Prevalence and Associated Factors of Malnutrition among Children Aged 6-59 Months in Addi Harush Eritrean Refugees Camp, Tigray Region, North Ethiopia

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Abstract: Malnutrition is a serious medical condition marked by a deficiency of energy, essential proteins, vitamins, and minerals in a diet. In Refugee situations where the population is often extremely dependent on the humanitarian assistance and food aid; the value of the food is greatly determine their nutritional status. That is why under nutrition is a critical public health problem among refugee children aged 6-59 months. Institutional based cross- sectional study was conducted from March to June, 2015 in Addi Harush Refugee camp, Northern Ethiopia. The data was collected using interview administered questioners, observational and Anthropometric measurement. Among the total of 372 planed participants 367 of them were enrolled in the study with a response rate of 98.7%. This had identified 69 (18.80%) of stunting and 36 (9.81%) of wasting. Children who fed exclusive breast feeding for the duration of six months were 0.04 times less likely to be wasted. Children, those who used bottle feeding were 6.067 times more likely to be affected with acute malnutrition (wasting). Children who had been vaccinated with BCG were 0.037 times less likely to be wasted. While generally immunized children were 0.013 times less likely to be wasted and 0.054 times less likely to be stunted. Both stunting and wasting are remaining public health nutrition problem in the refugee. Wasting is observed to be affected by immunization practice behavior, duration of exclusive breast feeding, BCG vaccination and bottle feeding. Stunting is observed to be affected by hand washing practice before serving food and immunization practice behaving. Bottle feeding should be avoided, Exclusive breast feeding till six months should be strengthen, Child immunization should be encouraged more than the current and Awareness towards cause and prevention of stunting and wasting should be increased at a refugee communities level.

Keywords: Child aged 6-59 months, Wasting, Stunting, Haddi Harush.

1. INTRODUCTION

The topic of malnutrition presents a paradox. On one hand, nothing should come as naturally as good nutrition. Like breathing, drinking water, and sleeping, it is essential to survival. Drought and conflict in the horn of Africa are causing population displacement increasing risks of child mortality and malnutrition [1]. Globally, 162 million under-five children were stunted in 2012. The global trend in stunting prevalence and burden continues to decrease. Between 2000 and 2012 stunting prevalence declined from 33 percent to 25 percent and burden declined from 197 million to 162 million. In 2012, 56 percent of all stunted children lived in Asia and 36% in Africa. Globally, 51 million under-five children were wasted and 17 million were severely wasted in 2012. In 2012, approximately 71 percent of all severely wasted children lived in Asia and 28 percent in Africa. Malnutrition in sub-Sahara Africa contributes to high rates of childhood morbidity and mortality. Over 10 million children aged less than five years die annually from preventable and treatable illnesses - almost all these deaths occur in poor countries [2]. Over the past five years, concerted efforts to prevent and treat acute and chronic malnutrition in a multi- faceted manner have brought about improvements in macro – and micronutrient malnutrition among refugees in many countries. However, in many of the high burden countries that host the majority of the refugees in Africa, global acute malnutrition (GAM) prevalence remains at critical levels according to the World Health Organizations (WHO) emergency standards [3]. From UNHCR point of view, the total number of refugees in Ethiopia has reached 570,000 refugees as of the end of May 2014, making Ethiopia the second largest refugee host nation in Africa after Kenya. The main refugee population in Ethiopia are from Somalia (42.6 %), followed by South Sudan (32%), Eritrea (16.8%), and Sudan (7%) [4, 5]. Worldwide malnutrition is an extremely serious issue particularly affecting the under – five Refugee children. It is estimated that half of the 12 million under five

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deaths that occur worldwide are associated with malnutrition. The long - term consequences of an inadequate varied diet, poor caring practices and poor infrastructure often leads to intergenerational malnutrition. Therefore it is extremely important to tackle malnutrition in the under - five population and women, and in particular pregnant and lactating women [6].

It had been shown through various studies that children and women are the primary victims of malnutrition who suffer the most lasting consequences. Prevalence information is useful to set objectives and indicators as part of preparing a logical framework and activity summary. This study will help the nutritional policy makers, programs and strategy designers, aiding institutes and other concerned body to understand the current nutritional status of Refugees. At last the researchers will use as base line, contributing to malnutrition in children.

2. METHOD AND MATERIALS

2.1. Study Design, Study Area and Study Period

A quantitative, institutional based cross-sectional study design was conducted to determine the prevalence and associated factors of malnutrition among Children aged 6-59 months at Addi Harush refugees camp in 2015. The refugee camp is located at Shire Zone Tigray regional state, at 1180 kilo meter from Addis Ababa to the Northern part of Ethiopia.

2.2. Source Study Population

All children aged 6-59 months found in the Addi Harush refugee camp.

2.3. Study Population

All children aged 6-59 months found in the selected study household during the study time.

2.4. Inclusion Criteria

All Refugee children aged 6-59 months who were living in the Addi Harush refugee's camp during the study time and lived more than one month were enrolled.

2.5. Exclusion Criteria

Children, those whose families don't allow them to participate in the study and Children whose were not in the study area during the data collection time.

2.6. Sample Size estimation

Study sample size was determined by using a single population formula to assess the prevalence and determinant factors. This study assumed to use the study under taken in 2014 at Mai Aini Eritrean Refugee's camp study result of children aged 6-59 months; which was 33.4% for underweight prevalence. To obtain the maximum sample size at 95 % certainty, a maximum discrepancy of + 5% between the sample and the underlying population including 10% non response rate.

The formula to determine the sample size is as below

$n = (Z/2)2\ (p\ (1-p))\ /d2$

$= (1.96*1.96)\ (0.334)\ (1- 0.334)/\ (0.05)^2$

$= (3.8416)\ (0.334)\ (0.666)/0.0025 = 342$

For possible non response during the survey the final sample size increases by 10% to n = 342+ (342*10%) which is 376. Thus to minimum 376 children were the required number to participate in the study.

2.7. Sampling Procedure

First, survey based identification of the households who have had children or child was done. Then, households who were included had been selected by using systematic random sampling method. A lottery method was used for selection of a study subject from a household with more than one candidate.

2.8. Operational Definition

Anthropometric: - using of height and weight scale and measurement of upper arm circumference (MUAC) measurement to assess the nutritional status of children.

Wasted: - it is the state of acute malnutrition in which Z-score will be less to -2Z.

Stunted: - it is the state of chronic malnutrition in which Z-score will be less to -2Z.

2.9. Data Collection Method

Data was collected using interview administered structured questionnaires and anthropometric measurement (MUAC, weight and height measurement). The questionnaires were developed based on literature review and previously used

questionnaires. The questionnaires were prepared in English, and translated to Amharic and Tigrigna language.

2.10. Data Quality Control

For effective and quality data collection, a four days workshop was held by UNHCR in Shire zone to update the data collectors. In addition, pre-test of 25 questioners and daily checking of the collected day for its completeness and consistency. The data was collected by first degree holder health professionals. Weight and height were measured with much slit clothes and no shoes.

2.11. Data Processing and Analysis

A bivariate analysis was performed to investigate the association of malnutrition and the associated factors. Checking and cleaning of data was under taken before loading to the computer. After coded the data entered to EPI - INFO Version 7 template and exported to SPSS version 20 for analysis.

2.12. Ethical Considerations

The research protocol was reviewed and approved by Institute of Public Health, University of Gondar, institutional research ethics review committee and permission letter was obtained from Administration for Refugee and Returnee Affairs. Data collection was carried out in June / 2015, after verbal consent was obtained from the family or caregivers of children. The participant children were informed and asked for their willingness to participate and the advantage of their participation to the study. Privacy and the confidentiality were maintained. The participant had the right to stop the data collection any time, to maintain their right to refuse.

3. RESULT

3.1. Socio Demographic Characteristics of the Study Participants

Among planned 372 household participants 367 were enrolled to the study, with a response rate of 98.7%. From which 189 (51.5 %) of them were male households. Among the children whom cared by illiterates 18(4.9%) of them were stunted while 6(1.63%) of them were wasted. About 9(2.45%) and 2(.54%) of children who were from illiterate father were stunted and wasted respectively. The study found that 18 (4.90%) and 6 (2.18%) of children from illiterate mothers were stunted and wasted respectively. The study identified that as family size increased the probability of being stunted and wasted also increased. As amount of family income increased the probability of stunting and wasting were observed to be decreased. Of all type of religion, the least probability of being stunted and wasted was identified among children from protestant religion followers' family.

3.2. Nutritional Status of Children Aged 6-59 Months Based on Child and Maternal Characteristics and Care Practice in Addi Harush Refugees Camp, Tigray Region, North Ethiopia, 2015

Three hundred sixty seven study children aged 6 - 59 months was enrolled in the study. Of which 188 (51.2%) of them were male. It was identified that almost there is no difference in the magnitude of being stunted or wasted because of being male or female. Being stunted was observed to be increased with child age increasing from 6 months to 48 months. While wasted was observed to be decreased with child age increasing from 13 months to 59 months of their age. Concerning place of delivery 330 (89.9%) of the children were registered to be delivered at Health facility while the rest 37 (10.1%) were delivered at home. It was observed that 346 (94.28%) households were started initiation of breast feeding immediately or within less than an hour, and 310 (84.47%) of them exclusively breast-fed for the first six months of birth, with (84.5%) continuation of breastfeeding for 12- 24 months. Frequent diarrhea was observed to affect the frequency of stunting more than wasting. Among frequent diseases observed the least probability of wasting and stunting was identified in case of frequent fever. Children who had not ever been immunized were observed to be more at risk to be stunted and wasted. Off all children whom immunized for vitamin A 68(18.53%) and 35(9.54%) of them were stunted and wasted respectively. Among children whom immediately put to the breast after birth 64(18.5%) and 34(9.26%) of them were stunted and wasted respectively. Off all Children who not get the first milk because of squeezing out 41(11.17%) and 21(5.72%) of them were observed to be wasted and stunted orderly. The study identified that as frequency of breastfeeding increased the probability of being stunted was decreased. While the most probability of being wasted was observed among children whom feed breast more than 12 times within 24 hours. Children whom used cow's milk as a complementary feeding were more stunted and wasted than those whom used formula milk. The study identified that as frequency of complementary feeding increased to more than three

Table 1: Prevalence of Nutritional status based on Child and Maternal Characteristics and Care Practice among Children Aged 6-59 Months in Addi Harush Refugees Camp, Tigray Region, North Ethiopia, 2015

Variable		Distribution of stunting and wasting			
		Stunted		Wasted	
		Yes N (%)	No N (%)	Yes N (%)	No N (%)
Sex	Male	34 (9.26)	154 (41.96)	19(5.18)	169(46.05)
	Female	35(9.54)	144(39.24)	17(4.63)	162(44.14)
Age	6 – 12 months	5(1.36)	48(13.08)	6(1.63)	47(12.81)
	13 – 24 months	15(4.09)	79(21.53)	18(4.9)	76(20.71)
	25 – 36 months	21(5.72)	69(18.80)	7(1.91)	83(22.62)
	37 – 48 months	20(5.45)	65(17.71)	5(1.36)	80(21.80)
	49 – 59 months	8(2.18)	37(10.08)	0(0.0)	45(12.26)
Place of delivery	Home	9(2.45)	28(7.63)	2(0.54)	35(9.54)
	Health facility	60(16.35)	270(73.57)	34(10.3)	296(80.65)
Has the child ever been immunized	Yes	67(18.4)	297(81.6)	34(9.3)	330(89.92)
	No	2(0.54)	1(33.3)	2(0.54)	1(0.27)
Has the child received vitamin A?	Yes	68(18.53)	278(75.75)	35(10.1)	311(84.74)
	No	1(0.27)	20(5.45)	1(0.27)	20(5.45)
Frequent Child health problem	Diarrhea	14(3.81)	31(8.45)	5(1.36)	40(10.9)
	Common cold	6(1.63)	15(4.09)	6(1.63)	15(4.09)
	Fever	1(0.27)	10(2.72)	2(0.54)	9(2.45)
	Malaria	3(0.82)	14(3.81)	2(0.54)	15(4.09)
	No	39(10.6)	211(57.49)	19(5.2)	231(62.94)
	Others	6(1.63)	17(4.63)	2(0.54)	21(5.72)
Age of mother at first birth give in years?	≤ 18	27(20.9)	102(79.1)	13(10.1)	116(89.9)
	19-23	24(13.9)	149(86.1)	21(12.1)	152(87.9)
	24-29	17(28.3)	43(71.7)	2(3.3)	58(96.7)
	≥ 30	1(20.0)	4(80.0)	0(0.0)	5(100.0)
How many times you visited health facility for ANC during pregnancy?	1 – 3 times	30(23.8)	96(76.2)	13(10.3)	113(89.7)
	4 – 6 times	37(17.5)	175(82.5)	22(10.4)	190(89.6)
	7 – 9 times	2(6.9)	27(93.1)	1(3.4)	28(96.6)
How long after birth did you first put your child to the breast?	Immediately	64(17.44)	282(76.84)	34(9.3)	312(85.01)
	2-12 hours	3(0.82)	12(3.27)	1(0.27)	14(3.81)
	13-24 hours	1(0.27)	4(1.09)	1(0.27)	4(1.09)
	> 24 hours	1(0.27)	0(0.0)	0(0.0)	1(0.27)
Did you squeeze out the first milk	Yes	28(7.63)	124(33.79)	15(4.09)	137(37.33)
	No	41(11.17)	174(47.41)	21(5.72)	194(52.86)
How many times in the last 24 hrs you breastfed?	< 8 times	13(3.54)	77(20.98)	8(2.18)	82(22.34)
	8-12 times	8(2.18)	49(13.35)	5(1.36)	52(14.17)
	>12 times	4(1.09)	26(7.08)	8(2.18)	22(6.00)
Type of complimentary feeding	Cow's milk	22(6.0)	111(30.25)	10(7.5)	123(33.51)
	Butter	0(0.0)	2(0.54)	0(0.0)	2(0.54)
	Sugar solution	12(3.27)	57(15.53)	4(1.01)	65(17.71)
	Formula milk	4(1.01)	12(3.23)	1(0.3)	15(4.09)
	Axmiet /bula	8(2.18)	20(5.45)	4(1.01)	24(6.54)
Duration of breast feeding in months	Less than 12	0(0.0)	10(2.72)	0(0.0)	10(2.72)
	12 -24 months	59(16.08)	252(68..66)	36(9.81)	275(74.93)
	25-36 months	8(2.18)	32(8.72)	0(0.0)	40(10.9)
	>36 months	2(0.54)	4(1.01)	0(0.0)	6(1.63)

(Table 1). Continued.

Variable		Distribution of stunting and wasting			
		Stunted		Wasted	
		Yes N (%)	No N (%)	Yes N (%)	No N (%)
Frequency of complimentary feeding per day	Once daily	31(8.45)	122(33.24)	15(4.09)	138(37.60)
	2 times daily	27(7.36)	130(35.42)	16(4.36)	141(38.42)
	3 times daily	5(1.36)	17(4.63)	1(0.27)	21(5.72)
	> 3 times	4(1..01)	18(4.90)	4(1..01)	18(4.90)
Bath taking of the child	Daily	51(13.9)	248(67.57)	33(9.00)	266(72.48)
	Weekly	13(3.54)	41(11.17)	2(0.54)	52(14.17)
	Every other day	2(0.54)	3(0.82)	0(0.0)	13(3.54)
	Every 3 days	3(0.82)	6(1.63)	1(0.27)	8(2.18)
Z-score	Less than -2Z	69(18.80)		36(9.81)	
	Greater than -2Z		298(81.2)		331(90.19)

times per day the probability of being stunted was observed to be decreased. While the least probability of being wasted was observed among children whom feed three time per day. In case of bathing frequency, the least probability of being wasted and stunted was observed among children whom took bath every other day. As the age of the mother at first birth giving year increased from 18 to 30 years the probability of their children to be stunted and wasted were identified to be decreased. The frequencies of health facility visit for ante natal care (ANC) and the probability of being stunted and wasted observed to have indirect relationship. This study revealed that 69 (18.80%) and 36 (9.81%) of the study participants were stunted and wasted respectively (Table **1**).

3.3. Factors Significantly Associated with Stunting of Children among Children Aged 6-59 Months in Addi Harush Eritrean Refugees Camp, Tigray Region, North Ethiopia, 2015

Those generally immunized children were 0.054 times less likely had the chance of being stunted. Those children who had been served with hand washing before serving food were 0.34 times less likely to be stunted (Table **2**).

3.4. Factors Those Significantly Associated with Children's Wasting

Study children who fed exclusive breast fed for the duration of six months were 0.04 times less likely to be wasted. Those children who had been generally immunized were 0.013 times less likely to be wasted. Children who had been vaccinated with BCG were 0.037 times less likely to be wasted; but those who used bottle feeding were 6.067 times more likely to be wasted (Table **3**).

4. DISCUSSION

The current study found that, off all children aged 6-59 months 18.8% and 9.81% of them were stunted and wasted respectively.

According to this study both stunting and wasting are lower when compared to the report of World Bank in 2011 revealed that 15% of children under - five years

Table 2: Factors Significantly Associated with Stunting of Children among Children Aged 6-59 Months in Addi Harush Refugees Camp, Tigray Region, North Ethiopia, 2015

Variables	stunted		95% Confidence interval		
	Yes	No	COR	AOR	p-value
Has the child ever been Immunized					
Yes	67	297	0.691 [0.310 – 0.541]	0.054 [0.003 –0.981]	0.048
No	2	1	1.00	1.00	
Hand washing practice before serving food					
Yes	54	196	1.873 [1.008 – 3.483]	0.335 [0.114 – 0.984]	0.047
No	15	102	1.00	1.00	

Table 3: Factors Significantly Associated With Children's Wasting among Children Aged 6-59 Months in Addi Harush Refugees Camp, In Tigray Region, North Ethiopia, 2015

Variables		Wasted		95% Confidence interval		
		Yes	No	COR	AOR	p-value
has the child ever been immunized	Yes	34	330	19.412 [1.715 –219.676]	0.013 [0.001 – 0.231]	0.003
	No	2	1	1.00	1.00	
Vaccines received	BCG	14	140	5.000 [9.426 – 58.672]	0.037 [0.001 – 0.929]	0.045
		22	191	1.00	1.00	
What do you use to feed the child	Bottle	5	37	0.793 [1.271 – 2.323]	6.067 [1.029 – 35.885]	0.047
	Cup	16	154	0.031 [1.492 – 2.163]	1.537 [0.385 - 6.141]	
	Spoon	15	140	1.00	1.00	
Exclusive breast feeding duration in months	6 months	30	280	1.867 [3.391 – 8.920]	0.040 [0.002 – 0.892]	0.042
	7 - 12	3	33	2.200 [1.321 – 15.066]	0.217 [0.011 – 4.191]	
	> 12 months	2	10	1.00	1.00	

were wasted [5,6]; and to the survey done in North Shewa, Oremia Regional state revealed that the prevalence of malnutrition of children among aged 6-59 months, 47.6% were stunted and 16.8% were wasted and male children aged 6-59 months were identified to be with highest prevalence of malnutrition [9]. Unlike that of North Shewa Oromia regional state study report the current study revealed that as there were no observed differences of both the magnitude of stunting and wasting of the two sex category. This might be because of knowledge, awareness of child care practice, community difference, different food diversity use practices and positive attitude change to cultural practices.

Many nutritional studies had demonstrated that, malnutrition in Ethiopia is serious and 44% of children were stunted, and 10% wasted with wide regional variations, in Amahara National Regional State, stunting, and wasting were found as 52%, and 9.9% respectively. Stunting to other regions were 51.4% in Tigray, and 41.4% in Oromia [10]. Unlike these reports the current study revealed that the prevalence of stunting among 6-59 months children at Haddi Harush refugee camp was lower whereas wasting was nearly similar. This might be because of community difference, child age difference, consistent nutrition assessment done had increased the knowledge on the nutritional status of the refugees that in its tern improved maternal and child care practice.

According to the study conducted in Lalibella, the prevalence of stunting and wasting among children age 6-59 months were about 47.3% and 8.9%, respectively [11]. Similarly the study conducted in Kombolcha in 2013 revealed that the prevalence of stunting and wasting was 45.8%, and 11.2%, respectively [13]. According to the report of IOM consecutive studies on the nutritional status of refugees in different countries in 2011 and 2012 showed that the prevalence of wasting was 11.9% and stunting was 25.0% in Ethiopia among children aged 6-59 months [14, 15]. Unlike these reports the current study revealed that the prevalence of stunting among 6-59 months children at Haddi Harush refugee camp was lower whereas wasting was approximately similar. This is might be because of time difference, study community difference, nutritional follow up to the refugee camp community and might be because of the recommendation on integration of stakeholders became in the effective action, and an increment of knowledge about nutritional handling for the children.

The prevalence of stunting and wasting in the current study were lower than that of the study conducted on Prevalence of Acute Malnutrition and its Associated Factors among Children aged 6-59 months in Mai Aini Eritrean refugee camp which was 24.6% for acute malnutrition by 2014 [16] and the study done in 2014 on preschool children in Hawassa showed the prevalence of stunting and wasting which were 53.1% and 28.2% respectively [12]. These differences might be due to the awareness of the majority of mothers, those who were assured how they exclusively breastfed their children (83.9%) for the first six months with a continuous of breastfeeding for more than one year and also due to 84.7% of mothers awareness to feed appropriate complementary feeding like cow's milk

(36.2%), formula milk (12.5%) and sugar solution (18.8%) at the age of 6 months using cups (46.3%) and spoon (42.2%) which are safety methods of feeding. From this fact, it is clear that appropriate timing of initiation, exclusive breast feeding and appropriate timing of complementary feeding leads the infant to optimum nutrition which would have a great impact on children nutritional status, this awareness might be due to different factors; like consistent nutritional survey which has helped to improve maternal care and child feeding practice through nutrition education.

From a multivariate logistic regression results of Hidabu Abote District, North Shewa, Oromia Regional State study showed child age, sex and family monthly income were significantly associated with chronic malnutrition (stunting) [9]. According to the analysis of the study done in Lalibella, northern Ethiopia age and sex of child, wealth quintile to the household and breast feeding child till now were statistically associated with stunting and wasting [11]. The analysis of Mai Aini refugee camp showed that children aged group 36-47 months, till breast feeding, fever in the last two weeks, respiratory disease and disposal of garbage to individual and common pits were significantly associated with wasting [12]. But according to current study these were had no association except breast feeding. This might be because of cultural behaviors and deferent awareness level between the two communities.

As to my review, the current finding of global acute malnutrition was low (9.8%) when compared with that of stakeholders (ARRA, UNHCR, and other humanitarian agencies) survey done on Prevalence of global acute malnutrition among children aged 6-59 months ranged from 25.8% in Leitchuor to 30.2% in Kule in Gambella. This might be because of differences in response to the large influx of refugees, due to armed conflict in South Sudan, and community differences [17].

5. CONCLUSION

Both stunting and wasting are public health nutrition problem in the refugee. This study revealed that exclusive breast feeding, bottle feeding, child vaccination for BCG and child immunization is significantly association with malnutrition.

RECOMMENDATION

- Bottle feeding should be avoided
- Exclusive breast feeding till six months should be strengthen
- Child immunization should be encouraged more than the current
- Child vaccination for BCG should be encouraged more than the current
- Awareness towards cause and prevention of stunting and wasting should be increased at a refugee communities

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