SALALE UNIVERSITY COLLEGE OF HEALTH SCIENCES
DEPARTMENT OF PUBLIC HEALTH

MAGNITUD AND FACTORS ASSOCIATED WITH RELAPSE OF SEVERE ACUTE MALNUTRITION AMONG 6-59 MONTH CHILDEREN DISCHAGED FROM STABILIZING CENTERS IN EAST BORENA ZONE, OROMIA REGION, ETHIOPIA A MIXED CROSS-SECTIONAL STUDY

BY: GENET TSEGAYE

A RESEARCH THE THESIS SUBMITTED TO PUBLIC HEALTH DEPARTMENT, COLLEGE OF HEALTH SCIENCES, SALALE UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE MASTERS DEGREE, IN PUBLIC HEALTH NUTRITION

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BY: GENET TSEGAYE

NEGELE BORENA

Email; fekadugenet137@gmail.com

Mobile Number; 0916874653

ADVISORS

Kassahun Ketema (ASSISTANT PROFESSOR)

Derara Girma (MPH, IN Epidemiology,)

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Abstract

Background: Background Severe acute malnutrition (SAM) is a critical global health issue, generally affecting children under five. Insub-Saharan Africa and Ethiopia, children treated for SAM in inpatient settings face high mortality rates and a significant threat of returning into acute malnutrition after discharge. This study aims to assess the extent and predictors of SAM relapse among children 6months – 59 months discharged from stabilization centers in the East Borena Zone, Ethiopia.

Objectives: The study seeks to identify Magnitud and factors associated with SAM relapse among children 6-59 months in the East Borena Zone and provide evidence-based recommendations to prevent relapse and ensure sustained recovery.

Methods and Materials: An institution-based cross-sectional design was employed using structured questionnaires, checklists, and logbook records from the Stabilization Center (SC). Bi-variate and multivariable logistic regression analyses identified factors associated with SAM relapse, including variables with a p-value ≤ 0.25 in the bi-variate analysis. Model confirmation test involved the Hosmer-Lemeshow goodness-of-fit test and multicollinearity tests. Statistical significance was set at p-value < 0.05, with adjusted odds ratios (AOR) at a 95% confidence interval (CI). Thematic analysis provided additional insights, conducted manually and with QDA miner software.

Results: Among the 387 children studied, 38% (95% CI: 33.1- 42.9) relapsed post-recovery. Predictors included MUAC at admission <110mm (OR = 2.601, 95% CI: 1.224, 5.526), 3and above hectar agricultural land (OR = .389, 95% CI: (.126, 1.208), and higher educational levels of caregivers (OR = 0.595, 95% CI: 0.135, 2.615). Qualitative findings were discussed under four themes to explore challenges to SAM relapse.

Conclusion and Recommendations: The proportion of SAM relapse in the East Borena Zone is high.when compered with other study. Factors such as caregiver education level, MUAC at admission, lack of agricultural land, absence of toilet facilities, poor water sources, and inadequate follow-up post-discharge were significantly associated with SAM relapse. Nutrition initiatives should enhance household food security and emphasize nutrition counseling, dietary instruction, continuous follow-up, and routine monitoring, especially in the first six months post-discharge.

Keywords: Relapse, severe acute malnutrition, children, East Borena Zone, Ethiopia

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List Acronyms

SC	Stabilization center
BF	Breast Feeding
CI	Confident Interval
CMAM	Community-based management of acute malnutrition
CORTASAM	Council of Research and Specialized Advice on Acute Malnutrition
FCS	Food consumption score
HDS	Household Deprivation Status
HFIA	Household Food Insecurity Access Scale
HH	House Hold
IRR	Incidence Risk Ratio
MAM	Moderate Acute malnutrition
MUA	Mid-upper arm circumference
MAM	moderate acute malnutrition
NRR	Non Response Rate
OPD	Out patient
OR	Odd ratio
OTP	Outpatient therapeutic program
PEM	protein- energy malnutrition
PI	Principal Investigator
RR	Risk ratio
RUTF	Ready-to-Use Therapeutic Food
SAM	Severe acute malnutrition
SAMs	Severe acute Malnutrition
SD	Standard deviation
SPSS	Statistical package for social science
UNICEF	United Nation Children Fund
WASH	Water sanitation and hygiene

1. Introduction

1.1. Background

Recurrent acute malnutrition relapses occur when a child who was previously treated within the last three months now qualifies for outpatient admission. Cases of relapse requiring additional support should be directed to a stabilization center for treatment initiation. A lack of essential nutrients can severely affect a child's cognitive and motor development, potentially leading to irreversible consequences. Therefore, a properly balanced diet in early life is crucial for optimal brain growth (1,2)

Mostly affecting children under five, severe acute malnutrition is a global health concern. Children in sub-Saharan Africa who suffer from severe acute malnutrition (SAM) have a high case fatality rate linked to a relapse of acute malnutrition after being released from inpatient therapy(3). Globally, the magnitude of malnutrition relapse ranges from 0 to 37%, Less than 1% of the community control children had SAM throughout the 6-month research period, but 24% of the OTP-cured children experienced relapse (4)

When we come to children receiving treatment for Severe Acute Malnutrition (SAM**)** in public health and nutrition programs, readmission is a common occurrence following successful treatment completion and initial recovery. However, not much research has been done to systematically measure the post-discharge relapse rate across various groups and functional programs(5).

A recent studies conducted in North West Ethiopia investigated this issue and east Ethiopia, examined the time to readmission and associated factors for under-five children who had been treated for SAM and subsequently discharged (6–8)

1.2. Statement of the problem

The recurrence of severe acute malnutrition (SAM) poses a significant challenge in the treatment of affected children. The rate of relapse after initiating SAM treatment varies widely, from 0% to 37% at different points after discharge. The absence of a standardized definition for relapse further complicates the comparison of these studies(4).

According to Encyclopediya in 2020, there were 149.2 million children under five who were suppressed, 45.4 million who were wasted, and 38.9 million who were overweight (9) In 2022, it was estimated that 45 million children under the age of five experienced some form of wasting, with 13.6 million suffering from severe wasting (10).

Research on SAM relapse is scarce and shows high variability due to differences in context and methodology. Understanding the long-term risks of SAM and associated factors post-CMAM treatment is challenging due to the limited number of comparative studies. To fill this gap, the 12-month relapse rate of children discharged as cured from the CMAM program was analyzed to identify ongoing risks and related factors(11)

There is absence of of analysis regarding the effects of discharge. Programs often use a strict MUAC $\geq$ 125 mm criterion, disregarding WHZ deficiencies that may be present at admission. Consequently, many children with persistent WHZ deficiencies are discharged as cured.(1)

Research indicates that CMAM programs are effective in achieving nutritional recovery in a timely manner(12) .However, to maximize their impact, SAM treatment programs must minimize relapse and consistently high morbidity and mortality rates. Post-discharge outcomes, such as relapse, often highlight poor health and nutritional status, emphasizing the need for continued support. Despite evidence addressing the causes, short-term consequences, and treatment methods for SAM, little is known about children's health and nutrition after discharge. Limited data from follow-up studies indicate poor post-discharge outcomes, including morbidity and death(4)

Studies show that the Community based management of acute malnutrition program's success in terms of access and key performance indicators (KPIs) like mortality, recovery, and default rates. Cure rates often exceed the minimum threshold of 75%.(13). However, the magnitude of relapse of acute malnutrition remains high after cure. In some studies, SAM relapse rates range

from 9% in Bangladesh to over 34% in various Ethiopian regions, with Eastern Ethiopia seeing a 36.2% relapse rate post-discharge from nutrition stabilization clinics(4,14,15)

The extent of under nutrition and its subsequent health impacts are critical, as acutely malnourished children have weakened immunity and a higher risk of death, particularly with severe wasting. SAM relapse assessment in programs and research is inadequate and poorly defined, leading to incomparable findings due to different treatment protocols, follow-up periods, and inconsistent relapse reporting(16)

In Ethiopia, research has mainly focused on identifying relapse factors. However, detailed studies on relapse in the Oromiya region are scarce, with only two cross-sectional studies conducted in Eastern Oromiya. This study aims to identify the magnitude and associated factors of SAM relapse using a mixed study design in the East Borena Zone, Oromia, Ethiopia.

1.3. Significant of the study

This study focuses on reducing the risk of relapse in children who have been treated for Severe Acute Malnutrition (SAM). By identifying risk factors and effective prevention strategies, the study aims to ensure that children maintain their recovery and continue to grow healthily. Mothers will benefit from increased awareness and understanding of the factors that contribute to SAM relapse. The study provides practical guidance on nutrition and healthcare practices that can prevent relapse, empowering mothers to better care for their children.

By addressing SAM relapse at a community level, the study contributes to overall public health improvement. Reducing the burden of malnutrition leads to healthier children, which in turn fosters a more productive and thriving community. Insights from the study help in optimizing the allocation of resources towards the most effective interventions, ensuring better use of community resources and support systems.

The study identifies evidence gaps, generates new hypotheses, and provides concrete data, guiding further research and policymaking. This contributes to the development of more effective and targeted interventions for preventing SAM relapse. Program designers and coordinators gain a deeper understanding of post-discharge outcomes, enabling them to design more comprehensive and effective SAM treatment programs that ensure long-term recovery.

2. Literature review

Magnitude of SAM relapses after cure for severe acute malnutrition

Globally, the magnitude of malnutrition relapse ranges from 0 to 37%, Less than 1% of the community control children had SAM throughout the 6-month research period, but 24% of the OTP-cured children experienced relapse.(3,4) The OTP-cured cohort had a 52-fold greater incidence rate of SAM compared to the community control cohort. In most cases, relapses in the first six months following release, relapses were seen more frequently. Children were found to be more likely to relapse in the first three months than in the six, nine, twelve, and eighteen months. In a 2016 Indian study that tracked children quarterly for 18 months after discharge.

According to a study in Niger, relapses after three months were more likely to relapse and had a 7.1-fold increased risk of death compared to those who were released from therapy after showing improvement (11).

Ethiopian Programme evaluation CMAM with relapse rate studies, shows that no established follow- up procedure; all relaps were defined as self- referring readmissions. Likely an underestimation of true relapse (4).

In 2015 Ethiopia , the probability of experiencing another episode of acute malnutrition (AM) was 7.5% for a 12-month period and 26% for 6-months of period, respectively(17)and according to recent studies the magnitude of relapse of severe acute malnutrition among children in Ethiopia is the re-admission (relapse) rate ranges from 2.6 to 37.5% a significant concern.(8).

Factors associated with relapse of severe acute malnutrition after discharge from stabilization center

Comorbidity of admitted child with severe acute malnutrition relapses

In eight trials, there was evidence of illness at the time of the relapse. According to a number of writers, children who are declared fully recovered from SAM treatment but are released on the basis of anthropometric measurements could not have fully recovered their immune systems, making them vulnerable to infection and relapse in the future. Micronutrient deficits were not linked to relapse, despite the fact that they were rarely measured (3,4,17).

The study done on Community-based Management of Acute Malnutrition (CMAM) program in Haiti from 2009 to 2013 revealed that a higher number of patients were cured at discharge. However, this low discharge cure rate suggests the program's quality likely influences relapses rates. Furthermore, the analysis indicates that illnesses occurring during the recovery period are significantly associated with the relapse of severe acute malnutrition, highlighting the need for effective illness management to reduce relapse rates (18).

The relapse rate, particularly among individuals who discontinued treatment, may be underestimated due to follow-up losses and/or survivor bias. Regressing against age at admission, sex, edema at admission, diarrhea at admission, fever at admission, cough at admission, MUAC at admission, mother not alive, father not alive, attendance to a supplementary feeding program, or MUAC at discharge, respectively, did not show any significant difference in the odds ratio of relapse at 6 or 12 months (8,16,19,20).

A cross-sectional study at Malawi on CMAM, admitted by WHM < 70% MUAC < 110 mm edema and discharge criteria of WHM ≥ 80% followed for 15.6 months (median length) 3, 12 months, prevalence of relapse rate was higher for HIV+ and less for HIV-) and Recommend more RUTF for HIV+ children, continued feeding for HIV+ children, and link CMAM model with HIV treatment (11).

A study of the Nigeria Coverage Survey on CMAM with admission criteria of WHZ < -3 or MUAC < 115 mm or edema and discharge of MUAC ≥ 125 mm and with relapse rate of mothers were asked if their child had previously been admitted and discharged. Observed high prevalence of illness at time of relapse; rates rely on caregivers' reports of prior treatment (11) .

Illnesses during the recovery phase have been closely associated with the relapse of severe acute malnutrition (SAM) in children (3). esearch shows that children who fall ill within three months after treatment have a higher risk of SAM relapse (3). This underscores the importance of continuous monitoring and comprehensive healthcare to manage and prevent illnesses, ensuring a sustained recovery and reducing the chances of relapse. Additionally, a study conducted in South Africa involving children aged 3–59 months discharged from two hospitals found that SAM relapse was linked to having any illness within three months.(21).

According to study carried out in the towns of Haik, Dessie, Kombolcha, and Northeast Ethiopia, and Hawassa University more than one-third of children who received CMAM

program treatment went back to SAM or MAM. Acute malnutrition relapse was substantially correlated with the child's ,diarrhea following| discharge (8,16).

Socio-economic status of Households

There is conflicting evidence about the meaningful relationships between relapse and aspects of the home, including food habits, living conditions that are clean, and socioeconomic status(22). The evidence on the impact of food security and seasonality on relapse is conflicting (23,24).

At 12 months after discharge, there was a five-fold increased risk of relapse for an orphan (4). A facility based prospective cohort study in Bangladesh with relapse rate 1% suggest that all study participants lived (4).

In a community-based matched case-control study from Jhapa, Nepal, researchers identified key predictors of severe acute malnutrition (SAM) relapse, including low economic status, short birth intervals of less than two years, infrequent breastfeeding of fewer than eight times daily, and household food insecurity. Low economic status and infrequent breastfeeding were particularly associated with higher SAM rates(23) The study also evaluated the role of Water, Sanitation, and Hygiene (WASH) interventions in preventing SAM relapse, identifying various risk factors in the process. Despite these interventions, multiple studies indicate that children remain at risk for SAM relapse even after completing outpatient treatment (25) .

Additionally, factors such as inadequate training of CMAM workers, religious beliefs, and a shortage of implementation materials like ready-to-use therapeutic food (RUTF), registration forms, and computers were found to negatively impact the quality of the CMAM program(26).

A multi-country, prospective cohort study in Mali, Somalia, and South Sudan, shows that children return to SAM followed for 12 months 15% to SAM in post SAM,1% in health controls post SAM children had higher risk for Acute malnutrition than controls; due to MUAC,HAZ, food security (12).

Children with severe acute malnutrition (SAM) are still susceptible to malnutrition relapse and suboptimal growth once they recover. A prospective cohort of Ethiopian children was followed, although contextual factors can lead to variability and there is a lack of data despite the growing interest in understanding these issues (3,15) .

Nutritional education/counseling

A facility based cross-sectional study in Senegal prevalence relapse rate 10.1%, Suggests return to an un favorable environment and poor adoption of nutrition counseling messages explain high relapse rate (4).

An evaluation of the CMAM program revealed that the report, which relied solely on program monitoring data, lacked comprehensive details about the follow-up procedures and duration(4). Additionally, a prospective cohort study in Tanzania on SAM treatment reported a 13% relapse rate, attributed to the use of outdated treatment protocols (27).

Incidence rate ratio of relapse for SAM rose if nutritional edema was present at the time of first admission. Similar to this, due to subpar treatment and counseling, being in the age ranges of 6–11 months elevated the incidence rate ratio of relapse when compared to the 48–60 month age group (20).

SAM relapse prevalence was 10.1% in a facility-based cross-sectional research conducted in western Ethiopia, Gambela Region. In children whose mothers had not received information or encouragement regarding infant and young child feeding (IYCF) practices, the likelihood of relapse into SAM was significantly greater (28).

Anthropometric factors associated with SAM Relapse

Research and program assessments consistently show that children who did not meet the recommended anthropometric discharge criteria or who were discharged early faced a higher risk of relapse. Including defaulters in the definition of relapse likely increases the proportion, as it is challenging to determine if they recovered and then relapsed or remained malnourished (4).

A prospective cohort study in Malawi found a 1.9% relapse rate, highlighting that using MUAC as a discharge criterion helped in early SAM detection, potentially reducing relapse rates. However, the initial treatment cure rate was relatively low (63%) due to early discharge. During the follow-up period, children in the supplementary feeding program (SFP) were monitored to ensure continued recovery. (11). Another prospective cohort study in Mali found similar relapse rates for children with MUAC < 125 mm and/or edema, regardless of their initial admission MUAC, indicating that lower anthropometric measurements at both admission and discharge predicted relapse (29).

Research in Ethiopia supports that the SAM relapse rate is significantly higher among children with a MUAC of less than 125mm at discharge, emphasizing the importance of MUAC measurements in predicting relapse. (3,28)

2.1 Conceptual framework

Children suffering from acute malnutrition during humanitarian crises go through phases of recovery, relapse, and default. investigates instances of failure, return, and recovery in the management of acute malnourishment (30). While not solely focusing on theoretical literature, it provides valuable insights into the challenges faced throughout treatment. We discuss what is meant by severe acute malnutrition (SAM) and moderate acute malnutrition (MAM), as well as their respective ranges. The review highlights how important it is to understand rates of default and relapse in order to enhance program effectiveness Conceptual Framework. the thorough examination of the recurrence of acute severe malnutrition (4).

Children who were discharged from treatment before fulfilling the WHO's recommended criteria for discharge were shown to have a higher likelihood of experiencing severe acute malnutrition following treatment, which may signal relapses or ongoing episodes of SAM after only partial recovery. Moreover, it was consistently found that worse anthropometric parameters at admission and discharge were associated with a higher risk of SAM after treatment. Several studies have suggested that children who were released from treatment based only on anthropometric criteria may have remained immunologically susceptible to infection when they relapsed (3,8,11) .Seasonality in food security and infectious diseases, as well as characteristics at the household level such feeding habits, hygienic living circumstances, and socioeconomic position, yielded inconsistent results.(17,31), vaccination status (3,4,8,20,28), diet and feeding practices (4,28).the conceptual framework was adopted from the above literatures

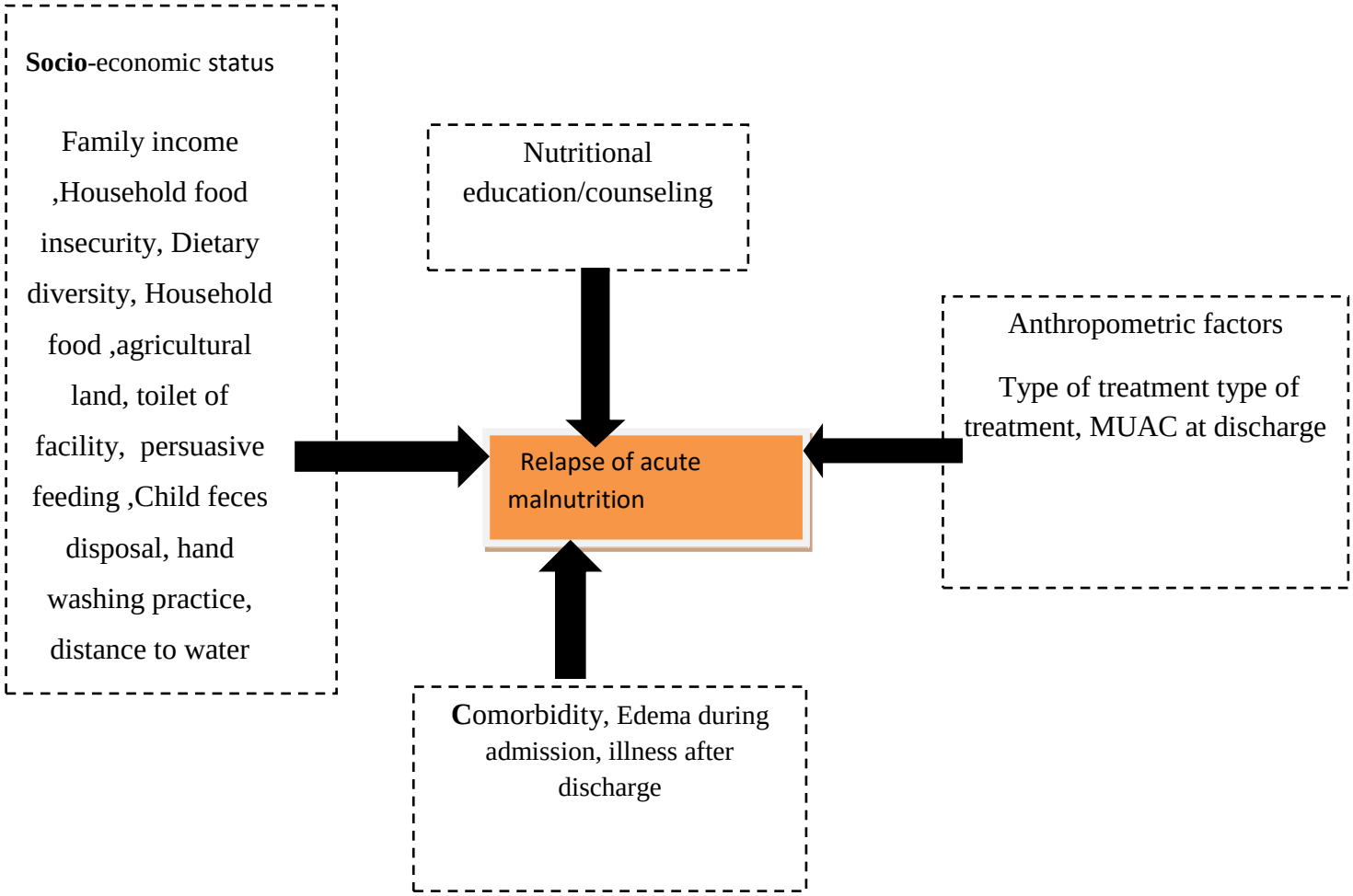


Figure 1; conceptual framework; Magnitude and associated factors among 6months upto five years' children in East Borena Zone, Ethiopia, 2024

3. Objectives

3.1 General Object

To identify, magnitude of relapse after cure for severe acute malnutrition and associated factors among children aged 6-59 month in East Borena Zone, Oromia Region, Ethiopia, 2024.

3.2 Specific Objective

- To assess magnitude of relapse after cure for acute malnutrition among children aged of 6-59 months in East Borena Zone, Oromia Region, and Ethiopia.2024.
- To identify factors associated with relapse after cure for acute malnutrition among children aged of 6-59 months in East Borena Zone, Oromia Region, and Ethiopia.2024
- To explore the experiences and challenges faced by caregivers of children who relaps ed after cure from acute malnutrition in East Borena Zone, Oromia Region, Ethiopia,2 024

4. Methods and Materials

4.1. Study area and periods

The study was conducted in East Borena, Oromia National Regional State, Southern Ethiopia. The zonal town, Negele Borena, is one of the zones in the Oromia Region. It is located at a distance of 595 km from Addis Ababa, the capital of the country. The approximate geographical coordinates of the zonal town of Negele Borana are Latitude: 5° 19’ 60.00" N, Longitude: 39° 34’ 59.99" E. It is named after its administrative center.

East Borena Zone is bordered on the south by Kenya, on the west by the Southern Nations, Nationalities, and Peoples' Region, on the north by the West Guji and East Guji zones, and on the east by the Dawa Zone in the Somali Region. The altitude of the East Borena Zone ranges from 1150 to 1350 meters above sea level.

Based on figures from the Zonal Health Office in 2016 E.C., the zone's population was estimated to be about 601,087, of which 298,139 (49.6%) were females and 302,947 (50.4%) were males. Out of this total population, the number of children aged 6-59 months was estimated to be about 90,164, with 44,991 males and 45,273 females. The zone has 8 woredas and one Administrative town. In terms of health facilities, it has 3 hospitals, 28 health centers, 116 health posts, and 30 stabilization centers

The study was conducted in the East Borena Zone from July 11 to August 30, 2024.

4.2. Study Design

An instructional based cross-sectional study and concurrent study design was used.

4.3. Population

4.3.1. Source of Population

The source population included all children aged 6 to 59 months who had recovered and been discharged from the stabilization center (SC) in East Borena Zone, along with their mothers or caregivers within the1month 20days (from July 11, 2024 to August, 30, 2024)

4.3.2. Study Population

The study population consisted of consecutively selected children aged 6 to 59 months who had recovered and been discharged from the stabilization center in East Borena zone from July11 to August 30, 2024

4.3.3. Study Unit

Mothers or possible primary caregivers of children who had been discharged from the stabilization center during the study period in East Borena Zone in 2024

4.4. Inclusion and Exclusion Criteria

4.4.1. Inclusion Criteria

Children aged 6 to 59 months who were discharged as recovered from the stabilization center during the data collection period, along with their mothers or caregivers, were included in the study.

4.4.2. Exclusion Criteria

Mothers or caregivers of children who were severely ill or on chronic medication during the data collection period were excluded from the study.

4.5. Sample Size Determination

For Objective 1, the sample size was calculated using the single population proportion formula, based on a similar study conducted in East Ethiopia. The study focused on the relapse of acute malnutrition after discharge from stabilization centers. The initial prevalence of relapse was 36.2%, considering an expected recovery rate from stabilization centers.

Where: n= minimum sample size required for study p= estimated prevalence from literature 36.2% (.362) Z α/2 = critical value at 95% confidence level of certainty (1.96). d= margin of error 5% (0.05). Thus, n is calculated as: n = z 2pq/ d 2 = where q = 1-p, n

= (1.96)2(0.362) (0.638)/ (0.05)2= 355. After 10% non-response rate was added to the sample size the final sample size obtained was 391.

Additionally, the sample size for factors associated with relapse to severe acute malnutrition was calculated using EPI INFO statistical software version 7.2.1. Assumptions included an 80% power, 95% confidence level, and a ratio of unexposed to expose of 1.5. Considering the total cases admitted in the East Borena Zone (355), all severe acute malnutrition (SAM) cases were included in the study.

Table 1 Objective two; Sample size calculation for relapse to severe acute malnutrition children population in East Borena Zone, Oromia, Ethiopia, 2024

Variables	**Proportion relapse among children cured from SAM**		**Sample size computed**	**Computed sample size +(10%)NR**	**Reference**
	Exposed	Unexposed			
Frequency of BF/day	<8(6.3%)	8-12(18.3%	105	116	(32)
MUAC	MUAC <110 mm (27.7%	MUAC ≥ 115 (mm43.7%)	320	352	(3)
Household food security status	Low to middle income	moderately to severely food insecure	208	229	(28)

Qualitative Sample size Determination

For this study, a purposive sampling method was used to select children who had been discharged from stabilization centers and had experienced relapse. This approach provided deep insights into the factors contributing to relapses rates. Participants were identified based on their medical history of severe acute malnutrition (SAM) and subsequent relapse, as recorded in stabilization databases and verified by experienced health professionals.

Initially, nine focus group discussions (FGDs) were planned, with each FGD consisting of eight to twelve participants across different facilities. However, due to data saturation, six FGDs were conducted three with mothers/caregivers and three with experienced health workers and community health representatives. Overall, 47 participants took part in these FGDs. The qualitative data complemented the quantitative findings by providing context and insights into the lived experiences of the participants and the factors associated with relapse rates.

4.6. Sampling procedure

The consecutive sampling technique was used to select 387 participants from all the stabilization centers in the East Borena Zone. These centers were located in eight woredas and one administrative town, which were included in the study. Initially, 30% of the woredas were randomly selected, resulting in three woredas. These three woredas had a total of nine stabilization centers this research was conducted in these stabilization centers.

The total number of participants was determined based on the case load of each center, as recorded in their registration books. The final sample was obtained from each center using proportional allocation. Specifically, the total sample size was proportionally distributed across all selected health facilities that provided stabilization services in the study area. This allocation was based on the number of children with Severe Acute

Malnutrition (SAM) admitted to each facility. This procedure ensured a representative sample, reflecting the distribution of SAM cases across the stabilization centers.

Calculation of Case Load for Each Center

The case load was calculated for each center using information from the registration book. Specifically, the case load represented the number of children with Severe Acute Malnutrition (SAM) who were admitted to each center.

Proportional Allocation

The sample was allocated proportionally based on the case load of each Hospitals contributed more to the overall sample size.

Allocation of Total Sample Size

The total sample size (387) was distributed across all selected health facilities that provided stabilization center in the study area.

Allocation Criteria

The allocation was determined based on the number of children with SAM who were admitted to stabilization center in each facility.

The total case load for each woreda was calculated as follows: Total case load = 7centers and Two hospitals × case load per center

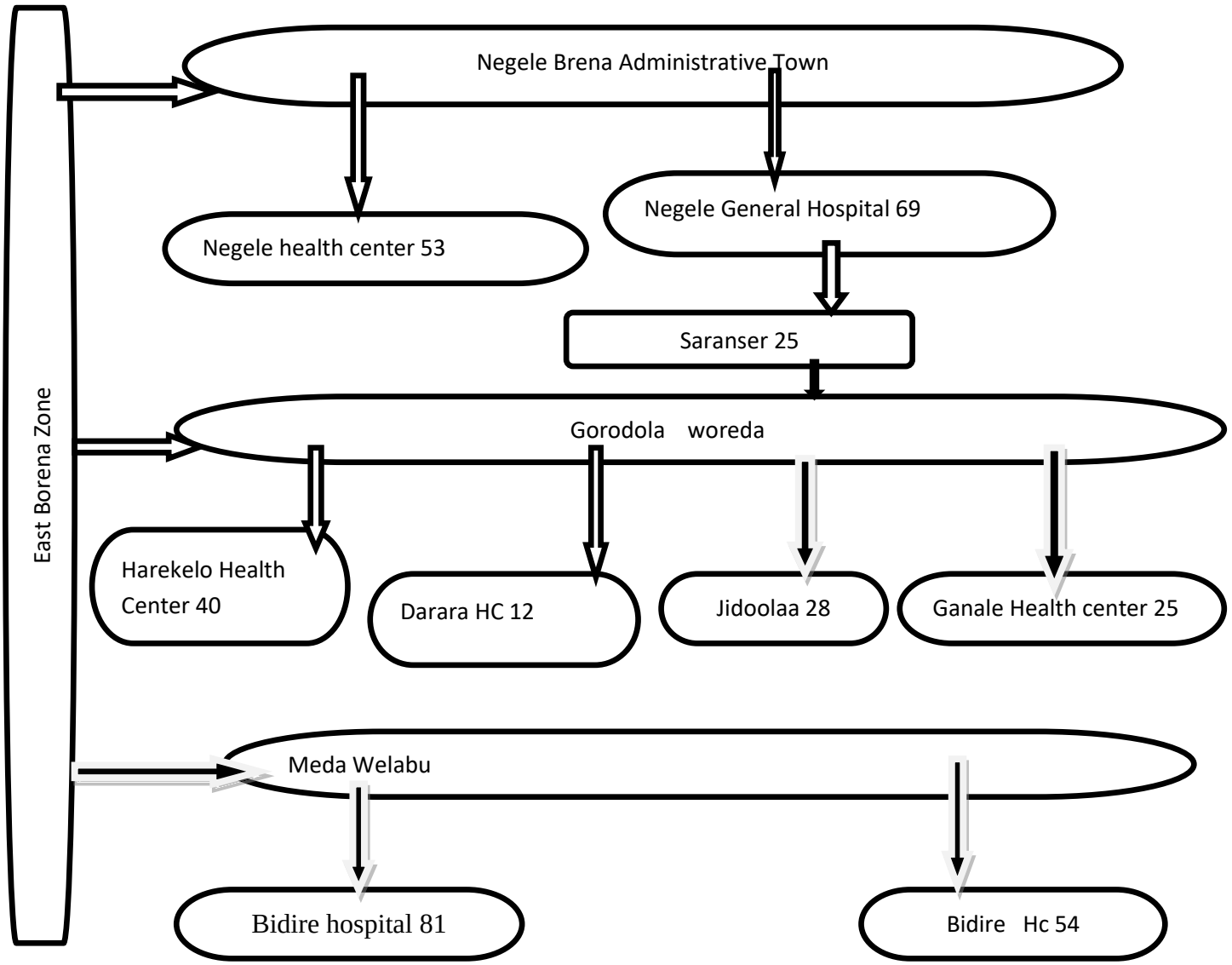


Figure 2: Sample size determination relapse of acute malnutrition and associated factors among 6months upto five years' children in East Borena Zone Ethiopia, 2024

Qualitative Sampling Procedure

For this study, a purposive sampling technique was employed to select participants for Focus Group Discussions (FGDs), targeting those with direct experiences or perspectives related to the care and recovery of children suffering from Severe Acute Malnutrition (SAM). Specifically, experts involved in the SAM treatment process, including medical staff and community health representatives, were chosen from nine stabilization centers. This selection continued until data saturation was reached, ensuring no new information was emerging from additional participants. Initially, nine FGDs were planned, with each group comprising eight to twelve participants. However, due to data saturation, six FGDs were ultimately conducted three with mothers/caregivers FGD and three FGD with experienced health workers and community health representatives. In total, 47 participants took part in these discussions. The qualitative data obtained from the FGDs complemented the quantitative findings, providing context and deeper insights into the lived experiences of the participants and the associated factors. .

4.7. Data collection procedures

Before data collection, a total of 4 data collectors (BSC nurses) with experience and training in Severe Acute Malnutrition (SAM) management were recruited. Additionally, three supervisors (BSc level) and three data clerks were enlisted. They underwent a one-day training covering both qualitative and quantitative data collection techniques, including active listening, probing, and the use of data collection tools.

The data collection tools included: Checklist: Prepared using the Stabilization Center (SC) multi-chart and registration logbook. Kilogram and height measurement scales and Mid-Upper Arm Circumference (MUAC) measurements. Video and Audio recording was employed during interviews and focus groups, with consent from participants. Field notes were maintained during observations to document non-verbal cues and contextual information for qualitative analysis.

Questionnaires initially prepared in English and Translated to the local language (Afan Oromo) and back to English to ensure consistency. The questionnaire aimed to identify variables associated with relapse in severe acute malnutrition. To trace discharged and recovered children, the number of admitted cases from the establishment centers and Health Management Information System (HMIS) report and the names of the children were extracted from their respective hospital and health center registration books, serving as the sampling frame. Prior to data collection, the questionnaires were pre-tested on 5% of actual respondents in another health facility outside the study area. The pre-test assessed understandability and clarity, and appropriate corrections were made based on the findings. Informed consent was obtained for audio recording during data collection

4.8.1 .Dependent variables

Relapse of severe acute under nutrition

4.8.2. Independent variables includes,

Socio demographic factors;

Age of the child, Occupation of family/care giver, parent education, sex of the child, area of Residence, marital status of care giver

Socioeconomic factors

Family income ,Household food insecurity, Household food ,agricultural land, toilet of facility, parent led feeding, persuasive feeding ,Child feces disposal, hand washing practice, distance to water source and source of water , BF, Access to Healthcare and Support, Follow-Up Protocols, Integration with Other Services, Challenges and Solutions,

Medical factors: Type of treatment type of treatment, MUAC at discharge, immunization status, edema during admission, illness history

Education and promotion on Nutrition

Measurement of Variables

Relapse was considered in a child whose MUAC is < 125 mm and/or the presence of bilateral pitting edema after discharge from inpatient treatment programs. Children whose WFH is < -2 SD and/or MUAC 115 to < 125 mm were categorized as Moderate Acute Malnutrition (MAM), whereas children whose WFH < -3 SD and/or MUAC < 115 mm and/or bilateral edema were considered Severe Acute Malnutrition (SAM) (33)

4.9. Operational Definitions

Severe acute malnutrition; It is diagnosed by weight for- height below -3 SD of the WHO standards, by a MUAC < 11.5 cm and by Clinical sign having bilateral edema (34)

Severe Acute Malnutrition Relapse:

Relapse; Cured within the past 3 months and now meets the admission criteria for SC or OTP. refers to the return or reemergence of symptoms or conditions that were previously under control or in remission In the context of severe acute malnutrition (SAM), relapse would mean that a child who had recovered from SAM experiences a return of malnutriti on symptoms, such as weight loss, reduced appetite, or other clinical signs of malnutrition (1)

Caregiver: caregiver is an individual, typically a parent or guardian, who is responsible f or the daytoday physical, emotional, and nutritional needs of a child. In the context of SA M(1).

Recovered; Patient that has reached the discharge criteria or Weight-for-height/length Z-score is ≥ –2 SD, and child has had no edema for at least 2 weeks; OR MUAC is ≥ 125 mm and child has had no edema for at least 2 weeks (1).

Defaulter; children who were absent treatment for two consecutive sessions (1)

Good Hand Washing Practice :A respondent was be categorized as having good hand washing practice if they reported washing hands at 3 or more of the recommended critical times/points (before eating, before preparing food, after defecation, and after cleaning child's bottom) (35,36)

Household food insecurity status: Before determining the food insecurity category (access), each response indicating the frequency of occurrence was coded as 0 if the answer to the corresponding occurrence question was "no." Following this, the four food security categories were calculated and created sequentially according to recommendations. Ultimately, HFIA category 1 was designated as food secure, while the others were classified as food insecure (31,37)

Wasting: Severe wasting in a child is characterized by significant loss of fat and muscle, resulting in a "skin and bones" appearance. This condition, also known as non-edematous malnutrition or marasmus, is indicated by a Z score of less than -2.

Kwashiorkor or edematous malnutrition; is a severe form of undernutrition where the child's muscles are wasted. However, this wasting might not be visibly noticeable due to generalized edema, which causes swelling from the accumulation of excess fluid in the tissues (1)

4.11. Data Quality Assurance

To ensure the integrity of both qualitative and quantitative data, comprehensive training was provided to supervisors and data collectors. The training covered the study's objectives, relevance, and ethical considerations, including confidentiality and informed consent. Pre-testing procedures were carried out to evaluate the functionality and clarity of the data collection tools. The findings were reviewed with the data collectors, leading to necessary adjustments in the questionnaires. Data obtained from the pre-test were excluded from the final analysis.During the actual data collection, the Principal Investigator (PI) and supervisors closely monitored the process to promptly address any

ambiguities or uncertainties. Completed questionnaires were reviewed daily for completeness and relevance, and feedback was provided to data collectors to enhance the quality of subsequent data collection.

Before analysis, the data underwent thorough cleaning to remove any inconsistencies or errors. A double-entry method was employed to ensure the accuracy of data entry. Throughout the development, collection, coding, entry, and analysis stages, rigorous quality checks were in place to maintain the highest standards of data quality

4.11. Data Processing and Analysis

Data were initially checked manually for completeness. Once verified, the data were coded and entered into Epi Info 7.2.1. Following this, the data were exported to SPSS version 27 for further analysis. Cleaning procedures involved visualizing, calculating frequencies, and sorting the data. Any errors identified during this process were corrected by revising the original data using code numbers and statistical commands.

The data were then presented using percentages and distributions of respondents based on socio-demographic characteristics and other relevant variables. Logistic regression analysis was employed to identify factors associated with severe acute malnutrition (SAM) among study participants. Explanatory variables that were associated with the outcome variable in the bivariate analysis (P-values ≤ 0.25) were considered candidates for the multivariable logistic regression analysis.

Backward-stepwise logistic regression models were utilized to control for confounders, and multicollinearity was checked to ensure that VIF values were less than 10 and standard errors were below 2. The Hosmer–Lemeshow goodness-of-fit statistic was used to assess whether the assumptions necessary for the multiple logistic regression models were met ($P > 0.05$). Variables showing significant associations with the outcome variable were included in the final model.

Lastly, the crude odds ratio (COR) and adjusted odds ratio (AOR), along with their 95% confidence intervals (CIs) and P-values, were calculated and displayed in tables A P-value below 0.05 was regarded as statistically significant.

For qualitative data analysis, themes and codes were identified using QDA Miner software alongside manual analysis. Audio recordings and notes from focus group discussions (FGDs) were transcribed verbatim and translated from Afaan Oromo to English. After an initial review of the transcripts, recurring themes were identified, and inductive codes were developed. All transcripts were organized based on the established coding system, which were then grouped into broader categories and overarching themes.

Quantitative and qualitative data were analyzed individually with the results were come together for interpretation. A side-by-side comparison was conducted, first presenting the quantitative statistical results, followed by qualitative findings that either confirmed or refuted the statistical outcomes.

4.12. Ethical Considerations

Ethical clearance was obtained from institutional review boared of Selale University. Aformal letter for permission and support was written to the East Borena Zone Health administration fom Salale University and official permission to undertakethe the study with the reference number of S/U/IRERC 118/2016 was obtaind. Informed verbal consent was obtained from each respondent after a thorough explanation of the study's purpose and procedures. Participants were informed of their right to discontinue or refuse participation. All responses were kept confidential and Anonymous.

4.13. Results Dissemination plan

After completion of the study, the thesis reports will be submitted to Salale University, College of Health Science, and Department of Public Health. In addition, the thesis results will be defended to Salale University, College of Health Science community, and examiner. Besides, a summarized technical report will be disseminated to, Oromia Regional Health Bureau, East Borena Zonal Health Department, East Borena District Health Office, and all stakeholders in the East Borena Zone .Furthermore, the manuscripts will be prepared, efforts will be made to present the results on scientific conferences, and peer-reviewed journal publications will be considered for scientific community

5. RESULT

5.1 .Socio Demographic Characteristics

Out of the 391 children who were initially calculated as the sample size to enroll in the study, 387 participants agreed to participate, resulting in a response rate of 99.0%. Among the study participants, 210 (54.3%) were males, and 177 (45.7%) were females. The children's ages ranged from 6 to 59 months

Characteristics	Category	Frequency	Percentage (%)
Age of the child	6-11months	160	41.3
	12-23 months	186	48.1
	24-59 months	41	10.6
Sex of the child	Male	210	54.3
	Female	177	45.7
Sex of care giver	Male	45	11.6
	Female	342	88.4
Age of care giver	15-30	159	41.1
	31-45	194	50.1
	>45	34	8.8
Marital status of care giver	Single	26	6.7
	Married	297	76.7
	Divorced/ Separated	53	13.7
	Widowed	11	2.8
Religion	Islamic	162	41.9
	Orthodox	82	21.2
	Protestant	134	34.6
	Wakefata	9	2.3
Educational level	Cannot read	237	61.2
	Elementary	106	27.4
	5-12 grade	32	8.3
	College and above	12	3.1
Occupation	Employed	56	14.5
	Farmer	68	17.6
	Housewife	191	49.4
	Daily Laborer	72	18.6
Average monthly income	1000 Bir-1500birr	296	76.5
	3000 Birr	60	15.5

	Above 3000 Birr	31	8.0
	Category	Frequency	Percentage (%)
family size	1-3	26	6.7
	4	47	12.1
	Above 4	314	81.1
Residence	Urban	201	51.9
	Rural	186	48.1

Table 2 ; Socio demographic and economic characteristics of study participants, East Borena Zone, Oromiya, Ethiopia 2024(n=387)

5.2 Environmental characteristics of study participants

This study examined the relapse cases of severe acute malnutrition in the East Borena Zone, focusing on two hospitals and seven health centers. Between July 11 and August 30, 2024, the study included 387 children with severe acute malnutrition. Among these, 240 children (62%) were new admissions, while 147 children (38%) were readmissions or relapses. In terms of water sources, 215 households (55.6%) used water from dug wells, 118 households (30.5%) used piped water, and 54 households (14.0%) relied on spring water.

	Variables	Frequency	Percent
Type of admission	New admission	236	61.0
	Re admission	151	39.0
Main source drinking water	Piped water	162	41.9
	Dug well	169	43.7
	Water from spring	56	14.5
Water source not available in 24 hrs.	In own dwelling	16	4.1
	In own yard/plot	275	71.1
	A river or stream	96	24.8
Kinds of toilet facility	Pour Flush toilet	10	2.6
	Pit latrine	203	52.5
	Open field	174	45.0
Kind of water treatment	Boil	155	40.1
	Add bleach/chlorine	60	15.5
	Strain through a cloth	148	38.2
	Use water filter (ceramic)	3	.8
	Sand/composite/etc.	21	14.2
Agricultural land in hectares	No agricultural land	155	40.1
	1 Hectare	155	40.1
	2 Hectares	53	13.7
	3 and above Hectares	24	6.2

Table 3 Environmental Characteristics of study participants of Children, East Borena Zone Ethiopia, 2024.

5.3 Household Food Insecurity Access Scale (HFIAS*)*

Household Food Insecurity Access Scale (HFIAS). In a study conducted in the East Borena Zone, 387 caregivers of children with severe acute malnutrition were assessed, revealing that 63.3% lacked resources.

Variables			Frequency	Percent
Lack of resource	Yes	Rarely	90	23.3
		Sometimes	68	17.6
		Often	87	22.5
	No		142	29.5
Have no enough food	Yes	Rarely	60	15.5
		Sometimes	60	15.5
		Often	104	26.9
	No		163	42.1
Limited variety of food to eat	Yes	Rarely	72	18.6
		Sometimes	135	34.9
		Often	51	13.2
	No		129	33.3
Eat some food	Yes	Rarely	82	21.2
		Sometimes	138	35.7
		Often	46	11.9
	No		121	31.3
Have smaller meal to eat	Yes	Rarely	84	21.7
		Sometimes	115	29.7
		Often	30	7.8
	No		158	40.8
Eating smaller (fewer)meal	Yes	Rarely	74	19.1
		Sometimes	111	28.7
		Often	29	7.5
	No		173	44.7
Have no food to eat	Yes	Rarely	53	13.7
		Sometimes	94	24.3
		Often	40	10.3
	No		200	51.7
Go to sleep at hungry	Yes	Rarely	21	5.4
		Sometimes	78	20.2
		Often	52	13.4
	No		236	61.0
Without eating any thing		Rarely	32	8.3
		Sometimes	80	20.7
		Often	46	11.9
	No		229	59.2

Table 4 Household Food Insecurity Access Scale (HFIAS) of study participants of Children, East Borena Zone Ethiopia, 2024

5.4 Child Feeding Practice among children treated for Severe Acute Malnutrition.

Child Feeding Practice among children treated for Severe Acute Malnutrition. Out of 387 admitted with severe acute malnutrition 173(44.2%) received deworming tablets and vitamin A 83(21.4) were treated at the stabilization center and 304 (78.6) were at the outpatient treatment program

Variable	Yes/no	Frequency	Percent
Shared plumpnut	Yes	207	53.5
	No	180	46.5
Baby finished plumpnut	Yes	189	48.8
	No	198	51.2
Baby received antibiotics	Yes	377	97.4
	No	10	2.6
Colostrum give	Yes	335	86.6
	No	52	13.4
Prelacteal feeding	Yes	353	91.2
	No	34	8.8
Currently breast feeding	Yes	363	93.8
	No	24	6.2
Frequency of bf	8-12 times	330	85.3
	Less than 8 times	58	14.7
prepare food separately for the child	Yes	193	49.9
	No	194	50.1
Trained for preparation child diet	Yes	329	85.0
	No	58	15.0
Child feces disposal	Yes	172	44.4
	No	215	55.6
deworming tablet	Yes	171	44.2
	No	216	55.8
vitamin A supplementation	Yes	173	44.2
	No	216	55.8
vaccinated for measle	Yes	171	44.2
	No	216	55.8
illness history	Yes	173	68.2
	No	214	55.3

Variable	Yes/no	Frequency	Percent
diagnosis during admission	Non-edematous	31	81.7
	Edematous	71	18.3
Admission with MUAC	Yes	304	78.6
	No	83	21.4
MUAC of children at discharge	<11.5cm	33	8.5
	11.5-12.5cm	25	6.5
	>12.5cm	329	85.0
child first treatment	OTP	304	78.6
	SC	83	21.4
currently on treatment	Yes	368	95.1
	No	19	4.9
Current MUAC	<11.5cm	105	27.1
	11.5-12.5cm	144	37.2
	>12.5cm	138	35.7
number of under five children within households	1	78	20.2
	2	186	48.1
	3 and above	123	31.8

Table 5 Child feeding practice variables associated with relapse to severe acute malnutrition at East Borena Zone Ethiopia 06/11/2024-07 /30/2024 G.c (n = 387)

Nutritional characteristics of children aged 6-59 months With Diagnosis

The majority of children (81.7%) admitted with SAM did not present with edema. This suggests that while edema is a significant symptom in SAM cases, most children in this study exhibited other forms of severe malnutrition.

Variable	Characterstics	Frequency	Percent
Presence of edema during first admission	Edematous	71	18.3
	Non Edematous	316	81.7
Treatment outcomes	Cured	354	91.5
	Defaulter	20	5.2
	Non-response	6	1.6
	Transfer out	7	1.8
MUAC of children at discharge	<11.5cm	34	8.8
	11.5-12.5cm	26	6.7
	>12.5cm	327	84.5
Weight gain during discharge from SC program	<5g/kg/day	295	76.2
	5-10kg/day	72	18.6
	>10kg/kg/day	20	5.2
currently on treatment	Yes	368	95.1
	No	19	4.9
MUAC during admission	<110mm	238	61.5
	110-115mm	109	28.2
	>115	40	10.3
number of under five children within households	1	78	20.2
	2	186	48.1
	3 and above	123	31.8

Table 6 Nutritional characteristics of children aged 6-59 months With Diagnosis in East Borena Zone 2024

5.5. Magnitude of Relapse Among study Participants.

The overall relapse rate during the study period among children aged 6-59 months in East Borena Zone was 38%.

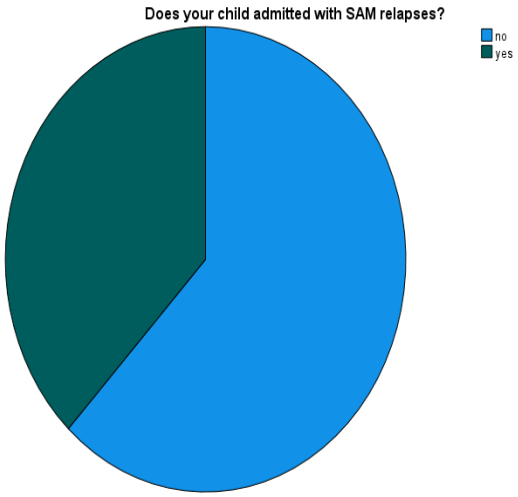


Figure **3** ; prevalence of severe acute malnutrition in East Borena Zone, 2024

5.6 Factors associated with relapse among children cured for severe acute malnutrition

5.6.1 Results of Bivariable Analysis

In a bivariate logistic regression analysis, various factors such as, education level, occupation, and ownership of agricultural land, main source of water, and MUAC during admission, Weight gain during discharge were examined in relation to the dependent variable (Table 7). The analysis found that low educational levels, especially the inability to read and write, are significantly associated with a higher risk of relapse in children. Notably, having a college education or above is associated with an 8.1 lower likelihood of relapseThe source of water used from Dug well plays a crucial role and has a significantly higher risk of relapse, 1.9 times higher for individuals relying on this source compared to the spring water source.

Another critical factor is the Mid-Upper Arm Circumference 110-11,5mm during admission decreases about 5.66 times than MUAC <110mm higher risk of relapse. Furthermore, using pit latrine 5.62 times less likely using open filed.

These variables were found to be significantly associated with SAM relapse at a p-value of less than 0.25, underscoring their importance in addressing and preventing the recurrence of severe acute malnutrition in children

Table 7: Result of Bivariate and Multivariate analyses on factors associated with relapse to severe acute malnutrition in East Borena Zone Oromiya, Ethiopia, 2024

Variabl	Category	Relapse		COR	AOR
		Yes%(n=147	No%(n=234		
Occupation	Employed	18((12.24)	38 (16.24)	1.421(.655-3.081)	.540(.230-1.266)
	Farmer	36 (24.5)	32 (13.7)	2.667(1.304-5.45)	.288(.130- .636)
	Housewife	79 (53.7)	112(48)	2.116(1.154-3.88)	.465(.239-.90)
	Daily labor or Merchant	18 (12.24)	54 (23.1)	1	1
Education	Unable to read and write	79(53.7)	158(68)	1	1
	Elementary	44 (30)	62 (26.4)	.357(.110- 1.161)	**.219(.057, .834)***
	5-10 grade	15 (10.2)	17 (11.6)	.507(.151- 1.701)	.342(.086- 1.356)
	College and above	7 (4.8)	5 (3.4)	.810(.212-3.0960)	.595(.135- 2.615)
Agricultural land owned	0	50(34)	105(71.4)	1	1
	1	56 (38)	99 (67.3)	.238(.096- .593)	**.203(.072- .573)***
	2	25 (17)	28 (19)	.283(.114-.702)	**.316(.113- .887)***
	3 and above	16 (10.9)	8 (5.4)	.446(.163-1.220)	.389(.126-1.208)
Main source of water	Piped	80 (54.4)	82 (56)	1	1
	Dug well	48 (32.7)	121 (82.3)	1.900(1.009- 3.578)	**2.907(1.414, 5.977)***
	Spring	19 (13)	37 (25.2)	.773(.405-1.474)	1.038(.503-2.145)
Toilet facility	Flush or pour flush toilet	5 (3.4)	5 (2.14)	1.260(.352-4.50)	.791(.185- 3.384)
	Pit latrine HHS	65(44.2)	138(59)	.593(.390- .903)	**1.784(1.104--2.883)***
	open field / brush	77(52.4)	97(66)	1	1

presence of soap, at the place for hand washing	Soap	76(52)	149(64)	1	1
	Ash or sand	25(17)	31(13.25)	.665(.415- 1.068)	**.492(.283, .854)***
	No	46(31.3)	60(25.6)	1.052(.548- 2.019)	1.466(.697-3.083)
MUAC during admission	<110mm	86(58.5)	152(65)	1	1
	110-11.5mm	41(28)	68(29)	.566(.288-1.110)	**.385(.181- .817)***
	>11.5mm	20(13.6)	20(8.54)	.603(.290-1.252)	.473(.206-1.089)
Weight gain during discharge	<5 g/kg/day	106(72.1)	189(80.8)	1	1
	5–10 g/kg/day	28(19.05)	44(18.8)	.302(.117-.780)*	.275(.095-.798)
	>10 g/kg/day	13(8.84)	7(3)	.343(122- .963)	.362(.115-1.142)

Note: *Statistically significant in multivariable logistic regression at P-value of 0.5 **statistically significant in multivariable logistic regression, severe malnutrition relapses, AOR: Adjusted odds ratio, CI: Confidence interval, COR: Crude odds ratio, and 1 = reference, the p-value of the fitness of the model was, 0.460

5.5.2 Results of Multivariable Analysis`

The multivariable logistic regression analysis identified several factors significantly associated with the relapse of severe acute malnutrition (SAM) among children aged 6-59 months.In the multivariable logistic regression, variables such as family size, education, occupation, agricultural land owned, main source of water, MUAC during admission, and type of toilet facility were significantly associated with the dependent variable (Table 7).

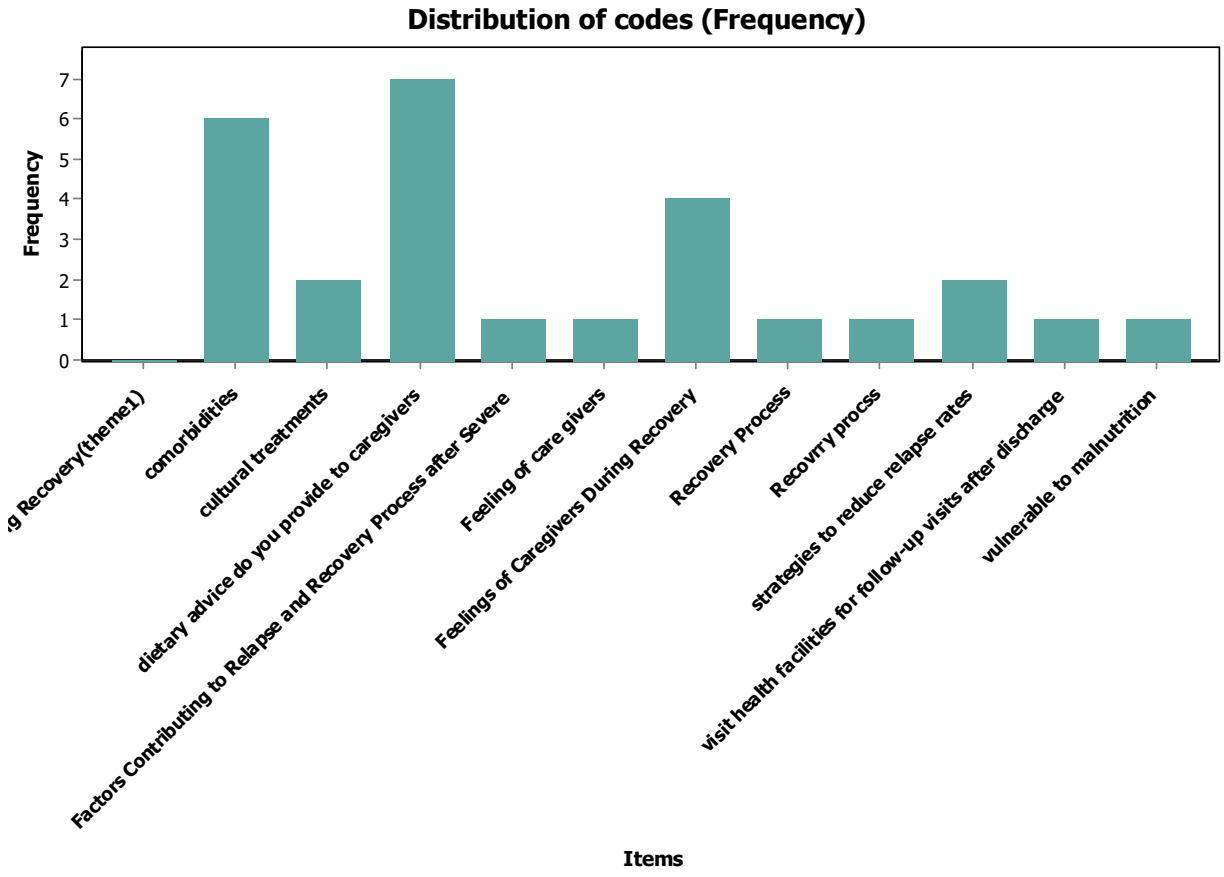
Children of caregivers with elementary education are 2.19 less likely to when compared to children of caregivers with care givers who are can not read and write. This indicates that lower educational levels among caregivers are a strong predictor of relapse.

Children admitted with a mid-upper arm circumference (MUAC) of less than 110-115mm 5.66 times less likely to experience SAM relapse when compared with childrens <110mm.

These factors were found to be significantly associated with SAM relapse at a p-value of less than 0.05, highlighting their importance in addressing and preventing the recurrence of severe acute malnutrition in children. Addressing these risk factors through targeted interventions could significantly reduce the likelihood of SAM relapse and improve overall child health outcomes.

5.3 Qualitative Data Result

A total of 47 individuals participated in six focus group discussions (FGDs). These FGDs included caregivers and health professionals experienced with children suffering from relapses of severe acute malnutrition (SAM) and those working in OTP (Outpatient Therapeutic Program) and SC (Stabilization Center) settings. Among the mothers, those with larger family sizes and lower literacy levels were more vulnerable. The children's ages ranged from 11 to 24 months. Most participants were aged 21–40 years, with varying educational backgrounds: illiterate (n=11), secondary education (n=9), and tertiary level (n=27). Participants actively engaged in the discussions, providing enthusiastic responses. Their answers were coded and analyzed using QDA Miner, where responses were compared for similarities and differences, merged, and categorized into four main themes: Challenges in Ensuring Recovery, Factors Contributing to Relapse, Recovery Process, and Strategies to Reduce Severe Acute Malnutrition.



Figure**Figure 4**; distribution of codes of qualitative data of East Borena Zone Ethiopia, 2024

Table8; themes and subthemes for qualitative data analysis
in East Borena Zone, Oromia Region, Ethiopia, 2024

S.no	Main Themes	Sub Themes(categories)
1	Challenges in Ensuring Recovery	Lack of Accessible Information
2	Factors Contributing to Relapse and Recovery Process after Severe Acute Malnutrition (SAM)	Environmental factor
3	Recovery Process	Food diversity issues:/Food insecurity factors
4	Strategies to reduce acute malnutrition	

6.5.3.1 Theme 1: Challenges in Ensuring Recovery

Under this theme, three categories emerged: financial strain due to treatment costs and transportation, isolation from caregiving demands impacting social interactions and support networks, emotional distress from judgment or blame related to their child's malnutrition, and difficulty accessing medical care, nutritious food, and information. Various opinions about risk factors and causes emerged. This was supported by FGD informant interview, as one participant stated

"There is no transportation during the follow-up period," a female, 35-year-old participant mentioned

Another key informant interview participant also stated that:-

"It's difficult to access medical care in our area," said 38 years old female a participant from FGD. In the same manner, another

"I struggle to get nutritious food for my children," a 29-year-old mother explained during the FGD.

Lack of Accessible Information:

Regarding proper nutrition and care

“There is a lack of accessible information regarding proper nutrition and care,” mentioned a 37-year-old participant from the FGD.

Another participant a 34-year-old woman mentioned, "Due to my limited literacy and lack of education on IYCF practices, along with food insecurity and inadequate water and sanitation, my child were malnourished.

6.5.3.2 Theme 2: Factors Contributing to Relapse and Recovery Process after Severe Acute Malnutrition (SAM)

Participants in groups including caregivers, highlighted several factors associated with relapse after severe acute malnutrition (SAM). A female 30 years health worker stated:

Based on my work experience, I have identified several factors that cause severe acute malnutrition “encompass child feeding habits, food insecurity, mid-upper arm circumference (MUAC) measurements at both admission and discharge, incomplete immunization and perspectives on family planning that affect its practice”

Another male 30 years old health worker from FGD stated in groups 1 noted that “living in settings of pervasive poverty and drought within the study area contributes to relapse”.

Similarly 31 years female stated, “Having more than one under five children at home and also Poor follow-up after discharge due to transportation also contribute to relapse.”

Environmental factor; The focus group discussions (FGDs) identified several environmental factors contributing to severe acute malnutrition, Lack of education and counseling for mothers on child feeding practices, Malaria and other diseases exacerbate malnutrition.

Female 34 years participant states that “Absence of pure water is one of the major cause of malnutrition this causes communicable disease our children”

Food diversity issues: A 31 years old participant stated, “Food diversity in the area is the main problem for the population. Since the area is drought-prone, I can’t buy vegetables and fruits because they are not available and are expensive. Similarly another 27 years participant states “lack of education and counseling for a mother on child feeding practices, and malarial disease also contribute malnutrition relapses”

6.5.3.3. Theme 3 Recovery Process: the caregivers in groups reported that after SAM treatment, their children regained weight over weeks, experienced an increased appetite, and saw swelling gradually subside over weeks. “The reason behind increasing my child’s weight and other improvement staying as it is lack of transportation is challenging during the follow-up period.” (A 35- year-old mother from FGD 3).Meanwhile, FGD groups 3and 4 emphasized the importance of ongoing monitoring after discharge to ensure sustained recovery.

6.5.3.4. Theme 4 Strategies to reduce acute malnutrition

The health workers states many things to reduce acute malnutrition **.**A 31 years old health worker also said that “Yes, health workers in Ethiopia have implemented several successful strategies to reduce relapse rates of severe acute malnutrition (SAM). Here are some key strategies: Community Based Management of Acute Malnutrition (CMAM), Social and Behavior Change Communication (SBCC), Post-Discharge Follow

6. Discussion

This study aimed to explore challenges related to SAM relapse through qualitative analysis and evaluate the magnitude and factors associated with severe acute malnutrition (SAM) relapse among children aged 6 up to 59 months in the East Borena Zone. The Findings revealed that SAM relapses were significantly linked to caregivers' educational levels and MUAC during admission, agricultural land in hectares, poor water sources, types of toilet used. Other contributing factors included deficient vaccination, inadequate fo-llow-up, and limited access to medical care, high transportation costs, food instability, and lack of dietary diversity. The study finding showed that 38% o(95% CI: 33.1-42.9) of children who visited a stabilization center relapsed,this rate aligns with findings from other studies in Eastern Ethiopia (36.2%) (3) and North East Ethiopia (35.2%) (8) highlighting a persistent public health issue requiring targeted interventions.

Comparative studies in other regions show varying relapse rates. For instance, research in the in Burkinafaso ,Hadiya zone and Gambella region reported relapse rates of 6·8 %, 9.6% and 10.1% to SAM, respectively (20,28,38) which are lower than the relapse reported in this study .These discrepancies could be attributed to differences in study design, setting, and cultural and socio-demographic factors.

This study identified a significant connection between the educational levels of mothers or caregivers and the relapse of SAM in children. Specifically, children whose caregivers had a college education or higher were 0.595 times less likely to experience relapse compared to those with caregivers who had no formal education. During focus group discussions, a 34-year-old woman mentioned, "Due to my limited literacy and lack of education on IYCF practices, along with food insecurity and inadequate water and sanitation, my child were malnourished." This finding, while higher than some previous studies, supports existing research that underscores the importance of maternal education in preventing malnutrition (4,28)

Inappropriate Infant and Young Child Feeding (IYCF) practices are major contributors to stunting and malnutrition (39).These practices are influenced by the availability and accessibility of nutrient-dense foods, the mother's knowledge, and prevailing cultural beliefs. Studies have consistently shown that nutrition education can significantly improve mothers' nutrition-related knowledge, dietary diversity, and nutrient intake, thereby enhancing the nutritional status of infants and young children.as the outcome qualitative insight as seen above ,This study also align with other study (40)**.**

For instance, a study conducted in Western Ethiopia highlighted the role of maternal education in child nutrition. Mothers who received education on IYCF practices were more likely to implement these practices effectively, which in turn reduced the risk of malnutrition and stunting among their children. The provision of tailored nutrition education on recommended IYCF practices is therefore vital in preventing stunting and promoting healthy growth in children (20,28)

In addition to maternal education, this study also identified other critical factors associated with the relapse of severe acute malnutrition (SAM) relapse in children. A low Mid-Upper Arm Circumference (MUAC) at admission emerged as a significant predictor of relapse. Children their MUAC >11.5mm about 0.472 less likely to seveve acute malnutrition relapses than MUAC <110mm.This finding emphasize the importance of ensuring that children achieve adequate nutritional recovery before discharge to prevent relapse. This quantitative study is align with the qualitative study, A female 30 years health worker stated“ .In my work experience, I have observed that factors contributing to severe acute malnutrition in our area mid-upper arm circumference (MUAC) at discharge and MUAC during admission” studies states that MUAC during admission less than 110 are more likely to relapse (3,11) Ensuring adequate nutritional recovery is essential because it directly impacts the child’s ability to maintain health and resist infections that could exacerbate malnutrition. Inadequate nutritional recovery at discharge often leads to a weakened immune system, making children more susceptible to relapses. Studies have

shown that close monitoring of nutritional status, along with interventions to address immediate nutritional needs, plays a critical role in sustaining recovery(41).

Therefore, it is vital to incorporate rigorous nutritional assessments and interventions into discharge protocols. Educating caregivers on the importance of continued nutritional support and follow-up visits can significantly reduce the risk of relapse and improve overall recovery rates.(14,28)

In addition, the study identified other factors influencing the relapse of severe acute malnutrition (SAM) in children. Children whose caregivers use pit latrines are 1.8 times more likely to be malnourished compared to those whose caregivers use flush or pour flush toilets. The presence of soap, detergent, or other cleansing agents at handwashing areas also significantly affects SAM relapse. The absence of such cleansing agents at handwashing stations is associated with a 1.5 times higher likelihood of SAM relapse compared to their presence. This study is align with othe studies, Overall, household sanitation facilities, especially the type of toilet used, play a crucial role in the risk of SAM relapse in children(3,28). Poor sanitation and hygiene practices are known to contribute to the spread of infections and diseases, which can exacerbate malnutrition(28,42).

This study found a significant association between water source and severe acute malnutrition (SAM) relapse. The use of dug well water was associated with a 2.907 times higher risk of SAM relapse compared to piped water sources, which revealed that children from households relying on dug wells were significantly more likely to experience SAM relapse than those using piped water(28,42). Another study indicated that children who drank spring water were more likely to relapse into SAM compared to those consuming piped water. Both results highlight the crucial role of water quality in preventing SAM relapse. According to studies, having a protected water source for drinking is more effective in preventing malnutrition than other sources. Access to clean

and safe drinking water is essential for preventing infections and reducing malnutrition rates (14,43)

Qualitative findings from Six focus group discussions (FGDs) revealed additional factors contributing to relapse, such as lack of maternal education on IYCF practices, incomplete immunization and illness history, food insecurity, lack of diversified foods, and environmental factors such as malaria, poor WASH conditions. These qualitative findings support the quantitative data and provide a comprehensive understanding of the challenges faced by caregivers (4,14,28),these adeas reflected from the participant is supported by these studies.

Addressing these issues requires a multifaceted approach. First, implementing comprehensive educational programs focusing on proper infant and young child feeding practices can enhance caregivers' knowledge and reduce relapse rates(20,28) .Second, enhancing discharge protocols to ensure children achieve a higher MUAC before discharge can help reduce premature discharge and relapse rates(14,28).Third, promoting family planning and providing economic support can help manage family size (44).

And ensure adequate nutrition and healthcare resources Fourth, improving access to clean water and sanitation facilities can prevent infections that exacerbate malnutrition(25).

Finally, implementing strict follow-up procedures and regular check-ups can ensure early detection and intervention for potential relapses. These strategies collectively aim to mitigate the risk factors identified and improve the long-term health outcomes for children in the East Borena Zone.

6.1 Strength and limitation of study

Strengths:

- This study uniquely combines cross-sectional and qualitative methods, offering a holistic view
- That ensures reliability and concise results unlike previous studies that relied solely on quantitative approaches.

Limitations

- The cross-sectional component of the study provides only a snapshot of the data collection period.
- Micronutrient status was not assessed due to resource constraints.
- Household food consumption scales were not measured due to time constraints.

7. CONCLUSION AND RECOMMENDATION

7.1. Conclusion

The proportion of severe acute malnutrition is very high. Educational level of the care giver the study aligns with other research findings that highlight the significant factors associated with severe acute malnutrition (SAM) relapse. Similar to studies conducted in other regions, it was found that the educational level of the caregiver, MUAC during admission, no agricultural land, and source of water, type of toilet facility, food insecurity, incomplete vaccination, and lack of follow-up after discharge are crucial factors influencing SAM relapse in the East Borena Zone. Notably, two out of five children experienced relapse after being discharged.

7.2. Recommendation

Based on the findings of this study, the following recommendations are forwarded to the concerned bodies:

For the Zonal Health Office:

- Establish near follow-up protocols for children discharged after severe acute malnutrition treatment. This should include regular check-ups to ensure early detection and management of any relapses
- Conduct thorough assessments and provide targeted counseling and follow-up care, especially for children from food-insecure households. This ensures that the specific needs of these children are addressed, reducing the risk of relapse
- Strengthen Public Safety Net Programs

For District Health Office

- Conduct awareness campaigns through various media channels to educate the public about the importance of family planning, nutrition, early detection, and treatment of malnutrition.
- Conduct awareness campaigns through various media channels to educate the public about the importance of nutrition, early detection, and treatment of malnutrition..
- Collaborate with non-governmental organizations and the private sector to leverage resources and expertise in tackling malnutrition.
- Empowering women and strengthening families' discussions on child growth through health education to improve nutritional status of children.

- Give training to health extension workers and health workers, to give effective counseling to mothers to improve the quality of severe acute malnutrition management.
- Organize workshops for both parents to educate them about child development, nutrition, and the importance of early childhood care and feeding practices

For Researchers:

Further Studies on SAM Relapse:

- Conduct more in-depth studies on the relapse of severe acute malnutrition among children aged 6-59 months. This should include comprehensive nutrition status assessments using improved methodologies, such as adding biochemical parameters.

Reporting and Action:

- Report findings to all relevant stakeholders and policymakers to inform actions and interventions. This will ensure that the research translates into practical strategies to combat SAM relapse.

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Annex I:

My name is [---------], and I am serving as a data collector for a study conducted in this community. The research is led by Genet Tsegaye, who is pursuing a Master's degree at Selale University, College of Health and Medical Sciences. I kindly request your attention to explain the study and your role as a participant.

Study Title: Identifying Factors Associated with Relapse after Treatment of Severe Malnutrition Among Children Aged 6-59 Months in East Borena Zone, Oromia, Southern Ethiopia, from May 8 to June, 23, 2024.

Aim of the Study: The purpose of this study is to assist the East Borena health office in planning interventions to prevent relapse into severe acute malnutrition following treatment. Additionally, this research will contribute to a thesis required for the partial fulfillment of the Master's program in Public Health Nutrition.

Procedure and Duration: I will interview you using a questionnaire to collect relevant data for the study. The questionnaire consists of approximately 56 questions, and I will record your responses during the interview. The interview is expected to take about 20 to 25 minutes, and I kindly request that you allocate this time for our discussion.

Risks and Benefits: Participation in this study poses minimal risk, primarily involving a small time commitment. There will be no direct financial compensation for participating. However, the findings may provide valuable insights for local health planners and policy implementers.

Confidentiality: Your information will be kept confidential. No identifying details will be associated with your responses. The study's findings will be generalized to the community and will not reflect the specifics of any individual or household. Questionnaires will be coded to ensure anonymity, and no oral or written reports will link participants to the study.

Rights: Your participation is entirely voluntary. You have the right to choose whether to participate and may withdraw from the study at any time without any loss of benefits to which you are otherwise entitled. You are not obliged to answer any questions that you prefer not to.

Contact Information: Should you have any questions or co*nc*erns about the study or procedures, please reach out to the principal investigator:

Genet Tsegaye Email: fekadugenet137@gmail.com Mobile: +251916874653.

Annex II: English Version questionnaire

PART 1. Demographic Questionnaire			
	Variables/questions	Response	Skip to
001	Age of the child	1.6-11months 2. 12-23 months 3.24-59months	
002	Child gender	1. Male 2. Female	
003	Place of residence	1) Rular 2. Urban	
004	Sex of care giver interviewed?	1) Male 2.Female	
005	Age of care giver interviewed?	_____	
006	Marital status of care giver interviewed?	1) Single 2) Divorced/ Separated 3) Married 4) Widowed	
007	What is your occupation?	1) Employed 2) Farmer 3) Housewife 4) Other (Specify	
008	What is your Educational level?	1) Illiterate 2) Elementary 3) 5-10 grade 4) College and above	
009	What is your family size?	_____	
PART 2: Household Food Insecurity Access Scale questionnaire			
101`	In the past 4 weeks, did you worry that your household would not have enough food?	1 No 2.Yes	If "no" skip to Q.103
102	How often did this happen?	1. Rarely (once or twice in the past 4 weeks 2. sometimes (3-10 times in the past 4 weeks) 3. Often (> 10 times in the past 4 weeks).	
103	In the past 4 weeks, were you or any household	1. Yes 2. No	If "no" skip

	member not able to eat the kinds of foods you preferred because of a lack of resources?		to Q.105
104	How often did this happen?	1. Rarely (once or twice in the past 4 weeks) 2. Sometimes (3-10 times in the past 4 weeks 3. Often (> 10 times in the past 4 weeks)	
105	In the past 4 weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources?	1. Yes 2. No	If "no" skip to Q.107
106	How often did this happen?	1. Rarely (once or twice in the past 4 weeks 2. Sometimes (3-10 times in the past 4 weeks) 3. Often (> 10 times in the past 4 weeks)	
107	In the past 4 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?	1. No 2. Yes	If "no" skip to Q.109
108	How often did this happen?	1. Rarely (once or twice in the past 4 weeks) 2. Sometimes (3-10 times in the past 4 weeks) 3. Often (> 10 times in the past 4 weeks)	
109	In the past 4 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. No 2.Yes	If "no" skip to Q.111
110	How often did this happen?	1. Rarely (once or twice in the past 4 weeks) 2. Sometimes (3-10 times in the past 4 weeks) 3. Often (> 10 times in the past 4 weeks)	
111	In the past 4 weeks, did you or any other household member have to eat fewer meals in a day because there was not enough food?	1. No 2.Yes	If "no" skip to Q.112
112	How often did this happen?	1. Rarely (once or twice in the past 4 weeks) 2. Sometimes (3-10 times in the past 4 weeks) 3. Often (> 10 times in the past 4 weeks)	
113	In the past 4 weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food?	1. No 2. Yes	If "no" skip to Q.116

114	How often did this happen?	1. Rarely (once or twice in the past 4 weeks) 2. Sometimes (3-10 times in the past 4 weeks) 3. Often (> 10 times in the past 4 weeks)	
115	In the past 4 weeks, did you or any household member go to sleep at night hungry because there was not enough food?	1. No 2. Yes	If "no" skip to Q.118
116	How often did this happen?	1. Rarely (once or twice in the past 4 weeks) 2. Sometimes (3-10 times in the past 4 weeks) 3. Often (> 10 times in the past 4 weeks)	
117	In the past 4 weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?	1. No 2. Yes	
PART 3: House Hold and Environmental Condition Questionnaire			
201	What is the main source of drinking water for members of your household?	1. Piped water 2. Dug well 3. Water from spring	
202	Where is that water source located?	1. In own dwelling 2. In own yard/plot 3. Otherspecify_____	
203	Do you do anything to the water to make it safer to drink?	1. Yes 2.No	
204	What do you usually do to make the water safer to drink? Anything else?	1. Boil 2. Add bleach/chlorine 3. Strain through a cloth 4. Use water filter (ceramic) 5. Sand/composite/etc. 6. Otherspecify_____	
205	What kind of toilet facility do members of your household usually use?	1. Flush or pour flush toilet HHS 2. Pit latrine HHS 3. open field / brush	
206	Do you have a separate room which is used as a kitchen?	1. Yes 2. No	
207	How many hectares of agricultural land do members of this household own	_____ximad/qimdii.	
208	Electricity for cooking	1. Yes 2 .No	
209	Observe presence of water at the place for hand washing. Record observation.	1. Water is available 2. Water is not available	
210	Observe presence of soap, detergent, or other	1. Soap or detergent (bar, liquid)	

	cleansing agent at the place for hand washing. Record observation	2. Ash, sand 3. None	
PART 4. Feeding practice Questionnaire			
301	Timely BF initiation (Within 1 hr. of birth)	1. Yes 2.No	
302	Colostrum given for the child during the birth	1. Yes 2. No	
303	Frequency of BF/day (including night) 8-12 times 2. Less than 8 times	1. Lessthan 8 times 2. 8-10 timesGreater than 10	
304	Feeding mode of the child currently	1. BF 3.Weaned 4.Never BF 2. Formula feeding (FF) 5.Other specify_____	
305	Prepare food separately for children from family diet	1. Yes 2. No	
306	Type of feeding your child.	1. Parent led feeding 2. Persuasive Feeding	
307	Feeding for reasons of your child	1. Due hunger 2. Food rewards 3. Food to calm the child 4. Other reasons_____	
308	Parent-led feeding	1. I carefully control how much my child eats 2. I have a rule about how much my child should eats 3. I let my child decide how much she/he eats. 4. I decide how much my child eats. 5. Other specify_____	
309	Family Meal Environment	1. My child eats together with other family members. 2. My child is given the same foods as the rest of the family (pureed, mashed, and chopped). 3. Whether my child is eating or not, my child sits with the rest of the family when they are having a meal. 4. I eat my meals while my child eats.	
310	How many times your child admitted with SAM	1. One 2. More than two times	
311	By what case your child admitted with SAM	1. Oedema 2. Non-edematous	
312	What types of treatment given for the child for the first time	1. Milk 2.Plumpnut	

313	Did you shared plumpnut with other person	1. Yes 2. No	
314	Did the baby finished the plumpnut	1.Yes 2 .No	
315	Did baby received antibiotics while on treatment	1. Yes 2. No	
316	Practiced prelacteal feeding.	1. Yes 2. No	
317	Trained on child food preparation and hand washing	1. Yes 2.No	
318	Child feces disposal (Open field)	1. Yes 2. No	
319	Does your child have a history of illness (fever, body rash, and cough) in the last	1. Yes 2.No	
320	Duration after recovery in month	1. Yes 2.No	
321	Outcome of first discharge	1. Cured 3. Defaulter 2. Non-response 4. Transfer out5.Other specify_____	
322	MUAC during admission	1. <110mm 2. 110-115mm 3. >115mm	
323	Weight Gain during discharge	1. <5gm/kg/day 2. 5-10gm/kg/day 3. 10gm/kg/day	
324	Childs MUAC during dischargce?	1. <11.5cm 2.11.5-12.3 cm 3.>12.5cm	
325	Number days in treatment for the first admission	1. 4wks 2.5 wks 3. 7wks	
326	Was your child currently on treatment of severe acute malnutrition	1. Yes 2. No	
327	Current MUAC value of the child	1. <11.5cm 2.11.5-12.3 cm 3.>12.5cm	
328	How many under five children you have within your family	1. 3 2. 4 3. 5 4. Above this	
329	De-worming tablet given in last 6 months and vitamin A	1. Yes 2.No	
330	Your child first treatment at SC or OTP	1.SC 2.OTP	
331	Vaccinated for measles (one and two)	1. Yes 2.No	

Part 6.Questionnaire for Focused Group Discussion (FGD)

Questinnar for caregivers

Experiences and Perceptions

1. What was the recovery process like for your child after being treated for severe acute malnutrition (SAM
2. How did you feel during the recovery period, and what challenges did you face.

Factors Contributing to Relapse

1. Do you know Factors Contributing to Relapse?

Nutrition and Feeding Practices

1. What foods were given to your child during the recovery phase? Were there any difficulties in feeding?
2. Did you receive guidance on appropriate feeding practices post-treatment?

Access to Healthcare and Support

1. Did you continue to visit health facilities for follow-up visits after discharge?
2. Did you receive any support from community health workers or other caregivers? Were there any barriers (e.g., distance, cost) to accessing healthcare services?

Community Perspectives

1. What do other community members believe about relapse after SAM treatment?
2. Are there cultural practices or beliefs related to nutrition and recovery that may influence relapse rates?

Part 7 Focus Group Discussions (FGDs) with health professionals

Relapse Patterns and Risk Factors

1. What patterns of relapse have you observed among children who were previously treated for acute malnutrition?
2. Low admission MUAC criteria and % weight gain as discharge criteria may explain higher relapse rate
3. Which factors contribute to relapse after discharge from treatment programs

Follow-Up Protocols

1. How often do you recommend follow-up visits for children who have recovered from severe acute malnutrition?
2. What challenges do you face in ensuring consistent follow-up?

Nutritional Counseling

1. What dietary advice do you provide to caregivers?

Community Engagement

1. How do you involve community health workers in preventing relapse?

Integration with Other Services

1. Do you collaborate with other health programs (e.g., WASH, maternal health) to prevent relapse?

Psychosocial Support

1. What role does psychosocial support play in preventing relapse?

Challenges and Solutions

1. Have you implemented any successful strategies to reduce relapse rate

Declaration of informed voluntary consent:

I have read/was read to me the participant information sheet. I have clearly understood the purpose of the research, the procedures, the risks and benefits, issues of confidentiality, the rights of participating, and contact address for any queries. I have the opportunity to ask questions for things that may have been unclear. It was informed 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 this study to be conducted with my initials (signature).

Name and Signature of the participant: _____Date_____

Name & Signature of data collector: _____Date_____

Afaan Oromo Version Waraqaa Odeeffannoo Hirmaattotaa& Unka Hayyama tola ooltummaa odeeffannoo qabu.

Afaan Oromootiin Walii galtee hirmaattota qorannichaa waliin geggeeffamu Ani maqaan Koo……..jedhama. Kanan hojjedhu qorannoo (Research) **Addee Gannat Tsaggaayee** barnoota isaanii **Digirii Lammaffaaf Yuunivarsitii Salaale Koollejjii Fayyaa fi Meedikalaatti** barataa jiraniif ragaa qorannoo funaanudha. Kanaafis duraan dursee waa'ee qorannichaa fi maalif hirmaataa qorannichaa taatanii akka filamtaniif waanan isiniif ibsuuf yaadaan akka Na dhaggeeffattanii fi gaaffileen itti aansee isin gaafadhuuf nuffii malee akka naaf deebiftaniif kabaja guddaa waliin isin gaafadha. Mata Duree Qorannichaa Sababoota hir'ina nyaataa cimaa irra deebiin qabaman Ijjollee batii 6 hanga 59 jirattota Godinaa Boranaa Baha Kan ta'ani dha. Kaayyoo Qorannichaa Jalqabarratti bu'aan qorannoo kanaa Kan fayyadu Waajjira Eegumsa fayyaa Godinaa Boranaa Baha Kan gargaaru yoo ta'u, lammaffarratti kaayyoon qorannoo kanaa eebba barnoota digrii lammaffaa geggeeffamaa jiruufi

Adeemsaa fi Yeroo qorannichaa Ani gaaffilee adda addaa waanan gaafadhuuf ragaa dhugaa irratti hundaa'eefii qorannichaaf gargaaru akkan argadhuuf gaaffileen isin gaafadhuuf obsaa akka naaf deebistaniifi. Kanan isin gaafachuuf deemu hanga gaaffii 55 yoo ta'u walii galatti hanga daqiiqaa 15-20 fudhata. Miidhaa fi Faayidaa Qorannichaa Qorannoo kana keessatti sababa hirmaattaniif faayidaan kallattiin isaanif kennamu hin jiru. Akkasumas miidhaan isinirra gahus baay'ee xiqqaadha, kunis yeroo qabdan keessaa gara daqiiqaa 20 naaf kennuun gaaffilee isin gaafadhuuf waan silaa hojjechuuf jettan adda kuttanii deebii naaf kennuun yeroo gubdaniin alatti miidhaa isin irraan geessisu Kan hin jirre dha. Garuu bu'aan qorannoo kanaa namoota karoora baasaniif ragaa barbaachisaa ta'a.

Iccitii ragaalee: Iccitiin Ragaalee nuti isinirraa fudhannuu Kan eeggamuudha. Ragaan kamuu addatti baasee waa'ee keessan ibsu hin jiraatu. Gaaffileen gaafatamu lakkoofsa addaa kennammeefii waan jiruuf maqaan keessan hin barbaachisu. Ragaan Nama dhuunfaa qorannoo wajjiin addatti baasee ibsu tokkollee hin jiraatu.

Mirga hirmaataa qorannichaa Hirmaataa qorannoo kanaa ta'uun fedhii guutuun keessan qofa irratti Kan hundaa'e ta'a. Qorannicha irratti hirmaachuu dhiisuu mirga qabdu. Yoo hirmaachuuf murteessan, gaaffii fi deebii Kennan yeroo barbaaddettanitti addaan kutuu dandeessu, kana jechuun faayidaan ala ta'a jechuu miti. Gaaffii fi deebii keessatti gaaffii hin barbaadneef deebii kennuu diduu Ni dandeessu

Annex III: Gaaffii Afan Oromo Ragaale sassabu Kodii-------

Kutaa I: Gaaffilee Hawaasummaa, Diinagdee fi Maatii waliin walqabatan			
Lkk	Gaaffilee (Variables)	Deebii (Response)	Utaali (Skip to)
001	Saala Daa'imaa	1) Dhiira 2. Dubara	
002	Umriin daa'ima keessanii Kan hirdhina nyaataa cimaa seenee meeqa?	1) Baatii 6-11 2. Baatii 12-23 3. Baatii 24-59	
003	Bakkaa dhaloota Daa'imaa	1) Badiyyaa 2.Magaala	
004	Saalli Nama gaaffii gaafatamu maali?(guddissaa da'imaa)	1) Dhiira. 2. Dubartii	
005	Sadarkaan fuudhaa fi heeruma keessanii akkami?	1. Kan hinfuune/heerumne 3.Kan fuudhe 2. Kan hiike/hiikte 4. Kan jalaa duute	
006	Sadarkaan barnootaa keessanii akkami?	1. Kan hin baratin 3. sadarkaa tokkoffaa 2. Kutaa 5-10 4. Kollejjii fi isaa ol	
007	Hojiin keessan maali?	1. Hojjataa mootummaa 4. Haadha manaa 2. Soorama kan bahe 3. . Qotte bulaa 5. Kan biraa	
008	Galiin kee ji'aa Qarshii Itophiyaatiin meeqa ta'a?	1. 1000 2. 1500 4. 3000 5. Isaa ol	
009	Maatii meeqa qabdu?	1) 3 2) 4 3)5 4) Isaa ol	
Kutaa 2. Gaaffilee Haala Waan Nyaatamuu Mana Keessaa			
101	Torbeewwan afran darban kana keessatti nyaanni nyaattan nutti hirdhata jettanii yaaddoftanii beektuu?	1. Lakkii 2. Eeyyee	Yoo" lakkii" ta'ee gara G. 103darbi
102	Yeroo hangamiif rakkinichi kun isin mudatee?	1. Yeroo muraasa (yeroo takka ykn lama torbee afran darbe keessatti) 2. Yeroo tokko tokko (3-10 torban afran darban keessatti 3. Yeroo heddu (si'aa 10 oli torbee afran	

		darban keessatti)	
103	Torbeewwan afran darban kana keessatti isin ykn miseensa maatii keessaa sababa hir'inatin nyaata fedhan nyaachuu kan hin dandeenye turee?	1. Lakki 2. Eeyyee	Yoo" lakkii" ta'ee gara G. 105 darbi
104	Torbeewwan afran darban kana keessatti sababa hir'ina waan nyaatamuutin nyaatni gosa gosaa dhabamee turee?	1. Lakki 2. Eeyyee	Yoo" lakkii" ta'ee gara G. 106 darbi
105	Yeroo hangamiif rakkinichi Kun isin mudatee?	1. Yeroo murasaa (yeroo takka ykn lama torbee afran darbe keessatti) 2. Yeroo tokko tokko (3-10 torban afran darban keessatti) 3. Yeroo heddu (si'aa 10 oli torbee afran darban keessatti)	
106	Torbeewwan afran darban kana keessatti sababa hir'ina	1. Lakkii, 2. Eeyyee	Yoo" lakkii" ta'ee gara G. 108 darbi
107	Yeroo hangamiif rakkinichi Kun isin mudatee?	1. Yeroo murasaa (yeroo takka ykn lama torbee afran darbe keessatti) 2. Yeroo tokko tokko (3-10 torban afran darban keessatti) 3. Yeroo heddu (si'aa 10 oli torbee afran darban keessatti)	
108	Torbeewwan afran darban kana keessatti isinis ta'ee miseensa maatii keessaa sababa wanti nyaatamu ga'aa ta'uu dhabuutin nyaata hammaan xiqqaa isin hin quubsine nyaattanii jirtuu?	1. Lakkii 2. Eeyyee	Yoo" lakkii" ta'ee gara G. 110 darbi
109	Yeroo hangamiif rakkinichi Kun isin mudatee?	1. Yeroo murasaa (yeroo takka ykn lama torbee afran darbe keessatti) 2. Yeroo tokko tokko (3-10 torban afran darban keessatti) 3. Yeroo heddu (si'aa 10 oli torbee afran darban keessatti)	
110	Torbeewwan darban afran kana keessatti isinis ta'ee miseensa maatii keessaa namni sababa nyaata ga'aan dhabamuutin nyaata hammaan xiqqaa nyaate jiraa?	1. Lakki 2. Eeyyee	Yoo" lakkii" ta'ee gara G. 112
111	Yeroo hangamiif rakkinichi Kun isin mudatee?	1. Yeroo murasaa (yeroo takka ykn lama torbee afran darbe keessatti) 2. Yeroo tokko tokko (3-10 torban afran darban keessatti)	

		3. Yeroo heddu (si'aa 10 oli torbee afran darban keessatti)	
112	Torbeewwan darban afran kana keessatti nyaanni nyaatamu mana keessaa sababa jiruun nyaata ittiin argattan dhabuutin nyaanni manaa dhabameeraa?	1. Lakki 2. Eeyyee	Yoo" lakkii" ta'ee gara G. 114 darbi
113	Yeroo hangamiif rakkinichi Kun isin mudatee?	1. Yeroo murasaa (yeroo takka ykn lama torbee afran darbe keessatti) 2. Yeroo tokko tokko (3-10 torban afran darban keessatti) 3. Yeroo heddu (si'aa 10 oli torbee afran darban keessatti)	
114	Torbeewwan darban afran kana keessatti isin ykn miseensa maatii keessaa sababa wanti nyaatamu dhabamuutin osoo beela'uu kan gara siree hirriibaa deeme jiraa?	1. Lakkii 2.Eeyyee	Yoo" lakkii" ta'ee gara G. 116 darbi
115	Yeroo hangamiif rakkinichi Kun isin mudatee	1. Yeroo murasaa (yeroo takka ykn lama torbee afran darbe keessatti) 2. Yeroo tokko tokko (3-10 torban afran darban keessatti) 3. Yeroo heddu (si'aa 10 oli torbee afran darban keessatti)	
116	Torbeewwan darban afran kana keessatti isin ykn miseensa maatii keessaa sababa nyaatni ga'aan dhabamuutin namni guyyaa fi halkan guutuu osoo nyaata hin nyaanne ture jiraa?	1. Lakki Gaaffileen xumurame jira. 2. Eeyye	Yoo" lakkii" ta'e gaaffiin xumuramee jira
117	Yeroo hangamiif rakkinichi Kun isin mudatee?	1. Yeroo murasaa (yeroo takka ykn lama torbee afran darbe keessatti) 2. Yeroo tokko tokko (3-10 torban afran darban keessatti) 3. Yeroo heddu (si'aa 10 oli torbee afran darban keessatti)	
Kutaa 3. Gaaffilee Haala Mana fi Naannoo Jireenyaa			
201	Maatiin keessan madda bishaan Dhugaatii maal irraa fayyadamu?	1. Bishaan Boombaa 2. Boolla bishaanii (haroo) 3. Bishaan lafa keessaa(madda)	
202	Maddi bishaanii eessatti argama?	1) Mana jireenyaa keessan keessa 2) Mooraa kee keessa 3) Iddoo Biraa	
203	Mala akkamitiin bishaan keessan qulqullessitan?	1. Bishaan danfisuu 3 . Kiloorinii itti dabaluu 2. Huccuudhaan Bishaan dhimbiibuu	

		4) Qulqullessituu Bishaanii 5. Biyyee itti makuu 6. Humna solaariin qulqullessuuf 7. Xiqqoo hanga qulqullaa'uu eeguu 8. Kan biro	
204	Gosti mana fincaanii maatiin keessan yeroo baayyee itti fayyadamu kami?	1. Kan Bishaan itti naqamuu ykn itti bifamu 2. Mana fincaanni Boola kan bishaan itti hin naqamne	
205	Nyaata bilcheessuuf maatiin keessan maali fayyadamu?	1) Humna electirikaa 4. Soolara (LPG) 2) Gaazii umamaa 5. . Biogas 6.. Gaazii adii 3) Kasala 7. Muka 8. Kanbiro	
206	Manni nyaata itti bilcheefamu eessatti argama?	1. Mana jireenyaa keessa 2. Mana jireenyattin alatti 3. Kan biro	
207	Mana nyaata itti bilcheeessan qophatti ni jira?	1) Eeyyen 2. Lakkii	
208	Lafa ykn Ooyruu qonnaa ni qabdanii?	1) Eeyyen 2. Lakkii	
209	Lafa qonna/Ooyruu/ hangammi qabdan?	ximmaadii/qimdii	
210	Bishaan iddoo harka dhiqannaa ni jiraa?	1. Bishaan ni jira 2.Bishaan hin jiru	
Kutaa 4 Gaaffilee Akkaataa soorata daa'immanii			
301	Harmaa Hadhaa sa'atii tokkoo kessattii hossistanii jirtuu	1. Eeyyen 2.Lakkii	
302	Daa'imni keessan yeroo dhalatu silgaa kennammeefii jira?	1) Eeyyen 2. Lakkii	
303	Guyyaatti yeroo hagam dadebi'e hodhaa (halkanwaliin)	1. Yeroo 8 gadi 2. Yeroo 8-12 3. 10 ol ta'uu	
304	Haala nyaata daa'imaa yeroo ammaa	1. .Harmaa hosisuu 3. Harma irraa kutuu 2. Gonkumaa harmaa hinhodhuu 2. Nyaata foormulaa (FF). 5.Kan biro	
305	Nyaata daa'immaniif nyaata maatii irraa addaan qopheessiituu?	1) Eeyyen 2.Lakkii	
306	Nyaata warraan durfamu	1. Mucaan koo hammam akka nyaatu of eeggannoo dhaan nan to'adha 2. Mucaan koo hammam nyaachuu akka qabu seera qaba 3. Mucaan koo hammam akka nyaatu/inni akka murteessu nan godha. 4. Mucaan koo hammam akka nyaatu nan murteessa. 5. Kan biroo ibsu_____ .	

307	Haala Soorata maatii (Family Meal Environment)	1. Nyaata Daa'imaa miseensa matii biroo wajjiin soorachisuu 2. Daa'imaa fi Maatii birootiif Nyaata gosa tokkoo kennuufi 3. Daa'imni osoo nyaata nyaatuu 4. Ani nyaata kan sooradhu yeroo daa'imni koo nyaattu	
308	Mucaan keessan yeroo meeqa Hanqinnaa nyaataa cimaa (SAM) waliin seenee?	1. Tokko 2. Yeroo lamaa ol	
309	Daa'imni keessan sababa hir'iinna nyaata gosaa kamiin seentee ?	1. Dhiita miila ykn qaama 3 .Huqqachuu 2. Huqachuu fi furdachuu	
310	Wallaansa gosa kamittuu yeroo jalqabatti daa'imma keessanf kenname?	1. Aananii 2. .plumpnutii	
311	Yeroo hangamiif pilumpiinutii fudhata turtee?	1. Torbani afur 2. Torban shan 3.Torban torbaa	
312	Pilumpiinutii nama birootif qoode jirtaa?	1) Eeyyen 2. Lakki	
313	Daa'imni keessan erga yalamee booda gara faffatti darbe jira?	1) Eeyyen 2) Lakki	
314	Daa'imni keessan pilumpii nutii hamma isaf barbaachisu fudhate xumure jiraa?	1) Eeyyen 2.Lakki	
315	Daa'imni keessan qorichaa shuropii (liimee) fudhate jira yeroo hanqina nyaataf walansaa irraa ture san?	1) Eeyyen 2. Lakki	
316	Nyaata qophaatti Daa'imaaf ni qopheessituu?	1) Eeyyen 2. Lakki	
317	Leenjii nyaata Daa'imaaf qopheessu fudhattanii jirtanii?	1) Eeyyen 2.Lakki	
318	Soorata daa'imma qopheessun dura harka keessan Saamunaan ykn Daaraantin nidhiqattuu?	1) Eeyyen 2) Lakki	
319	Daa'imni keessan Guddina fi dagaaginni (GMP) isaa baatii tokko tokkoon ilaalamee jiraa?	1) Eeyyen 2. Lakki	
320	Daa'imni keessan seenaa dhukkuba (Gaaran kaasuu, leeyda qaamaa, fi qufaa) qabaa torbee lamaan dhumaa kanatti?	1. Eeyyen 2. Lakki	
321	Yeroo jelqabaaf faalamee gaaf bahu hallii da'imaa kessan akkam turee?(Outcome of first discharge)	1. Fayyiite 2. Adaan kute 4. deebii hin kennine 3.Dabarsuu ba'uu 5 .Kanneen biroo ibsa___	
322	Safarri gidduu Gala Ciqilee Harkaa(MUAC) ni daa'imma yeroo jelqabaa meeqaa?/admission/	1. <110mm 2.110-115mm 3. >115mm	
323	Daa'imni kee talaallii hundaa fudhatee?	1) Eeyyen 2. Lakki	
324	Safarri gidduu Gala Ciqilee Harkaa (MUAC) ni	1. <11.5cm	

	daa'imma yeroo walansaa xumure bahuu meeqaa?	2. 11.5-12.3 cm 3. >12.5cm	
325	Daa'imni keessan Dhita'uun seene?	1) Eeyyen 2. Lakki	
326	Daa'imni keessan MUAC ni seene?	1) Eeyyen 2. Lakki	
327	Daa'imni keessan walansaa jalqabaa irraa guyyaa meeqaaf ture	1. Torban afur 2)Torban shan 3)Torban shan 4) Isaaol	
328	Da'imnii kee yero ammaa hanqiinnaa nyaata cimaatin yaalamaa jiraa?	2. Eeyyen 2. Lakki	
329	Yeroo amma MUAC ni daa'imma meeqa?	1) 11.5cm 2) 12.5 3) 13.5 4) Isaa ol	
330	Daa'imni waggaa shan gadii meeqa qabdu?	1) 1 2) 2 3) 4 4) Isaa ol	

Labsii hayyama tola ooltummaa beekumsa qabu:

Waraqaa odeeffannoo hirmaattotaa dubbiseera/dubbifameera. Kaayyoo qorannichaa, hojimaata, balaa fi faayidaa, dhimmoota iccitii, mirga hirmaachuu, fi teessoo quunnamtii gaaffii kamiifuu sirriitti hubadheera. Wantoota ifa hin taane ta'uu danda'aniif gaaffii gaafachuuf carraa qaba. Yeroo barbaadetti qorannicha keessaa ba'uufis ta'e gaaffiin hin barbaanne kamiifuu deebii kennuu dhiisuun mirga akkan qabu beeksifameera Kanaaf, qorannoon Kun akka gaggeeffamu qubee jalqabaa (mallattoo) kootiin akkan gaggeeffamuuf hayyama fedhii kootiin mirkanesa

Maqaa fi Mallattoo hirmaataa:_____Guyyaa_____

Maqaa & Mallattoo walitti qabaa odeeffannoo:_____Guyyaa_____Ibsa-

Kutaa 6.Gaaffilee yaadaa waljijjirraa Marii Garee (FGD) . Kodii_____

Muuxannoo fi Hubannoo

1. Adeemsi fayyuu daa'ima keessanii erga hanqina nyaataa cimaa (SAM)

2. Yeroo fayyuutti maaltu sitti dhaga'ame, qormaanni akkamii si mudate?

3. Erga gadhiifamee booda fayyaa, fedhii nyaataa ykn amala daa'ima keessanii irratti jijjiiramni akka jiru hubattaniittuu?

Wantoota Deebi'ee Dhukkubaaf Gumaacha Taasisan

1. Wantoota Deebi'ee Dhukkubaaf Gumaacha godhan beektaa?
2. Wantoota adda ta'an kanneen carraa deebi'anii dhufuu dabaluu danda'aan ilaaltaniittuu?
3. Wantoota adda ta'an kanneen carraa deebi'ee dhukkubichaan qabamuu dabaluu danda'an ilaaltaniittuu?

Hojimaata Nyaataa fi Nyaataa

1. Yeroo fayyuutti nyaata akkamii daa'ima keessaniif kennitaan? Nyaata kennuu irratti rakkoon turee?

2. Wal'aansa booda gochaalee nyaataa sirrii ta'an irratti qajeelfama argattee jirtaa?

3. Gochoonni nyaata kennuu Kun yeroo dheeraa keessatti hangam itti fufiinsa qabuu?

Eegumsa Fayyaa fi Deeggarsa Argachuu

1. Erga hospitaala baatee booda daawwannaa hordoffiif dhaabbilee fayyaa daawwachuu itti fufteettaa?

2. Hojjettoota fayyaa hawaasaa ykn kunuunsitoota biroo irraa deeggarsa argattee? Tajaajila eegumsa fayyaa argachuuf gufuuwwan (fkn, fageenya, baasii) jiraa?

Ilaalcha Hawaasaa

1. Miseensonni hawaasaa biroo waa'ee wal'aansa SAM booda deebi'ee dhufuu maal amanu?

2. Gochoonni aadaa ykn amantaan soorataa fi fayyina waliin walqabatan kanneen saffisa deebi'ee dhukkuba kanaa irratti dhiibbaa uumuu danda'an jiruu?

Kutaa 7ffaa .Gaaffilee yaadaa waljijjirraa Marii Garee (FGDs) ogeessota fayyaa waliin

Akkaataa Deebi'ee Dhufuu fi Qabxiilee Balaa

1. Daa'imman kanaan dura hanqina nyaataa cimaatiin wal'aanamaa turan irratti haala deebi'ee dhufuu akkamii argiteetta?

2. Ulaagaaleen MUAC seensaa gadi aanaa fi % ulfaatina akka ulaagaa gadi lakkifamuutti dabaluu saffisa deebi'ee dhufuu ol'aanaa ta'e ibsuu danda'aa?

3. Sagantaa wal'aansaa irraa erga gadhiifamee booda dhukkubaa kana deebi'ee akka dhufuuf wantootni gumaachan kamfa'i?

Pirootokoolota Hordoffii

1. Daa'imman hanqina nyaataa cimaa irraa fayyaniif yeroo meeqa daawwannaa hordoffii ni gorsitu?

2. Hordoffii wal irraa hin cinne mirkaneessuu keessatti qormaata akkamii si mudata?

Gorsa Nyaataa

1. Gorsa nyaataa akkamii kunuunsitootaaf kennitu?

2. Yaada dogoggoraa soorataa fi deebi'ee dhufuu wajjin walqabatee mul'atu akkamitti furtaa?

Hirmaannaa Hawaasaa

1. Hojjettoota fayyaa hawaasaa akkamiin hirmaachifta deebi'ee dhukkubichaan akka hin deebine ittisuu?

2. Hawaasa keessatti waa'ee balaa deebi'ee dhufuu hubannoo uumuuf tooftaalee akkamii fayyadamtu?

Tajaajila Biroo Waliin Walitti Makamuu

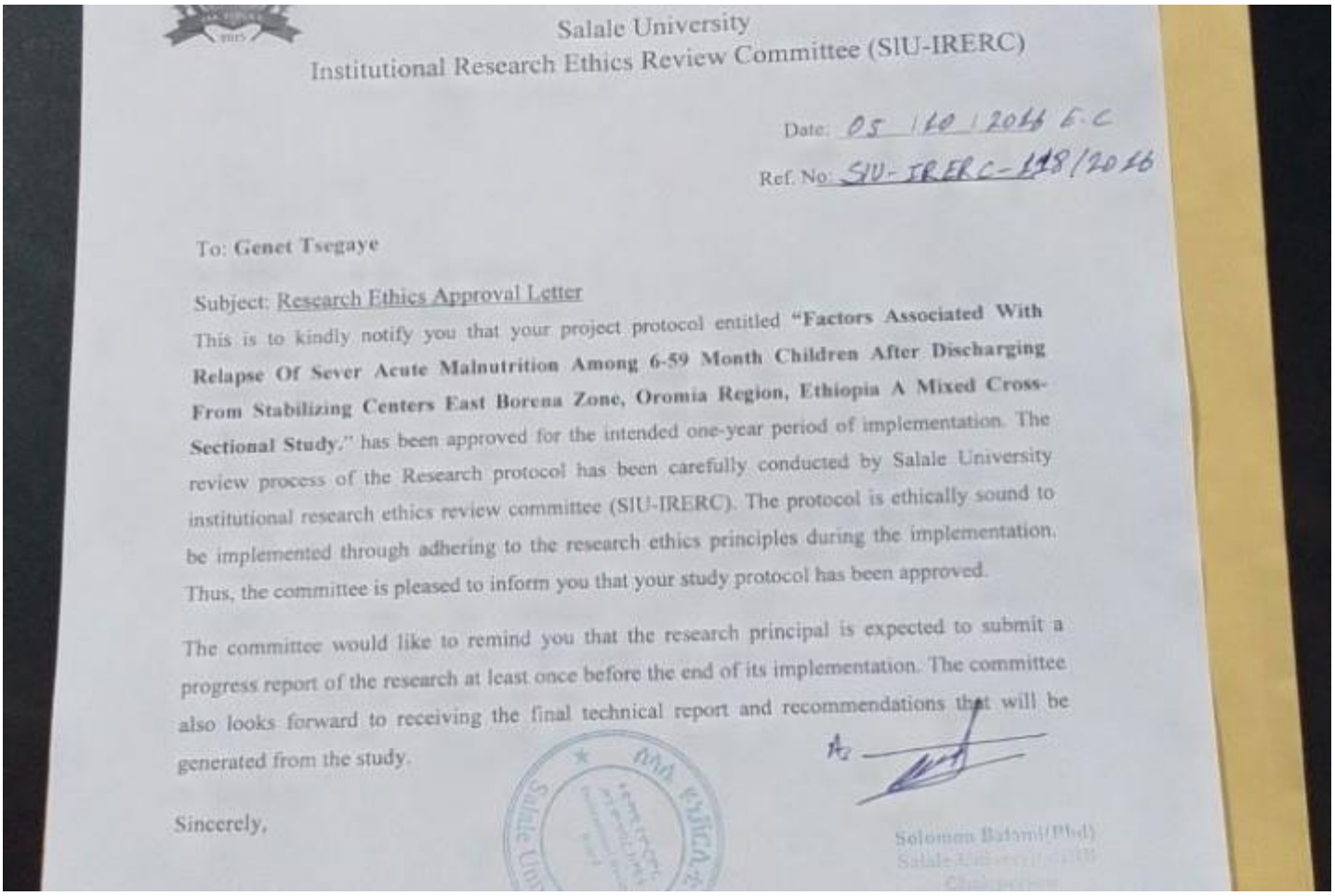
1. Sagantaa fayyaa biroo (fkn, WASH, fayyaa haadholii) waliin tumsitee akka hin deebine?

2. Tajaajilli walitti makame bu'aa deebi'ee dhufuu akkamitti fooyyessuu danda'a

Qormaata fi Furmaata

1. Dhimma dhukkuba deebi'ee dhufu bulchuu keessatti qormaata akkamii si mudata?

2. Saffisa deebi'ee dhukkuba kanaa hir'isuuf tooftaalee milkaa'oo hojiirra oolchitaniittuu?



Salale University
Institutional Research Ethics Review Committee (SIU-IRERC)

Date: 05 / 10 / 2016 E.C
Ref. No: SIU-IRERC-118/2016

To: **Genet Tsegaye**

Subject: Research Ethics Approval Letter

This is to kindly notify you that your project protocol entitled **"Factors Associated With Relapse Of Sever Acute Malnutrition Among 6-59 Month Children After Discharging From Stabilizing Centers East Borena Zone, Oromia Region, Ethiopia A Mixed Cross-Sectional Study."** has been approved for the intended one-year period of implementation. The review process of the Research protocol has been carefully conducted by Salale University institutional research ethics review committee (SIU-IRERC). The protocol is ethically sound to be implemented through adhering to the research ethics principles during the implementation. Thus, the committee is pleased to inform you that your study protocol has been approved.

The committee would like to remind you that the research principal is expected to submit a progress report of the research at least once before the end of its implementation. The committee also looks forward to receiving the final technical report and recommendations that will be generated from the study.

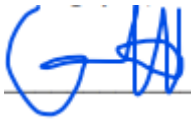
Sincerely,

Solomon Bafmi(Phd)

DECLARATION

I, the undersigned, declare that this proposa is my original work, has not been presented for a degree in this or any other university and that all sources of materials used for the thesis have been fully acknowledged.

Name: Genet Tsegaye (BSc Nurse)

Signature:  Date of submission 7/12/2024

Name of the institution: Salale University

This thesis has been submitted for examination with my approval as University advisor

Name of the first advisor: (BSc, MSc, Assistant, professor)

Kassahun KetemaSignature:  Date approval: 7/12/2024

Name of Co- advisor: Derara Girma

Signiture  Date of approval: 7/12/2024

The result of this thesis has been submitted for the department of public Health with my approval as a university examiner

Name of Internal examiner:

Signature: _____ Date of Approval: ……..

Name of External examiner:

Signature: _____ Date of Approval: _____