TIME TO RECOVERY FROM MODERATE ACUTE MALNUTRITION AND ITS PREDICTORS AMONG CHILDREN AGED 6- 59 MONTHS IN FEDIS WOREDA, EAST HARARGHE ZONE, EASTERN ETHIOPIA.

RESEARCH THESIS

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HARAMAYA UNIVERSITY, HARAR

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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 Children Age 6- 59 Months in Fedis Woreda, East Hararghe Zone, Eastern Ethiopia." prepared under my guidance by Berhanu Melaku. I recommend that it be submitted as fulfilling the thesis requirement.

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As a member of the Board of Examiners of the MPH Thesis Open Defense Examination, I certify that I have read and evaluated the thesis prepared by Berhanu Melaku and examined the candidate. I recommend that the thesis be accepted as fulfilling the thesis requirements for Master of degree in General Public Health.

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BIOGRAPHICAL SKETCH

The author was born in 1989 in Nekemte, East Wollega, Oromia, Ethiopia. I attended my elementary School in Chalalaki and Burka Jato primary school and High school in Biftu Nekemte, Preparatory class in Nekemte comprehensive and preparatory School in Nekemte, East Wollega. After completion of my preparatory School, I joined Haramaya University in 2008/9 and studied BSc in Public health and graduated on July 07, 2012. After graduation I was hired to Somali regional health bureau and worked in different health centers and woreda health offices as a health service provider, Medical Director, Surveillance and EPI focal Person until 2017. Also worked on different research activities as a data collector and Team leader with various research institutions and consultancy firms like Ethiopian public health institute. Additionally as Nutrition Officer with International Medical Corps and as a CMAM officer with Mother and Children Multisectoral Development Organization. In 2020, I joined post graduate program directorate at Haramaya University to pursue my study in Master of General Public Health.

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LIST OF ABBREVIATIONS AND ACRONYMS

AHR Adjusted Hazard Ratio

CMAM Community based management of acute malnutrition

CI Confidence Interval

CSB++ Corn Soy blend plus plus

EMDHS Ethiopia Mini Demographic Health Survey

EDHS Ethiopia Demographic Health Survey

FBF Fortified Blended Food

GNC Global Nutrition Cluster

IHRERC Institutional Health Research Ethics Review Committee

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: Acute malnutrition is a major global public health problem, particularly in low and middle-income countries. A targeted supplementary feeding program is an approach recommended to address moderate acute malnutrition in food insecure settings. Preventing and treating moderate acute malnutrition requires identifying factors shown to affect the treatment outcome and duration of stay on treatment. However, evidence is limited regarding the factors that affect the time to recovery of moderate acute malnutrition in Ethiopia, particularly in Fedis Woreda.

Objective: To determine time to recovery from moderate acute malnutrition and its predictors among children age 6-59 months in Fedis Woreda East Hararghe Zone, Eastern Ethiopia, From January 01, 2022 – December 31, 2022. Data was extracted from February 20 – March 10, 2023.

Methods: A facility based retrospective cohort study was conducted on 567 children with moderate acute malnutrition in randomly selected kebeles of Fedis Woreda East Hararghe Zone A multi stage sampling technique were used to select study participants. Pretested and structured checklist were used to extract/abstract the data by trained data collectors. Descriptive statistics were used to describe the characteristics of study participants. Cox proportional hazard regression was fitted to identify the predictors of time-to-recovery from moderate acute malnutrition, thereby estimating the crude and adjusted hazard ratios with 95% confidence intervals. Statistical significance was considered at $p<0.05$.

Result: Both the overall mean timely recover was 16 weeks and median times to recovery were 16 weeks. The major predicting factors for time to recovery among children 6-59 months are: admission mid upper arm circumference of 12.1-12.5 centimeter (AHR=1.02, 95%CI: 1.01-1.19), access to transportation (AHR=0.62, 95%CI: 0.36-0.81), specialized nutritious foods (AHR=1.96, 95%CI: 1.36-3.11) and diarrhea (AHR=0.4, 95%CI: 0.31-0.71).

Conclusion: Though 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 health care providers need to give emphasis on early case identification of the case and timely management of comorbidities like diarrhea.

Key words: Time to Recovery, Moderate acute malnutrition, targeted supplementary feeding program

1. INTRODUCTION

1.1 Background

Malnutrition is a condition that results from deficiencies, excess or imbalance in a person's intake of energy and or nutrients. It is broadly classified as under nutrition which includes stunting, wasting, underweight and micronutrient deficiency and the other form is overweight and obesity (Blössner et al., 2004). Acute malnutrition is one of the three main types of under nutrition affecting potentially all categories of the population but especially vulnerable groups such as children under five, pregnant and lactating women, and people living with a disease or chronic illness (Hobbs & Bush et al., 2014).

Acute malnutrition results from sudden reduction in food intake or diet quality and it is often combined with pathological causes. It is classified as moderate acute malnutrition (MAM) and severe acute malnutrition (SAM) (Sylvie et al., 2007). Sever acute malnutrition is defined as a very low weight for height (WFH) below –3z scores of the median WHO growth standards, or <70% of the median National Center for Health Statistics (NCHS) standard) and by the presence of nutritional edema or MUAC <11.5 cm (WHO, 2013, WHO U and WFP, 2007).

Moderate acute malnutrition (MAM), defined as having a weight-for-height Z-score (WHZ) −3 and −2, without edema and/or mid-upper arm circumference (MUAC) between ≥11.5 and <12.5cm (Thurston's et al, 2011), is associated with increased mortality and morbidity among children under 5 years of age ((Prost et al., 2019, Black et al.,2103). Children with MAM face a greater risk of morbidity from infectious diseases, weakened immune systems, and impaired physical and cognitive developments (Black et al., 2103, Berry et al., 2013, Fabiansen et al., 2016). Moreover, beyond deterioration to severe acute malnutrition, a recent study suggested that repeated episodes of moderate acute malnutrition in children can eventually lead to stunting over time with irreversible intergenerational growth failure (Richard et al., 2013).

Acute malnutrition is the major cause for child mortality. A child with MAM is up to 3 times as likely to die as well as well-nourished child. Child with SAM is nine times as likely to die as well as well-nourished child. For every child suffering from severe acute malnutrition there is eight to 10 suffering for moderate acute malnutrition and therefore absolute mortality is higher for MAM than SAM (WHO, 2013).

Targeted Supplementary Feeding is 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 (WHO U and WFP, 2007).

1.2 Statement of the problem

Globally, an estimated 47 million children younger than 5 years had acute malnutrition, of which 70% were attributed to moderate acute malnutrition (WHO, 2020). Africa and Asia bear the greatest share of moderate acute malnutrition (Black et al., 2103). In 2019, Asia and Africa account for more than two-thirds (69 and 27%, respectively) of all wasted children under the age of five. Consequently, Southern Asia is the sub-region with the highest prevalence of moderate wasting (14.3%) followed by Oceania (9.5%), in the world (WHO, 2020).

According to the World Health Statistics report, a global total of 52 million children under 5 have acute malnutrition of which 33 million had MAM. Thus, MAM affects about one in ten children under 5 years in the least developed countries. Acute malnutrition prevalence varies across regions and countries, in which high burden remains in low and middle income countries with an estimated figure of 7.7%, 2.0% and 0.7% in South Asia, Sub-Saharan Africa and Latin America respectively *(UNICEF 2017, Reginald et al., 2014*).

Ethiopia has made substantial progress in reducing the prevalence of malnutrition in the past two decades (Ahmed et al., 2020; Zegeye et al., 2021). However, childhood undernutrition, particularly moderate acute malnutrition, remains a major challenge ((James et al., 2016). Moreover, the progress made has been uneven across the administrative regions of Ethiopia as the prevalence of moderate acute malnutrition ranges from the highest of 21% in Somali region to the lowest of 2% in Addis Ababa (CSA and ICF, 2019).

Currently, the most common intervention for the management of MAM is the targeted supplementary feeding program (TSFP) (GNC, 2017). The targeted supplementary feeding program is a management approach intended to address the immediate and long-term impacts of MAM in food insecure settings (Gebre et al., 2019). The program linked community-and facility-based approaches and was characterized by nutritional monitoring, active case finding, distributions of nutritious food supplements, and routine medical treatment for vulnerable children (Lenters et al., 2013; MOH, 2019). As a part of the strategy to meet the sustainable development goal target of reducing child mortality and morbidity attributed to malnutrition, the government of Ethiopia launched a high level collaborative platform, the “Seqota declaration” which aimed to end child undernutrition by 2030 *(MOH 2016)*. Further to this declaration, the country launched the second national nutrition program and a new health sector transformation

plan (HSTP) thatconstitutethesettingsforthemanagementofmoderateacutemalnutrition through targeted supplementary feeding programs *(MOH 2021; NNP 2016)*. Preventing and treating MAM requires understanding the factors shown to affect the management outcomes and duration of stay on treatment (*ENN 2014; Adamu et al., 2016*). Previous studies conducted in various regions of Ethiopia have been focused on the management of severe acute malnutrition *(Binyam A et al., 2019, Mengesha et al., 2016; Teshome et al., 2019.Tekeste et al., 2012, Wondim et al., 2020)*. However, the management of moderate acute malnutrition should also be public health and development priority *(Wegner et al 2015; WHO, 2019*

In Ethiopia 7% of children 6-59 months of age are wasted, with 70%of these having MAM, and about 35% to 57% of the deaths in under five children are attributable to malnutrition. Malnutrition among children is a critical problem because its effects are long lasting and go beyond childhood and affects academic performance, physical and mental development throughout their lives *(EDHS, 2019)*.

To tackle this problem government of Ethiopia implemented TSFP activities in food insecure setting. Moderate acute malnourished children screened from community using MUAC, admitted to TSFP, promotive and preventive services such as provision of food ration, vitamin A supplementation and de warming is done according to MAM case management guidelines, and protocols. Despite standardized management, recent studies indicated that the child timely recovery from MAM ranges from 49.2 %to 73 % (*UNICEF 2017, USAID ENGINE 2014)*.

Though recovery time of MAM is with wide statistical range, no study reported MAM treatment outcome of Fedis district, east Hararghe. Due different factor 12.5% children failed to achieve their target weight within specified period and a little research is done on this area to explain factor that predict time of recovery in the study area.*(USAID ENGINE 2014)*

Some of TSF beneficiary children deteriorate or remain for long time without improvement for different reasons such as intra-household sharing, targeting problem and delay of distribution or other factor. So that this study helps to assess treatment outcome and associated factors of moderate acute malnutrition among 6-59 months children targeted for supplementary feeding in case of Fedis woreda Oromia region.

1.3 Significance of the study

There is limited scientific evidence that measures time to recovery and its predictors of moderate acute malnutrition in the study area. There is a high burden of child malnutrition, while there are nutrition-related interventions in the area. Even though it needs systematic study to conclude, the impact of interventions is not well known.

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 Fedis woreda, East 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.

1.4 Objectives of the Study

1.4.1 General objective

- To determine the time-to-recovery from moderate acute malnutrition and identify its predictors among children aged 6-59 months who were admitted at targeted supplementary feeding Programme in Fedis Woreda, East HarargheZone, Oromia region, Ethiopia from January 01 to December 31, 2022. Data will be extracted from February 20 2023toMarch 10 2023

1.4.2 Specific objectives

- To determine the time-to-recovery from moderate acute malnutrition among 6-59 months children.
- To identify predictors of time-to-recovery from moderate acute malnutrition among 6-59 months children.

2. LITERATURE REVIEW

2.1. Treatment outcome of MAM and Time to Recovery

A descriptive analytical study conducted in three hospitals of Dhaka city, Bangladesh showed that, Of the 388 malnourished children 62.4% recovered, 21.4% were defaulted or took early discharge and 13.7% died .This finding negatively far from minimum standard *(Ashraf et al., 2013).*

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 18months follow-up were 47.5%,46.5% and 43.5%, respectively (*Prost 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 ($P<0.001$). 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 *((USAID ENGINE 2014)).*

Retrospective cohort study design was employed on 540 sampled childeren and assessing time to recovery to moderate acute malnutrition and its predictors at Daro Lebu district, 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.*(Rashid et al., 2022)*

Retrospective cohort study was conducted using the data of moderate acute malnourished children aged 6-59 months which were admitted to TSFP and treated in 8 health posts in Shala district between May 1, 2017, and August 30, 2017. From the total of 402 children admitted to TSFP, 333 (82.8%) were recovered within 16 week. Whereas 69 (17.1%), were censored. *(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 of time to recovery from moderate acute malnutrition

2.2.1. Socio demographic factors

A cohort study design will be 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 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 et al, 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 *(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: 1.130, 3.128*) (John et al., 2019).* 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 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

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 factors

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 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 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 et al., 2019).*

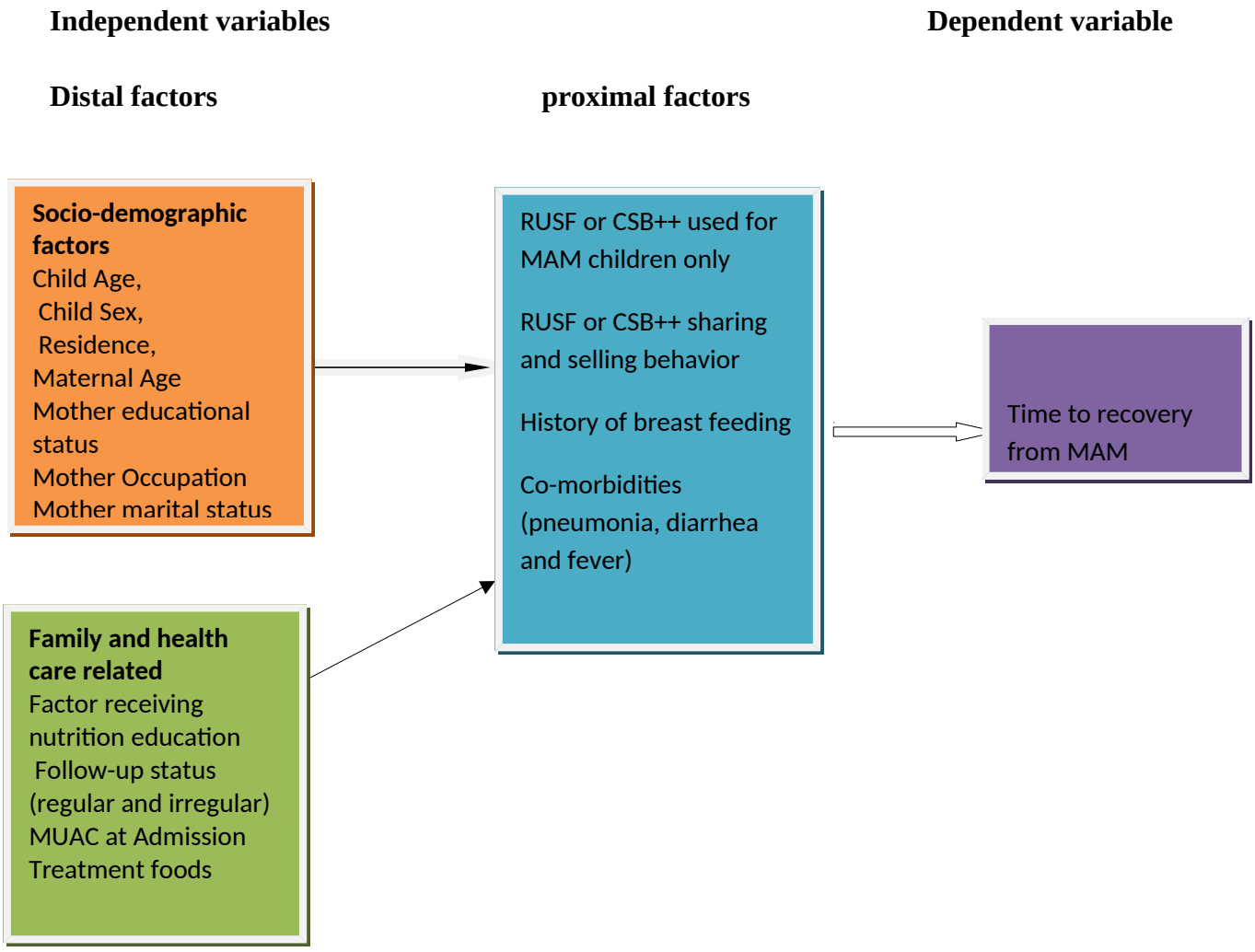
A cross-sectional descriptive survey and measurement of MUAC was conducted among 359 children aged 6-59 months in Guto Gida district, Oromia, Ethiopia from March to June 2013,

97.5% children those who got exclusive breast feeding and 2.5% those who didn't got it *(Alemu 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 Fedis woreda.

2.3 Conceptual Framework



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

Figure 1: Conceptual Framework of treatment outcome of moderate acute malnutrition and its associated factors among 6-59 months children targeted for supplementary feeding at Fedis woreda East Harerghe, Ethiopia, 2022

3. METHODS AND MATERIALS

3.1 Study setting and period

The study was conducted in Fedis woreda, East Hararghe Zone, Oromia region,located at 541 km to the East of Addis Ababa and 24km to the South of Harar Town, with altitude ranging from 500-2100 meters above sea level.

Fedis is bordered on the southwest by Garamulleta zone, Meyumuluke woreda, on the west by Girawa, on the northwest by Haro Maya, on the south by the Harari Region, on the east by Babille, and on the southeast by the Erer River which separates it from the Somali region,on south by Midega tola district. The administrative center of the district is Boko.

The 2007 national census reported a total population for this woreda of 113,108, of whom 57,250 were men and 55,858 were women; 4,574 or 4.04% of its population were urban dwellers. The majority of the inhabitants said they were Muslim, with 99.22% of the population reporting they observed this belief

A survey of the land in Fedis (reported in 1995) shows that 10.8% is arable or cultivable, 24.7% pasture, 19.5% forest, and the remaining 45% is considered built-up, degraded or otherwise unusable. The Harar Wildlife Sanctuary is a local landmark. Groundnuts and onions are important cash crops.

Industry in the woreda includes 18 grain mills employing 48 people, as well as 231 registered businesses including wholesalers, retailers and service providers. There were 23 Farmers Associations with 29,713 members and 4 Farmers Service Cooperatives with 346 members. Fedis has only dry-weather roads, but how many is not known. About 19.1% of the urban and 1.8% of the rural population have access to drinking water.

To combat problems related to food insecurity there is targeted and blanket food supply program in the woreda. The health infrastructure of the district is composed of 5 government health centers, 21 health posts. Data will be extracted from February 20 2023 to March 10 2023.

3.2 Study design

Institution based retrospective cohort study was used.

3.3 Source and study population

3.3.1 Source population

All moderately acute malnourished children whose age is from 6 to 59 month in Fedis Woreda who were screened and recorded for supplementary feeding programme from the community for TSFP from January 01 to December 30, 2022.

3.3.2 Study population

All moderate malnourished children whose age is between 6 to 59 month in Fedis woreda screened and included to TSF programme in selected Health posts from January 01 to December 30, 2022

3.4Eligibility criteria

3.4.1 Inclusion criteria

Records of all eligible 6-59 month age children who were identified from community and identified to have moderate acute malnutrition

3.4.2 Exclusion criteria

Records with incomplete information like missed age, sex were excluded.

3.5 Sample size and sampling procedure

3.5.1. Sample size

Sample size determination for time to recovery

Taking some variables into account from previous similar studies, the sample size for this study was determined using EPIInfo version 7 statistical software, considering the following assumptions: 95%CI, 80% power of the study, exposed to non-exposed ratio of 1:1, and a 5% incomplete record/non-response rate. Accordingly, four variables were considered, and we selected the “food sharing” variable since it yielded the largest sample size as depicted in Table 1

Variable	Proportion of outcome (%)	Confidence level	Power	Total sample size	Reference
Food Sharing -Yes (p1) -No (p2)	P1=43.8 P2=56.2	95%	80%	567	(Sadeta, 2018)

Exclusive breast feeding -Yes(p1) -No (p2)	P1=97.5 P2=2.5	95%	80%	10	(Sadeta, 2018)
Overcrowded condition of household members -Yes(p1) -No(p2)	P1=70 P2=30	95%	80%	61	(Sadeta, 2018)
Deworming -Yes(p1) -No(p2)	P1=89.1 P2=72.1	95%	80%	202	(Vianney B K et al., 2020)

Table 1: Sample size estimation for different factors for treatment outcome from MAM at Fedis Woreda, East Harerghe, Ethiopia, 2022

Finally, the required sample size for this particular study was decided by taking the maximum sample size. So that 567 sample size of predictors with time to recovery from MAM was included in this study.

3.5.2 Sampling technique and procedure

In the study Woreda, there are 21health posts. Populations living around these health posts were assumed more or less homogenous. As the result, 8 health posts was selected at random using lottery method presuming that there is no information lost with the unselected health posts.

Also the SFP protocol for management of MAM works equally to all health post level. So in total, a sampling frame of children managed for MAM from 8 health posts in the district was prepared. Samples were allotted to each health institution using the probability proportional to size sampling. Finally, the children was selected by systematic random sampling from each institution based on their unique identification number.

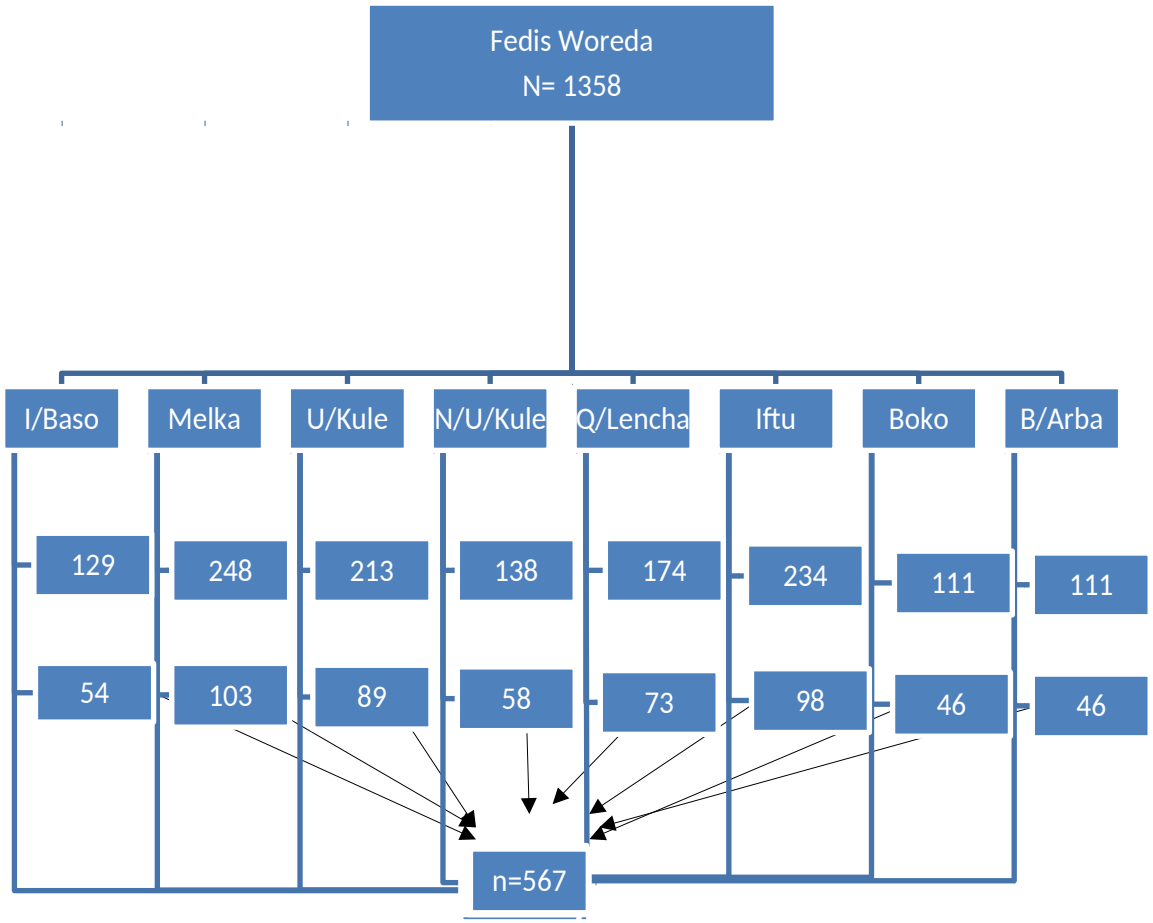


Figure 2: A multi stage schematic presentation of sampling procedure of children aged 6-59 months in Fedis woreda, Eastern Ethiopia 2022

3.6. Data collection Methods

3.6.1 Data collection tools/instruments

Data was extracted from registration book. To obtain data from registration book we used well design data extraction form.

3.6.2 Data collectors

Eight health extension workers was trained and assigned for data collection with two BSc Nurse as supervisor.

3.6.3 Data collection procedure

Records of eligible children was retrieved from the registration book. Children cards will also reviewed to record admission medical history, physical examination and routine medications, follow-up anthropometry measurements and clinical features, routine medications and outcome status.

3.7. Study Variables

3.7.1 Dependent variable

- Time to recovery of moderate acute malnutrition

3.7.2 Independent variable

- **Socio-demographic factors**

➢ Age
➢Sex
➢ Residence

- **Family and health care related factors**

➢ Follow-ups
➢Receiving nutrition education
➢ Co-morbidities
➢ Admission and discharge MUAC
➢ Treatment

3.8. Operational definition

Moderate acute malnutrition: having a weight-for-height Z-score (WHZ) −3 and −2, without edema and/or mid-upper arm circumference (MUAC) between ≥11.5 and <12.5cm

Treatment outcome: grouped as recovered and not recovered from MAM management at targeted supplementary feeding programin this study

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

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

Transferred in = has moved in from another facility where s/he was receiving TSFP
Transferred Out =Condition has deteriorated to SAM and referred for OTP or moved out to receive TSFP in another facility

Time-to-recovery (length of stay) = acceptable time to stay on program within 16 weeks.

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

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.

Re-admission= a child recovered from the program and again admit to the program within 3 months.
Follow-up = Bi-weekly or monthly visit of food distribution center for MUAC measurement and collecting RUSF
Receiving nutrition education = providing the people with the correct information on nutrition.
Co-morbidities = the simultaneous Presence of two or more diseases or medical condition in a patient.
Treatment = medical care given to a patient for an illness.

3.9. Data quality assurance

Both the data collectors and supervisors was given one day 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 Fedis 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 were done on daily basis and timely

feedback were communicated to the data collectors. Incorrectly filled or missed one were back to the respective data collectors for correction. The principal investigator were supervise the secondary data collection and confirm the data is correctly from the beneficiary registration book.

3.10 Data processing and analysis

The collected data was 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 will be done by two different data clerks to minimize errors. Then data was exported to SPSS version 22.0 and analysis was done by SPSS 22.0 for further analysis. Frequencies, percentages and summary measures was used to describe information about the dependent and independent variables.

The Life table were used to estimate the probabilities of recovery. Both bi variable and multivariable Cox proportional-hazard regression models was performed to identify the predictors of time to recovery. Independent variables with p-value of less than 0.25in the bivariate analysis was included into the final multivariate model. Adjusted hazard ratio (AHR) with a 95% confidence interval was reported to show the presence, strength and direction of association between the predictors and time to recovery.

3.11 Ethical consideration

Ethical clearance was obtained from the Institutional Health Research Ethics Review Committee (IHRERC) of College of Health and Medical Sciences (CHMS),Haramaya University. Permission letter obtained from CHMS was submitted to FedisWoreda Health Office and respective health posts. Heads of health posts was informed clearly about the purpose, risks and benefits of the study. Then, an informed, voluntary, written and signed consent were obtained from the heads. Confidentiality was maintained throughout the research process by giving a code for the participants' charts. The data abstraction was conducted in accordance with the standard safety measures to prevent the transmission of COVID-19.

3.12 Information Dissemination Plan

The finding of the study will be submitted to Haramaya University, College of Health and Medical Science, School of Public Health, East Hararge zone Health Bureau, Fedis woreda Health Buresu and NGOs working on nutrition intervention in Fedis woreda. The finding of the study will be presented to different stakeholders who are working on nutrition intervention and on Nutrition Program-based review meetings and scientific society through publication in journals.

4. RESULT

4.1 Socio demographic characteristics of the study population

A total of 567 moderate acute malnutrition children aged 6 to 59 months in 8 health posts at Fedis Woreda, East Harerghe Zone were included in the study. The mean age of children in the program was 16.48 months with standard deviation of 18 months. Two hundred eighty-five (50.3%) were male children. Four hundred thirty two (76.2%) were rural residents. The mothers were the primary responsible for child caregiver (95%).

Table 2: Socio-demographic characteristics of MAM children among 6-59 months children in Fedis Woreda,East Harerghe, Ethiopia, 2022.

Variables	Category	Frequency	Percentage
Age in months	6-23 24-59	295 272	52.1% 47.9%
Sex of the child	Male Female	285 282	50.3% 49.7%
Place of residence	Rural Urban	432 135	76.2% 23.8%
Primary care giver	Mother Father and Other(Specify)	541 26	95% 5%

4.2 Family and health care related characteristics of study population

Among the retrospective study of children treated in the program, majority 496(87.5%) were recovered from the program and 71(12.5%) were not-recovered. The study showed 340 (60%) were admitted with MUAC 11.5-12.0 centimeter and 227(40%) were admitted with MUAC 12.1-12.5 centimeter.531 (93.6%) were used ready to use supplementary feeding and 36 (6.4%) used Super cereal plus plus. 340(60%) received vitamin A supplementation while they were on follow up and 227(40%) not received. Among studied children 498 (87.8) were a new admission and 69(12.2%) were re-admitted to the program. 437(77.1%) were travel more than sixty minutes to reach the distribution center and 130(22.9%) less than sixty minutes. Among study participants 514(90.7%) caregiver received health and nutritional education during distribution and 53(9.3%) were not received. Related with co-morbidities 51(9%) were diagnosed with diarrhea among this 47(90.7%) were had watery diarrhea and 4(8%) were had bloody diarrhea.

The duration of the diarrhea were 2,3,4,5 days for 20(39.2%), 18(35.3%), 7(13.7%), 6(11.8%) participants respectively. Also 82(14.5%) had a history of fever and 485(85.5%) were not. The study also shows from the study participants 46(9.1%) were diagnosed with pneumonia and 521(91.9%) were not.

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 Fedis Woreda, East Harerghe, Ethiopia, 2022.

Variables	Category	Frequency	Percentage
MUAC at Admission	11.5 – 12.0 12.1-12.5	340 227	60% 40%
Vitamin A supplementation	Yes No	478 89	84.3% 15.7%
Deworming	Yes No	166 401	29% 70.7%
Amoxicillin	Yes No	162 405	28.6% 71.4%
Admission status	New admission Re admission	498 69	87.8% 12.2%
Distance from facility in minutes	<60 >=60	437 130	77.1% 22.9%
Transportation access to nearest health post and food distribution center	Yes No	333 234	58.7% 41.3%
Child received measles vaccination	Yes No	396 171	70% 30%
Caregiver get education during distribution period	Yes No	514 53	90.7% 9.3%
Cooking demonstration conducted during distribution period	Yes No	486 81	85.7% 14.3%
Specialized nutritious foods given to the child	CSB RUSF	36 531	93.6% 6.4%
Number of sachet of CSB++ is given for a child per month	Less than three Three Four More than four	0 0 36 0	0 0 100% 0
Number of plumpy sup given to a child per day	One Two	553 14	97.5% 2.5%

Fever	Present Absent	82 485	14.5% 85.5%
Hypothermia	Present Absent	3 464	0.5% 99.5%
Pneumonia	Present Absent	46 521	9.1% 91.9%
Vomiting	Present Absent	38 529	6.8% 93.3%
Diarrhea	Present Absent	51 516	9% 91%
Type of diarrhea	Watery diarrhea Dysentery 0ther specify)_____	47 4 0	92% 8%
Duration of diarrhea (days)	2 3 4 5	20 18 7 6	39.2% 35.3% 13.7% 11.8%
Anemia	Yes No	8 559	1.4% 98.6%

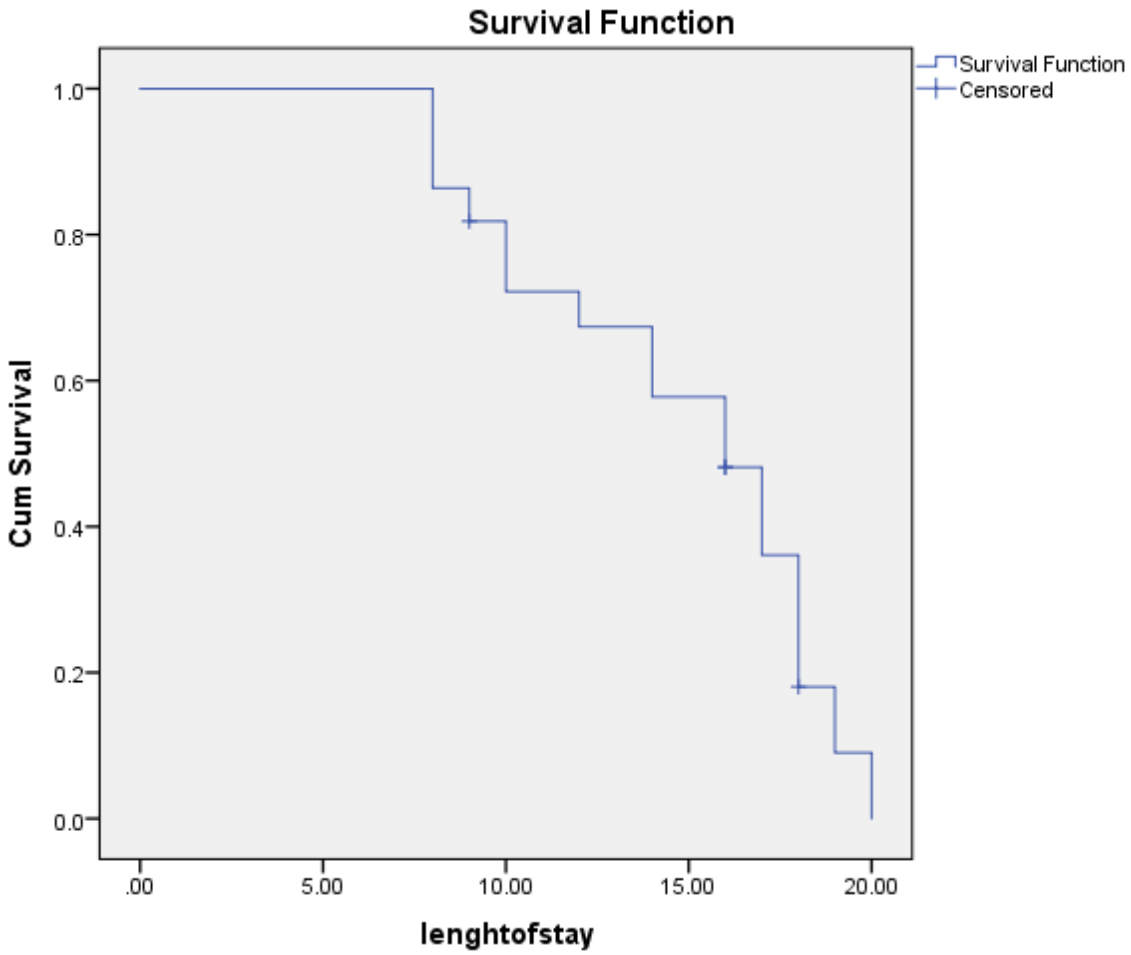
4.3 Time to recovery from moderate acute malnutrition among 6-59 months children

Among 567 children with moderate acute malnutrition enrolled in targeted supplementary feeding, majority 496 (87.5%) were recovered with a median time to recovery of 16 weeks with interquartile range of 5.4, 71 (12.5%) were not recovered. The median recovery time was lower among male 15 weeks (IQR=6) children than females 17weeks (IQR=7). This study showed that age of child between 24-59 months were 1.30 times more likely to be recovery time from MAM within 16 weeks than those age between 6-23 months. Also the study showed female children with MAM was 8% lower recover than male MAM children within 16 weeks. Regarding to place of residence the study showed children lived in rural was 29% lower to recover than those lived in urban and they were not showed the significant predictors of time to recovery from moderate acute malnutrition among 6-59 months children.

Table 4. Life table of Time to recovery of MAM children at different week among 6-59 months children in Fedis Woreda, East Hararghe, Ethiopia, 2022.

Interval start time	Number Entering Interval	Number Withdrawing during Interval	Number Exposed to Risk	Number of Terminal Events	Proportion Terminating	Proportion Surviving	Cumulative Proportion Surviving at End of Interval	Hazard Rate
0	567	0	567.000	0	.00	1.00	1.00	.00
4	567	0	567.000	0	.00	1.00	1.00	.00
8	567	0	567.000	102	.18	.82	.82	.06
12	447	4	445.000	154	.35	.65	.53	.18
16	245	1	244.000	53	.63	.37	.2	.30
20	91	0	91.000	84	.92	.08	.02	.46
24	13	0	13.000	13	1.00	.00	.00	.00

Figure 3 Kaplan Meier recovery estimate of children 6–59 months of age enrolled in targeted supplementary feeding program in Fedis Woreda, East Hararghe, Eastern Ethiopia, 2022



4.4 Predictors of time to recovery

In this study the findings of bivariate analysis showed that person with primary child care responsibility, admission MUAC, Vitamin A, admission status, transport access to nearest TSFP distribution center, measles vaccination, types of treatment food, co morbidities such as, fever, diarrhea were significantly associated with dependent variable at p- value of <0.25, and the multivariate cox regression analysis of this study showed that, Admission MUAC, transport access to nearest health facility, types of specialized food and diarrhea were a significant predictors of time to recovery of MAM treatment at p-value <0.05

Table 5: Bivariate cox-regression of predictors of time to recovery from moderate acute malnutrition among 6-59 months children in Fedis Woreda, East Harerghe, Ethiopia, 2022.

Variables	Category	No.	CHR	P-Value
Age of the children	6-24	295	1	1
	25-59	272	1.30(1.11-1.56)	0.38
Sex of the children	Male	285	1	1
	Female	282	0.92(0.81-1.2)	0.47
Place of residence	Urban	135	1	1
	Rural	432	0.71(0.46-1.81)	0.59
Person with primary Child responsibility	Mother	541	1	1
	Father	26	1.64 (0.92-3.3)	0.19
MUAC at Admission	115 – 120	340	1	1
	121-125	227	1.34(0.88-1.54)	0.21
Vitamin A	Yes	478	1	1
	No	89	0.81(0.64-1.02)	0.23
Deworming	Yes	166	1	1
	No	401	1.14(0.88 -1.31)	0.78
Amoxicillin	Yes	162	1	1
	No	405	1.49(0 .96, 1.68)	0.62
Admission status	Yes	498	1	1
	No	69	1.52(0.81-3.01)	0.18
Distance from facility in minutes	<60	437	1	1
	>=60	130	0.89(0.71-1.25)	0.51
Transportation access to nearest health post and food distribution center	Yes	333	1	1
	No	234	0.73(0.52-0.89)	0.014
Child received measles vaccination	Yes	396	1	1
	No	171	0.65(0.51 -1.93)	0.15
Caregiver get education during distribution period	Yes	514	1	1
	No	53	1.12(0.55-2.20)	0.87
Cooking demonstration conducted during distribution period	Yes	486	1	1
	No	81	0.91(0.83-1.21)	0.66
Specialized nutritious foods given to the child	CSB	36	1	1
	RUSF	531	1.82(1.31-2.32)	0.01
Number of sachet of CSB++ is given for a child per month?	Four	36	1	1
	Less or more than four	0	1.26(0.93-1.84)	0.75

Number plumpy sup given to a child per day	One	553	1	1
	Two	14	0.75(0.64-1.08)	0.42
Fever	Yes	82	1	1
	No	485	2.1(0.92-7.45)	0.19
Hypothermia	Yes	3	1	1
	No	464	1.9 (0.35-2.5)	0.64
Pneumonia	Yes	46	1	1
	No	521	2.46 (0.7 -9.3)	0.56
Vomiting	Yes	38	1	
	No	529	2.01(0.45-6.7)	0.91
Diarrhea	Yes	51	1	1
	No	516	1.33(0.93-2.01)	0.12
Anemia	Yes	8	1	1
	No	559	2.11(0.87-8.55)	0.72

On the multivariable Cox-regression analysis, variables that have significant level at 95% CI and p -value <0.05 were considered to be the predictor of time to recovery of children with moderate acute malnutrition admitted at Fedis Woreda targeted supplementary feeding program.

After controlling the effect of confounding variables, the final multivariable cox-regression analysis, the result showed that children who had admitted with mid upper arm circumference 12.1-12.5 were 1.02 times (AHR =1.02, 95% CI: 1.01-1.19) more likely to recover early than those children who had mid upper arm circumference between 11.5-12.0 centimeter. And families who had no access to transportation was 38% (AHR 0.62 95% CI, 0.36-0.89) lower than those who had access to transportation to recover. Moreover the children who had received ready to use supplementary feeding were 1.96 times (AHR= 1.96, 95%CI: 1.36-3.11) more likely to be timely recover from moderate acute malnutrition within 16 weeks than those who had received super cereal plus plus and Children with diarrhea was 69% lower to recover (AHR= 0.4, 95% CI: 0.31-0.71) within 16 weeks than those who didn't have diarrhea.

Table 6: Multivariable cox-regression analysis for predictors to time to recovery from MAM among 6-59 months of children in Fedis Woreda, East Harerghe, Ethiopia, 2022

Characteristics	Category	No	CHR(95%CI)	P-Value	AHR (95%)	P-Value
Person with primary Child responsibility	Mother	541	1	1	1	1
	Father	26	1.64 (0.92-3.3)	0.19	0.42(0.1-1.04)	0.35
MUAC at Admission	11.5 – 12.0	340	1	1	1	1
	12.1-12.5	227	1.34(0.88-1.54)	0.21	1.02(1.01-1.19	0.001
Vitamin A	Yes	478	1	1	1	1
	No	89	0.81(0.64-1.02)	0.23	0.93(0.69-1.08)	0.51
Admission status	New	498	1	1	1	1
	Readmission	69	1.52(0.81-3.01)	0.18	1.28(0.6-1.72)	0.22
Transportation access to nearest health post and food distribution center	Yes	333	1	1	1	1
	No	234	0.73(0.52-0.89)	0.02	0.62(0.36-0.89)	0.001
Measles vaccination	Yes	396	1	1	1	1
	No	171	0.65(0.51 -1.93)	0.15	1.21(0.73-1.46)	0.15
Specialized nutritious foods given to the child	CSB++	36	1	1	1	1
	RUSF	531	1.82(1.31-2.32)	0.01	1.96(1.36-3.11)	0.001
Fever	Yes	82	1	1	1	1
	No	485	2.1(0.92-7.45)	0.19	1.78(0.51-5.4)	0.27
Diarrhea	Yes	51	1	1	1	1
	No	516	1.33(0.93-2.01)	0.12	0.4(0.31-0.71)	0.001

5. DISCUSSION

The study assessed time to recovery from MAM and its predictors among children aged 6-59 months treated at targeted supplementary feeding program at Fedis Woreda. The median time to recovery was 16 weeks and the major contributing factors related to recovery time from MAM were Admission MUAC, Transport access to nearest health facility, specialized food they use and co morbidities such as diarrhea were independent predictors of time to recover.

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) and is similar with the study conducted in Darolebu which was 16 weeks *(Reshid et.al, 2022)* but higher with the study conducted in shalla district found that the median time to recovery was 15 weeks (IQR, 5) *(Sadeta, 2018)*. This study showed that the overall recovery rate was 87.5% which is acceptable threshold for the sphere international standard in which the minimum recovery rate was set at 75% (MOH, 2012; MOH, 2016; MOH, 2019).This may be due presence of regular follow up by nongovernmental organization working on it and continuous health education support given by health extension service worker at their locality.

The study showed that children who had admitted with MUAC 12.1-12.5 were 1.02 times (AHR= 1.02, 95% CI: 1.01-1.19) more likely to higher chance of early recovery within 16 weeks than those children who had MUAC between 11.5-11.9 which is similar with the previous studies *(Rashid et al 2022), (Sadeta, 2018),* (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.

This study revealed that transport access to the nearest health facility where targeted supplementary feeding service given was also significantly associated with the time to recovery. Among families who had no transport access, the proportion of children recovered from MAM was 38% (AHR 0.62 95% CI, 0.36-0.89) lower than those who had access to transportation which is consistent with the study done at kamba Woreda south Ethiopia (Negash A et al, 2015). This indicates that child who has transport accesses has got the service easily and show better prognosis.

This study also showed that children who had received RUSF were 1.96 times (AHR= 1.96, 95%CI: 1.36-3.11) 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% less likely recovered than RUSF (C Karakochuk et al., 2012), the study conducted at Shala district children treated by RUSF were two times recovered than those who treated by CSB and oil (Sadeta, 2018), The study conducted at Daro labu district shows that children treated with RUSF were 1.32 times more likely to be timely recover from MAM within 16 weeks than those who had received CSB++. At Malawi the proportion of children who recovered with supplementary foods: 85.9% for CSB++ (Lacey N LaGrone, 2012) and study conducted at Cameroon children those treated with CSB++ were 49% 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. Similarly the other study conducted in Jimma /Ethiopia showed that MAM children treated by CSB+ and oil is (49.2%) under TSFP was lower timely recovery than children treated by super cereals. From this we understood that treating MAM child with Ready to use supplementary food (RUSF) is more effective than CSB++.

This study also showed MAM children admitted to TSFP that had diarrhea was 69% lower to recover (AHR= 0.4, 95% CI:0.31-0.71) within 16 weeks than those who didn’t have diarrhea.

6. STRENGTH AND LIMITATION OF THE STUDY

6.1 Strength

This study was among a limited number of studies in Oromia region especially in eastern part of the country which determine the time-to-recovery from moderate acute malnutrition and identify its predictors among children aged 6-59 months who were admitted at targeted supplementary feeding Programme in Fedis Woreda.

6.2 Limitation

This study has its own limitation. The study used the recorded data of the discharged children to determine the time-to-recovery from moderate acute malnutrition and identify its predictors among children aged 6-59 months who were admitted at targeted supplementary feeding Programme in Fedis Woreda Therefore, this study was limited in determining time to recovery only usig medical records due to that could not permit including other factors such as, education and economic status of parents, completing breast feeding history and other factors.

7. CONCLUSION AND RECOMMENDATION

7.1 Conclusion

The median Time to recovery of MAM children admitted to TSFP is 16 week which is consistent with national standard acute malnutrition treatment guide line of Ethiopia, 2016.

TSFP recovery rate was 87.5% at 16 week in Fedis woreda.This is in line with international SPHERE standard

Admission MUAC, Transport access to nearest health facility, types of specialized food CSB++ and RUSF) and diarrhea were a significant predictors of time to recovery of MAM treatment.

7.2 Recommendation

- To the health care providers

  Create public awareness and give health education on sign and symptom of malnutrition that enhance an early identification of the case and timely use of routine treatments. Early detection of co morbidities like diarrhea is expected to reduce moderate acute malnutrition.

- To government and NGO's

  This study indicate the significant factors were transportation access and type of specialized food therefore expanding health facilities, building infrastructure like all season dry road , supply of RUSF that will help the beneficiaries.

- 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. ANNEXES

7.1 Information sheet and informed voluntary consent for the Heads of the Health posts.

My name is Berhanu Melaku I am here for the study to be conducted on time to recovery from moderate acute malnutrition and its predictors among 6-59 months children targeted for supplementary feeding in this health postto fulfill my Master's degree at Haramaya University, College of Health and Medical Sciences. This health post is randomly selected in this study. I kindly request you to lend me your attention to explain you about the study.

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 Fedis Woreda, East Harerghe, Ethiopia

2. Purpose/aim of the study:

The findings of this study can be of a paramount importance for the Fedis 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 Fedis 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 extract 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.

4. Risks and benefits:

There is no risk for the child in this study. 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 the child. 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.

6. Rights

Participation in this study is voluntary. The health post have the right to declare to participate or not in this study.

7. Contact address:

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

Berhanu Melaku: Phone No: 0917046846 Email: berhanumlk@gmail.com

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

8. Declaration of informed voluntary consent:

I have read the 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.

Name and Signature of the Head_____ Date_____

Name and Signature of the PI_____ Date_____

7.2: Checklist Formats

This questionnaire is prepared for data collecting information on treatment outcome of moderate acute malnutrition and associated factors among 6-59 months children targeted for supplementary feeding at Fedis woreda, East Harerghe, Ethiopia

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

Name of Health Post Identification No.			
Code	Questions	Responses	Skip
101	Age of the child (month		
102	Sex of the child	1. Male 2. Female	
103	Place of residence	1. Urban 2. Rural	
104	Person with primary child care responsibility	1. Mother 2. Father 3. Other(Specify)	

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	Response	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		
204	Weight at admission in Kgs		
205	Height at Admission		
206	Weight for height at admission		
207	Admission status	1. New admission 5. Re-	

		admission	
208	Date of Admission		
209	Date of discharge		
210	MUAC at discharge		
211	Weight at discharge		
212	Height at discharge		
213	Weight for height at discharge		
214	Distance from home to distribution site in minutes		
215	Transportation access to nearest health post and food distribution center	1.Yes 2.No	
216	Child received measles vaccination	1.Yes 2.No	
217	Caregiver get education during distribution period	1. Yes 2. No	
218	Cooking demonstration conducted during distribution period	1. Yes 2. No	
219	Which specialized nutritious foods given to the child?	1. CSB++ 2. RUSF	If Ans is 2, Skip to 227
220	How many sachet of CSB++ is given for a child once a month?	1. less than Three 2. Three 3. Four 4.more than Four	
221	How many plampy sup given to a child per day?	1. One 2. Two	
222	Fever	1.present 2.Absent	
223	Hypothermia	1.present 2.Absent	
224	Pneumonia	1.present 2.Absent	
225	Vomiting	1.present 2.Absent	
226	Diarrhea	1.present 2.Absent	
227	If diarrhea, which type?	1.watery diarrhea 2. dysentery 3. other specify)_____	
228	Duration of diarrhea (days)		

229	Anemia	1.present 2.Absent	

Part III: Treatment given

Code	Question	Response	Skip
301	Vitamin A	1. Yes 2. No	
302	Deworming	1. Yes 2. No	
303	Amoxicillin	1. Yes 2. No	

Part IV

Code	Question	Response	Skip
401	Treatment Outcome	1.Cure/Recovered 2.Defaulter 3.Non-responder 4. Died	

7.3 Curriculum Vitae

Name; - Berhanu Melaku Tesema
Address – Addis Ababa
Tel: – +251917046846
+251942693393
E-mail: berhanumlk@gmail.com

I. PERSONAL DETAIL

- Date of Birth – 27 September 1989 G.C.

- Place of Birth – Nekemte, East Welega, Oromia
- Sex – male
- Nationality – Ethiopia
- Marital Status – single

II. EDUCATIONAL BACKGROUND AND QUALIFICATION

Grade	*Institution/Place where I complete*	*Year of entrance-completion*	*Qualifications*
Higher institution	*Haramaya University*	2009-2012	BSC in Public Health
11-12	*Nekemte comprehensive Preparatory school(Nekemte)*	2007-2008	Certificate
9-10	*Biftu Nekemte Secondary school(Nekemte)*	2005-2006	Certificate
5-8	*Burka jato Primary School(Nekemte)*	2001-2004	Certificate
1-4	*chalalaki Primary School(Nekemte)*	1997-2000	Certificate

III. WORK EXPERIENCE (IN RELATION TO IMPORTANT HISTORY AND SALARY)

S. No	**Organization**	**Location**	**Position**	**Salary**	**Period**
1.	**ICAP**	**Country Wide**	**Data Collector/ Team Leader**	**24000**	**04/04/22- 31/07/22**
2.	**EPHI**	**E/Hararaghe and Harar**	**Data Collector/Team Leader**	**10500 + Per diem**	**01/07/2021 – 30/03/22**
3.	**International Medical Corps**	**E/Hararghe,Chinakson&FedisWoreda**	**Nutrition Officer**	**631 USD**	**03/03/2020 – 30/06/2021**
4.	**ABH Partners PLC**	**East Wollega and Diredawa**	**Research Assistant/Supervisor (M5D baseline Survey) and Observer respectively**	**Per diem**	**01/10/19- 31/12/19 and 14/12/2020 – 21/02/2021**
5.	**MCMDO** (Mother and Children	**Anchar Woreda (West Hararghe) & Lalo**	**CMAM Nurse**	**12295**	**01/08/18-31/07/19**

	Multisectoral Development Organization)	**Asabi Woreda (West Wollega)**			
6.	**EPHA(**Ethiopian Public Health Association)	**Country wide**	**Interviewer/ Data collector**	**19550**	**August 15,2017 to April 30, 2018**
7.	Governmental Organization (Health centers, WoHO)	**Jijiga city, TuliguledWoreda, YoaleWoreda (Ethio – Somali Region)**	-Nutrition OTP/SC -Adult OPD -Under 5 OPD - EPI Expert & CDC Coordinator - Medical Director -Surveillance focal person	2250 -6179 ETB	11 October 2012 - 9 August 2017

IV. LANGUAGE SKILLS

	Listening	**Speaking**	**Reading**	**Writing**
Afaan Oromo	Excellent	Excellent	Excellent	Excellent
Amharic	Excellent	Excellent	Excellent	Excellent
English	Excellent	Excellent	Excellent	Excellent
Somali	Excellent	V.good	Excellent	Excellent

V. SHORT TERM TRAININGS

S.No	Area (Topics)	Organized by
1	Supervisor Training (M5D baseline Survey)	ABH partners PLC
2	Interviewer training (EPHIA Survey)	EPHA
3	Leadership, Governance and Management	Management science for Health
4	Health center reform	FMOH and RHB
5	CMAM (OTP, SC) management	Save the children
6	Infection Prevention	FMOH and RHB
7	Comprehensive TB,TB/HIV and TB/Leprosy management ,ART	RHB
8	AWD case management	RHB, MSF and WHO

9	EPI and cold chain	RHB
10	IMNCI	Save the children, RHB & Unicef
11	Electronic HMIS(e-HMIS)	ICAP
12	PMTCT option B+ and FP	RHB and ICAP
13	Measles case management	RHB
14	ART	Haramaya University with ICAP Columbia University

VI. Personal Skills

- Excellent Knowledge of Statistical software (SPSS and EPIINFO) packages,ODK,CSEntry,DHIS 2
- Very good in report writing, Compilation, documentation, Monitoring and Evaluation
- Good in leadership and problem solving
- Excellent in research activities and community service

Personal Qualities

- Good communication, Interpersonal and active listening skills.
- Very good in creativity and fast learner
- Understand the importance of teamwork
- Good in working under hard situations/stress
- Committed in regard to tasks assigned to me

PROFICIENCY IN COMPUTERS

-Basic Knowledge on; MS words, Excel, Access, PowerPoint preparation and presentation & internet surfing, downloading programs &searching for information

HOBBIES

- Reading books (spiritual, inspirational and academic)
- Peaceful discussion , Watching and playing foot ball
- Following events on the world through medias

REFERENCES

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3. Bontu Berhanu: Research Coordinator of ABH Partners PLC

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4. **Nebiyu Ayalew:** CMAM program coordinator @ MCMDO**Tel**-+251930012684, nebiyuayalew2@gmail.com