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## RESEARCH ARTICLE

### THE PREVALENCE AND DETERMINANT FACTORS OF DIARRHEAL MORBIDITY AMONG UNDER FIVE CHILDREN IN SELAM KEBELE, SOUTH WEST ETHIOPIA

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#### ABSTRACT

**Back ground:** Diarrheal disease is the most common cause of illness and the second leading cause of child death in the world. The burden is greatest in the developing world including Ethiopia. In Ethiopia diarrhea kills half million under-five children annually secondary to pneumonia. The purpose of this study has been to identify socio-economic, demographic, environmental and behavioral factors that affecting diarrheal morbidity of under-five children in selam kebele south west Ethiopia.

**Methods:** Community-based cross-sectional study was conducted in south west Ethiopia, tepi town selam kebele from March 15– 21, 2017. One hundred three mothers/ care takers of index under-five children living in the households selected randomly by using random number table from the kebele constituted the study population. Data were collected using structured and pre-tested questionnaire. Binary logistic regression model was used to identify the risk factors of diarrheal morbidity for the last two weeks.

**Results:** Prevalence of diarrheal morbidity over a period of two weeks preceding the study was about 18.44%. In chi-square analysis source of water, latrine owner ship, dirty material in right hand finger , Practice of eating unwashed vegetables, and, Personal hygiene of the child, were significantly associated with prevalence of diarrhea among under-five children ( $P<0.05$ ). However, only Practice of eating unwashed vegetables, is not significant from binary logistic regression among those variable that were significant ( $P<0.05$ ) in chi-square analysis.

**Conclusion:** As diarrheal morbidity was major problem among under-five children in south west Ethiopia tepi town in the case of selam kebele. Therefore efforts should be invested to generate protected water source and educate parents about the importance of using protected and qualified water source to reduce the exposure children to diarrhea morbidity and mortality.

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#### INTRODUCTION

A diarrheal disease is the leading cause of preventable death, especially among under-five children in developing countries, and is defined as a child with loose or watery stool for three or more times. The frequency and severity of diarrhea is aggravated by lack of access to sufficient clean water and sanitary disposal of human waste, inadequate feeding and washing practice; poor housing conditions and lack of access to adequate and affordable health care (Gerald et al., 2001). Disproportionately the burden is high among children in low and middle-income countries; Young children are especially vulnerable to diarrheal disease and a high proportion of the deaths occur in the first 2 years of life (UNICEF, 2006). Diarrheal disease is the most common cause of illness and the second, next to respiratory infection, leading cause of under-five child death in the world (UNICEF, 2006).

Worldwide diarrhea causes approximately 4 billion morbidity and 2.2 million deaths per year (WHO and UNICEF 2000). Of these death 1.7 million are under-five children, and in developing countries particularly in under-five children 5-8 million deaths occurs per year. There is a general agreement that the cause of childhood morbidity in developing countries is multi factorial, and the child survival depends on the interaction of the socio economic, biological, behavioral and environmental factors (Ghai and Piyush Gupta, 1999). Primary Cause of death in acute diarrhea is dehydration and loss of fluid & electrolyte. Not only this but also Diarrheal disease makes every demand on health facilities and national health budget in developing countries (Fernodet et al., 2005). In Ethiopia Some of the factors associated with diarrhea in children such as, obtaining water from storage container by dipping, availability of latrine facilities, living in a house with fewer number of rooms, have been identified, and diarrhea is still a major public health problem among children under 5 years old (Bezatu Mengistie et al., 2013). In Ethiopia diarrhea kills half million under-five children annually secondary to pneumonia. Poor sanitation, lack of access to clean water supply and inadequate personal hygiene are responsible for

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90% of diarrheal disease occurrence, these can be easily improved by health promotion and education (UNICEF, 2004). In effect, Ethiopia introduced a new initiative Health Extension program (HEP) in 2002/03 as a means of providing a comprehensive, universal, equitable and affordable health service for the rural population on the base of primitive, preventive and basic curative services. The program was provided as a 16 packages focusing on health promotion and education supported by demonstration targeting households, particularly mothers and women through house to house visits (Argaw, 2007). Diarrhea is the most important public health problem connected to water and Sanitation and can be both "waterborne" and "water-washed". In recent decades, a consensus developed that the key factors for the prevention of diarrhea are sanitation, personal hygiene, availability of water and good quality drinking water; and that the quantity of water that people have available for hygiene is of equal or greater importance for the prevention of diarrhea as the bacteriological water quality (Mocket *et al.*, 1995). Diarrheal disease is also the most common cause of death next to respiratory infection in the world (UNICEF, 2006). A study from sub Saharan Africa and Asian countries demonstrated that diarrhea was the most principal cause of child death and the study conducted by Ethiopian Demographic Health Survey 2011 shows that prevalence of diarrhea is 13 percent among under five year child's. Were reported to have had diarrhea, and 3 percent had diarrhea with blood in the two-week period before the survey. The aim of this study is to assess the prevalence and risk factors of diarrheal morbidity among under five children in selamkebelesheka zone, south west Ethiopia.

## MATERIALS AND METHODS

A community-based cross-sectional study was conducted in Tepi Town, selamkebele from from March 15– 21, 2017. Tepi is one of the towns in sheka zone located in the south western part of the country at 611 km away from Addis Ababa. Tepi Town is administratively divided into 3 Kebeles. According to the 2009 health extension, selamkebele population is estimated to 14,492 and with about 3221 households. The source population was all mothers/ care givers-under-five children living in the town prior to the survey and the study subjects were a sample of them in the selected households. The two-week period prevalence of diarrhea among under-five children of the study area was not identified and studied before. Hence, sheko district south west Ethiopia two-week period prevalence of diarrhea (32%) among under-five children was taken to calculate the sample size (Teklemariam *et al.*, 2000). Using the assumptions the significance level (0.05), margin of error (0.08), and  $Z_{\alpha/2} = Z_{.25} = 1.96$ . A total sample size of 477 was determined. Simple random sampling procedure was employed, using Random number table. Then data was collected from selected households cooperating with kebele administrators. In case, where there were more than one under-five children in the same household, only one index child was selected by lottery method to collect information on child's health characteristics. Mothers/ care givers of index under-five children who had other health problem, critically ill and those who did not live at least six-months in the town prior to the survey were excluded. Data were collected using a structured questionnaire which was translated into Amharic by fluent speaker of both languages to ensure its validity and consistency, and again back translated to English. Five percent

of the questionnaires were pre-tested in another Kebele with the same level in every aspects of basic infrastructure and socio-demographic characteristics in the study area. The result of the pretest was used to correct some unclear ideas and statements. Moreover, the completed questionnaires were checked every day after data collection for completeness, clarity and consistency by the principal investigator.

## Variables Considered in the Study

The response variable of the study is the two weeks incidence of diarrhea prior to the survey and based on the available information, this study examined the influence of the following risk factors for causing diarrhea. Three categories of factors were assessed as independent variables;

**Socio-economic and demographic variables:** family size, maternal education and working status, number of child in a house and age of child.

**Environmental Factors:** Type of water source, Distance to water source, availability of latrine, Availability of hand washing facility, daily per capita water consumption, Refuse disposal, number of rooms.

**Behavioral Factors:** Method of water storage, hand washing practice, feeding practice, Breast feeding status.

## Statistical Methodology

In this study single and multilevel logistic regressions were employed to identify determinant factors of diarrheal morbidity among under-five children and to predict the two weeks probability of under-five children experiencing diarrhea. The response variable of the study is the two weeks prevalence of diarrhea prior to the survey. Firstly, Chi-square test was analyzed and finally we assessed the effect of determinant factors on prevalence of diarrhea using binary logistic regressions by assuming the occurrence of diarrhea was independent among under-five children.

## Binary Logistic Regression Model

Let be a dichotomous outcome random variable with categories 1 (presence of diarrhea) and 0 (absence of diarrhea) in the two weeks prior to the survey. Let  $x_{(n*(k+1))}$  denote the collection of k-predictor variables of the response. Then, the conditional probability that the  $i^{\text{th}}$  child has diarrhea given the vector of predictor variables  $X_i$  is denoted by  $P_i = P(y_i = 1|X_i)$ . The expression  $P_i$  in logistic regression model written in linear combinations of predictors can be expressed in the form of:

$$\text{logit}(P_i) = \log(P_i / (1 - P_i)), i = 1, 2, \dots, k; = 0, 1, \dots, k$$

## Data processing

First the data checked for completeness and consistency. Then data were entered into a computer, edited and analyzed using SPSS for windows version 20.0.1.

## RESULTS AND DISCUSSION

From sampled children, the two weeks prevalence of diarrhea among under-five children was about 18.44% in selamkebele.

**Table 1. With prevalence of Diarrhea among under-five children in Selamkebele on selected independent variables**

Variable	Level	N	N%	Had diarrhea		DF	Chi-square	P-value
				No%	Yes%			
Age of child	<=6 month	13	12.6	84.6	15.4	4	6.578	0.16
	6-24 month	30	29.1	66.67	33.33			
	25-36 month	41	39.8	87.8	12.2			
	37-45 month	13	12.6	92.3	7.7			
	46-59 month	6	5.8	83.33	16.67			
Sex of child	Male	56	54.4	80.4	19.6	1	0.117	0.733
	Female	47	45.6	82.9%	7.1%			
Relation of the child	Mother	78	75.7	61.2	13.6	1	0.053	0.818
	Care taker	25	24.3	19.9	4.9			
Age of mother	<25	36	35	29.1	5.8	2	1.792	0.408
	25-34	47	45.6	35	10.7			
	34+	20	19.4	17.5	1.9			
Education of the mother	Illiteracy	31	30.1	74.2	25.8	2	2.007	0.367
	Primary	52	50.5	86.5	13.5			
	Secondary and higher	20	19.4	80	20			
Occupation of the mother	No	63	61.2	83.5	16.5	1	0.105	0.746
	Yes	40	38.8	80	20			
Number of child	<=2	71	68.9	83.1	16.9	1	0.363	0.547
	>2	32	31.1	78.1	21.9			
Source of water for drinking	Protected	60	58.3	92	8	1	13.257	0.000
	unprotected	43	41.7	65.8	34.2			
Latrine owner ship	Private	59	57.3	91.52	8.48	1	9.129	0.003
	Shared	44	42.7	68.2	31.8			
Method of disposing refuses	Burning	35	34	77.1	22.9	3	1.963	0.58
	Burying in a pit	29	28.2	89.6	10.4			
	Storing and disposing in designed site	31	30.1	80.6	19.4			
	Dispose on open fields	8	7.8	75	25			
type of floor material	Mud	50	48.5	78	22	2	0.841	0.657
	Wood	12	11.7	83.33	16.77			
	Cement	41	39.8	85.4	14.6			
Know child's excrete cause disease	Yes	92	89.3	82.6	17.4	1	0.638	0.425
	No	11	10.7	72.7	27.3			
dirty material in right hand finger	Absent	65	63.1	87.8	12.2	1	9.947	0.002
	Present	38	36.9	70.3	19.7			
Hand washing with soap after defecate	Yes	58	56.3	77.78	22.22	1	2.267	0.132
	No	45	43.7	90.3	9.7			
Practice of eating unwashed vegetables	High	41	39.8	69.2	30.8	2	11.205	0.041
	Medium	41	39.8	88.4	11.6			
	Low	21	20.4	90.5	9.5			
Practice of finger nail trim	Yes	65	63.1	84.6	15.4	1	1.098	0.295
	No	38	36.9	76.3	23.7			
Personal hygiene of the child	Good	61	59.2	90.2	9.8	1	7.373	0.007
	Poor	42	40.8	69	31			

**Table 2. Result from binary logistic regression**

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
Owner(ref_ private)	-1.367	.633	4.662	1	.031	.255	.074	.882
source(ref_ unprotected)	-1.566	.658	5.657	1	.017	.209	.057	.759
dirty(ref_ present)	-1.329	.647	4.219	1	.040	.265	.075	.941
Practice(ref_ low)			3.585	2	.167			
practice(ref_ low)	-.976	.700	1.947	1	.163	.377	.096	1.484
practice(ref_ low)	-1.559	.977	2.548	1	.110	.210	.031	1.427
personal(ref_ good)	1.456	.638	5.214	1	.022	4.289	1.229	14.966
Constant	.484	.730	.440	1	.507	1.623		

Table 1 show that source of water, latrine owner ship, Hand washing with soap after defecate, Practice of eating unwashed vegetables, and, Personal hygiene of the child, were significantly associated with prevalence of diarrhea among under-five children ( $P < 0.05$ ). The result of table 1 also reveals that 54.4 % and 45.6 % were females and males, respectively. The prevalence of diarrhea among females and males were 19.6% and 7.1%, respectively. Result displayed in Table 1 also showed that, among 103 respondents, 38.8% of them had work and the prevalence of diarrhea in under-five children whose mothers had work were 20 %. Majority of under-five children (45.6%) were born to mothers in the age range of 25-34 years, while 35% and 19.4% of under-five children were born to mothers aged below 25 and above 34 years, respectively.

Two weeks prevalence of diarrhea were 10.7% in under-five children from mothers in the age range of 25-34 years, while 5.8% and 1.9% in below 25 and above 34 years old, respectively. Maternal educational level was categorized into three: 30.1% of under-five children were from uneducated mothers with 25.8% prevalence of diarrhea; 50.5% of under-five children were from mothers with primary education and had 13.5% diarrhea cases, and the remaining 20% were from mothers with secondary and higher education and had 12.2% diarrhea case. Among 103 respondents, 41.7% consumed water from unprotected source, and the remaining 58.3% used protected sources of water supply. Under-five children born to mothers who used unprotected source of water had the high prevalence of diarrhea (34.2%) compared with Under-five children born to mothers who used protected source of water

(8%). From 103 respondents 57.3% had private toilet facility with prevalence 12% of diarrhea and 42.7% had shared toilet facility with 17% prevalence of diarrhea. Children who had dirty material in the right hand finger were 36.9% and children who had not dirty material in right hand finger were 63.1%. The prevalence of diarrhea from children whose right finger contain dirty material (19.7%) were high compared with children whose right hand finger had not (12.2%). Mothers who had practice of hand washing with soap after defecate were (56.3%) and children who belongs to those mothers had prevalence of (22.22%). Mothers who hadn't practice of hand washing with soap after defecate were (43.7%) and children who belongs to those mothers had prevalence of 9.7%.

### Interpretation of Logistic Regression Coefficients

Results displayed in Table 2 revealed that Under-five children who used protected water source were 74.5% (0.255-1, OR: 0.255) times less likely to have diarrhea than under-five children who used unprotected water source. Under-five children whose family had private latrine owner ship were 79.1% (0.209-1, OR: 0.209) times less likely to have diarrhea than under-five children whose family had shared latrine ownership. Under-five children who hadn't dirty material in right hand finger were 73.5% (0.265-1, OR: 0.265) times less likely to experience diarrhea than under-five children who had dirty material in right hand finger. Under-five children who were poor personal hygiene were 4.289 times more likely to experience diarrhea than children who had good personal hygiene.

## DISCUSSION

The finding of this study revealed that the two weeks period magnitude of diarrhea among under five years of age children was 18.44%. From the demographic and socioeconomic factors; there were not showed significant association after adjusting the other variables. Controlling the other variables, households water source and owner ship of latrine were the only environmental factors which showed significant association with under-five diarrhea. Of all behavioral factors tested in, mothers/care takers hand washing with soap after defecate remained significant, making the other variables constant. The magnitude of under-five diarrhea in this study is similar with studies conducted in west Gojam zone (18%) (Muluken Dessalegn *et al.*, 2011) and eastern Ethiopia Kersa district (22.5%) (Bezatu Mengistie *et al.*, 2013). But this is relatively low compared to a study done in nekemte town western Ethiopia (28.9%) (Wondwossen, 2008) and relatively low compared to a study done in Arba-Minch rural community (31%) (Shikur Mohammed *et al.*, 2013). And this discrepancy in magnitude with the study done in Arba-Minch rural community could be their difference in socio demographic, basic environmental and behavioral characteristics of the respondents (Shikur Mohammed *et al.*, 2013). Children from households who use protected water source were less vulnerable to experience Diarrhea compared to children from households who use unprotected water source which is consistent with cross-sectional studies done in Sheko district rural community, Southwest Ethiopia (Teklemichael Gebru *et al.*, 2014), and case control study done in Derashe district (Bezatu Mengistie *et al.*, 2013). This can be explained by improved water source tends to be less contaminated by pathogenic microorganisms than unimproved water source and

thus decrease under-five diarrhea. Children whose mothers/care takers wash their hand with water and soap were less likely to developed diarrhea compared to children whose mothers/care takers wash their hand with water only. This is in agreement with the findings from south west Ethiopia (Teklemichael Gebru *et al.*, 2014), and Dejen district, North West Ethiopia (Tilahun Belete Mossie *et al.*, 2014). This could be explained by since they are the main care givers of the child and hand washing with soap/ash clears microorganisms in their hand highly compared to hand washing with water only. In this study, the sanitary facility (availability of latrine, and waste disposal method) were not showed any significant association with under-five diarrhea after controlling the other factors. This is in line with the findings from Sheko district rural community (Teklemichael Gebru *et al.*, 2014) and Arba-Minch rural community (Shikur Mohammed *et al.*, 2013).

But it is in contrast with cross-sectional studies done in Benishangul-Gumuz Regional State (Thomas Sinmegn Mihrete *et al.*, 2014), and Derashe District, Southern Ethiopia (Bezatu Mengistie *et al.*, 2013). This may be explained by having of this facilities doesn't necessarily indicate their utilization and again may be due to the homogeneous effect of the populations. Owner ship of latrine is significantly associated with under five diarrhea. This is in contrast with studies done in wolayittasodo town southern Ethiopia (Kediradissu, 2015). Numbers of under-five children were not significantly associated under five diarrheas. This is consistent with the studies done in Derashe district (Bezatu Mengistie *et al.*, 2013) and studies done in Ethiopia (Yilikal *et al.*, 2016). But in contrast with the finding from Gojam Hulet Ejju Enseworeda, where greater family size was associated with under five diarrhea (Andualem Anteneh and Abera Kumie, 2010). There might be a difference in maternal attention and general living standard that could explain the discrepancy. As the family size of the household becomes higher, there may be crowding which deteriorates the hygiene condition, which in turn increases the probability of contact with pathogens. Also there may be a competition for mother's attention and other resources. In this study maternal education and occupation were not significantly associated with under five diarrhea. This is consistent with study done in wolayittasodo town (Kediradissu, 2015) and But occupation of mother was significant factor, study done in Ethiopia (Yilkal Messelu and Kassahun Trueha, 2016). This might be the fact due to the study is done in urban area and most mothers have awareness of disease causative (environmental, behavioral) agents, feeding practice, and disease symptoms which boosts timely action on childhood illness, which lives in urban area.

## Conclusions and Recommendations

### Conclusion

The purpose of this study has been to identify demographic, socio-economic, and environmental related determinants and to assess two week prevalence of childhood diarrhea in south west Ethiopia in the case of tepi town selamkebele. The descriptive results showed that 18.44% of under-five children have experienced diarrhea in the two weeks prior to the time of survey. In this study chi-square test and binary logistic regression were used. In the chi-square test, that source of water, latrine owner ship, dirty material in right hand finger, Practice of eating unwashed vegetables, and, Personal hygiene

of the child, were the most important determinant associated with prevalence of diarrhea among under-five children ( $P < 0.05$ ). In the binary logistic regression the significant determinants for prevalence of diarrhea among under five child were source of water, latrine ownership, dirty material in right hand finger, and, Personal hygiene of the child.

### Recommendations

Based on the findings of this study we forward the following recommendations:

Efforts should be invested to generate protected water source and educate parents about the importance of using protected and qualified water source to reduce the exposure children to diarrhea. By collaborating the kebele administration and kebele health office should give health education program to the community about, dirty material in the right hand finger nails and Personal hygiene of the child. Further studies should be conducted to identify other correlates of diarrhea that are not analyzed in this study such nutritional and equipment related variables.

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