

Prevalence and associated factors of acute diarrhea among under five children living in Hargeisa IDPs, Somaliland

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Research Article

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Abstract

Background: *In developing countries, diarrhea is the major cause for child death when children are less than five years' old. Dehydration, malnutrition, delayed physical development and early childhood mortality are the major consequences of diarrheal diseases. In Somaliland, diarrheal diseases have been endemic and a major problem since 1994, with epidemics occurring annually.*

Objective: *The aim of this study was to assess prevalence and risk factors of acute diarrhea among under five children living in Hargeisa IDPs, Somaliland*

Methods: *A community based cross sectional study was conducted among mothers of under five children from August to September, 2020, in Hargeisa IDPs. 383 mothers were selected by using single population proportional formula. Data was entered, cleaned and analyzed using SPSS version 22. To explore association between variables, bivariate logistic regression was done for each independent variable with the dependent variable and those variables with a p-value of < 0.05 were adjusted into multivariate logistic regression. Finally, those variables having a P value < 0.05 were recognized as determinants of acute diarrheal disease.*

Results: *The prevalence of diarrhea among under five children living in Hargeisa IDPs was 51%. The children whose age older than one year [AOR= 3.586, 95% CI, 1.054, 12.196], didn't breastfed exclusively [AOR= 4.006, 95% CI, 3.274, 4.596], didn't met colostrum milk [AOR= 36.41, 95% CI, 24.312, 40.489], drinks water stored in Jerry-cans [AOR = 4.901 95% CI, 1.306, 8.387] and poorly practices hand washing [AOR = 5.739, 95% CI, 1.382, 7.822] were more likely to develop diarrhea than their respective counterparts.*

Conclusion: *From this study we concluded that the prevalence of was very high (51%). Lack of awareness of exclusive breastfeeding and colostrum feeding, storing drinking water in unprotected container and poor hand washing practice were identified to be significance predictors for childhood diarrhea (P < 0.05).*

1. Background

According to the WHO, diarrhea is defined as “the passage of three or more loose or liquid stools per day” (1). It's usually a symptom of an infection in the intestinal tract, which have multiple etiologic agents including bacteria, viruses and parasites (2–4). Diarrheal disease is the second leading cause of death in children under five years old. Globally, it is estimated that there are 2.5 billion cases and 1.5 million deaths annually in children under five years (5, 6). In developing countries, diarrhea is the major cause for child death when children are less than five years old (6). The morbidity and mortality of diarrhea is attributed by poor socio-economic status, lack of access to safe water, lack of hand washing, poor housing conditions, unsanitary disposal of human waste, improper feeding practices, and lack of access to adequate and affordable health care (7).

Dehydration, malnutrition, delayed physical development and early childhood mortality are the major consequences of diarrheal diseases (8)

In Somaliland, diarrheal diseases have been endemic and a major problem since 1994, with epidemics occurring annually. Very poor sanitation conditions and the human consumption of unsafe water are the main causes of this health situation. IDP camps which have even worse living conditions provide foci for endemic cholera outbreaks (9).

The two studies conducted in Somalia and Somaliland revealed that the prevalence rates of acute diarrhea were 11% and 47% respectively. Based on findings of this studies, lack of mother's knowledge towards hand washing at four critical times, drinking unsafe water and failure of exclusive breastfeeding increases the odds of acute diarrheal diseases (10, 11).

According the neighbor countries, the prevalence of acute diarrhea in under five-children ranged between 14.5% and 36.5% (12–15) in Ethiopia whereas prevalence rates ranging between 10.6% and 19.6% reported in Kenya (16) which are lower rates compared to Ethiopia.

This study aimed to assess (1); prevalence of acute diarrhea among under five children (2); to determine socio-demographic and economic of mother and child (3); explore child characteristics; and (4) to determine environmental and hygienic characteristics related to acute diarrhea

2. Material And Methods

2.1 Study sittings

A community based cross sectional study was conducted among mothers of under five children from August to September, 2020, in Hargeisa IDPs. Hargeisa is the capital city of Somaliland and locates in the northern part of Somalia. Hargeisa is on latitude 9°.5624" and longitude, 44°.177" and 1,334 meters (4,377 feet) of above the sea level with a population of approximately 1.5 million individuals. It has one referral public hospital, eight private hospitals, twenty-five private clinics and ten public MCHs. In the city there are 16 IDP settlements consist of 11,549 households living in 71,606 individuals. 46,544 (65%) and 17,902 (24%) of them are women and under five children respectively.

2.2 Sample size determination

The sample size was determined by using single population proportional formula

$$n = \frac{z^2 \cdot p \cdot (1 - p)}{d^2}$$
 with the following assumptions

n = sample size

Z = confidence interval at 95% which is 1.96

P = expected proportion of children who have diarrhea is taken to be 47% = 0.47 as reported in study conducted in Sanag region (11).

r = margin of error (0.05)

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After substitution the formula, the final sample size was **383** mothers/caregivers.

2.3 Sampling procedure

First, four IDPs (Stadium, Ayaxa 1, Digale and Ayaxa 2) was selected from total 16 IDPs in the city by using simple random sampling method followed by allocation of each IDP to probability sample proportional to its size. Household numbers having under-five children were taken from health extension workers registration books in the MCHs. Systemic random sampling was used to select households. The youngest child was selected for a household having two or more under 5 years of children. (Fig. 1)

2.4 Study variables

The dependent (outcome) variable of this study was the status of acute diarrheal disease in under five children as reported by the mother/caregiver of the child in two-week period prior to the survey.

The independent variables were socio-demographic characteristics of mother (maternal age, occupation, educational level, household income and household size); child characteristics (child's age, child's sex, vaccination status, EBF practice and colostrum feeding); environmental and hygienic factors (water storage container, hand washing practice at critical times, household floor type and frequency of latrine utilization).

2.5. Data collection procedure

Structured questionnaire was first prepared in English and then translated to Somali language. Retranslation was also being made to see the consistency of both questionnaires. After this, the questionnaire was used in interviewing the study participants through face to face interview method. Data collection was facilitated by health professionals using structured and pretested questionnaire.

2.6. Data quality control

Continuous guidance and supervision from principle investigator was done to keep data quality. The data collectors were trained for one day on the study instrument, consent form, how to interview and data collection procedures. Data was checked and rechecked for reliability and the questionnaire was pretested by 10% of sample size.

2.7. Data processing and analysis

The completeness of questionnaire was checked visually and coded with a whiteboard marker. Then was entered, cleaned and analyzed using SPSS version 22. Frequency tables and graphs were used to summarize the socio-demographic characteristics of the study participants and magnitude of diarrhea. To explore association between status and risk factors, bivariate logistic regression was done for each independent variable with the dependent variable and those variables with a p-value of < 0.05 were adjusted into multivariate logistic regression. Finally, those variables having a P value < 0.05 were recognized as determinants of acute diarrheal disease.

3. Results

3.1 Socio-demographic characteristics of mothers and her child

Total 348 mother-child pairs participated in this study making a response rate of 90.8%. Majority of mothers 158 (45.4%) were aged between 26 and 35 years' old. One-hundred fifty (43.1%) of them were illiterate whereas only 30 (8.6%) were diploma level and above. According to occupation, more than two-third 233 (67%) of mothers were housewives. More than half 187 (53.7%) of households were lived 5–8 individuals and only 58 (16.7%) of them were lived more than eight individual. Furthermore, fifty-five percent of households were lived 2–4 under five children and half of them were used monthly income ranged between 50\$ and 100% (Table 1).

Table 1
Socio-demographic characteristics of mothers and her children living in Hargeisa
IDPs Somaliland 2020.

Variables	Categories	N	%
Maternal age (348)	15–25	63	18.1
	26–35	158	45.4
	36–45	86	24.7
	> 45	41	11.8
Maternal education (348)	Illiterate	150	43.1
	Primary level	133	38.2
	Secondary level	35	10.1
	Diploma level and above	30	8.6
Maternal occupation (348)	Housewife	233	67.0
	Merchant	72	20.7
	Government employer	12	3.4
	Salaried woman	31	8.9
Household size	2–4	103	29.6
	5–8	187	53.7
	> 8	58	16.7
Number of under five children	Only one	152	43.7
	2–4	190	54.6
	> 4	6	1.7
Household monthly income (USD)	50\$ – 100\$	180	51.7
	101\$ – 150\$	73	21.0
	151\$ – 200\$	39	11.2
	> 200\$	56	16.1

3.2 Demographic and health characteristics of indexed child

More than half (52.6%) of children were males. 23.3%, 37.9% and 38.8% of them were aged less than one year, 1–2 year and 3–5 year respectively. Two-hundred and seven (59.5%) of children received measles vaccination. About one-third (30.1%) didn't fed breast milk exclusively, whereas eight percent of them met

colostrum (Table 2). 178 (50.1%) children had diarrhea in two weeks' prior the data collection. Majority of them (82%) had watery type of diarrhea (Fig. 2).

Table 2
Demographic and health characteristics of indexed child living in Hargeisa IDPs Somaliland 2020.

Variables	Categories	N	%
Child's sex (348)	Male	183	52.6
	Female	165	47.4
Child's age in years (348)	< 1	81	23.3
	1–2	132	37.9
	3–5	135	38.8
Measles vaccination	Yes	207	59.5
	No	141	40.5
EBF practice	Yes	238	68.4
	No	110	31.6
Colostrum feeding	Yes	278	79.9
	No	70	20.1

3.3 Environmental and hygienic characteristics

Majority 274 (78.7%) of households were used metal tank for water storage container. One hundred (28.7%) of children were rarely practiced hand washing at critical times where as 40.2% and 31% of them were sometimes and often practiced handwashing respectively. Considering with the livestock ownership, fourth-three percent of households had at least one kind of livestock mainly goats. Only fifty-eight (16.7%) of households had mud floor. All households had toilets however less than half (46.8%) of children were rarely used that latrines (Table 3).

Table 3
Environmental and hygienic characteristics of households in Hargeisa IDPs Somaliland 2020

Variables	Categories	N	%
Water storage container	Jerry can	74	21.3
	Tank	274	78.7
Hand washing practice	Rarely	100	28.7
	Sometimes	140	40.2
	Often	108	31.0
Livestock ownership	Yes	150	43.1
	No	198	56.9
Household floor	Mud	58	16.7
	Cement	217	62.4
	Tiles	73	21.0
Latrine utilization	Rarely	163	51.7
	Sometimes	78	24.8
	Often	74	23.5
Waste management	Poor	253	72.7
	Good	95	27.3

3.4 Factors associated with diarrhea

In bivariate regression analyses, significance variables (p -value ≤ 0.05) that may contribute the occurrence of childhood diarrhea were noted by maternal education, household monthly income, child's age, measles vaccination exclusive breastfeeding practice, colostrum feeding, water storage container, hand washing practice, livestock ownership, floor materials of household, frequency of latrine utilization and waste management (Table 4).

Table 4

Binary logistic regression analysis of factors associated with diarrheal diseases among under five children living in Hargeisa IDPs Somaliland.

Variable	Categories	Diarrhea occurrence		COR (95% CI)	P-Value
		No	Yes		
Maternal occupation	Housewife	138	95	1	
	Merchant	12	60	7.263 (3.707, 14.231)	0.000*
	Salaried woman	11	20	2.641 (1.210, 5.766)	0.015*
Household monthly income	50\$ -100\$	94	86	1.931 (1.026, 3.636)	0.041*
	101\$ - 150\$	29	44	3.203 (1.542, 6.653)	0.002*
	151\$ - 200\$	9	30	7.037 (2.770, 17.878)	0.000*
	> 200\$	38	18	1	
Child's age (years)	< 1	51	30	1	
	1-2	62	70	1.919 (1.090, 3.380)	0.024*
	3-5	57	78	2.326 (1.321, 4.096)	0.003*
Measles vaccination status	Yes	120	87	1	
	No	50	91	2.510 (1.614, 3.905)	0.000*
Exclusive breastfeeding practice	Yes	137	101	1	
	No	33	77	3.165 (1.954, 5.125)	0.000*
Colostrum feeding	Yes	167	111	1	
	No	13	67	33.601 (24.312, 40.489)	0.000*
Water storage container	Jerry can	18	66	11.933 (5.513, 25.831)	0.000*
	Tank	162	112	1	
Hand washing practice of child	Rarely	36	64	3.869 (2.175, 6.882)	0.000*
	Sometimes	60	80	2.902 (1.715, 4.912)	0.000*
	Often	74	34	1	
Livestock ownership	Yes	52	98	2.780 (1.790, 4.316)	0.000*
	No	118	80	1	

Variable	Categories	Diarrhea occurrence		COR (95% CI)	P-Value
		No	Yes		
Floor materials of household	Mud	21	37	3.597 (1.743, 7.425)	0.001*
	Cement	100	117	2.389 (1.369, 4.167)	0.002*
	Tile	49	24	1	
Frequency of latrine utilization	Rarely	54	109	5.094 (2.792, 9.296)	0.000*
	Sometimes	48	30	1.577 (0.798, 3.116)	0.189
	Often	53	21	1	
Waste management	Poor	108	145	2.522 (1.545, 4.119)	0.000*
	Good	62	33	1	

* Significant association as p-value < 0.05, COR = crude odds ratio, CI = confidence interval

The variables which were significant (p-value ≤ 0.05) during bivariate analysis were further considered in multivariate regression analysis in order to control potential confounders (Table 5).

Accordingly, being a child age is older than one year; being a child who had poor hand washing practice; being from mothers not breastfed their children exclusively; being a child didn't meet colostrum milk and storing drinking water by jerry cans were found to be independent predictors of diarrheal disease in children.

Children whose age ranged between one and two years were 3.586 times more likely to have diarrhea than those aged less than one year [AOR = 3.586, 95% CI, 2.054, 5.196]. Exclusive breastfeeding practice was also significantly associated with childhood diarrhea. The children who didn't feed breast milk exclusively were 4.006 times more likely to have diarrhea than those who fed [AOR = 4.006, 95% CI, 3.274, 4.596].

The children who didn't meet colostrum milk were 36.41 times higher risk to develop diarrhea compared to those who fed early colostrum milk [AOR = 36.41, 95% CI, 24.312, 40.489]. Moreover, the children living in households using Jerry-cans for water storage were 4.9 times more risk to have diarrhea than those used raised tanks [AOR = 4.901 95% CI, 1.306, 8.387].

The risk of developing diarrhea was higher among children who rarely practices hand washing [AOR = 5.739, 95%CI, 1.382, 7.822] and those whose sometimes practices [AOR = 3.201, 95% CI, 1.002, 5.354] when compared with children who had good hand washing practice.

Table 5

Multivariate logistic regression analyses of factors associated with diarrheal diseases among under five children in Hargeisa IDPs Somaliland, 2020

Variable	Categories	Diarrhea occurrence		AOR (95% CI)	P-Value
		No	Yes		
Child's age (years)	< 1	51	30	1	
	1–2	62	70	3.586 (2.054, 5.196)	0.041*
	3–5	57	78	1.143 (0.259, 5.049)	0.860
Exclusive breastfeeding practice	Yes	137	101	1	
	No	33	77	4.006 (3.274, 4.596)	0.018*
Colostrum feeding	Yes	167	111	1	
	No	13	67	36.41 (25.76, 47.9)	0.000*
Water storage container	Jerry can	18	66	4.901 (1.306, 8.387)	0.018*
	Tank	162	112	1	
Hand washing practice of child	Rarely	36	64	5.739 (1.382, 7.822)	0.016*
	Sometimes	60	80	3.201 (1.002, 5.354)	0.042*
	Often	74	34	1	

* Significant association as p-value < 0.05, AOR = adjusted odds ratio, CI = confidence interval

4. Discussion

The two weeks' prevalence of diarrhea among under five children in Hargeisa IDPs was 51%. The findings of this study was extremely very high compared to SLHDS 2020 report which was only 4%. However closely related results of 47% were reported from Ceel-afwayn distric in Sanag region (11). Current studies conducted in Somalia, 11% (10), Ethiopia, 26% (17), Kenya, 19.6% (16) and Tanzania, 12.1% (18) shows lower results compared to the findings of this study. This variation may be attributed to; the current study setting consider only urban dwellers; differences in socio-demographic characteristics, environmental factors (climate and geographical differences) and behavioral factors (availability of water, presence and usage of latrine, availability of hand washing facilities and ways of waste disposal in the study area compared to other studies.

Children whose age ranged between one and two years were 3.586 times more likely to have diarrhea than those aged less than one year [AOR = 3.586, 95% CI, 1.054, 12.196]. The finding is supported with that of other similar studies conducted in other areas (19–23). This may be justified so because children aged more than one-year start crawling or walking which increases their exposure to infectious agents. Moreover, such children start complementary feeding, and this may increase their exposure to different types of infections through contaminated food and water.

Exclusive breast feeding was found to be a significant predictor of diarrheal morbidity in children as breastfeeding is an effective means of protecting children from diarrheal disease (24, 25). For those children who didn't breastfed exclusively from their mothers were 4 times more likely to develop diarrhea than those who breastfed exclusively [AOR = 4.006 95% CI, 3.274, 4.596]. Similar finding were revealed from other studies (26–29). This is because of the presence of secretory immunoglobulin A (sIgA) in the milk. The IgA protects the mucus membranes of the gastro-intestinal tract from the adherence of microbes that could cause diarrhea in children. There are other protective molecules in the breast milk such us IgG, IgM, IgD, lactoferin, lacto-peroxidases and different kinds of leukocytes.

The colostrum is defined as a sticky white or yellow fluid secreted by the breasts during the second half of pregnancy and for a few days after birth, before breast milk comes in. Mothers colostrum provides effective passive immunity to the newborn against a wide range of enteric pathogens in the form of antibodies. They are central to the immunological link that occurs when the mother transfers passive immunity to the offspring (30). Therefore, this study revealed that the children who didn't met colostrum were 36.4 times more risk to have diarrhea compared to those who fed colostrum milk [AOR = 36.41 95% CI, 25.76, 47.9]. In most published literatures, colostrum milk is reported to be preventive measure for morbidity of various gastro-intestinal infections, but not in treatment of an established infection (30–34).

Unprotected water storage container is among the potential sources for diarrheal diseases transmission. The chance of contamination of water sources depends on whether the container is protected or not. Households using Jerry-cans for water storage were 4.9 times more likely to have a child with diarrhea than those using raised tanks [AOR = 4.901 95% CI, 1.306, 8.387]. This current study is in agreement with the study conducted in Ethiopia (35), but it contradicts with other study in that country (36). This might be due to the fact that there might be mixed use of water from both protected and unprotected sources, contamination during transport and storage or lack of homogeneity in source of water. Furthermore, frequency of hand washing practices in children was found to be independent predictor for morbidity of childhood diarrhea. Children who rarely and sometimes practices hand washing were 5.7 times and 3.2 times respectively increases the occurrence of diarrhea compared to those often practices [AOR = 5.739, 95% CI, 1.382, 7.822 and AOR = 3.201 95% CI, 1.002, 5.354]. Since hand washing practice ensures the elimination of microbes from the nails in hands, its missing increases the exposure of microbes through the food and drink.

From this study we concluded that the prevalence of was very high (51%). Lack of exclusive breastfeeding, colostrum discharge, storing drinking water in unprotected container and poor hand

washing practice were identified to be significance predictors for childhood diarrhea ($P < 0.05$). Its highly recommended to pay special attention in EBF promotion: health care providers and decision makers should comprehensively address issues to improve EBF practices in the community. Moreover, implementation of health education programs towards importance of colostrum milk and hand washing practice could reduce the morbidity of childhood diarrhea.

5. Limitations

Not using enough literatures from the surrounding towns on the study area in specific due to the unavailability of published journals on the topic of interest could be mentioned as a limitation. In addition to that, this study was cross-sectional study design, which made it difficult to establish causal effect relationship.

Declarations

Ethical Considerations

The study protocol was reviewed and approved by Ethical review committee of University of Hargeisa. Before data collection, written or oral agreement was obtained from the respondents such as parents and caregivers. informed consent was obtained from all a parent and/or legal guardian for participants under 18 and illiterates. Acceptance Permission of the study was obtained from every relevant authority in the Hargeisa city. Data collection was conducted confidentially. All methods were carried out in accordance with relevant institutional guidelines and regulations.

Competing interests

The authors declare that there are no competing interests.

Consent for publication

Not applicable

Authors' contribution

A.I.M wrote first draft of manuscripts from idea generation, proposal development, analysis and interpretation of data. M.M.A participated in reviewing, data analysis. Both authors read and approved the final draft of manuscript.

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Figures

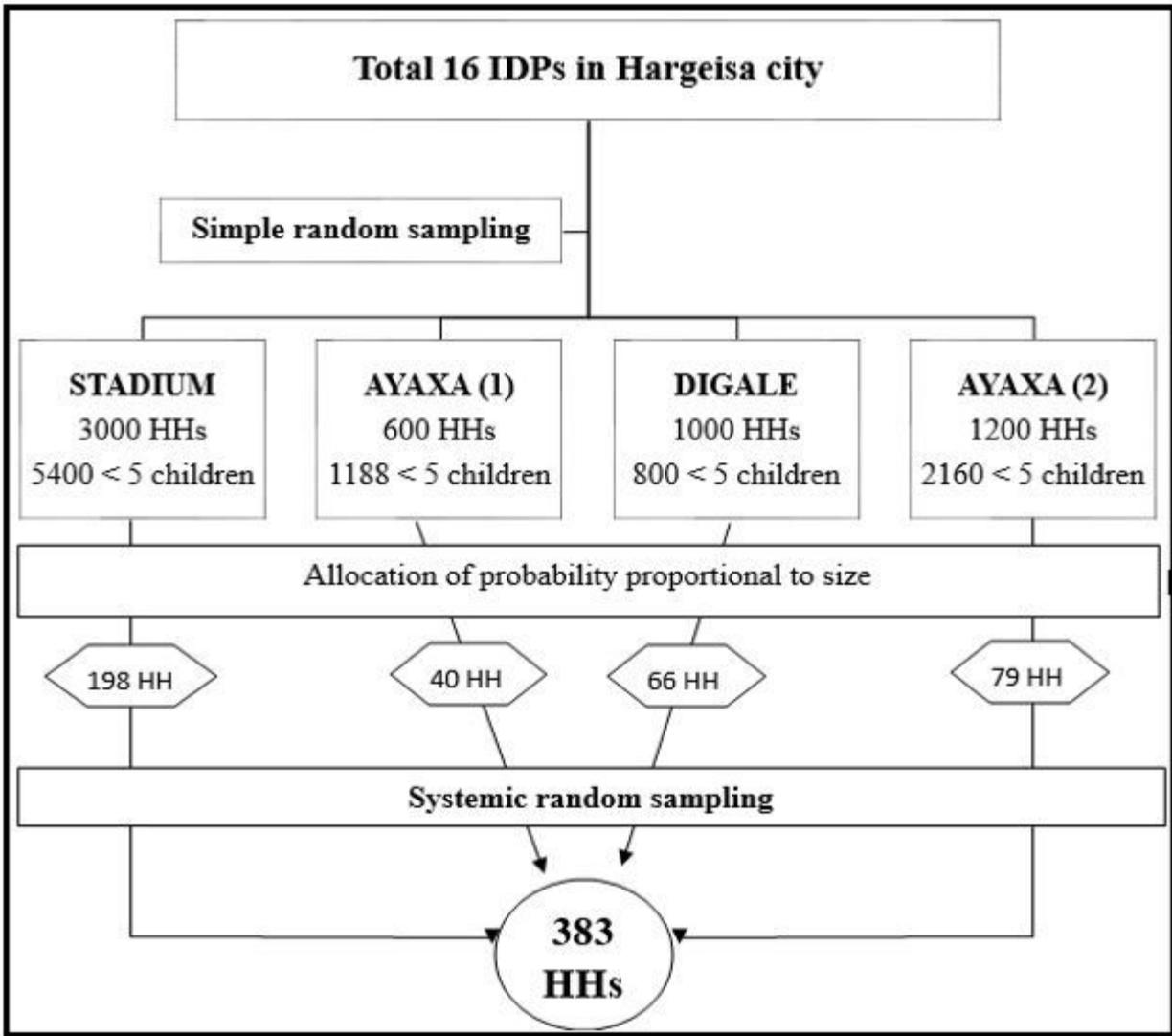


Figure 1

Sampling frame of the study participants

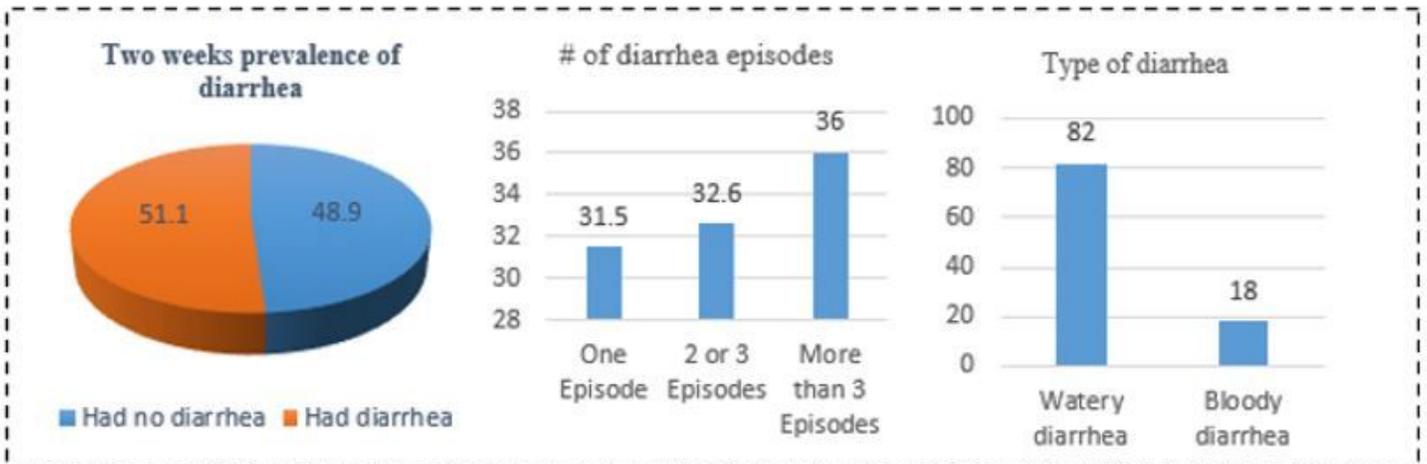


Figure 2

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [QuestionnaireforAcuteDiarrhea.docx](#)
- [QuestionnaireforAcuteDiarrhea.docx](#)