Prevalence and associated factors of diarrhea among under-five children in Debre Berhan Town, Ethiopia 2018: A cross sectional study

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Abstract

Introduction Diarrhea is responsible for 525,000 under five children deaths and 1.7 billion cases in the world and the second leading cause of death among under-five children. It is the major public health problem in developing countries like Ethiopia. The main aim of this study was to assess the prevalence and associated factors of diarrhea among under-five children in Debre Berhan Town, Ethiopia.

Methods Community based cross-sectional study design was done among 420 children in Debre Behan Town. Multi-stage sampling technique was used to select the study participants. Data were collected by using pre-tested and structured questionnaire. Odds ratios with 95% confidence intervals were used to assess level of significance.

Results The two week prevalence of diarrhea among under-five children was 16.4%. Age of children with 7-11 month years old (AOR: 4.2, 95%CI: 1.2 – 15.3), being the second children (AOR: 3.9, 95%CI: 1.8 – 8.5), not vaccinated against Rota virus (AOR: 10.3, 95%CI: 3.2 – 91.3) and feeding children by using hand (AOR: 2.5, 95%CI: 1.1 - 6.1) were significant predictors of under five children diarrhea.

Conclusions This study revealed that the two weeks' period prevalence of under-five diarrhea was relatively high. Age of children, vaccination against Rota virus and feeding children by using hand were associated with under-five children diarrhea. Education program on the important of vaccination against Rota virus and critical point of hand washing is recommended.

Background

Diarrheal disease is the major public health burden worldwide. Globally, 530,000 children under 5 years old are dying in a year due to diarrheal disease and the second leading cause of mortality in under-five children next to pneumonia which is responsible for one in nine children mortality [1, 2]. It is most common cause of preventable death and treatable disease among under-five children's [3]. Diarrheal deaths among children of under 5 years old show some change decreased by more than 50% from 2000 - 2015 worldwide [1]. In Africa, especially in sub-Saharan Africa countries diarrheal disease accounts for over 88% of deaths in children below five years old in 2015 [4].

According to the 2010 report of the Ministry of Finance and Economic Development 20% of the childhood death in Ethiopia was due to diarrhea [5]. The 2016 Demographic Health Survey of Ethiopia finding also showed that 12% of the children had diarrhea in the 2 weeks preceding the survey at the national level [6]. It is the persistently been the first or the second causes of visits to health units in the country [7]. There were many contributing factors associated with under-five diarrheal disease reported by different studies conducted in Ethiopia such as low maternal education [8], poor sanitation [9], contaminated water [10], duration of breast feeding [11], failure to wash hands [12, 13], failure to dispose of feces hygienically [14], age of child [11, 13, 15] and inadequate food hygiene [16] were associated with a high incidence of diarrheal diseases.

But, information related to under-five diarrheal disease in Debre Berhan town is rare. Therefore the aim of this research was to assess the prevalence and associated factors of under-five children diarrheal disease in the town and filling the gap on information. Its findings will contribute to those concerned about caring and improving the lives of under-five children and helping them to their full potential. In addition, the information which will be obtained from this research about diarrheal disease among under-five children can be useful in devising effective educational programs for reducing the problem in high-risk segment of the population. Similarly this research will contribute to policy makers, stake-holders and program initiators on possible and actionable services required to improve the situation of these children which can help for decision making.

Methods

Study Area and period

The study was conducted in Debre Berhan town from April 13–28, 2018 G. C. Debre Berhan town is found in North Showa Zone of Amhara regional state around 130km away from the capital of Ethiopia, Addis Ababa. The town has a latitude and longitude of 9°41’N 39°32’E / 9.683°N 39.533°E and an elevation or altitude of 2795 above the sea level with a high climatic condition. It has also one referral hospital, 3 health centers, 14 clinics and around 16 pharmacies. Based on Debre Berhan town health administration office report current total population of the town is 103,450 of whom 46,553 are men’s, 56,897 are women’s. From the total population 14,011 are under five children and around 88,369 people are living in urban area of the town and 15,080 are living in rural area of the town. The town is divided into nine kebeles and 5 rural kebeles.

Study Design

A community based cross sectional study design was used to assess the prevalence and associated factors of diarrhea among under-five children of Debre Berhan town.

Study population

All under-five children’s in Debre Berhan town was our source population. All under-five children’s with their mothers or care takers who live in selected kebeles of Debre Berhan town was our study population.

Sample size determination

Sample size was determined based on the formula used to estimate single population proportions assuming that 21.5% the 2-week period prevalence of diarrhea among under-five children in Jebithenan district, West Gojam zone Northwest Ethiopia [17] and 5% margin of error with 95% confidence level and anticipated 10% non-response rate.

[Due to technical limitations, this equation is only available as a download in the supplemental files section.]

After adjusting for non-response rate of 10% and design effect of 1.5 the final required sample size was 428 mother-child pair.

Sampling procedure

Multi-stage sampling technique was used to obtain a representative sample of the study participants. First four kebeles were selected from total of fourteen kebeles by lottery method. Then census was conducted in each selected kebeles to know the eligible households. Finally, households were selected by using systematic random sampling techniques and took child with their mother/care taker from each selected household until the required sample size was fulfilled.

Operational definition

Diarrhea—is the passage of three or more loose or watery stool in a twenty-four hours' period, as re- ported by the mother/caretaker of the child

Care taker- any person who give care for the child other than the mother

Data collection tool and methods

Data were collect by seven trained BSc midwives and three supervisors were deployed for supervision. Structured questionnaire was adopted in English after review of different literatures and guidelines. Finally, English version questionnaire was translated to Amharic language and again translated back to English by experts who were fluent in both languages. Pre-testing was conducted on 5% of the total sample size. Data were collected by face to face interview.

Data processing and analysis:

The data collected from the field were edited, checked for completeness and consistency, and then coded and entered into Epi-info computer software package version 3.5.1. Once entered, the data were exported to SPSS Window Version–16 for cleaning and further analysis. Both descriptive and inferential statistics were employed in the analysis. Bivariate and multivariate logistic regression analysis was used to identify the predictors of childhood diarrhea. Variables with 95% confidence intervals and P-value <0.2 during the bivariate analysis were included in the multivariate logistic regression analysis to see the relative effect of confounding variables. Adjusted odds ratios with 95% confidence intervals were calculated and P-value less than 0.05 were considered as statistically significant.

Results

Socio-demographic characteristics of the mother/care taker and children

A total of 420 mother/car taker completed the questionnaire making response rate 98.1%, of whom 92.1% were mothers. The majority, 50.1 of the mothers/care takers belong to the age group of 20–29 years, mean age of mother/care taker 29.7 years with SD of ± 5.6 years. From the total study participants, 86.7% were married in marital status and 83.6% were orthodox by religion. The majority, 70.0% of the household family sizes were between 1–4 people. Among the total respondents, 31.9% were educational status of college and above. More than half, 55.5% children were male and 21.2% were at the age group of 12–23 months (Table 1).

Environmental and hygiene characteristics

In the study area all of households have latrine in their dwelling. The majority, 45.0% of the households have traditional pit latrine and 61.9% dispose their solid waste through private establishment. The majority, 88.3% dispose under-five children waste in the toilet. Sixty four percent of the household disposal liquid wastes in seepage pits. The majority, 89.8% household get their water from pipe (Table 2).

Health and dietary characteristics of children

From the study participants, 50.0% of under-five children were first child for their family. About, 90.7% of the children were born in health institution. The majority, 71.2% of under-five children started complementary feeding at six months of their age. About, 79.5% children got vaccination against measles and 96.0% for Rota virus (Table 3).

Prevalence of under five children diarrhea

The prevalence of diarrhea among under-five children was reported to be 16.4% [95%CI: 12.7 –20.0] in the two weeks period, of whom 52.2% were males. Almost all, 97.1% were experienced watery diarrhea and the rest had bloody and mucuied. The prevalence of diarrhea was 23.9% in children age group of 7–11 months (Figure 1).

Factors associated with diarrhea among under-five children:

In the bivariate analysis, age of children, birth order of children, weaning age of children, vaccination against Rota virus and feeding children by hand were showed significant association with under five children diarrhea. The result from multivariate logistic regression analysis revealed the odds of developing diarrhea among children at age group of 7–11 month were 4.2 times higher (AOR: 4.2, 95%CI:

1.2 - 15.3) compared from age group of 48–59 months. Being the first child (AOR: 3.9, 95%CI: 1.8—8.5), not vaccinated against Rota virus (AOR: 10.3, 95%CI: 3.2—91.3) and feeding children by using hand (AOR: 2.5, 95%CI: 1.1 - 6.1) also significant predictors of under five children diarrhea (Table 4).

Discussion

This study was conducted to assess the prevalence and associated factors of diarrhea among under- five children in Debre Berhan town, Ethiopia. Ethiopian Demographic Health Survey of 2016, diarrheal disease was the leading cause for 12% of child illness among children of under 5 years old. The result of this study showed that, prevalence of diarrhea among under-five children was 16.4% [95%CI: 12.7 –20.0]. It was relatively similar with diarrheal disease prevalence of 14.7% found in a study Adama district 2015 [12], North Gondar Zone (15%) [18], Sheko district, Southwest Ethiopia (15%) [9], in Mecha district of northwest Ethiopia (18%) [11]. This result was lower than the study conducted in Senegal (26%) [19], north western Burundi (32.6%) [20] and in Ethiopia (21.5%) [17]. But, it was higher than the study conducted in East Gojam zone Amhara region, Ethiopia (6.5%) [21], Wolayta Sodo Town, Southern Ethiopia (11%) [22]. This difference may be occurred due to sample size and study setting difference and socio- cultural difference.

Children age category of 7–11 months was 4.2 times higher to develop diarrhea than children age group of 48–59 months. This result was in line with the result of study conducted in Kashmir India [23] Ethiopian [6, 24]. This might be occurred due to the result of the decline/ loss in maternally acquired antibodies and introduction of weaning foods that are given in unhygienic way. In addition, crawling usually begins at this age and the risk of putting contaminated materials and fingers in the mouth during this time is higher. In higher age groups, probably lower prevalence of diarrhea may be seen because the children have started to adopt the environment and the immunological system have developed to a large extent.

This study found that diarrhea was more common among second children in the when compared with first order children’s (AOR: 3.9, 95%CI; 1.7, 8.5). Similarly, a cross sectional study conducted in Jig-Jiga district, Somali Region, Ethiopia showed that birth order of the child fourth and above is more affected by diarrhea compared with first child [25]. This result may be occurred due to when the birth order of children’s increased mothers may become busy by taking care of more children’s.

According to the finding of this study children’s who didn’t receive Rota virus vaccination were 10.3 times more likely to have diarrhea when compared with children’s who receive Rota virus vaccination (AOR: 10.1, 95%CI: 1.2, 91.2).This result is in agreement with a study done in Farta Wereda, Northwest Ethiopia [26].This may be occurred due to Rota virus cause viral gastroenteritis and results in more deaths from diarrhea in children under five years of age. So not vaccinating children against Rota virus vaccines may predispose children to diarrhea and made them to lose the advantage they have got through Rota virus vaccination.

In this study, we have limitations that should be noted. Use of cross-sectional study may not create true causal relationship between under-five diarrheal diseases and its risk factors. Qualitative data were not included to explore some associated factors and to triangulate the finding of the quantitative study through qualitative data.

Conclusions

The prevalence of diarrhea among under-five children in Debre Berhan town was high. Childhood diarrheal disease was significantly associated with the age of children, birth order of children and feeding of children by hand. So, designing and implementing various intervention strategies such as health education and sanitation program is recommended to reduce childhood diarrhea.

List Of Abbreviations

AOR: *A*djusted *O*dd *R*atio CI: *C*onfidence Interval SD: *S*tandard *D*eviation BSc.: *B*achelors of *S*cience

Declarations

Ethical approval and consent to participate

This study was carried out after getting ethical clearance from Debre Berhan University research ethics review committee. Data collection was carried out after receiving ethical clearance letter from the town administrative health bureau. Informed written consent was obtained from mothers/care takers prior to data collection.

Consent for publication

Not applicable

Availability of data

The datasets used and/or analyzed during the current study available from the corresponding authors on reasonable request.

Author’s contribution

Sisay Shine: Has contribution in the study protocol design development, data collection, data quality monitoring, data analysis and preparation of the manuscript.

Sindew Mohamude: Has contribution in the study protocol design development, data collection, data quality monitoring, data analysis and preparation of the manuscript.

Solomon Adnew: Has contribution in the study protocol design development, data collection, data quality monitoring, data analysis and preparation of the manuscript.

Alebachew Demelsh: Has contribution in the study protocol design development, data collection, data quality monitoring, data analysis and preparation of the manuscript.

Conflict of interest

The Authors declare that we do not have any financial or non-financial competing interests in reference to this article for its publication.

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Tables

Table 1: Socio-demographic characteristics of mother/care giver and children in Debre Berhan Town, Ethiopia 2018

Variable	Frequency	Percent (%)
Relation of the respondent to the child		
Mother	387	92.1
Care taker	33	7.9
Age of mother/care taker		
<20	13	3.1
20-29	211	50.1
30-39	175	41.7
>=40	21	5.0
Sex of children		
Male	233	55.5
Female	187	44.5
Age of children (in month)		
0-6	59	14.0
7-11	46	11.0
12-23	89	21.2
24-35	75	17.9
36-47	81	19.3
48-59	70	16.7
Educational status of mother/care taker		
Can’t read and write	43	10.2
1-4	42	10.0
5-8	81	19.3
9-12	120	28.6
College and above	134	31.9
Family size of the household		
1-4	294	70.0
>=5	126	30.0
Household monthly income (Ethiopian Birr)		
<=3438	247	58.8
>3438	173	41.2

Table 2: Environmental characteristics of household in Debre Berhan town, Ethiopia, 2018

Variable	Frequency	Percent
Type of latrine used by households		
Traditional pit latrine	189	45.0
Ventilated improved pit latrine	107	25.5
Shared latrine	84	20.0
Flush latrine	40	9.5
Solid waste disposal methods		
Privately prepared pit hole	20	4.8
Burning	93	22.1
Collected by private establishment	260	61.9
Dumped in street	47	11.2
Liquid waste disposal methods		
Septic tank	54	12.9
Seepage pit	242	57.6
Open surface	124	29.5
Children’s feces disposal methods		
Toilet	337	80.2
Covered by soil	49	11.7
Open space	34	8.1
Source of water		
Unprotected spring	40	10.6
Pipe	377	80.2
Protected spring	43	10.2
Distance of water source to home		
<15 minutes	388	92.4
<=15 minutes	32	7.6
Hand washing facility beside toilets		
Yes	178	42.2
No	242	57.6

Table 3: Health and dietary characteristics of under-five children’s in Debre Berhan Town, Ethiopia 2018

Variable	Frequency	Percent
Birth order		
First	210	50.0
Second	121	28.8
Third	49	11.7
Fourth and above	40	9.5
Place of delivery		
Home	39	9.3
Health institution	381	90.7
Duration of breast feeding		
0-23 months	244	59.8
24 months	61	15.0
>=25	103	25.2
Got Rota virus vaccination		
Yes	403	96.0
No	17	4.0
Got measles vaccination		
Yes	334	79.5
No	86	20.5
Complementary food started		
At 6 month	299	71.2
Before 6 month	33	7.9
After six month	88	20.9

Table 4: Factors associated with diarrhea among under-five children in Debre Berhan Referral Hospital, Ethiopia 2019

Variable	Diarrheal status		COR (95%CI)	AOR (95%CI)
	Yes (%)	No (%)		
Age of children (in month)				
0-6	6 (10.2)	53 (89.8)	0.7 (0.6 - 8.2)	0.3 (0.1 - 16.2)
7-11	11 (23.9)	35 (76.1)	1.9 (0.7 - 5.3)	4.2 (1.2 - 15.3)*
12-23	16 (18.0)	73 (82.0)	1.3 (0.8 - 6.1)	0.9 (0.3 - 3.0)
24-35	15 (20.0)	60 (80.0)	1.5 (0.5 - 4.0)	1.1 (0.3 - 3.5)
36-47	11 (13.6)	70 (86.4)	0.9 (0.5 - 4.3)	0.5 (0.2 - 1.7)
48-59	10 (14.3)	60 (85.8)	1.0	1.0
Birth order of the child				
First	28 (13.3)	182 (86.7)	1.0	1.0
Second	28 (23.1)	93 (76.9)	1.9 (1.2 - 3.1)	3.9 (1.8 - 8.5)*
Third	3 (6.1)	46 (93.9)	0.4 (0.2 - 2.1)	0.2 (0.1 - 1.3)
Fourth and above	10 (25.0)	30 (75.0)	2.2 (0.1 - 4.8)	1.4 (0.4 - 5.1)
Weaning age of the child				
Less than six month	10 (30.3)	23 (69.7)	1.0	1.0
At six month	50 (16.7)	249 (83.3)	0.5 (0.2 - 1.1)	0.2 (0.1 - 1.8)
Above six month	4 (12.1)	29 (87.9)	0.3 (0.1 - 1.1)	0.2 (0.1 - 1.4)
Rota virus vaccination				
Yes	62 (15.4)	341(84.6)	1.0	1.0
No	7 (41.2)	10 (58.8)	3.9 (1.4 - 10.5)	10.3 (1.2 - 91.3)*
Feeding child by using hand				
Yes	32 (22.9)	108 (77.1)	1.8 (1.2 - 3.1)	2.5 (1.1 - 6.1)*
No	32 (14.3)	191 (85.7)	1.0	1.0

** Significant at P<0.05*

Figures

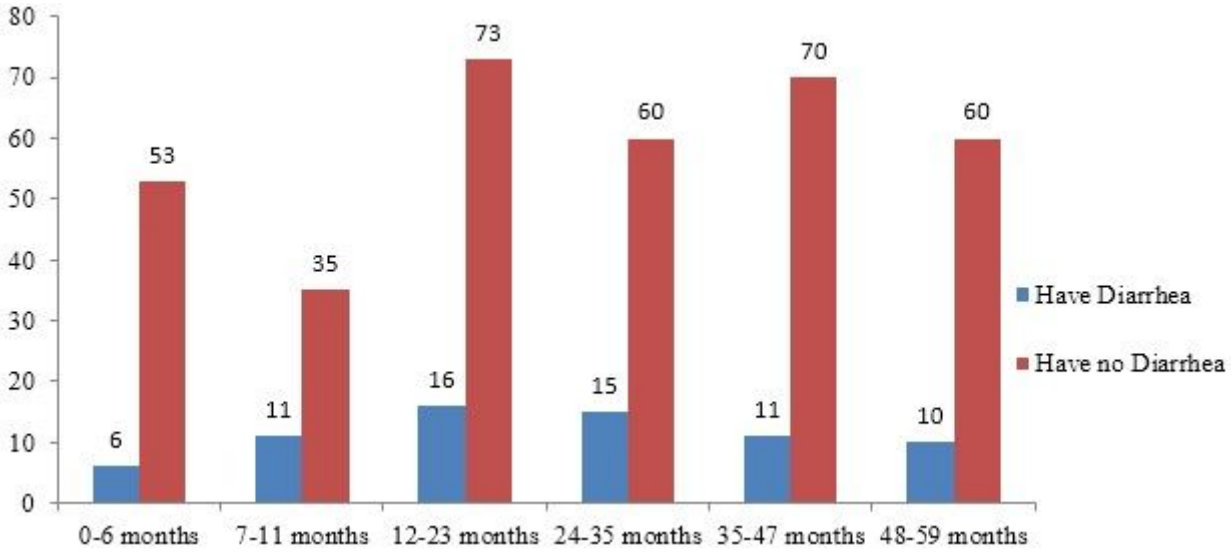

Figure 1

Prevalence of diarrhea with age categories in Debre Berhan town, Ethiopia 2018

Supplementary Files

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- supplement1.jpg
- supplement2.doc