

Prevalence And Predictors Of Acute Diarrhea Among Children Under Five Years Old In Galkayo Town, Somalia

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Received date: April 01, 2021; Accepted date: September 03, 2021; Published date: September 13, 2021.

Citation: . Mohamed.A.A(2021) Prevalence And Predictors Of Acute Diarrhea Among Children Under Five Years Old In Galkayo Town, Somali, Insights Allergy Asthma Bronchitis, Vol:7, NO:4

ABSTRACT

Background

Diarrheal diseases are major public health concern for the under-five child morbidity and mortality, particularly in Sub-Saharan African countries, where it is responsible for 8.6% global under-five child death. In Somalia, Acute watery diarrhea (AWD) is the second most cause of childhood morbidity and mortality. Successful design and implementation interventions that address this childhood diarrheal diseases require understanding the local context of factors associated with childhood diarrheal diseases. Therefore, this study aims to determine the prevalence and determinants of AWD among under-five children in Galkayo, Somalia. Method: A community-based cross-sectional study was carried out in Galkayo District from April 7th to 21st, 2018. A sample of 341 mothers/caregivers were conveniently selected, and data was collected through an interview-administered questionnaire and observational checklist. Results: The prevalence of childhood watery diarrhea for the last two weeks was 31.93%. Lack of handwashing facilities in the household [AOR=3.083 (1.351–7.030)] and absence of home-based water treatment [AOR=2.256 (1.064–4.783)] as well as open field disposal of rubbish [AOR=2.560 (1.101–5.949)] and breastfeeding duration of less than 12 months [AOR=2.060 (1.111–3.821)] were the risk factors for the occurrence of AWD. Feeding with cup [AOR=.176 (.041–.751)] and eating other food [AOR=.340 (.125–.926)] were also found to be protective against AWD. Conclusion: The prevalence of AWD in Galkayo district was higher than nationally reported 24%. Therefore, improvement of handwashing facilities, employment of home-based water treatment, and appropriate disposal of rubbish, breastfeeding children with more than 12 months, and proper feeding methods and food are highly recommended to reverse this high AWD.

Key Words: Acute Diarrhea, Diarrheal Disease, Under-Five Children, Galkayo, Somalia

INTRODUCTION

Although the world has made significant progress for the reduction of under-five child mortality, the risk of a child dying before his/her fifth birthday continues to be high in WHO African Region (76 per 1000 live births), approximately 8 times higher than that in the WHO European Region (9 per 1000 live births) (WHO, 2018). The under-five mortality rate in Somalia remains high, where 1 in 7 children die before the age of five years.

Diarrhea, which is referred as the passage of three or more loose or liquid stools per day, is a major public health concern, it contributes to significant childhood deaths. It is the second leading causes of under-five death, next to pneumonia, and account 8.6% global under-five child death (Liu et al., 2016). In Somalia, diarrhea remains to be the second primary cause that contributes to under five years of child mortality, which represents 19% death of children (SCI, 2018). The risk of childhood diarrhea diseases could be significantly prevented through water, sanitation, and hygienic interventions by 27% - 53% (Darvesh et al., 2017).

Different studies across the world have demonstrated that childhood diarrhea has been influenced by various socio-economic, environmental, and behavioral factors (Alebel et al., 2018). In Somalia, the magnitude of under-five AWD remained high, 24%. Understanding the local context of factors associated with AWD is very crucial for the successful design and implementation of child health programs and policies that aim to reduce morbidity and mortality of childhood diarrhea. Therefore, this study aimed to find the magnitude of under-five child diarrhea and socio-economic, environmental, and behavioral factors that influence it.

METHODS AND MATERIALS

Study Area

This study was conducted in Galkayo district, Mudug region, Somalia. Galkayo is the capital city of the Mudug region, which contains two federal member state governments, namely Puntland in the north and Galmudug in the south. Galkayo city, which is the most centrally located city in Somalia, is 750 kilometers away from Mogadishu. The city geographically contains four main sub-villages, namely Israc, Garsor, Horumar, and Wadajir, with approximately 545,000 inhabitants.

Study design and Period

A community-based, cross-sectional study was carried out among under-five children living in Galkayo district, Somalia. Study data were collected two weeks from 7th to April 21st, 2018.

Study Population

The study populations were all households with mothers/caregivers who have children less than five years living in Galkayo district. The study units were randomly selected houses with at least one under-five children.

Eligibility Criteria

Mothers/caregivers with under-five children and who were permanent residents in the study area were eligible to participate in the study. Households with children who was chronically ill and had persistent diarrhea for greater than two weeks and those with critically ill mothers/caregivers were excluded from the study.

Sample size and sampling procedure

The sample size was calculated considering the following parameters: Prevalence of diarrhea, 28% (UNICEF, 2016) in under-five children in Somalia, a confidence level of 95% (5% desired precision), and adding 10% of non-response rate making the final sample size 341 households. The study adopted a community-based cross-sectional, quantitative study to investigate the prevalence and determinants of AWD among under-five children. We used the non-probability sampling method (convenience followed by lottery). This method was used since Galkayo district does not have the list of houses "no sampling frame". Two villages out of the four villages in Galkayo district were randomly selected. Then, convenience sampling of the 341 households were implemented. The sample size was equally split among the selected villages. If there are more than one under-five children in the same household, the lottery method was used to select the indexed child, and if the mother/caregiver or the under-five child is not present in the selected household, the next household was chosen in the study data collection.

Data Collection

Data were collected using an interviewed-administered questionnaire and observational checklist from previously published similar articles through face-to-face data collection. A questionnaire comprising of a wide range of questions related to demographic, socio-economic, environmental, and behavioral variables were implemented in accordance with the WHO key features in diarrheal diseases. The questionnaire was prepared in English and was translated into Somali language by independent and qualified individuals. The Somali version was then translated back to English for cross-checking and consistency of the questions. We performed a pre-test of the questionnaire in villages that were not included in the study, and all necessary corrections to the data collection tools were made.

Ethical Approval

Ethical clearances were obtained from the institutional ethical committee (IEC) of Global Science University, Department of Public Health. Permission to conduct the study was obtained from Galkayo local government. The study data collectors thoroughly explained the aim of the study to the participants, and written consent was obtained from the mothers/caregivers of the indexed children.

Data Analysis

: The data were entered into computer application and subsequently exported for STATA 13 for data management and analysis. Categorical data were summarized by using frequencies and percentages, while numerical variables were described by using means and standard deviation in the form of tables. In the bivariate analysis, variables significantly associated with AWD at the level of 0.2 were identified and then entered into the multivariate analysis. In the final model, the variable was considered to be significant if it had a p-value of less than 0.5.

RESULT

Demographic and socio-economic characteristics of the households

A total of 332 mothers of children younger than five years old, with a response rate of 97.4% (341/332), were enrolled in this study. The majority of the household family size was ≥ 5 (83.7%), whereas 78.62% of the households had two or more under-five children. Nearly half (50.6%) of the respondents were in the age group of 25-34 years, while one-third (31.93%) of the mothers/caregivers were 35 or above years old. About 89.76% of the respondents were biological mothers, 72.89% were married, whereas a considerable part of the respondents (43.67%) were unable to read or write, and only 53 (15.96%) of the mothers/caregivers attended university (see table 1).

Variables	Frequency (n=332)	Percentage (%)
Age of the child (in Months)		
≤11	73	21.99

Dec-23	141	42.47
24-34	91	27.47
≥35	27	8.13
Household family size	54	16.27
<5	278	83.73
≥5		
Number of under-five children in the household		
One child	71	21.39
Two children	130	39.16
More than two	131	39.46
Relationship between respondent and child		
Mother	298	89.76
Caregiver	34	10.24
Age of mother/caregiver category		
18-24	58	17.47
25-34	168	50.6
≥35	106	31.93
Marital status of mother/caregiver		
Married	242	72.89
Other	90	27.11
Educational status of mother/caregiver		
Illiterate	145	43.67
Primary	79	23.8
Secondary	55	16.57
University	53	15.96
Occupational status of mother/caregiver		
Employed	117	35.24
Student	32	9.64
Jobless	183	55.12

Table1. Demographic and socio-economic characteristics of the households in Galkayo town, April 2018

ENVIRONMENTAL CHARACTERISTICS OF THE HOUSEHOLDS

According to the findings of this study, one hundred ninety-six (59.04%) of the households had a cement floor, while ninety-nine (29.82%) had mud-wall and floored compounds. The majority of the families (73.80%) were living in a house with

three or more rooms. Only twenty-five households (7.53%) had domestic animals (Goats) living with them in the house.

The majority of the families (97.54%) had functioning latrine facilities, and 234 (72%) of the latrines were traditional pit latrines. According to the data, two hundred fifty-one (75.60%) of the households had a handwashing facility while 75 (23.08%) of the pit latrines were unclean or feces were seen around the hole, and only 64 (19.28%) of the households were seen feces around the compound. Regarding the method of waste disposal, 122 (36.7%) of the household burn their rubbish properly while only 18.67% dispose and throw their rubbish in the open fields. One hundred thirty-three (40.06%) of the household use proper pipeline water sources, and 190 (57.23%) do not treat water from any sources (see table 2).

Variables	Frequency	Percentage (%)
Household floor type		
Mud	99	29.82
Cement	196	59.04
Other	37	11.14
Animals live in the same house		
Yes	25	7.53
No	307	92.47
Number of rooms		
1	49	14.76
2	38	11.45
≥3	245	73.8
Handwashing facility		
Yes	251	75.6
No	81	24.4
Latrine availability		
Yes	325	97.89
No	7	2.11
Functionality of the latrine		
Yes	317	97.54
No	8	2.46
Type of latrine		
Pit latrine	234	72
VIP latrine	91	28
Latrine ownership		
Private	197	60.62
Shared with neighbor	128	39.38
Feces was seen in the pit hole		
Yes	75	23.08

No	250	76.92
Feces were seen around the house		
Yes	64	19.28
No	268	80.72
If no latrine where they use		
Open field	3	42.86
Others	4	57.14
Disposal of rubbish		
Burning	122	36.7
Open field	62	18.67
Others	148	44.58
A water source for drinking		
Pipe	133	40.06
Pool	40	12.05
Others	159	47.89
Time to reach the water source		
<5 min	315	94.88
≥ 5 min	17	5.12
Type of water collection container		
Plastic tank	216	65.06
Others	108	34.94
Home-based water treatment		
Yes	142	42.77
No	190	57.23
Use of treatment method to make water safe		
Boil	38	26.76
Add chlorine	98	69.01
Other	6	4.23

Table 2. Environmental characteristics of the households in Galkayo town, April, 2018

BEHAVIORAL CHARACTERISTICS OF THE HOUSEHOLDS

The majority of the mothers/caregivers, 279 (84.04%), give supplementary foods to their child in addition to breastmilk, making powder milk 236 (71.08%) most fluid that was given to the children. More than half of the children (57.23 %) were bottle-fed, and approximately more than half of the caregivers (51.2%) wash their hands without soap or ashes. According to

this study, 190 (57.23%) and 61 (18.37%) of the respondents fed their children with bottle and spoon, respectively, as a supplement to breast milk (see table 3).

Variable	Frequency (n=332)	Percentage (%)
The child takes other food than breast milk		
Yes	279	84.04
No	53	15.96
Separate preparation of food to the child		
Yes	97	29.22
No	235	70.78
Complementary food/fluid type		
Camel milk	6	1.81
Powder milk	236	71.08
Adult food	47	14.16
Others	43	12.96
Complementary feeding type		
Hand	41	12.35
Spoon	61	18.37
Bottle	190	57.23
Cup	40	12.05
When to wash hands		
Before food preparation and eating	63	18.98
After eating	23	6.93
After visiting latrine	44	13.25
Others	202	60.84
Hand washing method		
Soap and water	162	48.8
Only water	170	51.2

Table 3. Behavioral characteristics of the respondents in Galkayo town, April 2018

Demographic and Health Characteristics of the Indexed Children

The majority of the children were male (53.31%) and aged less than 24 months (64.46%). Regarding breastfeeding initiation practice, most of the children 147 (47.12%) were breastfed within one hour after childbirth, and 165 (52.88%) had received breastmilk after one hour while 103 (33.01%) of the children were not given to colostrum milk.

Concerning other breastfeeding practices, only 11 (3.31%) of the children were exclusively breastfed, and approximately two in every three children (66.35%) were breastfed for less than 12 months. One-third of the children (31.64 %) did not receive measles vaccination. Regarding the time of complementary feeding initiation, 279 (88.57%) of the mothers started complementary feeding to their children before six months of age. The prevalence of Acute Watery Diarrhea "AWD" for the two weeks of this study period was 31.93% (See table 4).

Variable Name	Frequency (n=332)	Percentage (%)
Sex of the child		
Male	155	46.69
Female	177	53.31
Ever breastfed		
Yes	312	93.98
No	20	6.02
Initiation of breastfeeding		
Within 1 hour	147	47.12
After 1 hour	165	52.88
Feeding infants to the colostrum		
Yes	209	69.99
No	103	33.01
Duration of breastfeeding		
<12 months	207	66.35
≥12 months	105	33.65
Current breastfeeding status		
Exclusive breastfeeding	11	3.31
Partial breastfeeding	301	90.66
Not breastfeeding	20	6.02
Age at supplementary feeding		
>6 months	36	11.43
<6 months	279	88.57
Measles virus vaccine		
Yes	188	68.36
No	87	31.64
The child with AWD last two weeks		
Yes	106	31.93
No	226	68.07
Management of Diarrhea		

Give ORS	40	37.73
Take to hospital	48	45.25
Stay at home	18	16.98

Table 4. Demographic and health characteristics of the indexed children in Galkayo town, April 2018

ACTORS ASSOCIATED WITH ACUTE WATERY DIARRHEA

Variables that shown to be statistically associated with acute childhood watery diarrhea at $p < 0.2$ in the bivariate analysis were identified and included in multivariate analysis regression. Only hand washing facilities, method of a rubbish disposal, and home-based water treatment variables, as well as child feeding method and duration of breastfeeding variables, were statistically associated with acute childhood diarrhea ($p < 0.05$) in the multivariate analysis (see table 5).

Children living in a household with no handwashing facilities were three times more likely to have diarrhea than those children living in the household with handwashing facilities [AOR=3.083 (1.351–7.030)]. Similarly, children living in the household who dispose of their rubbish through an open field were two times more likely to have diarrhea than those that dispose of through burning the rubbish [AOR=2.560 (1.101–5.949)]. Besides, children who live in a household that did not use home-based water treatment had twice diarrheal events than their counterpart children [AOR=2.256 (1.064–4.783)]. Other types of food were found to be protective against diarrhea. Children who consumed other types of food were less likely to develop diarrhea than those who consumed powder milk [AOR=.340 (.125–.926)]. Concerning breastfeeding duration, children who were breastfed less than 12 months were two times more likely to develop than those children who were breastfed by more than 12 months [AOR=2.060 (1.111–3.821)]. Children fed with cups were less likely to have diarrhea than those fed with hand [AOR=.176 (.041–.751)].

Variable	Diarrhea (Yes)	COR (CI)	AOR (CI)
Handwashing facilities			
Yes	64 (60.38)	—	—
No	42 (39.62)	3.146 (1.870 - 5.293)	3.083 (1.351 - 7.030)
Disposal of rubbish			
Burning	25 (23.58)	—	—
Open field	23 (21.70)	2.288 (1.162 - 4.504)	2.560 (1.101 - 5.949)
Others	58 (54.72)	2.500 (1.443 - 4.332)	1.989 (.907- 4.361)
Home-based water treatment			
Yes	31 (29.25)	—	—
No	75 (70.75)	2.335 (1.426 - 3.823)	2.256 (1.064-4.783)

Food type			
Powder milk	81 (76.42)	—	—
Adult food	14 (13.21)	.811 (.411 - 1.603)	.578 (.174 - 1.916)
Other (partridge + camel milk)	11 (10.38)	.553 (.268 - 1.141)	.340 (.125- .926)
Child feed method			
Hand	11 (10.38)	—	—
Spoon	35(33.02)	2.165 (.920 - 5.097)	1.936 (.551 - 6.797)
Bottle	61 (57.55)	1.289 (.606 - 2.743)	.591 (.168 - 2.081)
Cup	7 (6.60)	.578 (.198 - 1.684)	.176 (.041 - .751)
Breastfeeding duration			
≥12	55 (56.12)	—	—
<12	43 (43.88)	1.916	2.060 (1.111-3.821)

Table 5: Multivariate analysis on the selected determinants of under-five diarrhea in Galkayo, Somalia, April 2018

Discussion

The prevalence of under-five watery diarrheal disease for the past two weeks in this study was 31.93%. The findings of this study are slightly higher than the result of Somali Region in Ethiopia, 27.3% (Hashi, Kumie, & Gasana, 2016), and UNICEF reported rate in Somalia, 28% (UNICEF, 2016), Uganda, 29.1% (Omona, Malinga, Opoke, Openy, & Opiro, 2020) and approximately similar with results from Arba-Minch in Ethiopia, 31% (Mohammed, Tilahun, & Tamiru, 2013) Burundi, 32.6% (Diouf, Tabatabai, Rudolph, & Marx, 2014).

The availability of a handwashing facility in the household is very crucial for the health of the family and particularly in children. In this study, children living in a household with no handwashing facilities were three times more likely to develop diarrhea. Similar results were also found in Ethiopia, where lack of handwashing facilities in the household was associated with the occurrence of AWD (Bizuneh, Getnet, Meressa, Tegene, & Worku, 2017; Dagnew et al., 2019; Degebasa, Weldemichael, & Marama, 2018). Lack of handwashing stand in the household could increase the contamination chance of food given to the children and subsequently could lead to diarrheal diseases.

Duration of breastfeeding is also another essential factor for child health. Children who were breastfed for less than 12 months were two times more likely to have diarrhea than their counterpart children. This could be due to the presence of bioactive molecules in human milk which prevents against diarrheal diseases. Besides, human milk is natural, safe, and free from contamination microbes that cause childhood diarrheal diseases (Ballard & Morrow, 2013).

Child feeding practice is an essential indicator of child health. Complimentary food and feeding method were also found to be a determinant factor for AWD. In this study, children who were

fed with cups were less likely to have AWD than that given food with hand. This result was supported by a study in Ethiopia which found that children who were bottle-fed were having higher diarrheal diseases than cup-fed children (Anteneh, Andargie, & Tarekegn, 2017). The probable reason for this finding could be the lack of proper cleaning of bottles used for complementary feeding of the children. Besides to complementary feeding method, the type of food given to the children was also a significant predictor for AWD in this study. Children received other types of food (porridge with camel milk) had less diarrheal than those given to powder milk.

This study also found that children living in a household that did not employ home-based water treatment had twice the prevalence of acute childhood watery diarrhea than those that used it. This inconsistent with the study in Cameron, which also found the association between the occurrence of diarrhea and lack of treatment of drinking water (Thiam et al., 2017). Another study in Burundi also found a lower prevalence of diarrhea for households, which boils water prior to their use (Diouf et al., 2014). This could be because home-based water treatment improves the microbiological quality of household water and thereby reduce the prevalence of childhood AWD (Agrawal & Bhalwar, 2009).

The findings of this study should be used in light of several limitations. First, we cannot establish causality as we employed a cross-sectional study design that simultaneously measures both the determinant factors and the occurrence of diarrhea. Second, the hygienic practice was self-reported by the participants, and this could introduce bias that underestimated the prevalence of acute diarrheal diseases. Third, the occurrence of diarrhea was based on the mother or caregivers' report, which could lead to recall bias.

CONCLUSIONS

In this current study, the prevalence of two weeks of diarrheal disease among under-five children in Galkayo was high (31.93%). Therefore, improvement of handwashing practice, employment of home-based treatment before the utilization of water, and appropriate disposal of rubbish, as well as the continuation of breastfeeding beyond 12 months, proper supplementary food, and feeding method, are highly recommended to reverse this high AWD.

DATA AVAILABILITY

The data that supported the findings of this study are available from the corresponding author on request.

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