
Morbidity and associated factors of diarrheal diseases among under five children in Arba-Minch district, Southern Ethiopia, 2012

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Abstract: Introduction: Acute diarrheal disease among children younger than 5 years old remains a major cause of morbidity and mortality worldwide. In Arba-Minch District diarrheal diseases are the second causes for clinical presentations. The aim of this study was to determine the morbidity and associated factors of diarrheal diseases among under five children in Arba-Minch District. Methods: A community based cross-sectional study was conducted in February 2012. A multistage sampling technique was used to select 590 households that had at least one under-five child. Data were collected using World Health Organization core questionnaire by trained data collectors. Descriptive statistics (frequencies, proportion and chi-square test) were used to describe the study population in relation to relevant variables. To identify independent predictors of childhood diarrhea, only variables that were statistically significant during chi-square test were entered into multiple logistic regression models to control the effects of confounders. Result: the prevalence of diarrhea among under-five index children was 30.5%, which was significantly associated with child's being from mothers of not attended formal education (AOR = 1.89, 95% CI = 1.35, 2.53), being at the age of 6-23 months ((AOR = 2.78, 95% CI = 1.72, 4.55) and being from mothers of poor hand washing practice (AOR = 2.33, 95% CI = 1.80, 4.15). Conclusion: The findings showed that the level of diarrheal morbidity is high in the study area. As significant number of the mothers do not have adequate knowledge on the occurrence and risk factor of diarrheal disease. Enhancing community based behavior change communications using multiple channels (radio) and community health workers is recommended to reduce the occurrence of childhood diarrhea and associated consequences among children in the study area.

Keywords: Under Five Year Children, Acute Diarrhea, Predictors of Diarrhea

1. Introduction

Acute diarrheal diseases are one of the main problems affecting children in the world, reducing their well-being and creating considerable demand for health services[1]. Diarrheal diseases are leading cause of preventable death, especially among children under five in developing countries. Diarrhea is defined as a child with loose or watery stool for three or more times during a 24-hour's period. The frequency and severity of diarrhea is aggravated by lack of access to sufficient clean water and sanitary disposal of human waste, inadequate feeding practices and hand washing; poor housing conditions and lack of access to adequate and affordable health care[2].

Studies have been conducted in the past to establish risk

factors of diarrhea. Study conducted in Egypt showed that some socio-demographic characteristics like maternal age and child's age are some determinant factors for the occurrence of episode of diarrheal disease[3]. Similarly, study in Ghana showed that water availability, sanitary facilities, hygienic practices, flies infestations and regular consumption of street food are also some predicting factors for the occurrence of diarrheal disease[4]. In Ethiopia, Yohannes and his colleagues found the incidence of diarrhea to be higher in the second half of the infant's life when inborn immunity is weak and exposure to contaminated weaning foods increases[5].

According to the 2011 Ethiopian Demographic and Health Survey (EDHS 2011), 13% of children in Ethiopia, both urban and rural, have experienced diarrhea in the two

weeks preceding the survey. Similarly, 25.5% of children in southern Ethiopia experience diarrhea, from which 22.8% are rural and 2.7% are urban children respectively[6]. However, there is no study which documented the magnitude and factors associated with diarrheal disease in the study area. Therefore, the objective of this study is to assess the prevalence of diarrhea and associated factors among children aged under five years by collecting current and reliable information on the magnitude and some determinants of acute diarrheal diseases, with a view of adding to the existing body of knowledge as well as help in policy change that will improve childcare in the study area in particular and in the country in general.

2. Methods

2.1. Study Setting and Sample

A community based cross-sectional study was conducted in Arba-Minch District, Southern Ethiopia. The sample size was calculated using single population proportion formula using the following parameters: 95% confidence level (1.96), Margin of error (0.05), Expected prevalence of children with diarrhea (25.5%)[6] And design effect of 2.

Multistage sampling technique was used to select household which has under five children. From 29 rural kebeles 9 were randomly selected and household which has under five children were selected using systematic random sampling technique after having the list of mother-child pair from the previous survey. A total of 590 mothers of index child aged under-five years were interviewed in February 2012.

2.2. Data Collection and Processing

Data were collected using WHO core questionnaire[11]. The questionnaires were pre-tested for its understandability by 5% of sample size in kebele which was not included in the study. Nine 12 grade completed data collectors were recruited and trained on the sampling procedure, interview technique and data collection methods. Principal investigators and four trained supervisors monitored the overall quality of the data collection.

The data were entered and analyzed using SPSS version 16. Descriptive statistics (frequencies proportion and chi-square test) were used to describe the study population in relation to relevant variables. Odds ratio was computed to see strength of association. To identify independent predictors of childhood diarrhea, only variables that were statistically significant during chi-square test were entered into multiple logistic regression models to control the effect of confounders. The test was two-sided and $P < 0.05$ was considered statistically significant. We reported the results as adjusted odds ratio (AOR) and 95% confidence intervals.

2.3. Ethical Considerations

Ethical clearance was obtained from Ethical Review Board of Arba-Minch University. Permission was obtained

from Arba-Minch district health office. Written informed consent was obtained from surrogate of the study participants after clear explanation about the purpose of the study.

3. Results

3.1. Socio-Economic Characteristics of the Households

A total of 590 households were included in this study and a complete response was obtained from all (100%) respondents. The mean age of mothers at the birth of index child was 29.5 (SD±6.7). The majority of mothers 366 (62%) were with no formal education and 517 (87.6%) mothers were housewives by occupation. The mean household family size of the study population was 5.7 (SD±2.1) persons (see table 1).

Table 1. Socio-economic characteristics of the households in Arba Minch District, Southern Ethiopia, 2012

Variables	Frequency	Percent (%)
Marital status		
Married	565	95.7
Single	25	4.3
Mothers educational status		
With no formal education	366	62.0
Primary and above	224	38.0
occupation of mother		
Housewife	517	87.6
Merchant	40	6.8
Others [§]	32	5.4
Ethnicity		
Gamo	462	78.7
Wolayita	91	15.4
Others**	34	5.8
Religion		
Protestant	371	62.9
Orthodox	205	34.6
Muslim	14	2.4
Mean age of mothers	29.5 (SD±6.7)	
Mean household family size	5.7 (SD±2.1)	

*= government employee; daily laborer ** = Amara, Gurage and Oromo

3.2. The Characteristics of Child's Living Environment

From the total of 590 households, 580 (98%) had dwelling with mud floor. Majority of dwelling houses 390 (66%) had no partition room. Fifty (9%) of the households

had no latrine. The mean per capita per day water consumption of the households was 6.5 (SD±4) liters. More than one-third of households (33.7%) used drinking water from unprotected sources. Only 191(32.4%) mothers have a comprehensive knowledge about the cause of diarrhea and its transmission methods. (See table 2).

Table 2. The characteristics of children's living environment in Arba Minch District, Southern Ethiopia, 2012.

Variables	Frequency	Percent (%)
Floor of the house		
Mud	439	74.4
Cement	151	25.6
Number of room		
1	390	66
2	110	18.6
≥3	90	15.4
Availability of latrine		
Yes	540	91.6
No	50	8.4
Type of latrine		
Traditional pit latrine	438	81.1
Ventilated improve latrine	102	18.9
Waste disposal		
Proper disposal	475	80.5
Improper disposal	115	19.5
Source of water		
Protected source	391	66.3
Unprotected source	199	33.7
Distance from water source		
≤30 minute	503	85.4
>30 minute	87	14.6
Way of water transportation		
Cover material	496	84.1
Uncovered	94	15.9
home based water treatment		
Yes	93	15.7
No	491	84.3
Mothers have Comprehensive knowledge on cause of diarrhea		
Yes	191	32.4
No	399	67.6
Mean per capita water consumption	6.5	(SD±4)

3.3. Demographic and Behavioral Characteristics of the Child

Two hundred forty five children (41.5%) were age 24 and above months; and 193 (32.7%) were in age category of 0-5months respectively. Majority of the children were females 325 (55.1%). In this study 180(30.5%) children have experienced diarrhea in the two weeks preceding the survey (see table 3).

Table 3. Child demographic and behavioral characteristics in Arba Minch District, Southern Ethiopia, 2012.

Variables	Frequency (n=590)	Percent (%)
Child sex		
Male	265	44.9
Female	325	55.1
Child's age		
0 -5 months	193	32.7
6– 23 months	152	25.8
24 months and above	245	41.5
Birth order		
First	94	16.1
Second	128	21.6
Third	129	21.8
Fourth and above	239	40.5
Currently Exclusive Breastfeeding (n=200)		
Yes	131	65.5
No	69	34.5
Measles vaccination (n=105)		
Yes	56	53.3
No	49	46.7
Hand washing practice		
Good	508	86.1
Poor	82	13.9
Occurrence of diarrhea		
Yes	180	30.5
No	410	69.5

3.4. Factors Associated with the Occurrence of Childhood Diarrhea

After doing chi-square test of socio-economic, environmental conditions and child characteristics with respect to childhood diarrhea; variables which were significant (p -value ≤ 0.05) during chi-square test (bivariate analysis) were further considered in multiple regression analysis. Accordingly, being from mothers of not attending formal education; child's being in age category of 6-23 months and being from mothers of poor hand washing practice were found independent predictor for the occurrence of childhood diarrhea (Table 4).

Children whose mothers were not attending formal education were more likely to develop diarrhea when compared with children whose mothers were attending formal education (AOR = 1.89, 95% CI = 1.35, 2.53).

The age of the child was also significantly associated with the development of diarrhea. children whose age was between 6-23 months were about three times more likely to

develop diarrhea when compared with children whose age was less than five months (AOR = 2.78, 95% CI= 1.72, 4.55).

The risk of developing diarrhea was higher among

children whose mother had poor hand washing practice when compared with children whose mother had good hand washing practice (AOR= 2.33, 95%CI =1.80, 4.15).

Table. Factors associated with the occurrence of diarrhea among under-five children in Arba-Minch District, Southern Ethiopia, 2012.

Predictors	Diarrhea occurrence		COR (95%CI)	AOR (95%CI)
	Yes (1)	No (0)		
Mother's educational status				
No formal education	125(34.2%)	241(65.8%)	1.59 (1.06, 2.38)*	1.89 (1.35,2.53)*
With formal education	55(24.6%)	169(75.4%)	1.00	
Floor of the house				
Mud	145(33%)	294(67%)	1.63 (1.06,2.56)*	1.22 (0.73, 2.04)
Cement	35(23.2%)	116(76.8%)	1.00	
Comprehensive knowledge on cause of diarrhea				
No	110(27.6%)	289(72.4%)	0.66 (0.46,0.95)*	0.71 (0.45,1.12)
Yes	70(36.6%)	121(63.4%)	1.00	
latrine available				
No	15(30%)	35(70%)	0.97 (0.54, 1.85)	-
Yes	165(30.5%)	375(69.5%)	1.00	
Waste disposal system				
Improper disposal	39(33.9%)	76(66.1%)	1.22 (0.79, 1.88)	-
Proper disposal	141(29.7)	334(70.3)	1.00	
Source of water				
Unprotected source	66(33.2%)	133(66.8%)	1.21 (1.11, 1.49)*	1.32 (0.97, 1.72)
Protected source	114(29.2)	277(70.8%)	1.00	
Age of the child				
0 -5 months	45(23.3%)	148(76.7%)	1.00	
6- 23 months	60(39.5%)	92(60.5%)	2.14 (1.41, 3.73)*	2.78 (1.72,4.55)*
24 months and above	75(30.6%)	170(69.4%)	1.45 (1.12, 3.5)*	1.52 (0.86, 2.70)
Hand washing practice				
Poor	44(54.4%)	38(45.6%)	2.79 (1.65, 5.00)*	2.33 (1.80, 4.15)*
Good	149(28.8%)	359(71.2%)	1.00	1.00

*Statistical Significance at $p \leq 0.05$, COR= Crude Odds Ratio, AOR= Adjusted Odds Ratio

4. Discussion

This study showed that the prevalence of childhood diarrhea among under-five children was about 31% in the study area. This figure was relatively high when compared with findings from southern part of Ethiopia which was 25.5%[6]. The high prevalence in the current study could be due to the difference in basic environmental and behavioral characteristics of caretakers.

Children whose mothers were not attending formal education were more likely to develop diarrhea when compared with children whose mothers were attending formal education. This finding is similar with the result obtained from another study in Ghana and Nigeria, where the prevalence of diarrhea varies according to education of mothers which was relatively high among children of mothers with no education[4,7,9]. This is probably because education provides the knowledge of the rules of hygiene, feeding and weaning practices, and the interpretation of symptoms which enhances timely action on childhood illness.

In this study the types of floor, availability of latrine,

waste disposal system and the source of water were not associated with diarrhea which contrasts with previous study in Ghana where water availability, sanitary facilities and hygienic practices were predicting factors for the occurrence of diarrheal disease[4].

In this study children whose age was between 6-23 months were at high risk of developing diarrhea when compared with children whose age was less than five months. This was in line with study conducted in Thailand[10]. Finding in Thailand showed that children aged from 6-23 months are more endanger of diarrheal disease than other age groups. The possible explanation could be due to environmental exposure and increased introduction of solid foods which is unsafe and poor hygiene to children whose their immune not well developed.

This study also indicated that mother's poor hand washing practice was associated with diarrheal morbidity. Studies indicated the risk of developing diarrhea was high among children whose mothers had poor hand washing practice before child fed[8,9]. Since mothers are the main care givers for their children they should wash their hand in order to prevent diarrhea and occurrence of other hygiene related disease.

5. Limitations

- Using WHO core questionnaire and using community based study design are the strength of this study. However, using cross sectional study design, it is very difficult to establish causal relationship.

6. Conclusions

From this study we can conclude that; the prevalence of diarrhea is high (30.5%). The variation in the level of diarrheal morbidity is well explained by maternal education, age of the child and personal hygiene. Overall, the findings have important policy implications for health intervention and support the view that investing in girl's education may have substantial benefits on child health. Women's education level of at least primary should be achieved to reduce childhood diarrheal morbidity. Reducing diarrhea morbidity involves providing better sanitation for the entire population and hygiene of the person caring of the child.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

SM (PI) designed the study, coordinated the field work, analyzed the data and drafted the manuscript. MT participated in drafting of the manuscript and review of the article. DT participated in the design of the study, drafting of the manuscript and review of the article.

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