their risk. (12). The study finding agree with a study in Ethiopia where there was 91.2% less likelihood of diarrhea prevention in large families .(13) and 22.4 increased risk with families having more than 3 children under 5 years.(12)

The study showed 4.645 increased odds of suffering from diarrhea in a child whose mother had poor handwashing behavior compared to those with proper handwashing behavior. This is because dirty hands serve as portals for carrying infectious pathogens to the skin of the child, especially the hands and further inoculation into the mouth, thus increasing diarrhea (14). This is further emphasized by the fact that the intervention of hand washing with soap and water, together with sanitation and hygiene (WASH) educational intervention reduced the diarrhoea incidence by 35% among children below 5 years in eastern Ethiopia(15). Obtaining water from a protected source reduced the odds of diarrheal disease by 73.5% when compared with an open water source. This is because open water sources are highly prone to contamination especially from fecal flow and sharing with animals.(16) the findings agree with a study in Nigeria where there was a high prevalence of diarrhea in children with un improved water sources (11.2% vs 9.5%) and an increasing risk by 1.20 (95% C.I 1.11–1.30) (17)

Child's age especially above 3 years, was associated with 48.7% reduced chances of having diarrhea when compared with those less than 1 year. (AOR = 0.513, 95%CI 0.294–0.895, p = 0.019). This is because children below 1 year have low immunity, haven't received measles vaccination and introduction of complementary feeds and trying out new feeds which usually coincides with diarrhea in developing countries(18). This agrees with a study by Pintu, (2020) and Vasconcelos and colleagues, (2018) that

there's a higher risk in the age group 0–11 months and that diarrhea reduces with an increase in age reducing diarrhea by 43–70% by age above 24 months.

Birthweight was significantly associated with diarrhea among children below 5 years with normal weight reducing diarrhea by 87.5% (AOR = 0.125, 95% CI 0.034–0.456, P = 0.002) in comparison to those with low birth weight. This is attributable to the fact that low birth weight (< 2.5kgs) is a key determinant for infectious diseases including diarrhea due to low immunity. Additionally, low birth weight is associated with undernutrition (stunting 57%, underweight − 15%, and wasting 51%), which is a great predictor of diarrheal diseases(21). The study findings agree with a study by Kumer and Bokar (2018) who found a 1.38 times higher risk of diarrhea among low birth weight babies while Aditya & Mahesh, (2014) found a 51% reduction in diarrhea among normal weight babies compared to low birthweight babies.

Having a vent pipe on the toilet as a cleanliness factor was associated with 0.503 reduced odds for diarrhea (AOR = 0.503, 95% C.I 0.281-0.900, P = 0.021) compared to having lid cover toilets. This is likely because the presence of a vent pipe helps to reduce bad smell and houseflies in the toilet, which breaks the diarrhea transmission pathway and reduces the spread of diarrhea pathogens by houseflies(23) furthermore having an improved latrine plays a role in reducing diarrhea cases and mortality to up-to 30% in children (24).

Conclusion

Our study shows a huge burden of diarrhea among children below 5 years in slum settlement and factors at play in the causation of diarrhea. This provides a basis for strengthening strategies for diarrheal prevention in slum settlements like access to protected water sources, use of vent piped latrines, and fecal waste management. Furthermore, adherence to the focused antenatal care promotion to prevent low birthweight and premature deliveries. Diarrhea, especially in children below 5 years, is associated with high morbidity and mortality, thus health stakeholders and supporting bodies need to engage more on how to reduce the burden in slum areas.

Declarations

Ethics approval and consent of participants

The research study received ethical approval from The Aids Support Organization (TASO) Uganda Ltd research ethics committee with registration number TASOREC/038/19-UG-REC-009. Informed consent was obtained from all the participants prior to enrollment and the study followed the declaration of Helsinki of 1964

Consent for publication

Not applicable

Availability of data and materials

Data is available on request from the principal author and the corresponding author.

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Conflict of interest

The authors declare no any conflict of interest regarding the publication of this research work

Author's contribution:

RN – conceptual frame work, study designs, methodology, manuscript body text writing

DK - conceptual frame work, study designs, methodology, designed tables and figures

CD – methodology, data analysis and presentation, proof read the manuscript

FD- Conceptual frame work, methodology and proof reading the manuscript

DN- Methodology, data analysis and result presentation, proof reading the manuscript

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Figures

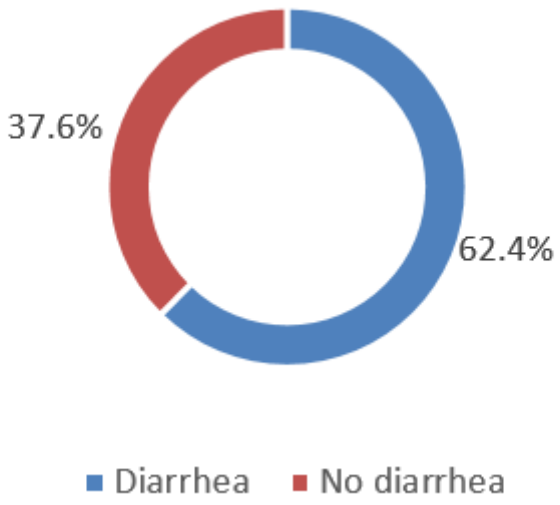

Figure 1

A Pie chart showing prevalance of diarrhea among study participants