

**HARAMAYA UNIVERSITY**  
**COLLEGE OF HEALTH AND MEDICAL SCIENCES**  
**DIRECTORATE FOR POST GRADUATE STUDIES**  
**TIME TO RECOVERY FROM MODERATE ACUTE**  
**MALNUTRITION AND ITS PREDICTORS AMONG 6-59 MONTHS**  
**CHILDREN AT DARO LEBU DISTRICT, WEST HARERGHE,**  
**ETHIOPIA**

**MPH Research Thesis**

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## APPROVAL SHEET

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I hereby certify that I have read and evaluated this Thesis entitled “Time to Recovery from Moderate Acute Malnutrition and Its Predictors Among 6-59 Months Children at Daro Lebu District, West Harerghe, Ethiopia” prepared under my guidance by Mohammed Yahya. I recommend that it be submitted as fulfilling the thesis requirement.

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## ABBREVIATIONS

AHR	Adjusted Hazard Ratio
CI	Confidence Interval
CSB++	Super cereal plus
EMDHS	Ethiopia Mini Demographic Health Survey
EDHS	Ethiopia Demographic Health Survey
FBF	Fortified Blended Food
GNC	Global Nutrition Cluster
HHF	Household Food Insecurity
IHRERC	Institutional Health Research Ethics Review Committee
LBNS	Lipid Based Nutrients Supplements
MOH	Ministry of Health
MAM	Moderate Acute Malnutrition
MUAC	Mid Upper Arm Circumference
NNP	National Nutrition Plan
RR	Relative Risk
RUSF	Ready to Use Supplementary Food
SAM	Severe Acute Malnutrition
TSFP	Targeted Supplementary Feeding Program
UNICEF	United Nations Children’s Fund
WFP	World Food Programme
WHO	World Health Organization
WHZ	Weight-for Height Z-score

## ABSTRACT

**Background:** Children with moderate acute malnutrition have an increased risk of mortality, infections and impaired physical and cognitive development compared to well-nourished children. Moderate acute malnutrition treatment would be to reduce child mortality and morbidity.

**Objective:** To assess time to recovery from moderate acute malnutrition and its predictors among 6-59 months children targeted for supplementary feeding at Daro Lebu district, West Harerghe, Ethiopia from August 1, 2019 and December 31, 2019.

**Methods:** Retrospective cohort study design was employed on 540 sampled children and assessing time to recovery to moderate acute malnutrition and its predictors at Daro Lebu district. Data was collected by using a pre-test structured questionnaire and translated into the local language (Afan Oromo version) by trained data collectors. Data were collected by reviewing registration records and home visits interview from August 25 to September 28, 2020. The data will be entered to EpiData 3.01 statistical software and analyze by SPSS 22.0.

**Result:** The overall mean timely recover was 14.77 weeks and median times to recovery were 16 weeks. The major predicting factors for time to recovery among children 6-59 months of : age were 24-59 months of age adjusted hazard ratio (AHR=1.24, 95% CI: 1.01-1.54, P=0.042), admission mid upper arm circumference of 11.5-11.9 centimeter (AHR=1.27, 95%CI: 1.03-1.56, P=0.024), no deworming (AHR=.75, 95%CI: .59-.94, P=0.013), greater than 60 minutes of distance (AHR=.80, 95%CI: .65-.99, P=0.042), specialized nutritious foods (AHR=1.32, 95%CI: 1.01-1.73, P=0.044) and food insecurity status(AHR=.80, 95%CI: .65-.99, P=0.045).

**Conclusion:** The median time to recovery of children admitted to targeted supplementary feeding was 16 weeks which is consistent with national standard acute malnutrition treatment guideline of Ethiopia.

**Keywords:** Time to recovery, moderate acute malnutrition, targeted supplementary feeding

# 1 INTRODUCTION

## 1.1 Background

Moderate acute malnutrition was a type of undernutrition caused by a lack of proper nutrient intake due to lack of sufficient availability or disease. Despite the overwhelming burden of MAM worldwide, affecting 33 million children each year (Stobaugh, 2018, AB et al., 2015). MAM, defined as weight-for-height between minus two and minus three standard deviations from the median weight -for-height for the standard reference population and/or mid upper arm circumference between 11.5cm and less than 12.5cm (WFP, 2012, Lindsey et al., 2016, UNICEF, 2014).

Acute malnutrition, also known as wasting, develops as a result of recent rapid weight loss or a failure to gain weight (WFP, 2012). It's results from sudden reduction in food intake or diet quality and its often combined with pathological causes.(Lindsey et al., 2016).

Moderate acute malnutrition affects a total of 11% of children worldwide under the age of 5 years (Bharaniidharan and Reshmi, 2019). Children with moderate acute malnutrition are at 3 times greater risk of mortality compared to well children, and face greater risk of morbidity from infectious diseases and delayed physical and cognitive development (UNICEF et al., 2017).

Some African countries such as Malawi and south Sudan, their prevalence of moderate wasting are 3% and 10.6% respectively (AJ Muhammad et al., 2019, Jackson et al., 2019). In Ethiopia, 38% of children less than 5 years are stunted or too short for their age, and 18% are severely stunted. 10% are wasted or too thin for their height, including 3% who are severely wasted. 24% of children under age 5 years are underweight or too thin for their age, with 7% severely underweight. Depending on three anthropometric index of nutritional status, in Oromia, based on height-for-age 37%, weight-for-height 10.6%, and weight-for-age 23% among under 5 children are malnourished (EDHS, 2016).

Moderate acute malnutrition treatment through targeted supplementary feeding programs employs fortified blended foods (FBFs), such as corn-soy blends (CSBs) or super cereal plus (CSB++), which are fortified with micronutrient pre-mixes and may include vegetable oil, whey

or skimmed milk powder (Robert, 2017). At present, the most common interventions for the management of MAM are supplementary feeding program, so that supplementary feeding was the provision nutritious rations to vulnerable children or special dietary needs (MOH, 2018).

There was currently no internationally recognized consensus on the discharge criteria for TSFP using recommended admission criterion, MUAC. The discharge criteria must match the admission criteria. If a child was admitted based on MUAC, they should be discharged based on a target weight gain of 13% and MUAC greater than 12cm for two consecutive distributions. So that appropriate duration of interventions for children 6-59 months of age with MAM are from 3-6 months (WFP., 2014, MOH, 2012).

In Ethiopia, moderate wasting also was defined as  $MUAC \geq 11\text{cm}$  and was  $<12\text{cm}$ , and was used mainly as admission criterion for the purpose of targeted supplementary feeding programs (Carine Magen, 2014). TSF was implemented in food insecure situations, including in emergencies, in order to treat MAM and to prevent children with MAM from becoming severely malnourished (falling into SAM) and usually indicated when MAM and SAM prevalence rates are between 10-14% or 5-9% with aggravating circumstances (Sadeta, 2018, Asres et al., 2018).

## **1.2 Statement of the Problem**

Moderate wasting alone affects 5% of children under 5 years worldwide and was associated with a greater than 3-fold increased risk of death (C R Fabiansen et al., 2016). According to World Health Statistics, Globally in 2017, 51 million children under the age of five (7.5%) are wasted (WHO, 2018). Moderate acute malnutrition was a condition of multifactorial etiology. It was unlikely that administration of food supplements alone without addressing the issues of food security, poverty, adequate sanitation and drinking water, and infectious morbidities would lead to long term amelioration of the problem (Gera T et al., 2017).

A child with MAM was up to 3 times as likely to die as a well-nourished, while the immediate risk of mortality was higher for a child with severe acute malnutrition than with MAM; the total number of children affected by MAM was much greater, and absolute mortality was higher for MAM than SAM (WFP, 2012, UNICEF et al., 2017).

In addition to nutritional requirements for regular growth and development, the moderate account for catch-up growth in weight and height, and increased needs to fight-off infection and disease (Bharaniidharan and Reshmi, 2019). Possibly the key constraint in the management of MAM was the lack of attention this problem currently receives compared with SAM, despite its large global caseload and associated mortality risk (Reginald et al., 2014).

The national nutrition program was to provide a framework for coordinated implementation of nutrition interventions in order to end hunger by 2030. The government of Ethiopia devised programs and initiatives with set targets that directly and indirectly contribute to the reduction of malnutrition and to ending hunger (MOH, 2016). Reducing wasting was an integral to reducing child mortality and the achievement of sustainable development goals. Thus, achieving the global target of reducing wasting prevalence to 5% or below by 2030 will require a comprehensive strategy addressing the multidimensional causes of malnutrition (John et al., 2019)

To tackle this problem, government of Ethiopia implemented TSFP activities in food insecure setting. MAM children screened from community using MUAC, admitted to TSFP, promotive and preventive services such as provision of food rations, Vit-A supplements and deworming was done according to MAM case management guidelines and protocols. Despite standardized,

management recent studies indicated that the child time to recovery for MAM ranges from 49.2% to 73% (Reginald et al., 2014). The duration of supplementary feeding for children with MAM may not be as important as their anthropometry in terms of remaining well-nourished after initial recovery. The currently accepted recovery criteria of WHZ of minus two may be insufficient for insuring long-term nutritional health consideration should be given to setting higher recovery criteria (Indi Trehan et al., 2015).

Socio-economic status, place of residency, maternal education status, poor water supply and sanitation, diarrhea episodes and eating less than 3 meals per day are the frequently mentioned factors that influence the nutritional status of the children (Taye et al., 2016). The immediate determinants of acute malnutrition are inadequate dietary intake and disease which are themselves caused by a set of underlying factors like: house hold food insecurity, poor maternal/child caring practices, and lack of access to basic health services including lack of safe water supply and unhealthy living environment such as open defecation (Gebre et al., 2019).

In Ethiopia 7% of children are wasted in the country and in Oromia region 4.7% of children are wasted (EMDHS et al., 2019). Changing national strategies to prevent and treat MAM requires a strong understanding of the factors that are related to poor health outcomes for children with MAM, particularly children not receiving treatment (Adamu et al., 2016). In case of targeted supplementary feeding children some of them are deteriorate without improvement for different challenges: like food sharing in the house, delay or absence of food distribution, preparation of food at home any time, selling this product and other related factors (MOH, 2012).

According to research done in Shala district, Oromia region, Ethiopia in 2018, the mean time to recovery from MAM was 15 weeks while the Ethiopian national malnutrition treatment guideline recommendation is 16 weeks. Therefore, the purpose of this study was to fill the gaps by determining time to recovery to MAM and identifies predictors contributing to recovery time among 6-59 months children targeted for supplementary feeding, as well as, it will add intervention to improve the program in Daro Lebu district, Oromia region, Ethiopia.

### **1.3 Significance of the Study**

The findings from this study will help the stakeholders, such as Zonal health office, woreda health office, administrators and other non-governmental organization working on targeted supplementary feeding program of moderate acute malnutrition and measure the effectiveness of the programs and develop best international approaches in the future.

Based on the study findings, the concerned body will develop strategies to improve time to recovery from moderate acute malnutrition and to reduce the prevalence of the moderate wasting will benefit all children in the Daro Lebu district, West Harerghe, Oromia regional state, Ethiopia. In addition to that all children in the woreda will be expected to benefit from the findings of this research at large and to prove adequate as baseline data for further study. Moreover, there was no research done or at least recently published regarding to time to recovery of management of moderate acute malnutrition in the study area.

## **1.4 Objective of the Study**

### **1.4.1 General objective**

To assess time to recovery from moderate acute malnutrition and its predictors among 6-59 months children targeted for supplementary feeding at Daro Lebu district, West Harerghe, Oromia regional state, Ethiopia from August 1, 2019 and December 31,2019.

### **1.4.2 Specific objective**

To assess time to recovery from moderate acute malnutrition among 6-59 months children

To identify predictors with time to recovery from moderate acute malnutrition among 6-59 months children

## 2 LITERATURE REVIEW

### 2.1 Proportion of recovery time from moderate acute malnutrition

A cohort study design was conducted among 2869 children aged 6-59 months from October 2013 to February 2015 in India, children who were recovered from MAM by 9, 12 and 18-months follow-up were 47.5%, 46.5% and 43.5%, respectively (Prost A et al., 2019).

According to narrative review studies conducted among eight countries in sub-Saharan Africa, the percentage of children those recovered from MAM in all study arms ranged from 59-94%, and qualitative synthesis of studies were conducted among seven countries of sub Saharan Africa (Suri et al., 2016)

A prospective observational study was conducted among 1967 children aged 6-59 months who recovered from MAM in Southern Malawi from November 2009 to February 2011, children who were treated with RUSF for their initial episode of MAM were more likely to remain well nourished (67%) than those treated with CSB++ (62%). Also, RUSF had a higher MUAC than children who were treated with CSB++. In addition, all children successfully recovered from MAM following-up to 12 weeks of treatment. (Chang et al., 2013).

A secondary data analysis following 1487 children aged 6-59 months, from April 2014 to June 2015, for one year after successful treatment of MAM, 36% among those who sustained recovery ( $P < 0.001$ ) (BL.Rogers et al., 2018). In contrast, an observational prospective study design analyzed data from an in-depth house hold survey followed up 1497 Malawian children aged 6-59 months for one year after recovery from MAM, the proportion of children who sustained recovery for the duration of 12 months was 58% (Stobaugh et al., 2018).

An observational prospective cohort study was conducted 884 children aged 6-59 months who were admitted to MAM at Mana and Dedo woredas of Jimma zone from August to September 2013, the mean cumulative probability of recovering was 79.6 (75.3-83.7%) for those with MUAC at enrollment between 12.0cm and 12.4cm, 49.2 (41.0-58.1%) for those with MUAC at enrollment between 11.5cm and 11.9cm and 31.3 (21.7-43.9%) for those with MUAC at enrollment between 11.0cm and 11.4cm. As well as the median times to recovery from enrollment for the same categories of MUAC were 7 (4-14) weeks, 13 (8-17) weeks and 16 (14-20) weeks respectively (James et al., 2016).

A retrospective cohort study design was conducted among 402 children, from all children admitted to TSFP 228 (71.6%) were recovered and 114 (28.4%) were censored and children treated by RUSF were (AHR= 2.44, 95%CI: 1.85-3.21) times higher estimated better timely recover than children treated by CSB+ and oil. In addition, among the family who had no transport access to the nearest facility (AHR=.5, 95%CI: .38-.64) times less likely to recovery times than those who had accessibility of transport to the facility (Sadeta, 2018).

A community based cross-sectional study design based up on nutritional status was used in Haramya district, East Harerghe, Oromia region from January-March 2015, among 337 children 6-59 months of age the prevalence of wasting 14.43% (95%CL:0.081- 0.143, P-value <0.05) (Redi et al., 2017).

## **2.2 Predictors time to recovery from moderate acute malnutrition**

### **2.2.1 Socio-demographic characteristics affecting recovery time to Moderate acute malnutrition**

A cohort study design was conducted among 2869 children aged 6-59 months from October 2013 to February 2015 in India, the adjusted hazard ratio for MAM using all anthropometric indicators was 1.43 (95% CI: 0.53-3.87, P=0.48) (Prost A et al., 2019). A cross-sectional study design was conducted between September 2012 and August 2013 in South Africa, from 225 children aged 6-59 months, 30% of children were classified as being food secure, 37% were food insecure and 32% were being at risk of hunger (Steenkamp et al., 2016). A prospective study conducted in Kirehe district in Rwanda among 200 children aged 6-59 months, children aged above 36-59 months were recovered at 90% where as children aged 24-35 months were recovered at 73.5% (Vianney B K et al., 2020). A study conducted at Kamba district Gamo Gofa zone among children 6-59 months, children older than two years had 1.25 times higher probability of recovering compared to children aged less than or equal to two years (AHR=1.25, 95%CI: 1.012-1.556) (Shanka et al., 2015).

An observational prospective study design analyzed data from an in-depth house hold survey followed up 1497 Malawian children aged 6-59 months for one year after recovery from MAM, the larger proportion households with a child who sustained recovery had lids on all water storage containers than those household whose child did not sustain recovery, out of 180, 78

(44%), and out of 132, 40 (32%), respectively (Stobaugh et al., 2018). And also prospective study design conducted in Malawi, 2712 children among 6-59 months the proportion of children who recovered with supplementary foods; 85.9% for CSB++ (95%CI: 83.5-88.1%), 87.7% for RUSF (95%CI:85.5-89.8%) (Lacey N LaGrone, 2012). In addition, the study conducted in Cameroon 833 children aged 6-59 months those treated with CSB++ and RUSF 73% (95%CI: 59-87%) and 85% (95%CI: 73-97%), respectively, recovered from MAM (Medoua et al., 2015).

A prospective cohort study design conducted in Shebedino, Southern Ethiopia among 216 children of 6-59 months severe household food insecurity (0.47, 0.28–0.79), walking for more than 1 h to receive the treatment (0.69, 0.50–0.96) (Teshome et al., 2019). A prospective cohort study conducted in Sidama Zone, among 1125 of children 6-60 months the proportion of recovered children who received CSB over 16 weeks were .85 (95%CI: .73-.99,  $p=.039$ ) times less likely recovered than RUSF (C Karakochuk et al., 2012). A prospective cohort study of 404 randomly sampled children aged between 0-59 months at rural Fagita lekoma district, Amhara region from February-April, 2016 the median recovery time was 62 days for children from food secure households (95%CI: 61.65-62.35) and 63 days (95%CI: 62.78-63.22). The overall median recovery times was 63 days ( 95%CI: 62.83-63.17) and depend up on recovery time from MAM, 60% of children in food insecure and 40% of children in food secure households had poor health outcomes (Adamu et al., 2016).

A community-based cross-sectional study was conducted on 840 children aged 6-59 months from March 1-25,2017 at pastoral communities of Afar region, among the total mothers interviewed 48.8% households were protected source of water and 43.1% households had latrine. Moreover, children living in households with greater than or equal to five family members were 2.72 times more likely to be wasted than those children living in households with less family members (AHR=2.72, 95% CI: 1.62-4.55) (Gebre et al., 2019).

A community-based cross-sectional study was conducted in Gida Ayana district, East Wollega from August 11 to September 11, 2015 among 588 children aged 6-59 months with respective caregiver, 24.6% have diarrhea and 14.8% have no diarrhea. AHR=1.881 (95%CI: (John et al., 2019)1.130, 3.128). The overall moderate wasting 8%; from 8% of moderate wasting significantly higher in male children 24-35 months those households of illiterate fathers and

mothers with lack of access to safe drinking water. In addition, moderate wasting were 2.1 times higher in male children (AHR= 2.1, 95%CI: 1.03-4.12) as compared to female children (Taye et al., 2016). According to cross-sectional descriptive survey and measurement of MUAC was conducted among 359 children aged 6-59 months in Guto Gida district, Oromia, Ethiopia from March to June 2013 based on socio-demographic characteristics of children, 52.6% were males and 47.9% were females. From 359 children with care givers 22% source of water were river or lake, 39.7% were stand pipe/bono and 31% were well protected spring water (Alemu A et al., 2014)

A community based cross-sectional study design was employed from February 20-30, 2014 in Badawacho district, Southern Ethiopia, a total of 508 households having at least one child aged 6-59 months in their house, educational status of respondents 43.8% mothers had no education and 40.9% completed primary education. In this study male children were 1.89 times more at risk of moderate wasting than female children (AHR=1.89, 95%CI: 1.01-3.54) (Betebo et al., 2017).

#### 2.2.2 Food sharing and selling characteristics affecting recovery time to Moderate acute malnutrition

A retrospective cohort study design was conducted among 402 children, from all children admitted to TSFP from May 1,2017 to August 30,2017 in Shala district, West Arsi zone, Ethiopia, ration use for MAM children 226 (56.2%) care giver used ration only for moderate acute malnourished and 176 (43.8%) care givers used ration for moderate acute malnourished and shared for others (Sadeta, 2018).

Data on food sharing and consumption practices, in Ethiopian children with MAM from 10 supplementary feeding sites received CSB/RUSF, were collected from 1125 households via structured questionnaires administered after 6 months of treatment CSB was shared among a significant higher number of family members (0.9, 2.9) compared to RUSF (-0.3, 0.5;  $p<0.001$ ). 14% of CSB and 9% of RUSF households reported food sharing and the majority 86% of whom were children in the same households under 5 years of age (Karakochuk et al., 2015).

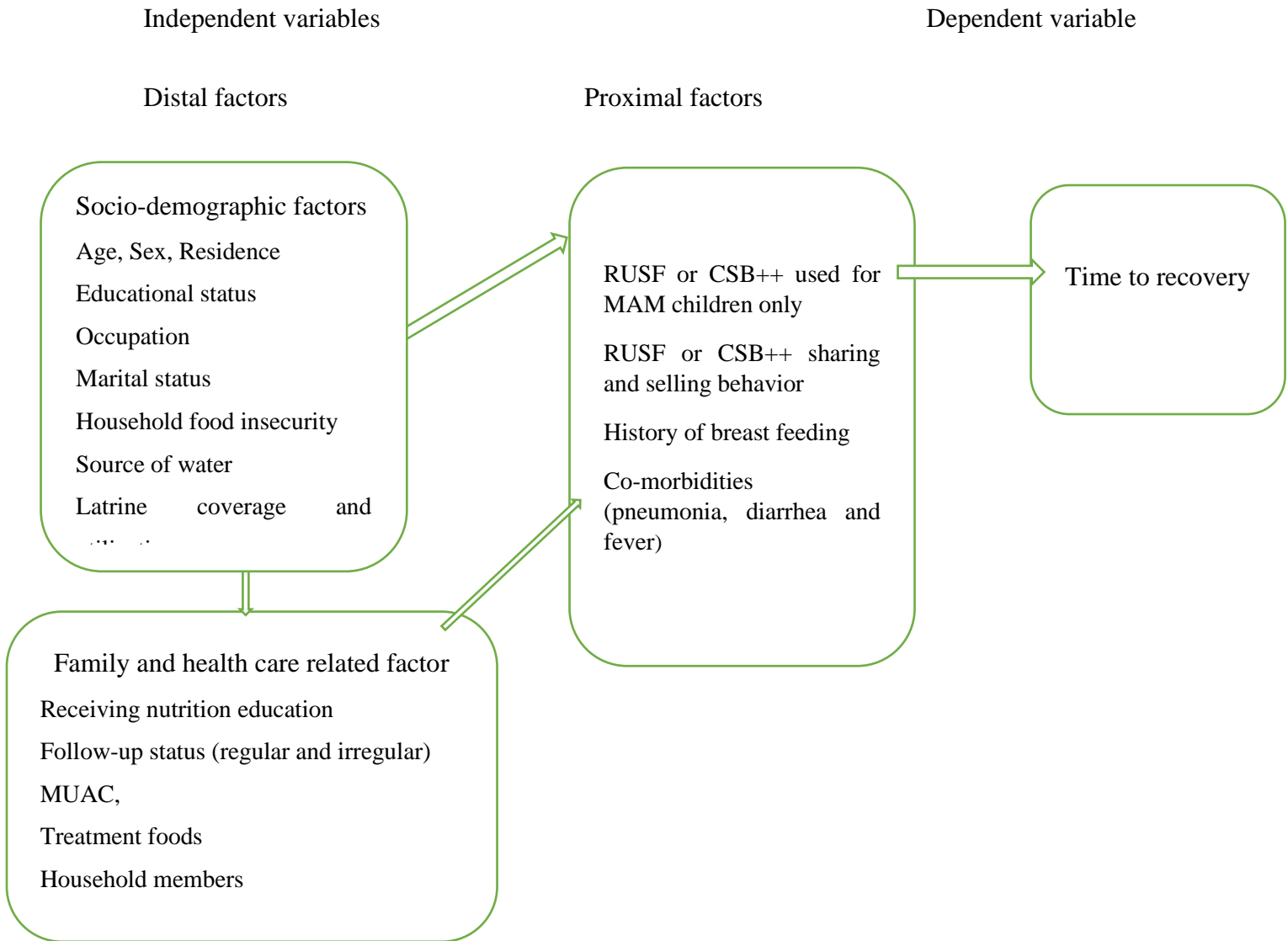
### 2.2.3 Health care related characteristics affecting recovery time to Moderate acute malnutrition

A prospective study conducted in Kirehe district in Rwanda among 200 children aged 6-59 months, children who had received deworming were 2.9 times likely to recover and this may be due to effect co-morbidities to plan interventions meaning that they did not present other medical problems during the course of treatment for MAM enhancing quick recovery (AHR= 2.9, 95%CI: 1.13-7.58, p=.027) (Vianney B K et al., 2020). A retrospective cohort study design was conducted among 402 children aged 6-59 months treated in TSFP in Shala district, West Arsi zone, Ethiopia from May 1,2017 to August 30,2017, 98% receive vit-A, 24.6% children had taken deworming and 77% receives measles vaccination. In addition, regarding the follow up status 87.1% admitted children were attending TSFP ration distribution regularly and 12.7% of children were intermittently follow up ration distribution, and also 97.8% of them got health education related to targeted supplementary feeding program (Sadeta, 2018).

A prospective cohort study design was conducted among 1609 children aged 6-23 months with moderate acute malnutrition; from which 55% were girls were randomly assigned to 12 weeks of supplementary feeding and 50% were included by both WHZ and MUAC, 21% were included by 50% were included WHZ alone and 29% were included by MUAC alone (Fabiansen C et al., 2019). A retrospective study design conducted at Dire Dawa among children under five who dewormed (AHR=1.44, 95%CI: 1.01- 2.06) had higher probability of recovering faster than those who had not received it (Binyam A et al., 2019).

A cross-sectional descriptive survey and measurement of MUAC was conducted among 359 children aged 6-59 months in Guto Gida district, Oromia, Ethiopia from March to June 2013, 97.5% children those who got exclusive breast feeding and 2.5% those who didn't got it (Alemu A et al., 2014). A community based cross-sectional study design was employed from February 20-30, 2014 in Badawacho district, South Ethiopia, a total of 508 children/caregivers, from a total children had diarrhea, fever and other serious illness two weeks prior to the survey were 66.7%, 34.5% and 13.3%, respectively (Betebo et al., 2017). This study tries to address the existing gap conducting in the literature by assessing moderately malnourished children aged 6-59 months recovered from targeted supplementary feeding program at Daro lebu woreda.

### 2.3 Conceptual Framework



Source: Adopted from Teshome et al.2019 and related articles

Figure 1: Conceptual Framework of time to recovery to moderate acute malnutrition and its predictors among 6-59 months children targeted for supplementary feeding at Daro Lebu district West Harerghe, Ethiopia, 2020

## **3 MATERIALS AND METHODS**

### **3.1 Study Area and period**

The study was conducted in Daro lebu district, West Hararghe, Oromia region, Ethiopia from August 25 to September 28, 2020. The capital town of woreda was, Mechara-Micheta, located around 112 km from chiro town and 436 km from Finfinnee. According to the 2011 central statistics report, the district has nearly 192,922 total populations. The woreda has 37 rural kebeles and 4 urban kebeles. Concerning health facilities, the woreda has 6 health centers and 41 health posts.

### **3.2 Study design**

Retrospective cohort study design was employed using the data of moderate acute malnourished which were admitted to targeted supplementary feeding program and treated in health posts in the woreda from August 1, 2019 and December 31, 2019.

### **3.3 Population**

#### **3.3.1 Source of population**

All moderate malnourished children aged between 6-59 months in Daro lebu woreda, who screened and recorded for supplementary feeding program.

#### **3.3.2 Study population**

All moderately malnourished children aged between 6-59 months and discharged from targeted supplementary feeding program in selected sites.

### **3.4 Eligibility criteria**

#### **3.4.1 Inclusion criteria**

6-59 months of age children discharged from targeted supplementary feeding program those were included in selected periods.

#### **3.4.2 Exclusion criteria**

Children whose date of birth were missed by mother/caregiver.

Whose mother was unable to communicate with data collectors.

### 3.5 Sample size determination

The required sample size for objective 1 was determined by using single population proportion formula under the following assumption. A retrospective cohort study design was conducted, in Shala district, West Arsi zone, Ethiopia, 2018, 71.6% was recovered (Sadeta, 2018) with 95% confidence interval, 5% margin of error and considering 10% non- response rate using the following formula:

$$n = \frac{[Z^{\alpha/2}]^2 [P][1-P]}{[d]^2}$$
$$n = \frac{[1.96]^2 [0.716][0.284]}{[0.05]^2} = 312$$

Where; P = was the recovered rate (71.6% = 0.716)

$Z_{\alpha/2} = 1.96$  ~ Standard normal distribution

Z = level of significance = 95%

d = level of absolute precision (margin of error) = 5%

Considering 10% non-response rate, the final sample size for objective 1 was 343, including estimated 10% was added for non-response rate was 31.

For Objective-2: Sample size estimation for predictors with time to recovery from MAM based on the information obtained by using statistical software (Epi-info statistical software version-7.1.0.6) considering the following assumption as depicted by “Table-1” below: 95% CI, Power=80%, non-response rate=10%, proportion of exposed, proportion of non-exposed and the sample size.

Table 1: Sample size estimation for different predictors with time to recovery from MAM at Daro Lebu District, West Harerghe, Ethiopia, 2020

Variable	Proportion of exposed	Proportion of non-exposed	Confidence level	Power	Total sample size	Reference
Food sharing	43.8	56.2	95%	80%	540	(Sadeta, 2018)
Recovery rate	20.4	79.6	95%	80%	50	(James et al, 2016)
Exclusive breast feeding	97.5	2.5	95%	80%	10	(Sadeta, 2018)
Overcrowded condition of household members	70	30	95%	80%	66	(Sadeta, 2018)

Finally, the required sample size for this particular study was decided by taking the maximum sample size. The first specific objective (343) was less than the sample size for second specific objective (540). So that (540) sample size of predictors with time to recovery from MAM was included in this study.

### 3.6 Sampling technique and procedure

There were 41 health posts in the woreda. Populations living around these health posts were assumed homogenous with taking benefits of SFPs. So that the 8 health posts were selected at random using lottery method. In addition to that SFP protocol for the management of MAM works equally at all health post level. A sampling frame based upon TSFP treatment registration book of children managed for MAM from 8 health posts in the woreda were prepared. Samples were distributed to each health posts using the probability proportional to size sampling. Finally, the children were selected by systematic random sampling from each health posts based on their unique identification number. At the end children who had incomplete data in their registration books were substituted with other children with the nearest card number during data collection. The following figure shows that selection process of study units.

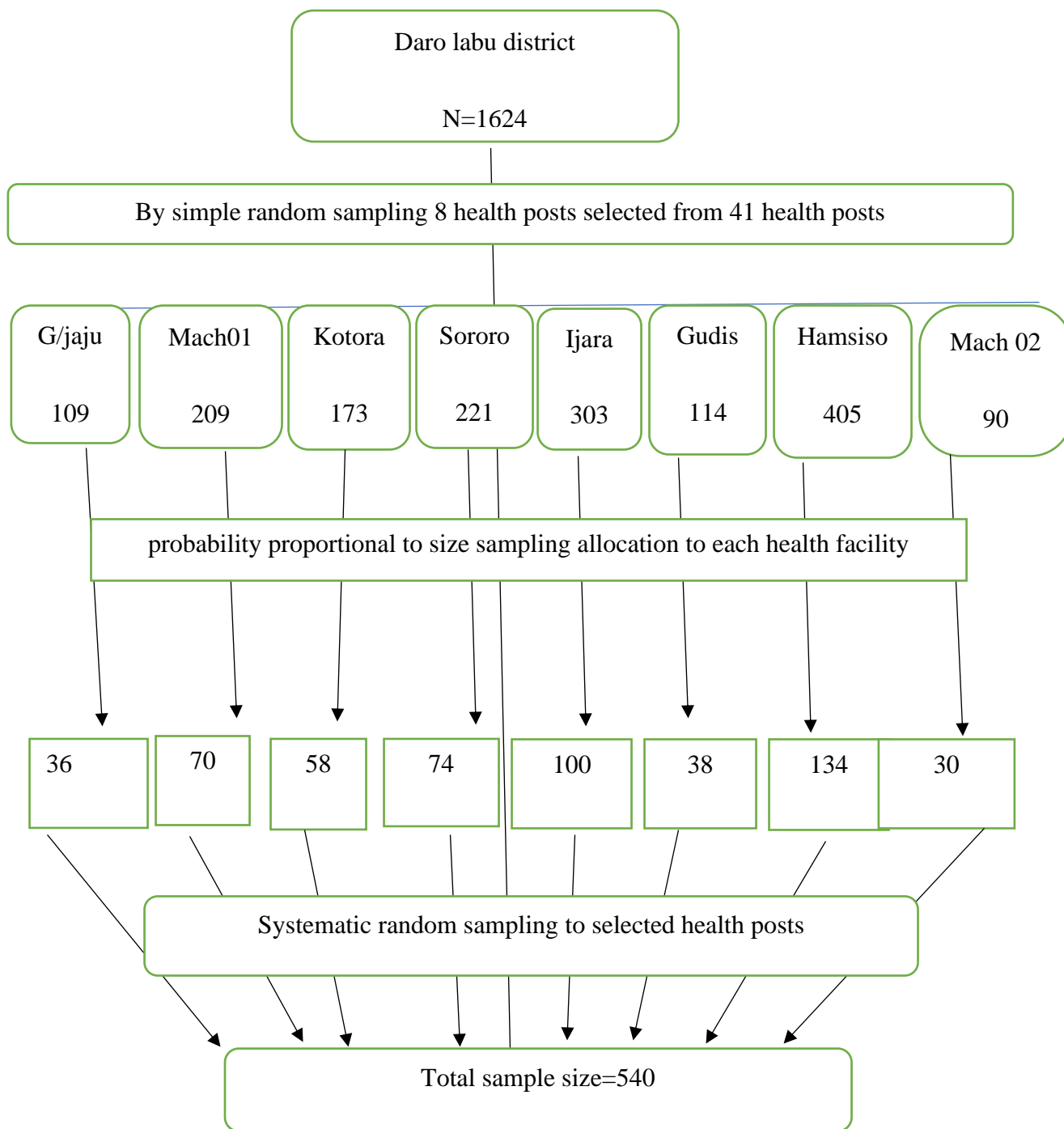


Figure 2: Schematic representation of sample selection procedure of recovery time of MAM in Daro labu district West Harerghe, Ethiopia, 2020

### **3.7 Data collection procedure**

#### 3.7.1 Data collection

Data were obtained from registration book, and interview with care givers. To obtain data from registration book we were used well design data extraction form; data were collected by using a pre-test structured questionnaire, and translated into the local language (Afaan oromoo version) by trained data collectors.

#### 3.7.2 Data collectors

Data collectors were given a two days training about the aim of the study before data collection.

Data were collected by data collectors who were trained data procedures.

Three clinical nurse diplomas were trained and assigned for data collection with one BSc Nurse as supervisor.

#### 3.7.3 Data collection procedure

Pretest was conducted to check consistence of questionnaire on other health posts which were not included data collection site. 5% of questionnaires were collected a week before data collection to check reliability and applicability with desired objective. Mothers/cargivers of the children were responded to the questionnaire. Children 6-59 months discharged from MAM systematically selected from registration book available from health posts, their household addresses were traced in the children's parent database. Before interview with mother, the data collectors explain about the aim of the study, the right to accept and refuse to participate in the study and confidentiality issues. Then, all mothers who were willing and sign informed consent were interviewed.

### **3.8 Study variables**

#### 3.8.1 Dependent variable

- Time to recovery from moderate acute malnutrition

#### 3.8.2 Independent variable

Socio-demographic factors

- Age
- Sex
- Residence
- Educational status
- Occupation
- Marital status
- Household food insecurity
- Source of drinking water
- Latrine coverage and utilization

#### Family and health care related factors

- Follow-ups
- Receiving nutrition education
- Co-morbidities
- Admission and discharge MUAC
- Treatment foods
- Breast feeding history
- Household members

### 3.9 Operational definition

**Recovered** =children reach the target weight of 13% from admission weight and MUAC  $\geq$  11.9cm or  $> - 2$  Z-score period of two consecutive distributions.

**Defaulter** = child absent from the program for three consecutive distributions.

**Non-response** = failure to respond to treatment, where child fails to reach the discharge criteria over a period of four months.

**Time to recovery** = acceptable time to stay on program within 16 weeks (James et al., 2016, Sadeta, 2018).

**Targeted supplementary feeding program** = was the program which aims to rehabilitate children 6-59 months age as well as pregnant and lactating women identified as moderate acute malnutrition.

**Overcrowded**= was a condition occur when person per room was greater than 2 persons/1 room, 3 persons / 2 rooms,5 persons/3 rooms.

**Transport access**= easy to reach desired distinction by means of specific transport system.

**Re-admission**= a child recovered from the program and again admit to the program within 3 months.

### **3.10 Data quality assurance**

Both the data collectors and supervisors were given two days training regarding the objective of the study to capacitate the skill of data collection methods. As part of the training, the data collection tool was pre-tested at Daro labu district before the actual data collection was done to maintain data quality. Completed questionnaire was collected on daily basis and checked for completeness and consistency by supervisors. Cleaning was done on daily basis and timely feedback was communicated to the data collectors. Incorrectly filled or missed one was back to the respective data collectors for correction. The principal investigator was supervised 5% of the secondary data collection and confirmed the data were correctly from the beneficiary registration book and their caretakers.

### **3.11 Data processing and analysis**

The collected data were checked for its completeness and consistence. Each completed questionnaire was assigned a unique code. The data were entered to EpiData 3.01 statistical software and cleared for impossible and missed values. Double entry was done by two different individuals to minimize errors. Then data were exported to SPSS version 22.0 and analysis were done by SPSS 22.0 for further analysis of frequency and proportion were used to summarize information about dependent and independent variables. Simple descriptive statistics such as mean, standard deviation, median, frequency, percentiles and a percentage were used to present socio-demographic characteristics and predictors time to recovery. Cox-regression model was applied to test further the observed significant variables in bi-variate and multivariable models

while controlling for confounders. Variables that are statistically significant at bivariate level p-value  $< 0.25$  confidence interval 95% were candidate for multivariate Cox-regression to control the effect of confounding variables. Level of statistical significance was declared at p-value  $< 0.05$ . The fitness of the model was tested by Omnibus tests of model.

### **3.12 Ethical consideration**

This study was carried out after obtaining ethical clearance from Haramaya University, Institutional Health Research Ethics Review Committee (IHRERC). A permission letter obtained from school of graduate study was submitted to Zonal health office and a signed written consent was obtained from the office. participants were informed clearly about the purpose and benefit of the study, and written informed consent was obtained from the participants. Those who signed written consent were participated in the study and the confidentiality of responses were maintained throughout the research process by giving code for participants.

## 4 RESULTS

### 4.1 Descriptive analysis

#### 4.1.1 Socio demographic characteristics of study participants

A total of 540 moderate acute malnutrition children aged 6 to 59 months in 8 health posts at Daro Labu District, West Harerghe Zone were included in the study. From 540 MAM children were interviewed, 282 (52.2%) of them were between 6-23 months. The mean age of children in the program was 18.16 months. 280 (51.9%) were male children. Four hundred five (75%) were rural residents. Five hundred one (92.8%) care giver were Oromo in ethnicity and 527 (97.6%) were Muslims in religion. 281 (52%) of the care givers were not attended formal education and one hundred sixty-eight (31.1%) were attended primary school. (Table 2).

Table 2: Socio-demographic characteristics of MAM children among 6-59 months children in Daro Lebu District, West Harerghe, Ethiopia, 2020.

Variables	Category	Frequencies	Percentage (%)
Age in months (540)	6-23	282	52.2
	24-59	258	47.8
Sex of children (540)	Male	280	51.9
	Female	260	48.1
Residence (540)	Urban	135	25.0
	Rural	405	75.0
Ethnicity (540)	Oromo	501	92.8
	Somali and others	39	7.2
Religion (540)	Muslims	527	97.6
	Orthodox	12	2.2
	Others	1	.2
Educational status of caregiver (540)	No formal education	281	52.0
	Primary school	168	31.1
	Secondary school and above	91	16.9
Occupation (540)	Housewives	478	88.5
	Civil servant	9	1.7

	Merchant and others	53	9.8
Person with primary child care responsibility	Mother	427	79.1
	Father	113	20.9
Marital status (540)	Married	511	94.6
	Widowed	14	2.6
	Divorced	15	2.8
Sex of household leader (540)	Male	437	80.9
	Female	103	19.1
Household member	1-5 members	166	30.7
	>=6 members	374	69.3

#### 4.1.2 Family and health care related characteristics of study population

Among the retrospective study of children treated in the program, majority 394(73%) were recovered from the program and 146 (27%) were non-recovered. 396 (73.3%) were used ready to use supplementary feeding and 144 (26.7%) were used Super cereal plus plus. Among participants those rations used only for moderate acute malnutrition were 340 (63%) while the rest 200 (37%) were food sharing in their house (Table 3).

Table 3: Family and health care related characteristics of study population of time to recovery from moderate acute malnutrition among 6-59 months children in Daro Lebu District, West Harerghe, Ethiopia, 2020.

Variables	Category	Frequencies	Percentage (%)
MUAC at admission in cm (540)	11.11.4	270	50.0
	11.5-11.9	270	50.0
Vitamin-A (540)	Yes	380	70.4
	No	160	29.6
Deworming (540)	Yes	343	63.5
	No	197	36.5
Admission status (540)	New admission	484	89.6
	Re admission	56	10.4
Follow up status (540)	Regular	381	70.6
	Irregular	159	29.4
Follow-up outcome (540)	Recovered	394	73.0
	Not recovered	146	27.0

Measles vaccination	Yes	345	63.9
	No	195	36.1
Exclusive breast feeding (540)	Yes	400	74.1
	No	140	25.9
Complementary breast feeding (540)	Yes	418	77.4
	No	122	22.6
Health education (540)	Yes	365	67.6
	No	175	32.4
Specialized nutritious foods (540)	CSB++	144	26.7
	RUSF	396	73.3
Ration used only for MAM children (540)	Yes	340	63.0
	No	200	37.0
Availability of latrine	Yes	293	54.3
	No	247	45.7
Diarrhea (540)	Yes	214	39.6
	No	326	60.4
Fever (540)	Yes	60	11.1
	No	480	88.9
Cough (540)	Yes	87	16.1
	No	453	83.9
Household food insecurity (540)	Food secured	169	31.3
	Food in secured	371	68.7

#### 4.1.3 Proportion of time to recovery from moderate acute malnutrition among 6-59 months children

Among 540 children with moderate acute malnutrition enrolled in targeted supplementary feeding, majority 394 (73%) were recovered with a median time to recovery of 16 weeks with standard deviation of 4.1 weeks, 134 (24.8%) were defaulted and 12 (2.2%) were non-responders.

#### 4.1.4 Predictors of socio-demographic to recovery

In bivariate cox-regression age of children, educational status of caregiver and household members, were showing significant predictors of time to recovery from moderate acute malnutrition. Other variables like sex of children, residence, occupation of caregiver, person

with primary child care, marital status and availability of rooms in the house were not showing significant predictors of time to recovery from moderate acute malnutrition among 6-59 months children (Table 4).

Table 4: Bivariate cox-regression of predictors of socio-demographic characteristics of time to recovery from moderate acute malnutrition among 6-59 months children in Daro Lebu District, West Harerghe, Ethiopia, 2020.

Variables	Category	Follow up outcome		CHR (95% CI)	P-Value
		Recovered 394 (%)	Censored 146(%)		
Age (in months) (540)	6-23	158(56)	124(44)	1	.003*
	24-59	236(91.5)	22(8.5)	1.36(1.11-1.66)	
Sex (540)	Male	207 (73.9)	73 (26.1)	1	.095
	Female	187 (71.9)	73 (28.1)	.85(.69-1.03)	
Residence (540)	Urban	91 (67.4)	44(32.6)	1	.096
	Rural	303 (74.8)	102 (25.2)	1.22(.96-1.55)	
Educational status (540)	Cannot read and write	145(51.6)	136(48.4)	1	.000*
	Primary school	162(96.4)	6(3.6)	1.50(1.19-1.88)	
	Secondary school and above	87(95.6)	4(4.4)	1.31(1.00-1.70)	
Occupation (540)	Housewife	353(73.8)	125(26.2)	1	.788
	Civil servant	7(77.8)	2(22.2)	.92(.43-1.94)	
	Merchant and others	34(64.2)	19(35.8)	.89(.62-1.26)	
Person with primary child care (540)	Mother	314(73.5)	113(26.5)	1	.550
	Father	80(70.8)	33(29.2)	1.08(.84-1.38)	

Marital status (540)	Married	370(72.4)	141(27.6)	1	
	Widowed	10(71.4)	4(28.6)	.85(.46-1.60)	.623
	Divorced	14(93.3)	1(6.7)	.94(.55-1.61)	.830
Household members (540)	1-5 members	134(80.7)	32(19.3)	1.25(1.01-1.54)	.039*
	>=6 members	260(69.5)	114(30.5)	1	
Rooms in the house (540)	1	114(69.5)	50(30.5)	1	
	2	190(75.4)	62(24.6)	.83(.65-1.05)	.112
	>=3	90(72.6)	34(27.4)	.89(.67-1.17)	.403

CHR= Crude Hazard Ratio

1 is reference category

#### 4.1.5 Predictors of family and health care related characteristics of time to recovery

In bivariate cox-regression admission MUAC, vitamin-A, deworming, admission status, follow up status, distance to the nearest facility, transportation access to the nearest facility, measles vaccination, exclusive breast feeding, complementary feeding, specialized nutritious foods, ration used only to MAM children, latrine availability, source of water, diarrhea and food security status were showing significant predictors of time to recovery from moderate acute malnutrition. Other variables like number of children TSF used in the house, household got providing foods other than TSFP, health education, cooking demonstration at distribution site and cough within two weeks before data collections were not showing significant predictors of time to recovery from moderate acute malnutrition among 6-59 months children (Table 5)

Table 5 Bivariate cox-regression of predictors of time to recovery from moderate acute malnutrition among 6-59 months children at community in Daro Lebu District, West Harerghe, Ethiopia, 2020

Variables	Category	Follow up outcome		CHR (95% CI)	P-Value
		Recovered n (%)	Censored n (%)		
Admission MUAC in cm (540)	11-11.4	156(57.8)	144(42.2)	1	
	11.5-11.9	238(88.1)	32(11.9)	1.37(1.12-1.68)	.002*
Vitamin A (540)	Yes	292(76.8)	88(23.2)	1	
	No	102(63.8)	58(36.2)	.77(.61-.96)	.022*
Deworming (540)	Yes	276(80.5)	67(19.5)	1	
	No	118(59.9)	79(40.1)	.69(.56-.87)	.001*

Admission status (540)		New admission	354(73.1)	130(26.9)	1.39(1.01-1.94)	.045*
		Re-admission	40(71.4)	16(28.6)	1	
Follow-up status (540)		Regular	358(94)	23(6)	1	
		Irregular	36(22.6)	123(77.4)	.22(.16-.31)	.000*
Distance from facility in minutes (540)		<=60	251(71.1)	102(28.9)	1	
		>60	143(76.5)	44(23.5)	.81(.66-.99)	.047*
Transportation access to nearest facility (540)		Yes	196(78.4)	54(21.6)	1	
		No	198(68.3)	92(31.7)	.80(.66-.98)	.027*
Measles vaccination (540)		Yes	249(72.2)	96(27.8)	1.24(1.01-1.53)	.041*
		No	145(74.4)	50(25.6)	1	
Exclusive breastfeeding (540)		Yes	297(74.3)	103(25.8)	1	
		No	97(69.3)	43(30.7)	.78(.64-.98)	.030*
Complementary feeding (540)		Yes	305(73)	113(27)	1.31(1.03-1.66)	.028*
		No	89(73)	33(27)	1	
Number of children TSF used in the house (540)		One	301(72.7)	113(27.3)	1	
		Two	93(73.8)	33(26.2)	.89(.71-1.12)	.325
Other program providing food used in the house (540)		Yes	77(53.1)	68(46.9)	1	
		No	317(80.3)	78(19.7)	1.31(1.02-1.68)	.033*
Health education (540)		Yes	239(65.5)	126(34.5)	1	
		No	155(88.6)	20(11.4)	1.19(.98-1.46)	.085
Cooking demonstration (540)		Yes	127(72.2)	49(27.8)	1	
		No	267(73.4)	97(26.6)	.94(.76-1.16)	.552
Specialized nutritious foods (540)		CSB++	66(45.8)	78(54.2)	1	
		RUSF	328(82.8)	68(17.2)	1.42(1.09-1.85)	.010*
Ration used only for MAM children (540)		Yes	253(74.4)	87(25.6)	1.26(1.03-1.55)	.027*
		No	141(70.5)	59(29.5)	1	
Availability of latrine (540)		Yes	176(60.1)	117(39.9)	1	
		No	218(88.3)	29(11.7)	1.24(1.02-1.52)	.034*
		Tap water	123(53.2)	108(46.8)	1	

Source of water (540)	Protected spring	96(95)	5(5)	1.71(1.31-2.23)	.000*
	Unprotected spring	82(87.2)	12(12.8)	1.40(1.06-1.86)	.018*
	Pond water	93(81.6)	21(18.4)	1.09(.83-1.44)	.517
Diarrhea (540)	Yes	111(51.9)	103(48.1)	1	
	No	283(86.8)	43(13.2)	1.29(1.04-1.61)	.023*
Cough (540)	Yes	63(72.4)	24(27.6)	1	
	No	331(73.1)	122(26.9)	.98(.75-1.28)	.854
Food security status (540)	Food secured	163(96.4)	6(3.6)	1	
	Food in secured	231(62.3)	140(37.7)	.33(.63-.94)	.010*

1→ Reference category

\*→ Variables selected for multivariate analysis (P-value < 0.25)

#### 4.1.6. Multivariable cox-regression analysis for predictors to time to recovery

After controlling the effect of confounding variables, the final multivariable cox-regression analysis, the result showed that age of child between 24-59 months were 1.24 times (AHR=1.24, 95%CI: 1.01-1.54) more likely to be recovery time from MAM within 16 weeks than those age between 6-23 months, and children who had admitted with mid upper arm circumference 11.5-11.9 were 1.27 times (AHR=1.27, 95%CI: 1.03- 1.56) more likely to recover early than those children who had mid upper arm circumference between 11-11.4. Children those had not taken deworming within 6 months were 25% times (AHR=.75, 95%CI: .59-.94) lower chance of recovery than those who took them. The family those who had distance from the nearest facility greater than 60 minutes were 20% times (AHR= .80, 95%CI: .65-.99) lower chance of recovery than those who had distance from the nearest facility of less than or equal to 60 minutes. The children who had received ready to use supplementary feeding were 1.32 times (AHR= 1.32, 95%CI: 1.01-1.73) more likely to be timely recover from moderate acute malnutrition within 16 weeks than those who had received super cereal plus plus, and among the family those who had food in secured were

20% times (AHR=.80, 95%CI: .65-.99, p=0.045) lower recovery time than those who had food secured (table 7).

Table 6: Multivariable cox-regression analysis for predictors to time to recovery from MAM among 6-59 months of children in Daro Lebu District, West Harerghe, Ethiopia, 2020

Variables	Category	Follow up outcome		CHR (95% CI)	AHR (95% CI)	P-value
		Recovered n (%)	Censored n (%)			
Age (in months) (540)	6-23	158(56)	124(44)	1	1	.042
	24-59	236(91.5)	22(8.5)	1.36(1.11-1.66)	1.24(1.01-1.54)	
Household members (540)	1-5 members	134(80.7)	32(19.3)	1.25(1.01-1.54)	1.12(.90-1.39)	.303
	>=6 members	260(69.5)	114(30.5)	1	1	
Admission MUAC in cm (540)	11-11.4	156(57.8)	144(42.2)	1	1	.024
	11.5-11.9	238(88.1)	32(11.9)	1.37(1.12-1.68)	1.27(1.03-1.56)	
Vitamin A (540)	Yes	292(76.8)	88(23.2)	1	1	.348
	No	102(63.8)	58(36.2)	.77(.61-.96)	.89(.70-1.13)	
Deworming (540)	Yes	276(80.5)	67(19.5)	1	1	.013
	No	118(59.9)	79(40.1)	.69(.56-.87)	.75(.59-.94)	
Admission status (540)	New admission	354(73.1)	130(26.9)	1.39(1.01-1.94)	1.37(.98-1.92)	.065
	Readmission	40(71.4)	16(28.6)	1	1	
Distance from facility in minutes (540)	<=60	251(71.1)	102(28.9)	1	1	.042
	>60	143(76.5)	44(23.5)	.81(.66-.99)	.80(.65-.99)	
Transportation access to nearest facility (540)	Yes	196(78.4)	54(21.6)	1	1	.308
	No	198(68.3)	92(31.7)	.80(.66-.98)	.89(.73-1.10)	
	Yes	249(72.2)	96(27.8)	1.24(1.01-1.53)	1.18(.96-1.45)	.125

Measles vaccination (540)	No	145(74.4)	50(25.6)	1	1	
Exclusive breastfeeding (540)	Yes	297(74.3)	103(25.8)	1	1	
	No	97(69.3)	43(30.7)	.78(.64-.98)	.84(.63-1.12)	.238
Complementary feeding (540)	Yes	305(73)	113(27)	1.31(1.03-1.66)	1.08(.79-1.47)	.633
	No	89(73)	33(27)	1	1	
Specialized nutritious foods (540)	CSB++	66(45.8)	78(54.2)	1	1	
	RUSF	328(82.8)	68(17.2)	1.42(1.09-1.85)	1.32(1.01-1.73)	.044
Food security status (540)	Food secured	163(96.4)	6(3.6)	1	1	
	Food in secured	231(62.3)	140(37.7)	.33(.63-.94)	.80(.65-.99)	.045

## 5 DISCUSSION

In many developing countries including Ethiopia, malnutrition is still widespread. This study reveals that moderate acute malnutrition is a problem in Daro Labu District, where by it affects children among 6-59 months of age. Children were a potentially vulnerable groups since they were entirely dependent upon parents or caregivers for a nutritional need. The goal of supplementary feeding programs is to treat children with MAM and prevent children from deteriorating and developing severe acute malnutrition.

This study showed that the overall recovery rate was 73%. Of 24.8% participants defaulted and 2.2% were non-responders. The median time to recovery was 16 weeks which is consistent with Ethiopian national standard malnutrition guide line which is 16 weeks (Reginald et.al, 2014; MOH, 2012). The major contributing factors related to recovery time from MAM were Age of child in months, Admission MUAC in cm, deworming given to child within 6 months, distance to nearest facility, specialized nutritious foods and food security status were identified as independent predictors of time to recovery from moderate acute malnutrition.

In this study the proportion of recovery rate was 73% before 16 weeks which was lower than the acceptable threshold for the sphere international standard in which the minimum recovery rate was set at 75% (MOH, 2012; MOH, 2016; MOH, 2019). Similarly, the study done in Sidama zone, Ethiopia, (CSB++=67% and RUSF=73%) timely recovered at the end of 16 weeks. However, it was lower than the study done in shala which showed a recovery rate of 82.8% and. This may be due absence of regular follow up by health care providers working on it, inappropriate way of feeding foods, sharing foods to others and inadequate health education to the caregivers.

Age of the child was important variable which determined recovery time from MAM. 6-23 months of age group have greater infection burden, have needs higher nutrient requirements and more vulnerable to develop cognitive deficiency than 24-59-month age group (GNC., 2017). This study showed that age of child between 24-59 months were 1.24 times (AHR=1.24, 95%CI: 1.01-1.54) more likely to be recovery time from MAM within 16 weeks than those age between 6-23 months. In similar way the study conducted at Rwanda children above 36-59 months were recovered at 90% where as children aged 24-35 months were recovered at 73.5% (Vianney B K et al., 2020). Moreover, study conducted in Mana and Dedo woredas of Jimma zone, children less than 24 months were 22% (95% CI: 4-36%) lower recovery time than those greater than or equal to 24 months (James et al, 2016), and the other study conducted at Kamba district Gamo Gofa zone children older than two years had 1.25 times higher probability of recovery time compared to children aged less than or equal to two years (AHR= 1.25, 95%CI: 1.012-1.556) (Shanka et al., 2015). This due that during management of MAM children 6-23 months have more lossed appetite and the mothers focused only breast feeding than other supplementary feeding.

The present study showed that children who had admitted with MUAC 11.5-11.9 were 1.27 times (AHR= 1.27, 95%CI: 1.03-1.56) more likely to higher chance of early recovery within 16 weeks than those children who had MUAC between 11-11.4, which is similar with study done in Shala district West Arsi, the child admitted with MUAC 11.6 -12.5cm has recover early within 16 weeks than child admitted with MUAC less than or equal to 11.5cm (AHR: 1.18, 95%CI: 1.13-1.23) (Sadeta, 2018), and the other study conducted in Mana and Dedo

woredas of Jimma Zone the mean cumulative probability of recovering was 49.2 (41.0-58.1)% for those with MUAC at enrolment between 11.5-11.9cm and 31.3 (21.7-43.9) % for those with MUAC at enrolment between 11.0-11.4cm (James et al, 2016). This indicates that early child screening for moderate acute malnutrition and giving supplementary feeding enables as to get better outcome and also children with the highest MUAC at enrolment had significantly lower risk of remaining with MAM and higher chance of recovering.

Moreover, children those who had not taken deworming within 6 months were 25% times (AHR=.75, 95%CI: .59-.94) lower chance of recovery than those who took them, which is similar with study done in Dire Dawa, children who dewormed (AHR=1.44, 95%CI: 1.01-2.06) had higher probability of recovering time (Binyam A et al., 2019) and study conducted at Rwanda children who had received deworming were 2.9 more likely to be recover than who had not received it (AHR= 2.9, 95%CI: 1.13-7.58, p=.027) (Vianney B K et al., 2020).This due to mostly cause of malnutrition is intestinal parasitosis .

This study also revealed that distance to the nearest facility were targeted supplementary feeding service given was significantly associated with time to recovery. The present study showed that among the family those who had distance greater than 60 minutes from the facility were 20% times (AHR= .80, 95%CI: .65-.99) lower chance of recovery than those who had distance less than or equal to 60 minutes from the facility. Consistent with this study, the study conducted at Shebedino, Southern Ethiopia showed that among the family who had distance greater than 60 minutes were 31% times (AHR=.69, 95%CI: .50-.96) less likely to recovery times than those had distance less than 60 minutes from the nearest facility (Teshome et al., 2019). This indicates that children those who had distance nearest to the facility to get service early and easily.

Moreover, this study showed that children who had received RUSF were 1.32 times (AHR= 1.32, 95%CI: 1.01-1.73) more likely to be timely recover from MAM within 16 weeks than those who had received CSB++. The study conducted at Sidama zone proportion of recovered children who had received CSB were 15% times (AHR=.85, 95%CI: .73-.99) less likely recovered than RUSF (C Karakochuk et al., 2012), the study conducted at Shala district children treated by RUSF were two times (AHR= 2.44, 95%CI: 1.85-3.21) higher estimated

timely recovered than treated by CSB and oil (Sadeta, 2018), the study conducted at Malawi the proportion of children who recovered with supplementary foods: 85.9% for CSB++ (95%CI: 83.5-88.1%) (Lacey N LaGrone, 2012) and study conducted at Cameroon children those treated with CSB++ were 49% times (AHR=.51, 95%CI: .29-.90) less likely recovered than RUSF (Medoua et al., 2015). This indicates that CSB++ was easily shared with other members of household as well as amount proportion of daily cooking and time for cooking was irregular. This is due to absence of cooking demonstration by governmental and non-governmental body at health post which increase awareness at community level.

This study revealed that household food insecurity was significantly associated with recovery time. The present study showed that among children aged 6-59 months those family of food in secured in their house were 20% times (AHR=.80, 95%CI: .65-.99, p=0.045) lower recovery time than those family of food secured in their house. In similar way, the study done in Shala district West Arsi, children from severe food in secured family had 51% times (AHR=.49, 95%CI: .21-.78) lower chance of recovery than moderate food in secured households (Sadeta, 2018), and study done in Shebedino, Southern Ethiopia children from food in secured households were 53% times (AHR=.47, 95%CI: .28-.79) lower chance of recovery than moderate food in secured households (Teshome et al., 2019). This may be due to household food in secured may prompt mothers to share specialized food nutritious with other members of the household and sold some part of foods used for other purpose in the house.

## **6 6 LIMITATIONS OF THE STUDY**

The limitation of this study was incomplete registration book records observed in some predictor variables and recall bias from caregivers during data collectors.

## **7 CONCLUSION AND RECOMMENDATION**

### **7.1. Conclusion**

The median time to recovery of MAM children admitted to TSFP were 16 weeks which is consistent with national standard acute malnutrition treatment guideline of Ethiopia. Age of children, MUAC at admission, deworming, transport access and treatment foods were found to be significantly associated with time to recovery from MAM and can be concluded as their gaps with protocol for management of moderate acute malnutrition.

### **7.2. Recommendation**

#### **1. To the family**

Dietary counseling, breast feeding and positive feeding practices should always be part of management of moderate malnutrition and to reduce acute malnutrition.

#### **2. To the health care providers**

Create public awareness on healthy dietary practices and timely use of routine treatments. Monitor sharing of food at household level after food distribution to reduce moderate acute malnutrition and provide nutrition routine education service on the former of health education program.

#### **3. To policy makers**

There were gaps in support to MAM management protocol in treating children under TSFP at the study area. So, plan community-based guidance policy like community health workers and early detection of moderate acute malnutrition to reduce the gaps.

#### **2. To researcher**

Further prospective studies should examine how engagement with community and caregivers through the implementation of nutrition education activities, counseling and home visits contributes to successful program delivery and improvement of intervention outcomes.

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## 9 APPENDICES

### 9.1 9.1: Participant Information Sheet and Informed Voluntary Consent Form

My name is \_\_\_\_\_ I am working as a data collector for the study being conducted on time to recovery from moderate acute malnutrition and its predictors among 6-59 months children targeted for supplementary feeding in this community by Mohammed Yahya who is studying for his Master's degree at Haramaya University, College of Health and Medical Sciences. Your child is randomly selected to be participant in this study. I kindly request you to lend me your attention to explain you about the study and the child's participation.

1. The study/project title:

Time to Recovery from Moderate Acute Malnutrition and Its Predictors Among 6-59 Months Children Targeted for Supplementary Feeding at Daro Lebu District, West Harerghe, Ethiopia

2. Purpose/aim of the study:

The findings of this study can be of a paramount importance for the Daro lebu woreda health office to develop strategies to improve time to recovery to moderate acute malnutrition and to reduce the prevalence of the moderate wasting will benefit all children in the Daro Lebu woreda and set baseline for future planning. Moreover, the aim of this study is to write a thesis as a partial requirement for the fulfillment of a Master's Program in Public health nutrition.

3. Procedure and duration:

I will provide you the following questionnaire which mainly focuses on time to recovery from moderate acute malnutrition. The questionnaire comprises Socio demographic, family and health care related factors affecting recovery time extracted from registration book at health post and obtained through interview at home visits. So, I kindly request you to spend your time with me for about 40 minutes and provide relevant information concerning the questions that I will provide you.

4. Risks and benefits:

The risk of being participating for your child in this study is very minimal; but only taking few minutes from your time. There would not be any direct payment for participating in this study. But the findings from this research may generate important information for governmental and non -governmental agencies that want to work on this area and sets a baseline for future planning and policy design.

#### 5. Confidentiality:

The information that we will collect from this study will be confidential. There will be no information that will identify your child or yourself in particular. The findings of the study will be general for the study community and will not reflect anything particular of individual persons or housing. The data that we gather from the measurements will exclude showing names. No reference will be made in oral or written reports that could link participants to the research.

#### 6. Rights:

participation in this study is voluntary. You have the right do declare to participate or not in this study. If you decide to participate, you have the right to withdraw from the study at any time and this will not label you for any loss of benefits which you otherwise are entitled. You do not have to answer any question that you do not want to answer and you think that not important to you.

#### 8. Contact address:

If there are any questions or enquires any time about the study or the procedures, please contact:

**Mohammed Yahya Rashid: mobile number: 0921440809/0910716065**

**Email: mameyahya155@gmail.com**

Haramaya University office phone 0254662011 or Po Box 235, Harar Campus, Ethiopia

#### 8. Declaration of informed voluntary consent:

I have read the participant information sheet. I have clearly understood the purpose of the research, the procedures, the rights and benefits, issues of confidentiality, the right of participating and the contact address for any queries. I have been given the opportunity to ask questions for things that may have been unclear. I understood that I have the right to withdraw

from the study at any time or not to answer any question that I do not want. Therefore, I declare my voluntary consent to participate in this study with my initial (signature) as indicated below.

Signature of parent/guardian: \_\_\_\_\_ Date \_\_\_\_\_

Signature of data collector: \_\_\_\_\_ Date \_\_\_\_\_

Signature of supervisor; \_\_\_\_\_ Date \_\_\_\_\_

Kebele code \_\_\_\_\_ Questionnaire code \_\_\_\_\_

### 9.2: English Version Questionnaires Formats

This questionnaire is prepared for data collecting information on time to recovery from moderate acute malnutrition and its predictors among 6-59 months children targeted for supplementary feeding at Daro lebu district, west harerghe, Ethiopia

Part I: Socio demographic charecteristics related factors affecting recovery time from moderate acute malnutrition and its predictors among 6-59 months children

Name of health post _____			
Identification Number _____			
Code	Questions	Responses	Skip question to
101	Age of child	_____ (in months)	
102	Sex of child	1. Male 2. Female	
103	Address of child	1. Urban 2. Rural	
104	Admission date	__/__/__ (DD/MM/YYYY)	
105	With whom the child lives with	1. Mother only 2. Father only 3. Mother and father 4. Other	
106	Ethnicity of the caregiver	1. Oromo 2. Somali 3. Amhara 4. Gurage 5. Other, specify _____	
107	Religion of the caregiver	1. Muslim 2. Orthodox 3. Protestant	

		4. Catholic 5. Other specify _____	
108	Educational status of caregiver	1. Cannot read & write 2. Primary (1-8) 3. Secondary (9-12) 4. Greater than 12 grades	
109	Occupation of the caregiver	1. House wife 2. Civil servant 3. Merchant 4. Daily laborer 5. Others (specify)	
110	Person with primary child care responsibility	1. Mother 2. Father 3. Other	
111	Marital status of caregiver	1. Single 2. Married 3. Widowed 4. Divorced	
112	Sex of household leader	1. Male 2. Female	
113	Educational status of household leader	1. Cannot read & write 2. Primary (1-8) 3. Secondary (9-12) 4. Greater than 12 grades	

Part II: Family and health care related factors affecting recovery time from moderate acute malnutrition and its predictors among 6-59 months children

Code	Questions	Responses	Skip
201	Vit-A given to child within 6 months	1. Yes 5. No	
202	Deworming given to child within 6 months	1. Yes 6. No	
203	MUAC at admission in cm	5. _____	
204	Weight at admission in Kgs	6. _____	
205	Admission status	1. New admission 5. Re-admission	
206	Date of discharge	1. ___/___/___(D/MM/YYYY)	
207	Length of stay in weeks	2.	
208	Is s/he early recovery (less than or equal to 16)	1. Yes 3. No	

209	Is s/he late recovery (greater than 16)	1. Yes 4. No	
210	MUAC at discharge	5. _____	
211	Weight at discharge	6. _____	
212	Follow up status	1. Regular 7. Irregular	
213	Follow up outcome	1. Recovered 2. Died 3. Defaulter 8. Non responder	
214	Number of household members	1. One upto three 2. Four upto five 3. Six and above	
215	How many rooms in the house	1. One 2. Two 3. Three or more	
216	Distance from home to distribution site in minutes	_____	
217	Transportation access to nearest health post and food distribution center	1. Yes 2. No	
218	Child received measles vaccination	1. Yes 2. No	
219	Exclusive breastfeeding in the first 6 months of life	1. Yes 2. No	
220	Continued breastfeeding through out 24 months	1. Yes 2. No	
221	Complementary food to child in addition to breast milk at 6 months of life	1. Yes 2. No	
222	Number of children beneficiaries of TSFP in the household	1. One 2. Two or more	
223	Household another program providing food or cash like PSNP	1. Yes 2. No	
224	Caregiver get education during distribution period	1. Yes 2. No	
225	Cooking demonstration conducted during distribution period	1. Yes 2. No	
226	Which specialized nutritious foods given to your child?	1. CSB++ 2. RUSF	If Ans is 2, Skip to 227
227	Do you know the exact amount of CSB++ given to your child per day?	1. Yes 2. No	

228	How many cups cooked CSB++ for a child once a time?	1. One 2. Two 3. Three	
229	With how much of water in cups?	1. One 2. Two 3. Three 4. Four	
230	How many times cooked CSB++ per a day	1. Once 2. Twice 3. Thrice 4. Four times	
231	Do you know the exact amount of RUSF given to your child per day?	1. Yes 2. No	
232	How many plampysup given to a child per day?	1. One 2. Two	
233	Are rations given only to the screened child?	1. Yes 2. No	If yes, Skip to number 231
234	Who usually share the entitled number of rations of screened child?	1. Children of household 2. Parents/caregiver 3. Sick	
235	Availability of latrine	1. Yes 2. No	If No, skip to 233
236	Utilization of latrine	1. Yes 2. No	
237	Source of water	1. Tap water 2. Protected spring 3. Unprotected spring 4. Pond water	
238	Diarrhea within two weeks before this survey	1. Yes 2. No	
239	Fever within two weeks before this survey	1. Yes 2. No	
240	Cough within two weeks before this survey	1. Yes 2. No	

Part III: Household food Insecurity level questions at home visits

Code	Questions	Responses	Skip to
301	In the past four weeks, did you worry that your household would not have enough food?	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol>	If no skip to Q303
302	How often did this happen?	<ol style="list-style-type: none"> <li>1. Rarely (once or twice in the past four weeks)</li> <li>2. Sometimes (three to ten times in the past four weeks)</li> <li>3. Often (more than ten times in the past four weeks)</li> </ol>	
303	In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol>	If no skip to Q305
304	How often did this happen?	<ol style="list-style-type: none"> <li>1. Rarely (once or twice in the past four weeks)</li> <li>2. Sometimes (three to ten times in the past four weeks)</li> <li>3. Often (more than ten times in the past four weeks)</li> </ol>	
305	In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources?	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol>	If no skip to Q307
306	How often did this happen?	<ol style="list-style-type: none"> <li>1. Rarely (once or twice in the past four weeks)</li> <li>2. Sometimes (three to ten times in the past four weeks)</li> <li>3. Often (more than ten times in the past four weeks)</li> </ol>	
307	In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol>	If no skip to Q309
308	How often did this happen?	<ol style="list-style-type: none"> <li>1. Rarely (once or twice in the past four weeks)</li> <li>2. Sometimes (three to ten times in the past four weeks)</li> </ol>	

		3. Often (more than ten times in the past four weeks)	
309	In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	1. Yes 2. No	If no skip to Q311
310	How often did this happen?	1. Rarely (once or twice in the past four weeks) 2. Sometimes (three to ten times in the past four weeks) 3. Often (more than ten times in the past four weeks)	
311	In the past four weeks, did you or any other household member have to eat fewer meals in a day because there was not enough food?	1. Yes 2. No	If no skip to Q313
312	How often did this happen?	1. Rarely (once or twice in the past four weeks) 2. Sometimes (three to ten times in the past four weeks) 3. Often (more than ten times in the past four weeks)	
313	In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food?	1. Yes 2. No	If no skip to Q315
314	How often did this happen?	1. Rarely (once or twice in the past four weeks) 2. Sometimes (three to ten times in the past four weeks) 3. Often (more than ten times in the past four weeks)	
315	In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?	1. Yes 2. No	If no skip to Q317
316	How often did this happen?	1. Rarely (once or twice in the past four weeks) 2. Sometimes (three to ten times in the past four weeks) 3. Often (more than ten times in the past four weeks)	

317	In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?	1. Yes 2. No	If no skip next question
318	How often did this happen?	1. Rarely (once or twice in the past four weeks) 2. Sometimes (three to ten times in the past four weeks) 3. Often (more than ten times in the past four weeks)	

### 9.3: Afan Oromo Questionnaires and the consent form translated into Afan Oromo

Uunkaa hirmaannaa fi Gaaffiileef odeeffaanoo kennuu

Maqaan koo \_\_\_\_\_ Ani kaniin hojjachaa jiru qorannoo adeemsa daa'imman ji'a 6 hanga 59 jiran isaanoowwan nyaata dabalataa fayyadamanii hanqina nyaataa giddu-galeessa irraa yeroo itti fayyanii bahanii fi fuuldaratti wantoota gara hanqina nyaataatti deebisuu malan irratti xiyyeeffata. Waraqaan qorannoo kun yuunivarsiitii Haramayaa kolleejjii saayinsii fayyaatti, fayyaa Hawaasaatiin Digrii lammaffaa ittiin eebbifamuuf Mahammad Yahya tiin gaggeeffamaa jira. Anis qorannoo kanaafiin odeeffannoo walitti qabachuutti jira. kanaaf atiis hirmaataa qorannoo kanaa taatee waan filatamteef gaaffiilee qorannoo dhiheessuu kootiin dura haalaa fi maaluummaa qorannichaa akka armaan gadiitti isiniif ibsuu yaala.

1. Mata duree Qorannichaa: - adeemsa daa'imman ji'a 6 hanga 59 jiran isaanoowwan nyaata dabalataa fayyadamanii hanqina nyaataa giddu-galeessa irraa yeroo itti fayyanii bahanii fi fuuldaratti wantoota gara hanqina nyaataatti deebisuu malan qorachuudha.

2. Kaayyoo Qorannichaa: - Argannoon qorannoo kanaa barbaachisummaa fi faaydaa dursee kan qabuuf waajjira Eegumsa fayyaa aanaa Daaroo labuutti tarsiimoo yeroo daa'imni sagantaa nyaata dabalataa giddu galeessaa keessaa itti bahu fooyyeessuu fi baay'achuu hanqina nyaataa giddu galeessa hir'isuu irratti akkasumas, karoora fuulduraaf bu'uura kaa'uudha. Dabalataan Kaayyoon qorannoo kanaa inni guddaan Fayyaa Hawaasaatiin Digrii 2ffaa argachuudha.

3. Adeemsa qorannichaa fi yeroo inni fudhatu. Qorannoon kun kan adeemsifamu Haramayaa Yunivarsiiti keessatti yoo ta'u adeemsa daa'imman ji'a 6 hanga 59 jiran isaanoowwan nyaata dabalataa fayyadamanii hanqina nyaataa giddu-galeessa irraa yeroo itti fayyanii bahanii fi fuuldaratti wantoota gara hanqina nyaataatti deebisuu malanii irratti gegeefama. Gaaffileen Qorannoo kanaa irra caalaatti mata durewwaan armaan gadii kaniin siif dhiheessu irratti xiyyeeffata. Kunis haala waligalaa Teessuma lafa hawaasaa, kunuunsa maatiin daa'imaaf gdhu fi fayyaan wal qabatee dhiibbaa yeroo daa'imni sgantaa hanqina nyaataa giddu galeessaa irraa itti fayyuu qaburratti fiduu malu akkasumaas beekomsa tajaajilaan wal qabate kan of kessatii qabatanidha. Kanaaf gaaffiilee kanaaf deebii nuu kennuun daqiiqaa 40 tilmamaan waan fudhatuuf kabajaan akka nu wajjiin turtan isin gaafanna.

4. Bu'aa fi miidhaa Qorannoon kun fiduu danda'u

Qorannoo kana keessatti hirmaachuu fi odeeffannoo kennuun miidhaa tokkollee waan isinirraan ga'u hin qabu. Garuu yeroo keessan irraa hanga tokko isin jalaa fudhata. Qorannoo kana irratti hirmaachuun wanti kafalamu ykn kennamu humaatuu hin jiru. Garuu bu'aan qorannoo kanaa odeffannoo waltawaa qaamolee motummaas ta'ee miti motummaa roga kanarratti hojjetaniif argamsisuun karoora fuula duraaf bu'uura kaa'uu danda'a.

5. Iccitii Odeeffannichaa

Odeeffannoon qorannoo kanaaf funaanama jiruu hunduu iccittiin isaa kan eegamedha. Namoonni odeeffannoo kana yammuu kennan maqaan isaanii hin barreeffamu, garuu odefannoon isaanii mallattoo addaan gargar baafamee taa'a. Itti dabaluun odeeffannoo kana nama qoranna adeemsisuun ala namni kamiyyuu akka hin-arginettii taa'a. akkasumaas odefannon kun dhimma barbadameef qofaaf ola.

6. Mirga qorannoo irratti hirmaachuufi hirmaachuu dhiisuu

Qorannoo kana irratti hirmaachuu fi hirmaachuu dhiisuun guutumaa guututti fedhii irratti waan hundaa'eef, gaaffii deebisuu hin barbaanne irra dabruu dandeessu. Akkasumas yeroo feetanitti gaaficha addaan kutanii bahuun ni danda'ama.

7. Teessoo: Qorannoo kana ilaalchisee gaaffiis ta'ee yaada yoo qabaattan teessoo armaan gadii kanaan nu argachuu ni dandessu.

Maqaa qorataa: - Mahammad Yahya Rashiid

Tessoo: - Harar/Haramaya Yuniversiitii

Bilbila: - 0921440809/0910716065

E-mail: - mameyahya155@gmail.com

Koree J/Galeessa Qorannoo fi Qo'annaa

- Yunivarsiitii Haramaayaa (L.S. Poostaa 235) Bilbila 0254662011

Yuniversiitii Haramaya Koollejji Saayinsii Fayyaa

8. Hayyamamoo ta'uu hirmaattootaa mirkaneessu

Uunkaa hirmaattotaa sirritti hubadheen jira. akkasumas kaayyoo, adeemsa, iccitii, mirgaa fi bu'aa qorannoo kana sirritti hubadheen jira. Wantoota naaf hin galin gaafachuufiis carraan naaf kennameera. Kanaaf odeeffannoo armaan olitti kenname kana bu'uura godhachuun qorannoo kana irratti hirmaachuuf fedhii kootiin akka armaan gadii kanatiit mallattoo kiyyaaniin mirkaneessa

Mallattoo hirmaataa \_\_\_\_\_ Guyyaa \_\_\_\_\_

Mallattoo odeeffannoo funaanaa \_\_\_\_\_ guyyaa \_\_\_\_\_

Mallattoo suparvaaysaraa-----guyyaa \_\_\_\_\_

koodii araddaa \_\_\_\_\_ Koodii gaaffii \_\_\_\_\_

#### 9.4: Foormii gaaffiiwwan Afaan English irraa gara Afaan Oromootti jijjiiramee qophaawe

Gaaffiiwwan armaan gaditti qophaawan kunneen Godina Harargee lixaa aanaa Daaroo labuu keessatti odeeffannoo deetaa funaanuu daa'imman ji'a 6 hanga 59 jiran isaanoowwan nyaata dabalataa fayyadamanii hanqina nyaataa giddu-galeesaa irraa yeroo itti fayyanii bahanii fi fuuldaratti wantoota gara hanqina nyaataatti deebisuu malan irratti xiyyeeffata.

Kutaa I: Teessuma lafa hawaasaa fi dub-duubee seemaa maatiitiin wal qabatee dhiibbaa yeroo daa'imni sgantaa hanqina nyaataa giddu galeessaa irraa itti fayyuu qaburratti fiduu malu ragaa keellaa fayyaatti galmeerraa funaanamu

Maqaa keellaa fayyaa _____			
Lakkoofsa eenyummaa daa'imaa			
Koodii	Gaaffiiwwan	Deebii	Gaaffii aanutti dabri

101	Umrii daa'ima	(Ji'aan)	
102	Saala	1. Dhiira 2. Dubara	
103	Iddoo jireenyaa	1. Magaalaa 2. Baadiyyaa	
104	Guyyaa galmaawe	__/__/__(DD/MM/YYYY)	
105	Daa'imni eenyu waliin jiraataa jira?	1. Haadha qofa 2. Abbaa qofa 3. Haadhaa fi Abbaa 4. Kan biraa	
106	Sabni keessan maali?	1. Oromoo 2. Somaalee 3. Amaara 4. Gurage Kan biroo_____	
107	Amantiin kee maali?	1. Muslima 2. Ortodoksii 3. Protestaantii 4. Kaatoolikii 5. Kan biroo_____	
108	Haala barnoota tajaajilaa daa'ima	1. Dubbisuu fi barreessuu hin dandahu 2. Sadarkaa 1ffaa (1-8) 3. Sadarkaa 2ffaa (9 & 12) 4. Kutaa 12 oli	
109	Hojii tajaajilaa daa'ima	1. Haadha manaa 2. Hojjataa/ttuu mootummaa 3. Daldaltuu/laa	
110	Kunuunsa daa'imaaf itti gaafatamummaa dursa kan fudhatu	1. Haadha 2. Abbaa 3. Kan biroo	
111	Haala fuudhaa fi heeruma kunuunsaa daa'ima	1. Kan hin fuudhin/hin heerumin 2. Bultii godhate/te 3. Kan irraa du'e 4. kan hiikkate/te	
112	Saala hogganaa maatii	1. Dhiira 2. Dubara	

113	Haala sadarkaa barnoota hogganaa maatii	<ol style="list-style-type: none"> <li>1. Dubbisuu fi barreessuu hin dandahu/dandeessu</li> <li>2. Sadarkaa 1ffaa (1-8)</li> <li>3. Sadarkaa 2ffaa (9 &amp; 12)</li> <li>4. Kutaa 12 oli</li> </ol>	
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Kutaa II: Kunuunsa maatiin daa'imaaf godhuu fi fayyaan wal qabatee dhiibbaa yeroo daa'imni sgantaa hanqina nyaataa giddu galeessaa irraa itti fayyuu qaburratti fiduu malu ragaa daawwannaa manaa manatti godhamu irraa funaanamu

Koodii	Gaafiiwwan	Deebii	Gaafii aanutti dabri
201	Giddu galeessa naannoo ciqilee olii yeroo seensaa sentimeetiraan	5. _____	
202	Ulfaatina yeroo seensaa Kg dhaan	5. _____	
203	Viitamina-A ji'a 6'n darban keessa daa'imni fudhatee jiraa?	<ol style="list-style-type: none"> <li>1. Eeyyee</li> <li>6. Miti</li> </ol>	
204	Qoricha raammoo daa'ima waggaa 1 oliif ji'a 6'n darban keessa daa'imni fudhatee jiraa?	<ol style="list-style-type: none"> <li>3. Eeyyee</li> <li>5. Miti</li> </ol>	
205	Haala seensaa	<ol style="list-style-type: none"> <li>1. Haaraa</li> <li>4. Kan deebi'ee seene</li> </ol>	
206	Guyyaa sagantaarraa bahe	4. ___/___/__(DD/MM/YYYY)	
207	Turmaata sagantaa keessa ture torbaaniin kaahi	5. _____	
208	Daa'imni kun dafee fayyee jiraa (Torbee 16 fi iaa gadi)	<ol style="list-style-type: none"> <li>1. Yes</li> <li>6. No</li> </ol>	
209	Daa'imni kun turee fayyee jiraa (Torbee 16 oli)	<ol style="list-style-type: none"> <li>1. Yes</li> <li>7. No</li> </ol>	
210	Giddu galeessa naannoo ciqilee olii yeroo bahiinsaa sentimeetiraan	8. _____	
211	Ulfaatina yeroo bahiinsaa Kg dhaan	9. _____	
212	Haala hordoffii ture	<ol style="list-style-type: none"> <li>1. Yeroo mara</li> <li>10. Ciccitaa</li> </ol>	
213	Bu'aa hordoffiin kun fide	<ol style="list-style-type: none"> <li>1. Fayyee jira</li> <li>2. Du'eera</li> <li>3. Addaan kute</li> <li>11. Fooyya'insa hin agarsiifne</li> </ol>	

214	Lakkoofsa miseensa maatii	1. Dhiira _____ 2. Dubara _____, W/G_____	
215	Manni kun gola/kutaa meeqa qaba?	1. Tokko 2. Lama 3. Sadii fi isaa ol	
216	Fageenyi manni keessan iddoo raabsaa nyaataa irraa qabu daqiiqaa meeqa deemsisa?	_____	
217	Geejjiba iddoo keellaa fayyaa fi iddoo raabsaa itti deemtu argattaa?	1. Eeyyee 2. Miti	
218	Daa'imni kun talaallii farra shiftee fudhatee jiraa?	1. Eeyyee, daa'ima ilaali 2. Miti	
219	Daa'ima keessan dhalatee hanga ji'a 6 tti harma haadhaa qofa kennitaniifii	1. Eeyyee 2. Miti	
220	Hanga waggaa lama guututti daa'ima keessan harma hoosiftanii jirtanii	1. Eeyyee 2. Miti	
221	Daa'ima keetiif nyaata dabalataa yoom eegalte? Ji'a 6 booda	1. Eeyyee 2. Miti	
222	Mana kana keessa daa'ima meeqaatu nyaata kabajamaa fudhatee jiraa?	1. Tokko 2. Lamaa fi isaa ol	
223	Maatiin keessan sagantaa biroo gargaaramaa jirani? fkn: seftineetii	1. Eeyyee 2. Miti	
224	Barumsa fayyaa yeroo nyaata dabalataa fudhatuuf deemtan isiniif kennamee jiraa?	1. Eeyyee 2. Miti	
225	Nyaata dabalataa iddoo raabsaa sanitti bilcheessanii akkaataa itti hojjatamu isin garsiisanii beekanii?	1. Eeyyee 2. Miti	
226	Gosa nyaataa kabajamaa keessaa isa kamtu daa'ima keessaniif kenname/laatame?	1. Faaffaa 2. Pilaampisap	If Ans is 2 skips to Q 227
227	Faaffaan kun daa'ima keetiif guyyaatti hanga kennamu sirritti beektaa?	1. Eeyyee 2. Miti	
228	Yeroo takkatti faaffaa kubbaayyaa meeqa marqaa gootaaf	1. Tokko 2. Lama 3. Sadii	

229	Bishaan kubbaayyaa meeqa faafaa kanatti dabalta?	1. Tokko 2. Lama 3. Sadii 4. Afur	
230	Faafaa kana guyyaatti yeroo meeqa gootaaf	1. Al-tokko 2. Al-lama 3. Al-sadii 4. Al-afur	
231	Pilaampiisap kun daa'ima keetiif guyyaatti hanga kennamu sirritti beektaa?	1. Eeyyee 2. Miti	
232	Pilaampiisap guyyaatti saakkeeta meeqa kennitaaf	1. Tokko 2. Lama	
233	Nyaata dabalataa daa'ima calalamee fudhate qofaaf kennitanii	1. Eeyyee 2. Miti	If yes, Skip to No.231
234	Yeroo baay'ee nyaata dabalataa kana mana keessatti eenyu eenyuuf qooddan	1. Joollee manaa 2. Maatii/kunuunsaa 3. dhukkubsataaf	
235	Mana fincaanii qabdanii	1. Eeyyee 2. Miti	If No, skip to 233
236	Itti fayyadamaa jirtanii	1. Eeyyee 2. Miti	
237	Bishaan eessarraa argattan	1. Boombaa 2. Bishaan maddaa qulqullinni eeggama 3. Bishaan maddaa qulqullinni hin eeggamin 4. Bishaan haroo	
238	Torbee lamaan darban keessa daa'ima keesan garaa baasaan qabee jiraa	1. Eeyyee 2. Miti	
239	Torbee lamaan darban keessa daa'ima keesan laydaan qabee jiraa	1. Eeyyee 2. Miti	
240	Torbee lamaan darban keessa daa'ima keesan michiin sombaa /qufaan qabee jiraa	1. Eeyyee 2. Miti	

Kutaa III: Gaaffiiwwan nyaataan of-danda'uu abbaa warraa manaa manatti godhamu

Koodii	Gaaffiiwwan	Deebii	Gaaffii aanutti dabri
301	Torbee afran darban keessa maatiin kee nyaata gahaa hin arganne jettee yaaddooftee beeytaa?	<ol style="list-style-type: none"> <li>1. Eeyyee</li> <li>2. Lakkii</li> </ol>	If no skip to Q303
302	Taateen kun hangam takkaaf si/isin mudate?	<ol style="list-style-type: none"> <li>1. Al-tokko ykn lama torbeee 4'n darban keessa</li> <li>2. Yeroo 3-10 ni taha)</li> <li>3. Yeroo hunda (<math>\geq 10</math> torbee 4'n darban keessa)</li> </ol>	
303	Torbee afran darban keessa ati ykn miseensa maatii keessaa gosa nyaataa sababa waa dhabuutiin osoo nyaachuu feetuu/dhanii dhabde/an jiraa?	<ol style="list-style-type: none"> <li>1. Eeyyee</li> <li>2. Lakkii</li> </ol>	If no skip to Q305
304	Taateen kun hangam takkaaf si/isin mudate?	<ol style="list-style-type: none"> <li>1. Al-tokko ykn lama torbeee afran darban keessa</li> <li>2. Yeroo 3-10 ni taha)</li> <li>3. Yeroo hunda (<math>\geq 10</math> torbee 4'n darban keessa)</li> </ol>	
305	Torbee afran darban keessa, ati ykn miseensa maatii keessaa gosa nyaata adda addaa (garagaraa) (variety) sababa waa dhabuutiin osoo nyaachuu feetuu/dhanii dhabde/an jiraa?	<ol style="list-style-type: none"> <li>1. Eeyyee</li> <li>2. Lakkii</li> </ol>	If no skip to Q307
306	Taateen kun hangam takkaaf si/isin mudate?	<ol style="list-style-type: none"> <li>1. Al-tokko ykn lama torbeee afran darban keessa</li> <li>2. Yeroo 3-10 ni taha)</li> <li>3. Yeroo hunda (<math>\geq 10</math> torbee 4'n darban keessa)</li> </ol>	
307	Torbee afran darban keessa, ati ykn miseensa maatii keessaa sababa waa dhabaatiin kan nyaachuu hin qabne waan nyaatte/an qabdaa/anii kan nyaachuu hin barbaachifne akka nyaataa fayyadamtee?	<ol style="list-style-type: none"> <li>1. Eeyyee</li> <li>2. Lakkii</li> </ol>	If no skip to Q309
308	Taateen kun hangam takkaaf si/isin mudate?	<ol style="list-style-type: none"> <li>1. Al-tokko ykn lama torbeee afran darban keessa</li> <li>2. Yeroo 3-10 ni taha)</li> <li>3. Yeroo hunda (<math>\geq 10</math> torbee 4'n darban keessa)</li> </ol>	

309	Torbee afran darban keessa, ati ykn miseensa maatii keessaa hanga nyaachuu qabduu/anii gadi sababa hanqina qabeenyaatiin kan nyaatte/tan jiraa?	1. Eeyyee 2. Lakkii	If no skip to Q311
310	Taateen kun hangam takkaaf si/isin mudate?	1. Al-tokko ykn lama torbeee 4'n darban keessa 2. Yeroo 3-10 ni taha) 3. Yeroo hunda ( $\geq 10$ torbee 4'n darban keessa)	
311	Torbee afran darban keessa, ati ykn miseensa maatii keessaa sababa nyaatni wal hin geenyeeff guyyaa keesaatti hanga nyaachuu qabduu gadi yeroon nyaate jiraa?	1. Eeyyee 2. Lakkii	If no skip to Q313
312	Taateen kun hangam takkaaf si/isin mudate?	1. Al-tokko ykn lama torbeee afran darban keessa 2. Yeroo 3-10 ni taha) 3. Yeroo hunda ( $\geq 10$ torbee 4'n darban keessa)	
313	Torbee afran darban keessa, ati ykn miseensa maatii keessaa yeroon gosa nyaata kamuu itti dhabdee /anii osoo hin nyaatin hafte/an jiraa?	1. Eeyyee 2. Lakkii	If no skip to Q315
314	Taateen kun hangam takkaaf si/isin mudate?	1. Al-tokko ykn lama torbeee afran darban keessa 2. Yeroo 3-10 ni taha) 3. Yeroo hunda ( $\geq 10$ torbee 4'n darban keessa)	
315	Torbee afran darban keessa, ati ykn miseensa maatii keessaa sababa nyaata gahaa dhabuutiin galgala namni beelaan rafe/tan jiraa?	1. Eeyyee 2. Lakkii	If no skip to Q317
316	Taateen kun hangam takkaaf si/isin mudate?	1. Al-tokko ykn lama torbeee afran darban keessa 2. Yeroo 3-10 ni taha) 3. Yeroo hunda ( $\geq 10$ torbee 4'n darban keessa)	
317	Torbee afran darban keessa, ati ykn miseensa maatii keessaa sababa nyaata dhabuutiin guyyaa fi halkan walitti aansee namni osoo hin nyaatin ture jiraa?	1. Eeyyee 2. Lakkii	If no skip to next question
318	Taateen kun hangam takkaaf si/isin mudate?	1. Al-tokko ykn lama torbeee afran darban keessa 2. Yeroo 3-10 ni taha)	

		3. Yeroo hunda (≥10 torbee 4’n darban keessa)	
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## 9.5: CURRICULUM VITAE

### Personal Background

Name	<b>Mohammed Yahya Rashid</b>
Sex	Male
Date of Birth	Feb 06, 1988 GC.
Place of Birth	Goro Gutu, East Hararghe
Nationality	Ethiopian
Marital Status	Married
Present Address	Harar

Mobile: **0921440809/0910716065**

E-mail: [mameyahya155@gmail.com](mailto:mameyahya155@gmail.com)

### Professional profile

Around 9 **years** of progressive professional experience in health sector management in the area of Sc/OTP/MAM coordinator, MCH coordinator, health center manager, OPD focal person, TSF/CSI woreda coordinator and TSF East and West Harerghe zone coordinator, Monitoring and evaluation of food distribution, storage handling and keeping and extensive problem-solving skills.

### Educational background

1. Haramaya University, BSc Degree in Comprehensive Nursing (2008-2010 G.C)
2. Deder Senior secondary School, Certificate of completion (2006-2007) G.C
3. Kara mile secondary school, from 2004-2005 G.C.
4. Primary Education in Nadi and Bika Elementary school (1996-2003 G.C).

### Professional Experience

1. From September 2017 up to December 2019 working at TSF East and West Harerghe zone coordinator.

2. From April 1, 2016 up to August 2017 working at Daro lebu woreda TSF child survival initiatives (CSI) coordinator.
3. From February, 2015 Up to March 30, 2016 worked at Boke woreda TSF child survival initiatives (CSI) coordinator.
4. From July, 2011 upto January, 2015 worked at Micheta health center. Between these years, from July, 2011 up to June, 2012 I am worked at MCH coordinator. From July, 2012 up to May, 2014 worked as Health center manager and from June, 2014 up to January, 2015 worked at adult OPD.

I worked as MCH expert in planning, coordinating EPI, Cold chain, OTP, ICCM, IMNCI, CBN, CHD, PHEM and other Nutrition activities.

5. (From September, 2011, up to June, 2011): Worked as Milkaye Health center in Daro Lebu at Sc/OTP and under 5 OPD.

**Current position**

- TSF East and West Harerghe zone coordinator.

**Responsibility and abilities**

- Highly participate on nutrition, especially Sc/OTP/MAM in woreda.
- Organizing and mobilizing the communities towards hygiene, maternal health and nutrition.
- Evaluating and monitoring any health activities.
- Provide technical support to the Health Center (H/C) and Health Post (H/P) staff on the implementation of Health extension package of the preventive activities as per the guide lines of the program, and also Conduct supportive supervision to the H/C and H/P.

**Training and work shop Attended**

S. No	Type of training	Trainer	Duration of training	Status of certification
1	TB training	Heal TB	For 6 days	certified
2	Leadership development program	Collaboration of Haramaya University, USAID and MSH	For 2 months	certified
3	Training on food and nutrition	WFP	For 2 days	Not certified

4	Nutrition survey techniques	GOAL-Ethiopia	For 2 days	Not certified
5	TOT stabilizing center (Sc/OTP)	IFHP	For 5 days	Not certified
6	HMIS (Health management information system)	IFHP	5 days	Not certified
7	TB and HIV/AIDS Integrated refresher training (IRT)	ICAP	6 days	Not certified
8	ART (Anti-Retroviral therapy)	World Health organization	For 12 days	Certified
9	IMNCI	ICAP	For 10 Days	Not Certified
10	IMNCI	IFHP	For 5 days	Not certified
11	Infant new born care	UNICEF	2 days	certified

### **Language Ability**

Language	Speaking	Listening	Writing	Reading
Afan Oromo	Excellent	Excellent	Excellent	Excellent
English	Good	Excellent	Excellent	Excellent
Amharic	Good	Excellent	Good	Good

### **Hobbies**

Designing future plan

Reading books

Achieving my goals

Using internet

### **Reference**

Alemayo erena, Oromia TSF/CSI project leader (0911648182)