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Determinants for Acute Malnutrition among Under-Five Children at Public Health Facilities in Gedeo Zone, Ethiopia: A Case-Control Study

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Abstract

Introduction: Childhood poor nutritional status continues to be a serious public health problem in Ethiopia. Despite the high magnitude of childhood acute malnutrition, previously there is no study conducted to determine risk factors for acute malnutrition in Gedeo Zone. Thus, the main aim of this study was to identify risk factors for acute malnutrition among under-five children in Gedeo Zone, Ethiopia.

Methods: The unmatched case-control study was conducted on 451 under-five children (151 cases and 300 controls). Data were collected through interviewer-administered the structured questionnaire and measuring mid-upper arm circumference. Statistical package for social science version 20 software was used for data entry and analysis. Odds Ratio along with 95% the confidence interval was estimated using the multivariable logistic regression. The level of statistical significance was declared at P<0.05.

Result: Determinants identified for acute malnutrition among under five children were; diarrheal diseases (AOR=3.601 CI=(1.36, 9.53)), complimentary feeding started before 6 months or late after 6 months (AOR=4.4, CI=(1.6, 11.84)), household monthly income <750 ET.BRR, (AOR=4.6 CI=(1.1, 21.6)), maternal illiteracy (AOR=4.18, CI=(1.36, 12.8)), merchant mothers (AOR=7.45 CI=(2.6, 21.2)), mothers'/care givers' infrequently hand washing (AOR=5.4 CI (1.15, 25.8)) and family size more than four (AOR=5.9, CI (2.1, 16.7)).

Conclusion: In this study, socio-demographic and behavioral factors were identified as determinants of acute malnutrition among under-five children. Therefore; collaborative effort is needed to prevent diarrhea among under-five children, promote hand washing practice, create mass awareness about complementary feeding, make family planning methods available and empower women.

Keywords: Acute malnutrition; Childhood; Diarrheal diseases

Introduction

Childhood malnutrition is a major health problem, contributing to childhood morbidity, mortality, impaired intellectual development, suboptimal adult work capacity, and increased risk of diseases in adulthood. Of the 7.6 million deaths annually among children who are under 5 years of age, approximately 35% are due to nutrition-related factors and 4.4% of deaths have been shown to be specifically attributable to severe wasting [1,2].

The vast majority of children suffering from acute malnutrition are found in the developing world. Ninety percent of cases occur in sub-Saharan Africa (13 million or 9.4% of under-fives in that region) and south and Southeast Asia (28 million or 15% of under-fives and 5 million or 10% of under-fives respectively) [2]. In Ethiopia, under five malnutrition is a common public health problem. Overall, 9 percent of Ethiopian children are wasted, and 3 percent are severely wasted [3].

Evidence showed that socio-demographic factors such as; household's poverty and income, residence, parental occupation, parental education, maternal age, family size, overcrowding, and lack of exposure to mass media have influenced the occurrence of under-five acute malnutrition [4-12]. Furthermore, some behavioral or community factors including lack of maternal and child health services, of adequate and safe water supply, hygiene of caregiver and of improved environmental sanitation play their role in the occurrence of malnutrition [13,14].

In addition, lack of exclusive breastfeeding, pre-lacteal food, early or late initiation of complementary feeding, bottle feeding, inadequate weaning and poor Infant and Young Child Feeding practices (IYCF) are also risk factors for children acute malnutrition according to different kinds of literature [15-21]. Finally, diarrhea and other childhood diseases are also identified risk factors for under five acute malnutrition [16-19].

Factors that are contributing to malnutrition may differ among regions, communities and over time. Before interventions can be planned for an area, it is necessary to identify risk factors for under-five malnutrition in that area. There is no study previously done in Gedeo Zone to identify risk factors for acute malnutrition. Therefore, this study was designed to assess the risk factors for acute malnutrition among under-five children.

Methods and Materials

Study setting and design

The study was conducted at Dilla referral hospital in Gedeo zone, SNNPR, Ethiopia. Dill town is the administrative center of the Gedeo zone and located on the main road from Addis Ababa to Nairobi. Facility based unmatched case-control study was conducted from June 1 to August 30, 2015.

Study population and sampling procedure

The study population was of under-five children who visited Dilla referral hospital during data collection period and their mothers or caregivers. Are defined as all under-five children whose weight for height who fall below minus two standard deviations (−2SD) from the median of the reference population or with bilateral pitting edema or weight for height less than 79 percent of the median reference population or their mid-upper arm circumference (MUAC) less than 12.5 cm are considered as severely acutely malnourished. Controls were under five children who didn't have malnutrition (weight for height ≥ 2sd, Mid-Upper Arm Circumstance (MUAC) >12.5 cm, there is no pitting edema) visited the selected health facilities for other medical condition.

The sample size was calculated by using EPINFO 7. The required sample size was calculated by using two population proportions formula. Mother education was taken as major associated factor. Assumptions: the proportion of illiteracy among the mothers of the controls to be 56.1% and of the cases 71 .0%, 5% type I error, 90.0% power of the study, control to case ratio of 2: 1 to detect an odds ratio of 2.00. Based on the above assumptions, the total sample size was 452 with 151 for cases and 301 for controls.

Dilla referral hospital was purposively selected among public health facilities available in the Zone because the hospital has well established therapeutic feeding center and large case. Consecutive sampling technique was employed to select study subjects. All cases and controls and their mothers/caregivers available during data collection period was included in the sample till the calculated sample size reach.

Study variable

Dependent variable:

Acute malnutrition (SAM or MAM)

Independent Variables: Socio-economic and demographic variables; Age of child and mothers, child sex, family size, income, maternal/paternal education and occupation, marital status of the mother.

Child characteristics, caring and feeding; birth order and childhood illness, exclusive breastfeeding, hygiene and immunization.

Maternal caring and health services utilization and Environmental Health condition; water supply, sanitation.

Data collection procedure

After reviewing different kinds of literature, an interviewer-administered structured questionnaire was developed in English and translated into the Amharic language for actual data collection. The questionnaire had three subsections; the first subsection consists of socio-demographic variables of parent and child. The second section consists of child characteristics, child caring, child's anthropometric data, child's medical conditions etc. The third section consists of maternal and health services information, environmental and other factors.

The anthropometric data, particularly MUAC were collected by using the procedure stipulated by the WHO (2006) for taking anthropometric measurements. Before taking anthropometric data for children; first, their age were determined in order to ensure the target population. Edema was checked and noted on data sheet because children with edema are severely malnourished. In order to determine the presence of edema, normal thumb pressure was applied to the two feet for three seconds whether a shallow print or print remains on both feet when the thumb is lifted.

To identify retrospective morbidity of children, mothers were asked about any occurrence of illness during the past two weeks. Vaccination status of children was checked by observing immunization card and if not available mothers were asked to recall it. Data were collected by four trained BSC nurses.

Data quality assurance

Two days intensive training was given to data collectors on the objective of the study, methods of data collection, anthropometric measurement and data recording. The questionnaire was pre-tested on 10% of the sample size. On daily basis, the Principal investigator supervised the data collection process and ensure completeness and consistency of the collected questionnaires.

Data processing and analyses

EPI Info 7.00 software was used to enter data into the computer. After entry data were exported to Statistical Package for Social Sciences (SPSS) version 20.00 software for analysis. Then the data were categorized and sorted to facilitate analysis. Descriptive statistics for the respondents' relevant variables were computed and presented using tables. Multivariable logistics regression analysis was used to identify determinants for acute malnutrition. Odds ratio along with 95% confidence interval was estimated and a P value <0.05 was used to declare the statistical significance.

Ethical consideration

The study was conducted after getting ethical clearance from Dilla University, Health Science and Medicine College. Verbal consent was obtained from Dilla University referral hospital administrates. In addition, informed consent was obtained from study participant to confirm willingness for participation after explaining the objective, benefits, and procedure of the study. For under five children consent was obtained from mothers/caregivers. The respondents were informed that they have the right to refuse or terminate at any point of the interview and the information provided by each respondent was kept confidential.

Operational definitions

Case: It has defined as all under-five children whose weight and height falls below minus two standard deviations (−2SD) from the median of the reference population or with bilateral pitting edema or weight for height less than 79 percent of the median reference population or their mid-upper arm circumference (MUAC) less than 12.5 cm are considered as severely acutely malnourished.

Results

Sociodemographic characteristics

In this study, a total of 451 under five children (150 cases and 301 controls) were enrolled. Mothers aged 30-39 and 40-49 years old were 47.1% and 10.6% respectively in cases whereas 34% and 3.7% respectively in controls. Mothers' mean age for cases was 31.04 + 5.83 years and for controls was 28.4 + 4.83 years. Being single marital status was higher among mothers of cases 14.6% as compared to mothers of controls 3.3% (OR=4.9, CI=(2.3-10.7). The illiteracy status was higher among mothers of cases 62.9% as compared to mothers of the controls 45.2% (OR=1.9, CI=1.31-2.9). Merchant mothers were higher among mothers of cases as compared to controls (OR=2.5 CI=1.6-4.1). In cases, 80.9% households had family size more than four while 65% households in controls (OR=2.2, CI=1.4-3.6). Households which had a monthly income of <750 ET, birr was 83.4% in cases which were higher as compared to households of controls 61% (OR=18.2, CI=(4.4, 76.2) (Table 1).

Characteristics	Frequency				Crude OR (95% CI)	
	Case		Control			
	no	%	no	%		
Birth order						
Less than 3	75	49.7	184	62.3	1	
Greater than 3	76	50.3	116	38.7	1.7 (1.1, 2.79)	
Exclusive breast feeding for 6 months						
Yes	70	46.4	246	82	1	
No	81	53.6	54	18	5.2 (3.5, 10.1)	
Complimentary feeding started						
6 months	49	32.5	216	72	1	
Before 6 months or late	102	67.5	84	28	5.3 (3.5, 8.2)	
Duration of breast feeding						
Less than 24 months	44	31.2	25	10.8	3.7 (1.9, 7.1)	
More than 24 months	97	68.8	275	89.2	1	
Child vaccination completed						
Yes	78	51.7	250	83.3	1	
No	73	48.3	50	16.7	4.68 (3.0, 7.3)	
Diarrhea in the last two weeks						
Yes	116	76.8	78	26	9.44 (5.9, 14.9)	
No	35	23.2	222	74	1	
Fever in the last two weeks						
Yes	91	61.3	241	80.3	1	
No	60	39.7	59	19.7	2.7 (1.7, 4.2)	

Table 1: Socio-demographic characteristics of respondents at Dilla referral hospital Gedeo Zone, SNNPR, Ethiopia, 2015, G.C.

Obstetric history and child feeding practices

More than half 52.4% cases were born after 3rd birth order which was higher than 38.7% controls were born after 3rd birth order (OR=1.7, CI=1.1-2.79). None exclusively breastfeed cases for first six months were 53.2% which was higher as compared to 18% controls who didn't exclusively breastfeed for first six months (OR=5.2, CI=3.5-10.1). Cases who completed vaccination were 51.7% which was lower as compared to 85.7% controls completed vaccination (OR=4.68, CI=(3.0, 7.3)). Cases who had diarrhea two weeks prior to the survey were 76.8% which was higher as compared to 26% controls had diarrhea (OR=9.44, CI=5.9-14.9). Among controls, 80.3% had fever two weeks prior to the survey which was higher as compared to 61.3% case had a fever (OR=2.7, CI=1.75-4.2) (Table 2).

Characteristics	Frequency				Crude OR (95% CI)
	Case		Control		
	No	%	No	%	
Maternal age					
20-29	64	42.4	187	62.3	
30-39	71	47	102	34	1
40-49	16	10.6	11	3.7	2.03 (1.3, 3.0)
Mean age	31.04 + 5.83		28.4 + 4.83		4.25 (1.87, 9.6)
Marital status					
Married	129	85.4	290	96.7	1
Single, divorced, widowed	22	14.6	10	3.3	4.9 (2.3, 10.7)
Maternal educational status					
Illiterate	95	62.9	140	45.2	1.94 (1.2, 2.8)
Literate	56	37.1	160	54.8	1
Maternal occupation					
House wife	102	67.5	235	78.3	1
Employed	2	1.3	23	7.7	--
Merchant	47	31.2	42	14	2.82 (1.6, 5.1)
Paternal educational status					
Illiterate	72	47.7	119	39.7	1.44 (0.9, 2.3)
Literate	79	53.3	181	60.3	1
Place of residence					
Urban	29		88		1
Rural	76		122		1.89(1.14, 3.14)
Family size					
Less than or=4	22	19.1	105	35	1
Greater than 4	129	80.9	195	65	2.26 (1.4, 3.62)
Monthly income					
< 750	126	83.4	183	61	18.2 (4.4, 76.2)
750-1500	23	15.2	64	21.3	9.5 (2.1, 42.2)
>1500	2	1.3	53	17.7	1

Table 2: Obstetric and child feeding practices of mothers of under five children at Dilla referral hospital Gedeo Zone, SNNPR, Ethiopia 2015.

ANC utilization and knowledge toward IYCF

Among controls' mothers, 85.7% utilized ANC which was higher as compared to 54.3% cases' mothers utilized ANC (OR=5.05, CI=2.93-8.7). Mothers who received counseling during ANC about diarrhea among cases were 17.5% which was lower than mothers' of control 50% (OR=4.7, CI=(2.23-9.86). There was no difference observed between cases and controls regarding counseling during ANC for breastfeeding. The majority of mothers among controls 81.7% received counseling for complementary feeding during ANC follow up which was higher than mothers of cases 38.6% (OR=2.8 CI=1.45-5.4). Mothers who perceived pre-lacteal feeding is important for infant among the cases were 34.3% which was higher as compared to mothers of control 23.3% (OR=1.7, CI=1.03-2.86). The majority of mothers 59%

among cases were started breastfeeding an hour after birth which is higher as compared to controls 22.4% (OR=5.0, CI=3.0-8.3) (Table 3).

Characteristics	Frequency				Crude OR (95% CI)
	Case		Control		
	No	%	No	%	
ANC utilization					
Yes	83	55.0	249	83	1
No	68	45.0	51	17	4.0 (2.5, 6.21)
Mothers received counseling during ANC for Diarrhea					
YES					
NO	18	21.7	117	47	1
	65	78.3	132	53	3.2 (1.79, 5.7)
Mothers received counseling during ANC for breastfeeding					
YES					
NO	75	80.3	201	80.7	-
	8	19.7	48	18.3	-
Mothers received counseling during ANC for Complementary feeding					
YES					
NO	50	60.2	203	81.5	1
	33	39.8	46	18.5	2.9 (1.69, 5.0)
Prelacteal feeding important					
Yes	48	31.8	75	25	1.7 (1.03, 2.86)
No	103	68.2	225	75	1
Do Complimentary feeding start at 6 months?					
Yes					
No	111	73.5	184	61.3	1
	40	26.5	116	38.7	1.74 (1.14, 2.6)
When does BF started after birth?					
Within one hour	62	41.1	223	74.3	1
After one hour	89	58.9	77	25.7	4.15 (2.7, 6.3)

Table 3: Maternal ANC utilization and their knowledge toward infant and young child feeding at Dilla referral hospital, Gedeo Zone, SNNPR, Ethiopia 2015.

Child care and environmental factors

Among mothers of cases who have access to safe water, drinking water from a tap or protected spring, were 61.6% which is comparable to mothers' of control 66.1%. Households which didn't have latrine among cases were 35.8% which was higher than households of controls which lack latrine 13% (OR=3.7, CI=2.3-5.9). Improper solid waste disposal (open field) practices were higher among mothers' of cases

64.2% as compared to mothers' of controls 43.7% (OR=2.3, CI=(1.5-3.4). Mothers' of cases who practice hand washing before food preparation, after use of latrine and after cleaning child were 39.7%, 37.7% and 28.5% respectively which was lower as compared to mothers of control (Table 4). Infrequent hand washing, hand washing not frequently practiced after or before each activity, among mothers of cases were 86.7% which was higher as compared to mothers of controls 29.7% (OR=9.2, CI=(5.75-14.6) (Table 4).

Characteristics	Frequency				Crude OR (95% CI)
	Case		Control		
	No	%	No	%	
Drinking Water from safe source					
Yes	93	61.6	199	66.1	1
No	58	38.4	101	33.9	1.22 (0.75, 2.01)
HH has latrine					
Yes	97	64.2	261	87	1
No	54	35.8	39	13	3.7 (2.3, 5.9)
HH solid waste disposal practice					
Proper	54	35.8	169	56.3	1
Improper	97	64.2	131	43.7	2.3 (1.5, 3.4)
Maternal hand washing practices After use latrine					
Yes	57	37.7	258	86	1
No	94	62.3	42	14	10.1 (6.3, 16.1)
Maternal hand washing practices Before food preparation					
Yes	60	39.7	244	81.3	1
No	91	60.3	56	18.7	6.6 (4.2, 10.2)
Maternal hand washing practices After cleaning child					
Yes	43	28.5	164	74.7	1
No	108	71.5	76	25.3	7.4 (4.7, 11.4)
Hand wash practice					
Frequent	31	20.5	211	70.3	1
Infrequent	120	86.7	89	29.7	9.2 (5.75, 14.6)

Table 4: Maternal hand washing practices, household water source and sanitary facilities of respondents at Dilla referral hospital, Gedeo Zone, SNNPR, Ethiopia 2015.

Determinates of severe malnutrition

Multivariable logistic regressions were used to identify determines of severe malnutrition. Those variables showed association with outcome variables at a p-value of less than or equal to 0.05 in the bivariate were selected as candidate variables for multivariable logistic regression analysis. In this study at multivariable logistic regression analysis only the following factors were identified as determines of

severe malnutrition; a presence of diarrhea two weeks before the interview, being a late or early initiation of complementary feeding, maternal hand washing practices, household monthly income, Maternal educational status, family size and maternal occupation.

Characteristics	P-value	Adjusted OR (95% CI)
Diarrhea in the last two weeks		
Yes	0.01	3.601 (1.36, 9.53)
No		1
Complimentary feeding started		
At 6 month	0.004	1
Before or after 6 month		4.4 (1.6, 11.84)
Monthly income (in ET. BIRR)		
<750	0.048	4.6 (1.1, 21.6)
750-1500	0.24	2.4 (0.51, 13.66)
>1500	-	1
Maternal educational status		
Illiterate	0.012	4.19 (1.36, 12.8)
Literate		1
Maternal occupation		
House wife	-	1
Employed	0.591	1.63 (0.27, 9.8)
Merchant	0	7.45 (2.6, 21.2)
Hand wash practice		
Frequent	0.033	1
Infrequent		5.4 (1.15, 25.8)
Family size		
Less than or=4	0.001	1
Greater than=4		5.9 (2.1, 16.7)

Table 5: Multivariable logistic analysis to determine risk factors significantly associated with acute malnutrition at Dilla referral hospital, Gedeo Zone, SNNPR, Ethiopia 2015.

Children who had diarrhea two weeks before interview were 3.6 times risk of acute malnutrition as compared to children didn't have diarrhea (AOR=3.601 CI=(1.36, 9.53)). Children who were started complementary feeding before or late after 6 months were 4.4 times more likely to have acute malnutrition as compared to children who were started complementary feeding at 6 months (AOR=4.4CI=(1.6, 11.84)). Children from households monthly income less than 750 ET. BIRR were 4.6 times at risk to have acute malnutrition as compared to children from households monthly income more than 1500 ET.BIRR (AOR=4.6 CI=(1.1, 21.6)). Children whose mother illiterate were 4.2 times more risk to have acute malnutrition as compared to children whose mothers literate (AOR=4.18 CI=(1.36, 12.8)). Children whose mothers merchant was 7.45 times more risk to have acute malnutrition

as compared to children whose mothers housewife (AOR=7.45 CI=(2.6, 21.2)). Children whose mothers infrequently wash their hand before or after each activity were 5.4 times more risk as compared to children whose mothers regularly washed their hand before or after each activity (AOR=5.4 CI (1.15, 25.8)). Children from family size more than 4 were 5.9 times more risk to have acute malnutrition as compared to children from family size less than four (AOR=5.9 CI (2.1, 16.7)) (Table 5).

Discussion

To reduce burden and consequences of acute malnutrition among under-five children, factors contributing to its occurrence should be investigated. This study was aimed to investigate risk factors for the occurrence of acute malnutrition among under-five children.

Presence of diarrhea in the last two weeks was significantly associated with acute malnutrition. In this study presence of diarrhea increased a risk of acute malnutrition in 3.6 fold as compare to have not diarrhea. A similar finding was obtained in the study conducted in Machakel Woreda, Northwest Ethiopia where diarrhea increases the risk of malnutrition nearest to three times more likely than those who had not diarrhea [13]. Also it is similar to studies conducted in North Gondar [17] which indicated that the risk of diarrhea associated with under five acute malnutrition and conducted in Shashogo Woreda, Southern Ethiopia revealed that severe wasting was 4 times more likely to occur in children who had diarrhea before 2 weeks than those children who hadn't diarrhea within 2 weeks preceding (AOR=4.13, 95%, CI 1.34-11.47) [22] and other study conducted at Beta-Israel also revealed that diarrhea episode was among the main contributing factors for under-five malnutrition [20]. This could be due to increases loss of body nutrients and fluid which leads to weight loss.

The introduction of complementary feeding before or late after 6 month increases the risk of acute malnutrition. In this study, complementary feeding started before or late after 6 month increases a risk of acute malnutrition more than 4 folds as compared to complementary feeding started at 6 months. Similar findings are reported at study conducted in Gonder, Ethiopia where children with severe acute malnutrition are started with complementary diet either too early or too late [17] and study conducted in Pakistan revealed that introduction of weaning foods too early, before six months of age or too late, after one year of age has 4 strong associations with severe malnutrition [16]. The early introduction of complementary food is associated with an increased risk of respiratory infections, eye infection and a high incidence of malaria morbidity. When complementary foods are started, there is a reduction in breast milk consumption, which can lead to a loss of protective immunity [16]. This causes a higher morbidity when unhygienic foods are used, due to the development of diarrhea. In addition, inadequate weaning practices and poor infant feeding practices lead to low protein and energy intake [23].

Family household monthly income was significantly associated with under five acute malnutrition. The result is similar to studies conducted in Somali region [12], Ethiopia, Oromia region West Ethiopia [14], and Gambit, Ethiopia [9]. Similarly, other studies conducted in Iran [6], Nigeria [7], north Sudan [10] and Zimbabwe [11] argued that low family income was the risk factor for under five acute malnutrition. When income decreases, the quality and quantity of food also decrease. Evidence shows that when unemployment and low wages are presenting factors, families eat cheaper food, which is

less nutritious, leading to weight loss and malnutrition. As food products derived from animals are usually more expensive, children's intake of proteins and nutrients from these groups decreases with poverty. Malnutrition therefore also develops when the food ingested does not meet the high protein and energy needs of the child [8].

In this study, maternal educational status is significantly associated with acute malnutrition. Children whose mothers are illiterate were 4 fold at risk to have severe acute malnutrition as compared to those children have literate mothers. Similar findings were revealed at studies done in Shashogo Woreda, Southern Ethiopia [22], Gonder, Ethiopia [17], Oromia region, West Ethiopia [14], Somali Region, Ethiopia [12], in Ghana [24], Gambia and Nigeria [18], Bangladesh [25] and Granada, Nicaragua [26]. This could be due to illiterate mothers have less perception about the nutritional need of their children and most of them have poor socio-economic status. Evidence suggested that improvement in female secondary education enrollment rate was estimated to be responsible for 43% of total 15.5% reduction in child underweight in developing countries [27].

Maternal occupation also significantly associated with severe acute malnutrition. Children their mother merchant were 7 fold at risk to have acute malnutrition as compared to children whose mothers housewife. A study conducted by Bayesian Approach in Ethiopia identified occupation of the mother as determinates of severe malnutrition. [21]. A study conducted in Ekpoma, Edo-Nigeria also revealed that mother with traders occupational status were more likely to present with under-nourish under-five [28]. Also, a study conducted in Mazowe District of Zimbabwe showed that maternal occupation as a risk factor for under five acute malnutrition [11]. This could be due to traders spent less time with their children in searching for income which leads to deprived under-five the care and attention they required.

In this study maternal hand washing practices significantly associated with acute malnutrition. Children whose mothers infrequently washed their hands before or after each active were 5.4 folds at risk to have severe malnutrition as compared to children whose mothers washed their hands frequently before or after each activity. This finding is similar to study conducted in Oromia region, West Ethiopia [14], where odds of acute malnutrition were fourteen-fold higher among children whose mothers had practices of hand washing only at the time off after visiting latrine or before serving/preparing food or after cleaning child feces or not wash their hands at all as compared to those whose mothers had practices of hand washing for each activity. In other study conducted in Machakel Woreda, Northwest Ethiopia revealed that child caregivers or mothers hand washing only at the time off after visiting latrine strongly contributes to malnutrition which was threefold higher than whose mothers had hand washing at each activity [13]. This could be due to infrequent hand washing leads to contamination of food and drinks. Contamination of food and drinks increase a risk of infection which leads to poor appetite and loss of body nutrient.

In this study family with more than four members is significantly associated with severe malnutrition. Children from family size more than four were 5.9 folds at risk to have severe acute malnutrition as compared to children from family size less than four. A similar result was reported from studies conducted North Gonder, Ethiopia [17], Oromia region, West Ethiopia [14], Habu Abote District North Shewa, Oromia Regional State [29] and Malaysia [30]. This could be increased number of family size placed a heavy burden on the scarce household

resources, particularly on financial and food; it also reduced the time and quality of care received by the children.

Conclusion

In this study, several factors were identified as risk factor for acute malnutrition. Factors identified were diarrhea in last two weeks, early or late initiation of complementary feeding household monthly income, maternal illiteracy and occupation, infrequent hand washing and large family size.

Recommendation

Based on the finding I recommend that integrated and organized effort is needed at all level to: Mobilize community to promote personal hygiene specially hand washing (mothers/caregivers need to wash their hands before preparing food, before feeding baby and after visiting of a toilet or disposing of child feces) and to construct and use latrines to prevent diarrheal disease.

Mobilization Community is to promote awareness to start complementary feeding and disseminate complimentary feeding and related information.

Make family planning methods and information available for households to manage their family size.

Empower women particularly to increase their educational status and income.

Eliminate poverty so as to increase household income.

Acknowledgment

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