



## ASSESSMENT OF NUTRITIONAL STATUS OF CHILDREN BORN FROM HIV POSITIVE MOTHERS IN HARARI REGIONAL STATE, ETHIOPIA, 2017

Arif Hussen\*

Harar Health Science College, Department of Pediatrics Nursing, East Ethiopia.

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### \*Corresponding Author

**Dr. Arif Hussen**

Harar Health Science  
College, Department of  
Pediatrics Nursing, East  
Ethiopia.

### ABSTRACT

**Background:** Growth failure in children is a health problem in developing countries. Growth failure is frequently found in children among HIV positive mothers, especially in areas where a high prevalence of HIV/AIDS coexists with high rates of food insecurity. However, despite the seriousness of the problem few studies conducted to explain nutritional status of children among HIV positive mothers but still relatively inadequate. **Objective:** This study aims to investigate nutritional status of children and associated factors among HIV positive mothers in Harari regional state, Ethiopia. **Methodology:** A community based cross sectional method was employed, The study

was conducted in Harari Region which is one of Ethiopian regional states, which is 515Km far from capital city Addis Ababa. Number of participants were one hundred ninety three (193) children, the sampling technique was simple random sampling method. Data was collected using a structured checklist. Data was entered; cleaned and analyzed using SPSS version 20. Logistic regression was used to assess the association between the dependent and independent variables to control confounding factors. Adjusted odds ratio (OR) with 95% confidence interval (CI) and P values will be calculated.  $P < 0.05$  was considered statistically significant. **Result:** Among total of the studied children (53.9%) of them were mal-nourished. About 44% were underweight of which 30.1% were severely underweight, 40% were wasted of which 19.7% were severely wasted and 8.3% were stunted of which 2.1% were severely stunted. **Conclusion:** Malnutrition among children under five years of age among HIV positive mothers affects greater than half of the study population therefore it is a public health

concern. The identified causative factors were: being female by sex, low food access and HIV positive status of child.

**KEYWORDS:** HIV+ mothers, under- fives, Mal-nutrition.

## 1. INTRODUCTION

### 1.1BACK GROUND

Nutritional status meaning Intake of a diet sufficient to meet the needs of the individual will keep the composition and function of healthy individuals within the normal range.<sup>[1]</sup>

Growth failure in children is a global health problem in developing countries.<sup>[2]</sup> Poverty has been identified as one of the impacts of HIV/AIDS on children, their families and communities, affecting the health and nutrition of children in a number of ways.<sup>[3]</sup>

HIV/AIDS can affect the health and nutritional status of children in a number of ways. Children may be affected by HIV/AIDS indirectly or directly when their communities, and the services these communities provide, are strained by the consequences of the AIDS epidemic or when they become orphans, have ill parents, live in poor households that have taken in orphans, are discriminated against because of a family member's HIV status, or have HIV themselves.<sup>[4]</sup>

HIV/AIDS affect children directly when the children themselves get infected with HIV from vertical transmission.<sup>[5, 6]</sup>

HIV/AIDS affects children as a consequence of parental illness and death. It has been noted that children born to HIV positive women are more likely to die before the age of five than other children, and this risk applies to all these children and not just those who are HIV-infected themselves.<sup>[7]</sup>

Infants born to HIV-positive mothers are at a substantially higher risk of low birth weight, early malnutrition, and mortality in the first two years of life, than children born to mothers without HIV, and the risks are greatest for infants of mothers with more advanced disease.<sup>[8]</sup>

Growth failure is frequently found in areas where a high prevalence of HIV/AIDS coexists with high rates of food insecurity.<sup>[9, 10]</sup> HIV exposure in utero without subsequent infection

affects growth in infancy and early childhood.<sup>[11]</sup> Newborns whose mothers are infected with HIV have higher rates of foetal malnutrition than newborns of HIV-sero negative mothers.<sup>[12]</sup>

Globally, about 35.3 million people are now living with the Human Immunodeficiency Virus (HIV), with women comprising more than half of this population.<sup>[13]</sup> Further, 1.5 million pregnancies are among women living with HIV, globally.<sup>[14]</sup>

Sub-Saharan Africa remains the region most adversely affected by the HIV/AIDS epidemic, accounting for 68 percent of the global burden in 2009 and despite recent declines in new infections, the number of people living with HIV/AIDS has continued to grow.<sup>[15]</sup>

According report of UNICEF Malnutrition is associated with more than half of all deaths of children worldwide and it is a major waste of human energy. Adults who survive a malnourished childhood are less physically and intellectually productive and suffer from more chronic illness and disability. The personal and social costs of continuing malnutrition on its current scale are enormous. Eradicating malnutrition remains a tremendous public policy challenge.<sup>[4]</sup>

In Ethiopia, child malnutrition is one of the most serious public health problem and the highest in the world. According to the 2011 EDHS survey, 44%, One in five children are severely, One in ten children under five years is wasted,. Almost 30% of children under age five are under weight. Though still high, malnutrition has decreased in Ethiopia in recent years. Stunting and underweight have decreased steadily since 2000, while wasting has remained more or less stable. Stunting is more common in rural areas (46%) than urban areas (32%).

Particularly in Harari region malnutrition of child among HIV positive mothers is alarming but it is not research proven because there is no researches done on nutritional status assessment among HIV positive mothers. This is the main reason for under taking this research hoping that it will shed some light on the issue and provide important information both to the clinicians and to the programmers in the region to manage malnutrition among the under five children among HIV positive mothers. Also This study may serve as a baseline data for further research on nutritional problem of children born from HIV infected mothers in Harari region and reference for other cities in Ethiopia.

## **2. METHODOLOGY**

### **2.1 Study area and period**

The study was conducted in Harari Region which is one of Ethiopian regional states, which is located in eastern part of Ethiopia 515Km far from capital city Addis Ababa. The region is divided in nine woredas. Based on the 2007 Census conducted by the ECSA, Harari has a total population of 183,415, of whom 92,316 were men and 91,099 women. This region is the only one in Ethiopia where the majority of its population lives in urban area: 99,368 or 54.18% of the population are urban inhabitants. With an estimated area of 311.25 square kilometers, this region has an estimated density of 589.05 people per square kilometer. For the entire region 46,169 households were counted, which results in an average for the Region of 3.9 persons to a household, with urban households having on average 3.4 and rural households 4.6 people. Ethnic groups in the region include the Oromo (56.41%), Amhara (22.77%), Harari (8.65%), Gurage (4.34%), Somali (3.87%), Tigray (1.53%), and Argobba (1.26%). Languages spoke include Oromiffa (56.84%), Amharic (27.53%), Harari (7.33%), Somali (3.70%), and Gurage (2.91%). The religion with the most believers in the region is Muslim with 68.99%, 27.1% are Ethiopian Orthodox, 3.4% Protestant, 0.3% Catholic, and 0.2% followers of other religions.

According to the current regional health bureau profile, the HNRS has four governmental, two private and one non-governmental (Fistula) hospitals; a total of seven hospitals, eight health centers, twenty nine private clinics, twenty six health posts and one regional laboratory serving the peoples of the state.

The study was conducted from October to December 2017.

### **2.2 Study design**

Cross sectional community based study design was conducted to assess nutritional Status of children among HIV positive mothers.

### **2.3 Source population**

The source population was all children 12-59 months of age among HIV positive mothers in Harari regional state.

## 2.4 Study population

The study population was selected children aged 12-59 months of age among HIV positive mothers in harari regional state.

## 2.5 Eligibility criteria

### 2.5.1 Inclusion criteria

All children whose age is between 12-59 months of age among HIV positive mothers and guardians were willing to participate.

### 2.5.2 Exclusion criteria

All children whose age is between 12\_59 months of age among HIV positive mothers and who was very sick.

## 2.6 sample size and sampling procedure

### 2.6.1 Sample size determination

The Sample size for this study was calculated using formula for a single population considering the following assumption: A95%CI, Margin of error0.05 and P 23 %( used data found from similar study done in Uganda)

$$n = \frac{(Z_{\alpha/2})^2 p (1-p)}{d^2}$$

Where;

n =sample size

Z= 95% confidence interval =1.96

P= prevalence rate.

d= margin of error (5%)

By using the data found from similar study done in Uganda, the prevalence of stunting, wasting or acute mal nutrition and underweight was 23%, 3.5% and 11% respectively; stunting is selected because it gives maximum sample size. (Among HIV positive mothers).

$$n = \frac{(1.96)^2 0.23(1-0.23)}{0.05^2} = 272$$

10% non respondent rate =27

Total sample size was 299

Since the total population is less than 10,000 correction formula is needed so the formula was as follow.

$$n = \frac{n}{1 + n/N}$$

$$1 + \frac{n}{N}$$

$$n = \frac{299}{1 + 299/600} = 200$$

$$1 + \frac{299}{600}$$

Sample was randomly recruited with the help of The AIDS Support Organization (mother to mother support groups).

The procedure used in selection of the calculated sample of study was Simple Random Sampling (SRS). A numbered list of all eligible children was first made by assigning each child a unique number. These numbers were subsequently written on small pieces of paper and placed in a box. 200 children were then picked from the box, making sure that the box was well shaken each time to ensure the principle of equal and random selection. The selected subjects care giver was then contact for consent. An interview was conducted in local languages (Amharic, Oromifa) at the respective of respondents.

## 2.7 Variables

### 2.7.1 Dependent variable

Nutritional status of children among HIV positive mothers.

### 2.7.2 Independent variable

Socio-demographic characteristics of child

Like Age, Sex, Number of siblings, HIV Status and immunization status

Socio-demographic characteristics of mother

Like Age, Marital status, Educational background, Occupation and Monthly income

Nutritional quantity & Nutritional quality

Like Number of meal per day and type of food eaten

Adverse health outcomes of child

Like Malaria, Diarrhea, Measles, Running nose, Fever

## 2.8 Operational definition

A meal is defined as consumption of food at a particular time in the 24 hours prior to the assessment within the household.

Diet quantity is determined from the number of meals consumed per day in the households: four times and above ( $\geq 4$ ) is good quantity and less than four ( $< 4$ ) times not good.

Dietary diversity score is defined as the number of different food groups consumed in the 24 hours preceding the interview: Low dietary diversity score ( $< 4$ ), Medium dietary diversity score (4-6) & High dietary diversity score ( $> 6$ ).

**Malnourished:** Any of the nutritional assessment indices weight for height, weight for age, or height for age is abnormal.

**Stunting:** A child was defined as stunted if the height for age index was found to be below -2 SD of the median of the standard curve. Severe stunting was diagnosed if it was below -3 SD.

**Underweight:** Refers to a deficit and is defined as underweight below the -2 SD from the NCHS/WHO reference of the median of the standard curve. A severely underweight was diagnosed if it was below -3 SD.

**Wasting:** Nutritional deficient state of recent onset related to sudden food deprivation or mal-absorption utilization of nutrients which results weight loss, weight-for-height below-2SD from the NCHS/WHO median value. Severe wastage was diagnosed if it was below -3 SD.

## 2.9 Data collection instrument and procedure

After getting ethical clearance from Ethical review committee of the CHS of Mekelle University; data was collected using a structured checklist. The checklist was prepared in English then translated into local language by expertise. Four Nurses (graduated with bachelor of Nursing) and two supervisors whose background is HO (Bsc. In Public Health) who were working in pediatrics unit were trained for two days by principal investigator. The data collection was supervised by principal investigator and supervisors.

### Measurement of variables

The length of children  $< 2$  years was measured by using labeled standard measurement board by placing the child flat on the board, his/her head against the base of board, his/her feet flat against foot piece and the line of sight perpendicular to the base of the board. For those  $> 2$  years it was measured by placing the child standing parallel to the board by making the occipital area, buttock and heels to touch against back and base of the board.

Regarding weight measurement; the weight of children <2 years was measured using digital weight measuring device by putting the child on the device. For other by letting child to stand on adult measuring device. Height and weight was measured twice by two independent examiners.

MUAC was measure for children >6 months on the left arm, by convention. A point was marked mid way between the acromion(shoulder) and olecranon(elbow) on the vertical axis of the arm with the arm bent at a right angle and between the lateral and medial surface of the arm.

Children was also clinically assess for signs of clinical malnutrition such as marasmus and kwashiorkor.

### **2.10 Data quality control**

Data collectors were trained extensively for two days with sample. One supervisor with principal investigator was checking the daily collected data for completeness and validity. The data form in Epi Data was managed in way that it was not allow illegal values through specifying range of legal values. The data was coded carefully in order to increase accuracy and quality of data collected.

Every day at the end of the data collection discussion was made with the data collectors; so faced problems find the solution. The completeness of the questionnaire was checked before data entry. Pre testing was done at Diredawa city (Sabian kebele) prior to actual data collection. The principal investigator had checked collected data for completeness and corrective measures were taken accordingly.

### **2.11 Data entry and analysis**

The completed questionnaires were checked for completeness, consistency and were coded by the principal investigator. Data was entered, cleaned and analyzed using SPSS version 20. First descriptive statistics of percentages and frequency distribution using tables and figures was carried out to explore the socio demographic characteristics.

Logistic regression was used to assess the association between the dependent and independent variables. After checking model fitness was made to obtain odds ratio and the confidence interval of statistical association All factors with  $P < 0.05$  in bi-variate logistic regression analysis were further entered into multi-variate model to control confounding

effects. Adjusted odds ratio (OR) with 95% confidence interval (CI) and P values were calculated.  $P < 0.05$  is considered statistically significant.

The major assumption of logistic regression analysis (absence of multi co-linearity and interaction among independent variables) were checked to be satisfied. The fitness of logistic regression model was assessed using the Hosmer-Lemeshow statistics, in this study the significant value was .589 which is greater than 0.05 so the model is fit.

Commonly used cut-off points for determining the presence of multi co linearity (tolerance value of less than .10, or a VIF value of above 10).

In this study, the tolerance value for each independent variable is not less than .10; therefore, we have not violated the multi-co linearity assumption. This is also supported by the VIF value, which is well below the cut-off of 10.

### **2.12 Ethical consideration**

Ethical clearance was obtained from the ethical review committee of the CHS of Mekelle University and ethical clearance was taken. Accordingly, an initial letter of cooperation was written to HRHB, HRHB in turn, wrote a letter of support to all woredas.

Information of the study (purpose and producers, potential risk and benefits) were given to mothers/guardian of child, they were informed that the study was voluntary base they can participate or not, even if they were voluntary to participate they have right to withdraw themselves in the study at any time, confidentiality was assured for the information gathered; personal identifiers were not used on the checklist and written consent were obtained.

## **3. RESULTS**

### **Background characteristics of the study participants**

A total of 193 children (12-59 months) were studied making the response rate of 96.5%, of which 50.3% were female and 49.7% male. The distribution of children by age group were 12-23 months 76(39.4%) followed by age group 24-35 months 57(29.5%). The mean and the median age of the children were 27.02(+13.016) and 24 months respectively while the minimum and maximum age was 12 and 58months respectively. HIV status of children 153(79.3%) were negative. Except five of children all of children were fully immunized.

**Table 1: Socio-demographic characteristics of children for the study of nutritional assessment of children among HIV positive mothers in Harari regional state, Ethiopia 2017.**

<b>Socio-demographic characteristic Child (N =193)</b>	<b>Number</b>	<b>Percent</b>
Age in months		
12-23	76	39.4
24-35	57	29.5
36-47	36	18.7
48-59	24	12.4
Sex		
Male	97	50.3
Female	96	49.7
HIV status		
Positive	31	16.1
Negative	153	79.3
Unknown	9	4.3
Mean age in months	27.2	

A total of 193 mothers/caregivers were interviewed. The mothers of 182(94.3%) children were alive at the time of the study while the rest children lost their mothers. The age of the mothers/caretakers age were range from 18to 41 years, the mean age was 28.67 years. The majority of mother/caregivers were house wives (45.1%) by occupation. the study revealed that around half of the mothers/caregivers had a secondary level of education (42%) but there was any mother who had higher education (diploma and above). Only small segment of mothers/caregivers (24.4%) Were governmental employee.

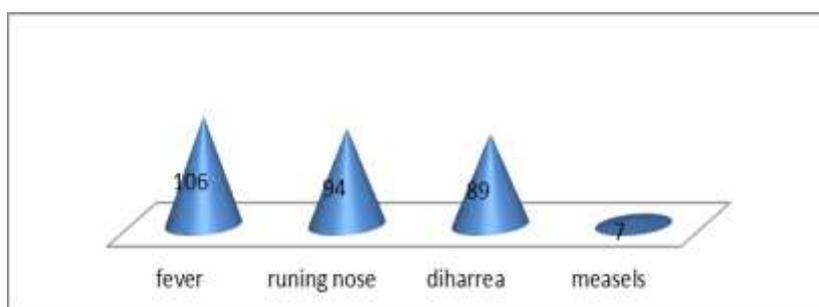
**Table 2: Socio-demographic characteristics of mothers/care givers for the study of nutritional assessment of children among HIV positive mothers in Harari regional state, Ethiopia 2017.**

<b>Socio-economic characteristic Mother/caregiver(N=193)</b>	<b>Number</b>	<b>Percent</b>
Marital status		
Not married	25	13
Married	116	60.1
Divorced	30	15.5
Widowed	22	11.4
Educational level		
No formal schooling	25	13
Primary school	51	26.4
Secondary	81	42
Preparatory	36	18.7

Higher education	0	0
Occupation		
house wife	87	45.1
Self employee	59	30.6
Government employee	47	24.4
Maternal condition		
Alive	182	94.3
Dead	7	3.6
Unknown	4	2.1

### Adverse health Outcome of children

The common illnesses reported among children were fever (54.9%), running nose (48.7%) and diarrhea (46.1%). There were only 3.6% measles cases among children in the two weeks before the assessment.



**Figure 1: Shows Morbidity pattern of study population 2 weeks before study for the study of nutritional assessment of children among HIV positive mothers in Harari regional state, Ethiopia 2017.**

### Dietary quality and quantity

#### Dietary quality

The average number of food groups consumed in the study households was about six, more than half of these households reported consumption of less than six food groups in the 24 hours prior to the survey (57.6%).

The food groups reportedly consumed within households in the 24 hours prior to the assessment were mainly cereals (80.8%), roots (75.6%), sugar/honey (69.4%), legumes (60.1%) and milk (51.3%). There was low consumption of eggs (45.1%), fruits (45.1%), and foods of animal origin such as meat (43%), poultry (12.4%) and fish (8.8%).

**Table 3: Type of food eaten within past 24hours of study by children among HIV positive mothers in Harari regional state, Ethiopia 2017.**

	Type of food	frequency	Percent
1	Cereals	156	80.8
2	Legumes	116	60.1
3	Root	146	75.6
4	Milk and milk product	99	51.3
5	Meat and	83	43
6	Fish	17	8.8
7	Vegetable	88	45.6
8	Egg	87	45.1
9	Poultry	24	12.4
10	Fat/oil	98	50.8
11	Sugar/ honey	134	69.4
12	Fruits	87	45.1

#### Diet Quantity

Half of households reported that their children consume their meal only twice per day (50.8%) , only (5.7%) eat their meal more than four times per day and almost all of them reported that there was skipping of minimum of one meal within 24 hours at daily base.

**Table 4: Frequency of food eaten within 24hours of study by children among HIV positive mothers in Harari regional state, Ethiopia 2017.**

	Frequency	percent
Twice	98	50.8
Three times	68	35.2
Four times	16	8.3
More than 4 times	11	5.7
Total	193	100

#### Nutritional status of children under five years of age

Among 193 of the children below five years of age 104 (53.9%) of them were mal-nourished. About 44% of the children below five years of age were underweight of which 30.1% were severely underweight, 40% were wasted of which 19.7% were severely wasted and 8.3% of the children below five years of age were stunted of which 2.1% were severely stunted.

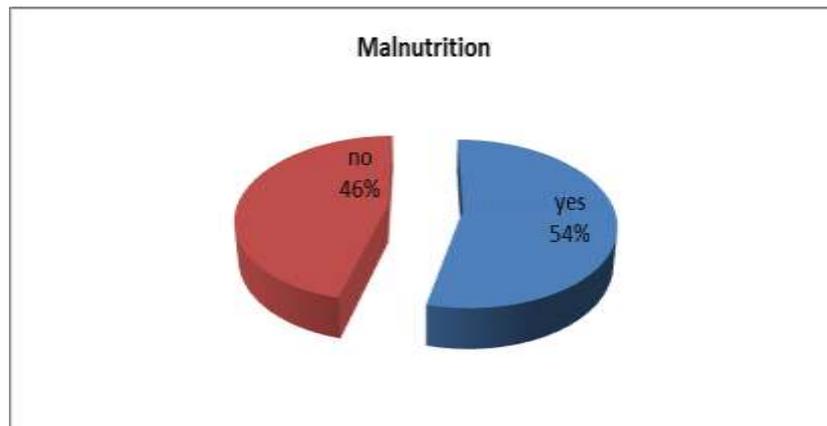


Figure 2: Graphic representation of nutritional status of children among HIV/AIDS positive mothers in Harari region 2017.

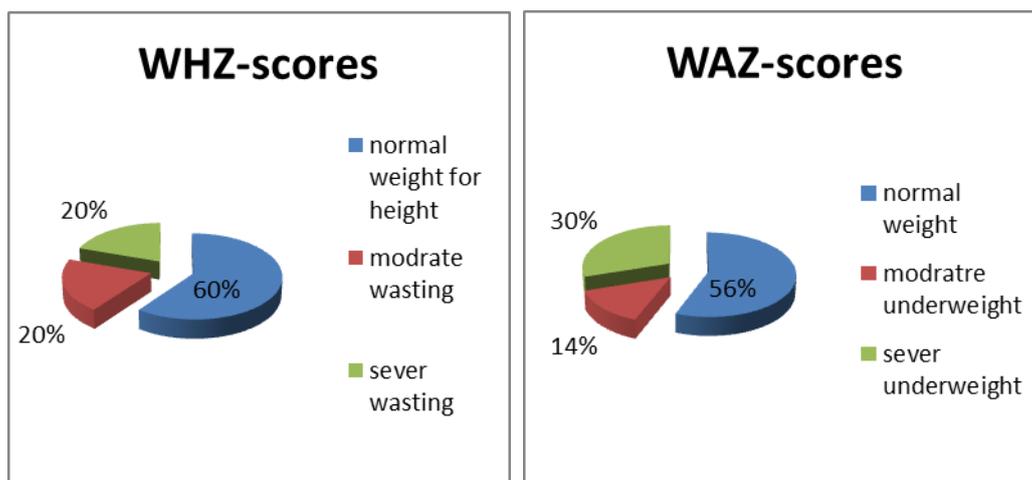


Figure 3a figure 3b.

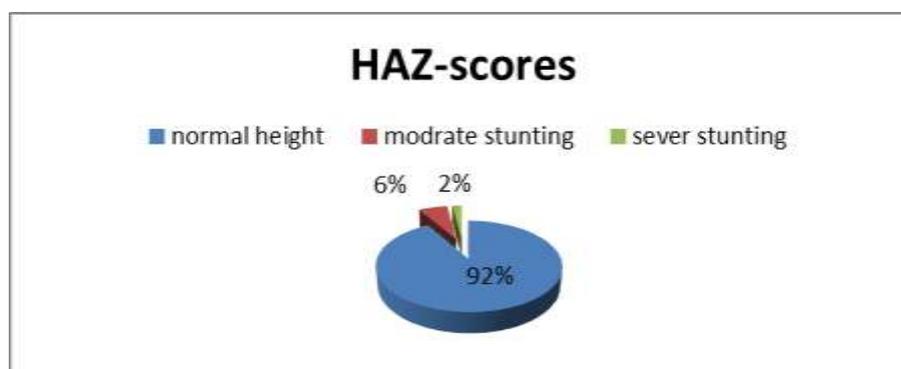


Figure 3c.

Figure 3 (a,b,c) Graphic representation of weight for height(3a), weight for age (3b) and height for age(3c)Z-scores of children among HIV/AIDS positive mothers in Harari region 2017.

### Factors associated with malnutrition

In bivariate logistic regression analysis, sex female was statistically significant associated with malnutrition ( $p= 0.000$ ) and remained statistically significant in multivariate logistic regression ( $p=0.000$ ) compared to sex male. Age group 12-35& age group 36-47 months was statistically significant associated with malnutrition ( $p=0.027&0.003$ ) respectively and remained statistically significant in multivariate logistic regression ( $p= 0.010$ ) compared to children aged more than 4 years. In bi-variate logistic regression analysis, HIV status of children was significantly associated with malnutrition ( $p= 0.000$ ) and remained statistically significant in multivariate logistic regression ( $p= 0.026$ ) compared to those of HIV negative. Meal timing was statistically significant associated with malnutrition ( $p= 0.000$ ) and remained statistically significant in multivariate logistic regression ( $p= 0.000$ ) compared to children who has meal timing less than four times per day.

**Table 5: Table shows result of bi-variate analysis of the study of nutritional assessment of children among HIV positive mothers in Harari regional state, Ethiopia 2017.**

Variables	Options	Nutritional Status		Crude Odds Ratio with 95% CI	P value
		Mal-nourished	Non Malnourished		
Sex	Male	32	64	1	
	Female	72	25	5.8(3.10-10.70)	0.000*
Age of child	12-23	44	32	3.40(1.22-8.93)	0.017*
	24-35	38	19	4.857(1.720-13.718)	0.003*
	36-47	15	21	1.74 (0.58- 5.22)	0.327
	48-59	7	17	1	
HIV status positive	Yes	30	1	.028(.004- .211)	0.000*
	No	88	74	1	
Meal Timing	<4 times	100	66	1	
	≥4 times	4	23	.115 (.038-.347)	.000*
Mother alive	yes	99	87	1	
	not alive	5	2	2.20 (0.42 - 11.61)	0.354
Types of food eaten	1-3	21	15	1.62(0.73-3.58)	0.232
	4-6	45	30	1.74 (0.92 - 3.27)	0.088
	7-12	38	44	1	
Immunization status	Yes	101	87	1	
	No	3	2	1.29 (0.21 - 7.91)	.782
No. family members	1-4	36	32	1.10(.587-1.917)	.846
	4+	68	57	1	
Marital status	Not married	16	9	1.778(.553-5.72)	.335
	Married	62	54	1.148(.461-2.858)	.767
	Divorced	15	15	1.000(.333-3.005)	1.00
	widowed	11	11	1	
Fever	Yes	56	50	1	

	No	48	39	1.099(.622-1.942)	.745
Running noise	Yes	56	50	1	
	No	48	39	1.099(.622-1.942)	.498
Diarrhea	Yes	46	43	1	
	No	58	46	1.179(.668-2.080)	.571
Measles	Yes	4	3	1	
	No	100	86	.872(.190-4.005)	.860

\* Shows statistically significant association at 95% Confidence interval.

Variables which showed statistically significant associations with the various forms of nutritional status in the bivariate analysis were entered in to a multivariate logistic regression model to see the independent effect of each potential determinant while controlling for possible confounders.

**Table 6: Table shows result of multi-variate analysis of nutrition and variables for the study of nutritional assessment of children among HIV positive mothers in Harari regional state, Ethiopia 2017.**

		COR(95%CI)	P value	AOR(95%CI)	P value
Sex	Male	1		1	
	Female	5.8(3.10-10.70)	0.000*	13.935( 3.721, 52.18)	.000
Age of child	12-23	3.40(1.22-8.93)	0.017*	3.967(.985,15.969)	0.52
	24-35	4.857(1.720-13.718)	0.003*	5.635(1.231,25.790)	0.26*
	36-47	1.74 (0.58- 5.22)	0.327	1.033(.221,4.836)	0.967
	48-59	1	1	1	
HIV status positive	Yes	0.28(.004- .211)	0.000*	.110(.017,.711)	0.20*
	No	1	1	1	
Meal Timing	<4 times	1	1		
	≥4 times	.115 (.038-.347)	.000*	.141(.064, .314)	.000*

#### 4. DISCUSSION

##### Major determinants of malnutrition

The causes of malnutrition among children (12-59 months) born to HIV-positive mothers are many and complex but stem basically from inadequate food intake, improper feeding practices and frequent illnesses. This particularly puts children at risk for malnutrition and therefore increased vulnerability to infection and poor growth, as time and household resources are diverted in an effort to care for the HIV-positive mother/caregiver.

##### Gender of the child

The present study found that poor nutrition mainly affects girls than boys of (OR 5.8, 95% CI 3.10-10.70), a finding consistent with earlier findings; Girls in orphanages were more likely

to be malnourished than boys in orphanages. Children who had been admitted to an orphanage for more than one year were less malnourished<sup>[16]</sup>, A consistent theme that has emerged in both resources rich and limited settings is a significant inequity in the experience of food insecurity by gender, with women most at risk<sup>[17]</sup>, Among a sample of HIV-infected individuals in British Columbia, 33% of women were categorized as hungry, compared with 20% of men<sup>[18]</sup> and another study in Botswana and Swaziland, 32% of women were found to be malnourished, compared with 22% of men.<sup>[19]</sup> But other Studies in Senegal showed that being a male child is associated with a higher risk of both stunting and underweight (malnutrition).<sup>[20]</sup> the possible difference could be due to study population, cultural difference, gender(sex) preference ,sample size or study period.

### **Health outcome of child**

In the current study, a child whose HIV sero- status is positive is more malnourished than whose HIV sero-status is negative; A finding is consistent with other studies for instance Study in South Africa showed there is high prevalence of under nutrition, particularly stunting, which is more prevalent among HIV positive children<sup>[21]</sup>, Another study done in South Africa by Kimani-Murage *et al.* also documented that the prevalence of stunting was more in HIV-positive children in South Africa<sup>[22]</sup>, Study conducted in Dar es Salaam, Tanzania showed that among 213 HIV positive and 203 HIV negative 6-60 months age group and documented that in HIV positive group 36.6% were stunted, 22.1% were underweight, and 13.6% were wasted<sup>[23]</sup> and another study conducted in India found that 22% HIV positive children were wasted, 38.9% were stunted and 38.9% were both stunted and wasted.<sup>[24]</sup> So HIV status remained a significant determinant of many of outcomes; growth failure has been associated with HIV elsewhere in sub-Saharan Africa. HIV infection in children below five years increases energy requirements and affects nutritional status through increase in resting energy expenditure, reduction in food intake, nutrient mal-absorption and loss, and complex metabolic alterations that culminate in weight loss and wasting common in AIDS.

### **Household dietary intake**

The results of the current study demonstrate that more than half of the households had an inadequate macronutrient consumption. Since a high proportion of study households reportedly consumed meals less than four times per day (86%), this would likely mean lower macronutrient intake. This possibly contributes to the poor quality of life of HIV-positive

mothers/caregivers and their children, since the two groups have high energy and nutrient requirements.

## **5. CONCLUSION**

This study showed that malnutrition among children under five years of age in Harari households of mothers/caregivers living with HIV/AIDS Affect more than half (54% ) of the study population so it is a public health concern. The identified causative factors were: being girls by sex, low food access and HIV status of child. Interventions to address malnutrition in this vulnerable group should therefore aim at addressing the above contributory factors.

## **6. RECOMMENDATIONS**

### **To program planners**

Since greater than half of the study group is already affected by malnutrition they should plan means to decrease mal-nutritional problem of children born from HIV infected mothers by supply food for malnourished children and food support for the family and the capacity of health care facilities and health care workers specially health extension workers should be strengthened through better training on management of nutrition education and service management.

### **To researcher**

To assess the factors associated with malnutrition using stronger study design, in another words more in depth qualitative studies are required to understand deeply the factors affecting malnutrition among children of under five years of age.

### **To the clinician**

Since there is high burden of fever, running nose among children clinician should dig out the root cause and treat children through home to home campaign and educate parents of the children on how to prevent malnutrition among the children.

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