ADDIS ABABA UNIVERSITY COLLEGE OF HEALTH SCIENCES

SCHOOL OF PUBLIC HEALTH

RELAPSE OF SEVERE ACUTE MALNUTRITION IN CHILDRENS DISCHARGED FROM OUTPATIENT THERAPEUTIC PROGRAM AND ITS ASSOCIATED FACTORS IN GAMBELLA REGION, SOUTH WEST, ETHIOPIA

BY: ENDALKACHEW BEFEKADU (BSc)

ADDIS ABABA, ETHIOPIA

JUNE, 2021

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Examiners' Approval Sheet

We, the undersigned, members of the Board of Examiners of the final open defense by Endalkachew Befekadu, have read and evaluated his thesis entitled "Relapse of severe acute malnutrition in children's discharged from outpatient therapeutic program and its associated factors in Gambella region, south west, Ethiopia: A cross-sectional study". This is to verify that the thesis has been accepted in partial fulfillment of the requirements for the masters of public health degree in "Nutrition".

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ACRONYMS AND ABBREVIATIONS

AOR: Adjusted odds ratio

CMAM: Community based management of acute malnutrition

CI: Confidence interval

CM: Centimeter

DALY's: Deaths and Disability-Adjusted Life-Years

ETB: Ethiopian Birr

FMOH: Federal ministry of health

HEW: Health extension worker

HFA: Height for Age

HIV: Human Immunodeficiency Virus

IYCF: Infant and young child feeding

NGO: Non-Governmental Organization

MAM: Moderate Acute Malnutrition

MM: Millimeter

OTP: Outpatient Therapeutic Feeding Program

RUTF: Ready- to- use therapeutic food

SAM: Severe Acute Malnutrition

SPSS: Statistical Package for Social Sciences

WFA: Weight for Age

WFH: Weight for Height

W H O: World Health Organization

ABSTRACT

Background: Severe acute malnutrition affects millions of children in low-and middle-income countries. Currently, children with severe acute malnutrition without complication are treated in the outpatient therapeutic program and the program has been reported to be effective as it achieves internationally agreed standards for recovery rate. However, relapse post-discharge from the program is poorly defined, scarcely evaluated across programs and research.

Objective: The study aimed to assess the magnitude of severe acute malnutrition among children (6-59 months) of age who have been discharged from the outpatient therapeutic program as cured and its associated factors in the Gambella region, South West Ethiopia.

Methods: A facility-based cross-sectional study was conducted among 208 children aged 6-59 months who have been discharged from the outpatient therapeutic program as cured between January, 2019-January, 2020 and their caregivers. The data was collected from April; 2020 to June; 2020 and children were assessed after a median (inter-quartile range) of 6 (4-9) months of recovery. Caregivers were interviewed using a structured questionnaire and were asked to bring children to health facilities to take the anthropometric measurement and to examine them for oedema. Anthropometric measurements including, weight and height were measured and then, anthropometric indices was calculated using Anthro software version 3.2.2. The collected data were entered in Epi-data version 4.4.1 and analyzed by SPSS version 23.

Result: Out of the sampled children, the magnitude of severe acute malnutrition relapse using weight-for-height (WHZ) <-3 z-score was 10.1% (95% CI: 5.8-14%). Upon multivariable logistic regression analysis, children with mothers who had not obtained any IYCF education (AOR: 5.7, 95% CI, (1.3-26.9), children's who were not fully vaccinated for their age (AOR: 8, 95% CI, 1.8-34.8), and children with MUAC at discharge of <12.5 cm (AOR: 4.4, 95% CI: 1.1-18.8) had higher odds of severe acute malnutrition post-discharge than their counterparts.

Conclusion: The study found that; the magnitude of severe acute malnutrition in children discharged as cured was high. And children, with mothers who had not obtained any IYCF education, who were not fully vaccinated for their age and whose MUAC at discharge below 12.5 cm had higher odds of severe acute malnutrition post-discharge. Therefore, the current study finding suggests that; to limit relapse programs should avoid premature discharge before a MUAC of <12.5 cm and periodic monitoring of discharged children should be organized.

1. **INTRODUCTION**

1.1. Background

Acute malnutrition is a serious public health problem in under 5 children globally (1), and most prevalent in developing countries including Ethiopia (2). Acute malnutrition is classified as moderate acute malnutrition or severe acute malnutrition based on the degree of malnutrition and/or the presence of oedema (3, 4). According to the World Health Organization(WHO), severe acute malnutrition(SAM) in children aged (6-59 months) is diagnosed with the following criteria's: weight-for-height/length (WH/LZ) less than -3 z-score, mid-upper arm circumference (MUAC) <115 mm or existence of bilateral pitting oedema(4). Globally, according to the 2019 United Nations International Children's Emergency Fund (UNICEF) report, more than 51 million under 5 children were acutely malnourished (1) and of this, around 17 million were severely wasted (1). Children with SAM are approximately 9 times more at risk of mortality than non-malnourished children (5) and survivors suffer impairment in physical growth, motor development and are at high risk to contract a disease (1, 2, 6-8).

Currently, a community-based approach is used to treat children with SAM. This approach has both a community-based outpatient therapeutic feeding program and facility-based inpatient care. The decision of where to manage SAM cases depends on the presence of complication or not (4, 9, 10). Children with uncomplicated SAM who passed the appetite test and free of medical complication are treated in the outpatient therapeutic program (OTP) by providing ready to use therapeutic foods (RUTF) (5). And, children will be discharged as recovered from the program when their weight-for-height (WHZ) is $\geq$-2 z-score, no oedema for consecutive two weeks for children admitted with oedema, and otherwise, if their MUAC is >12.5 cm(4).

While, children who did not pass the appetite test and with medical complication will be referred to the inpatient program because; is the sign of severe metabolic malnutrition and these patients are at immediate risk of death(11).

The literature strongly mentioned that community-based management of acute malnutrition (CMAM) programs are effective as it achieves the internationally agreed standards for recovery rate >75%, death rate <10%, default rate <15%, length of stay <4 weeks and coverage >50-70

(12) in sub-Saharan Africa (13), including Ethiopia (14). However, the above mentioned CMAM program achievements are short-range, which focuses on achieving immediate recovery while the children's are in the program and does not indicate sustainability of recovery post discharge. Besides, some studies mentioned, children who have been discharged from OTP as cured are susceptible for morbidity and mortality afterwards (15, 16). Currently, monitoring of children periodically post-discharge from SAM treatment programs to avoid relapse is strongly recommended(4, 11).

1.2. Statement of the problem

Globally in 2018, over 49 million under 5 children were wasted and of this, nearly 17 million were severely wasted. The prevalence of wasting in children is high in Asia and Africa, with more than two third of wasted children existed in Asia and more than one quarter in Africa (1). Globally an estimated 1 million children die each year due to severe wasting (5).

Ethiopia is one of the countries severely affected by acute malnutrition. According to the Ethiopian Demographic and Health Survey (EDHS) 2016 report, 10% of under 5 children were wasted (17). Gambella is one of the regions in Ethiopia with a high prevalence of wasting, which was 14% with a mortality rate of 88 per 1000 live births (17). According to the WHO classification, wasting prevalence of 10-14% is an indication of a serious public health concern (18). Currently, OTP is used to treat children with SAM without complication in Ethiopia including the Gambella region and was effective (19). However the program mainly focuses on short-range achievements (15) such as recovery rate, default rate and mortality rate while the children's are in the program. But, children discharged as cured might relapse post discharge from the program.

Systematic reviews showed that; the proportion of children, who relapsed into SAM after discharged as cured, varied significantly from 0 % to 37 % based on the duration of follow up post-discharge from treatment centers. Several factors have been noted which contributes to SAM relapse, but the identified factors differ across settings. The factors identified include; age (20), gender (20-22), vaccination status (23), HIV status (20), and lower anthropometric measurement on admission and discharge (24). Additionally, studies reported a high prevalence of illness in children post discharge from the program suggesting that infection might have contributed to relapse (25).

Currently, the WHO and FMOH guidelines mentioned the importance of follow-up to prevent relapse post discharge from SAM treatment however, it did not indicate clear definition of relapse on how often to follow and by whom to be performed(4, 11) rather, program relapses were defined as self-referring readmission; only depending on voluntary returns; so, it will likely underestimate a true relapse burden (11). Additionally, in some parts of the world, children will be linked to a supplementary feeding program for a further period of nutritional

support after discharged from SAM treatment centers, but this is not available in all settings (26, 27).

In the literature there is high variation in estimates of SAM relapse because of contextual and methodological differences, which makes it difficult to understand and compare the risk of relapse post discharge plus, most of the studies are old, and before the current definition of SAM(28). Currently, relapse post discharge was mentioned as priority research area with its associated factors (4). Therefore, the objective of the study is to assess the magnitude of SAM relapse in children (6-59 months) of age who have been discharged from OTP as cured and its associated factors in Gambella, South West Ethiopia.

1.3. Significance of the study

Assessing the nutritional status of previously treated SAM cases and a good understanding of the associated factors is important to improve the sustainability of recovery of children post discharge from OTP. Besides, the study is important as it gives information on a true burden of SAM relapse post discharge from the program; this helps program managers to understand the situation outside the program, as this determines the policy and program which are required to sustain the recovery of children post discharge from the program.

Furthermore, the study will also identify children highly likely to relapse by assessing the associated factors with SAM relapse; this will help to have a good understanding of the associated factors in different contexts. Lastly, the study will be important in providing information's for government policy makers, program planners and Non-governmental organizations (NGOs) to develop relevant interventional strategies and it may encourage other researchers and policy makers to carry out a more extensive research in this particular area.

2. LITERATURE REVIEW

2.1. Relapse of SAM post discharge from OTP

A series of recent studies across the globe have indicated different magnitude of SAM relapse post discharge from the CMAM program. These studies define relapse differently, used different follow-up period, and different study design.

2.1.1. Relapse of SAM 6 months' post discharge

A follow-up study conducted 6 months post-discharge from SAM treatment in Bangladesh found, 32(17.8%) SAM relapse and 5(2.8%) were died (25). Similarly, the study conducted in Nigeria six months' post-discharge from OTP found high SAM relapse, among 354 children discharged as cured 93.4% were found alive and of this 64 (18.1%) were relapsed into SAM (WHZ <-3) and 25 (6.6%) were died(29).

In line with the above studies, a prospective matched cohort study conducted in Nigeria found a higher relapse rate, the 6-month incidence of SAM relapse among 553 OTP cured children was 134(24.2%) and mortality of 9(1.6%). While; among 526 community control children's the incidence of SAM relapse was 3(0.6%) (21). In this study, SAM relapse was defined if children's MUAC $\leq$ 112 mm at any visit or if MUAC between 112-115 mm for two consecutive visits. However, the study has some limitations first the study was limited in evaluating post discharge results in the rainy season due this did not investigate seasonal effect on SAM relapse plus, the health facilities were selected purposefully so cannot generalize the finding to the population in other settings.

Similarly, a prospective observational study conducted in Pakistan which followed children monthly for 6 months reports, 8(7.4%) SAM relapse (30). In the study relapse was defined if MUAC is <115 mm and/or presence of oedema. The variations in the magnitude of relapse among studies conducted 6 months post discharge might be due to the differences in the definition of relapse, data collection point, follow-up period and study setting.

2.1.2. Relapse of SAM 12 months' post discharge

A prospective observational study conducted in southern Malawi among children aged (6-59 month) found; 334(17%) MAM relapse, 190(10%) SAM relapse, and 74(4%) mortality (22).

In the study, relapse was defined if MUAC <12.5 cm or WHZ<-2 z-score. Similarly, a quasi-experimental prospective study conducted in Malawian children aged (6-59 months) found a similar figure. The study compared the 12-month clinical outcome among children discharged from supplementary feeding after a fixed of 12 weeks treatment regardless of anthropometry criteria with children initially treated with a goal of WHZ >-2 z score (treated to goal group).

Children treated for 12 weeks were found more likely to remain well nourished (71%) than children treated only until they reached WHZ>-2 (63%) and children treated for 12 weeks were less likely to relapse into SAM (7%) than children treated only until they reached WHZ>-2 (10%) (20).

Likewise, a cluster randomized clinical effectiveness trial conducted in Malawi among children aged (6-62 months) post MAM treatment assigned children's in to the control and intervention site. Then separately from routine health and nutrition counselling, the intervention group received a lipid nutrient supplement, deforming treatment, zinc supplementation, bed net and chemoprophylaxis for malaria. Among 1383 children throughout the 12 months 407 (56%) and 347 (53) sustained recovery in the intervention and control group respectively. Among children included in the final analysis, 754 (51%) sustained recovery, 541 (36%) relapsed to MAM, 73(5%) developed SAM, and 15 (1%) were died (31). In the study MAM was defined if MUAC is 11.5-12.4 cm and SAM was defined if MUAC is <11.5 cm/or presence of bipedal oedema at every follow-up period.

2.1.3. Relapse of SAM after greater than 12 months' of discharge

A study conducted in Burkina Faso among 637 children 6-20 months post discharge found a relapse rate of 15.4 % and mortality rate of 14(2.2%)(32). In the study, relapse was defined if children's WHZ z-score is <-2 and/or presence of bipedal oedema. On the contrary, the study conducted in India reports a lower relapse rate, the combined rates of SAM relapse in children who have been discharged as cured (MUAC >=120 mm) were 9.1%, 2.9%, 2.8%, and 0% at 3,

6, 12 and 18 months following discharge respectively (33). In the study, relapse was defined if MUAC is <125 mm. This difference in SAM relapse finding might be explained by, the study conducted in Burkina Faso reported relapse based on multiple data collection points while the study conducted in India reports relapse based on a single measurement either 3, 6, 9, 12 or 18 months (average 9 months) post-discharge.

In summary, the magnitude of SAM relapse after children have been discharged from CMAM treatment centers varied significantly. The magnitude of SAM relapse post discharge ranges from 0% to 24.2%. The lowest was found in the Indian study, 0% SAM relapse were found 18 months post discharge. While the highest relapse was found in the study conducted 6 months post-discharge in Nigeria, 134 (24.2%) SAM relapse was found. The difference in SAM relapse might be due to; the difference in their definition of relapse, data collection point, follow-up period and study setting.

2.2. Factors Contributing to relapse of SAM post discharge from OTP

2.2.1. Socio-demographic factors associated with SAM relapse post discharge from OTP

Studies have indicated that SAM relapse post-discharge from community-based treatment centers is attributed to socio-demographic characteristics. These socio-demographic variables include age, sex of the child, maternal education, marital status, household income and the number of under-5 children in the household.

Child age

A study conducted in India post discharge from SAM treatment not found a significant difference in the risk of relapse or mortality among children due to their age at admission or discharge (33). In the study SAM relapse was defined if children's MUAC measurement is <11.5 cm. Similarly, a study conducted in southern Malawi which followed children aged (6-62 month) post-MAM treatment found no association between children's age and SAM relapse (31). In the study, SAM relapse was defined if children's MUAC measurement is <11.5 cm or the of presence oedema.

On the contrary, a follow-up study conducted in Malawi post discharge from MAM treatment found that; with each 1-month increase in age of the child the likelihood of remaining well-nourished was 1.04 times higher (20). In the study relapse was defined if children's WHZ is ≤-3 z-score. The difference among the studies could be explained by dissimilarities in the way the studies define relapse; and age categorization.

Child sex

A prospective matched cohort study conducted in Nigeria found; male children's were less likely to relapse into SAM than females (21). In this study, SAM relapse was defined if children's MUAC measurement is ≤ 112 mm at any visit or if MUAC between 112-115 mm for two consecutive visits.

In contrast to this finding, a follow up study conducted in Malawi post discharge from MAM treatment reports, females were less likely to relapse in to MAM but, no difference was found in the risk of mortality (20). In the study MAM relapse was defined if WHZ z-score ≤-2->-3 and/or

MUAC <12.5 cm while SAM relapse if WHZ z-score ≤-3. Similarly, a follow up study conducted 12 months post discharge in Malawi founds, females to be less likely to relapse in to SAM than males (22). The study defines relapse if MUAC <12.5 cm or WHZ z-score <-2.
While; the studies conducted in Malawi and India did not found a significant association between the sex of a child and relapse(33, 34). The difference among the studies could be explained by dissimilarities in the definition of relapse and cultural difference in the study settings.

Maternal education and Socio-economic status

A prospective matched cohort study conducted in Nigeria found no association between maternal education and SAM relapse among children (21). Similarly, the study conducted in Burkina Faso post discharge from MAM treatment found no significant difference among children's risk of SAM relapse due to difference in maternal education (23). The reports from these two studies were similar and might be because maternal educational status is similar among the study participants.

Regarding socioeconomic status, the studies conducted in Malawi and Burkina Faso post discharge from MAM treatment found no significant association between relapse and socioeconomic status of the household (23, 35). Similarly, no association was found in the study conducted in Nigeria (21). This might be because socioeconomic status is similar among the study participants in the study setting.

Orphanage

Regarding orphanage, the study conducted in Nigeria 12 months post-discharge from SAM treatment found children with died, either a father or a mother to be 5 times more likely to have SAM relapse than their counterparts (29).

Number of under-5 children in the household

The study conducted in India found children who live in a household with >2 number of under-5 children were 2 times more at risk of SAM relapse than children who live in the household with

<=2 number of under-5 children (33). In the study, relapse was defined if children's MUAC measurement is <11.5 cm.

On the contrary, an unmatched case control study conducted in Ethiopia not found a significant association between the number of under-5 children in the household (<=2 and >2) and relapse of acute malnutrition. In the study relapse was defined if children's MUAC measurement is <12.5 cm (36). Similarly, a follow up study conducted in Malawi post discharge from MAM treatment not found an association between the number of under-5 children in the household and relapse of acute malnutrition. In the study relapse was defined if children's WHZ z-score is between -2 and -3 z-score (20). The difference among the studies could be explained by dissimilarities in their relapse definition and dissimilarities' in the number of under-5 children in the study setting.

2.2.2. Nutritional factors associated with SAM relapse post discharge from OTP

Severity of malnutrition on admission and discharge (Anthropometric status)

Studies have indicated that; SAM relapse post discharge from CMAM programs are associated with severity of malnutrition (anthropometric measurement) on admission and discharge from the program.

A prospective study done in Nigeria found, children with lower MUAC and HAZ/LAZ at admission in to OTP have SAM relapse more likely than their counterparts (21). In this study SAM relapse was defined if children's MUAC measurement is ≤112 mm at any visit or if MUAC between 112-115 mm for two consecutive visits. Similarly, a follow-up study conducted in Burkina Faso found, children with MUAC <12.5 cm at discharge were 3 times more at risk of SAM relapse than children discharged with MUAC >=12.5 cm (32). In support of the above studies, a prospective study conducted in Malawi post MAM treatment found, children with lower MUAC and WHZ at discharge were more at risk of SAM relapse (20).

This might be explained by children with more severe malnutrition at admission have more comorbidities and have additional underlying biological deficit which takes longer to recover immunologically and physiologically than which can be identified by simple anthropometric measurement as a result they remain susceptible to infections (7, 15).

On the other hand, a study conducted in India not found an association among children discharged as cured with MUAC 120-125 mm and MUAC >=125 mm at discharge with SAM relapse (33). The difference among the studies could be due to the difference in admission and discharge criteria.

Household food insecurity

The study done in India found, children living in the household with low and medium food insecurity status to have SAM relapse 5 and 4 times more likely than children who live in food secured household (33). Similarly, an unmatched case control study conducted in Ethiopia found, children, living in a household with food insecurity have SAM relapse 1.5 times more likely than their counterparts. In the study, relapse was defined if MUAC is <12.5 cm (36).

In addition, a prospective study conducted in Nigeria found, children living in the household with severe food insecurity to have SAM relapse more likely than children living in moderate food in secured household (21). On the contrary, the study conducted in Burkina Faso not found an association between household food insecurity and SAM relapse (32).The difference among the studies could be due to the difference in the study setting and the difference in the classification of food security status.

2.2.3. Clinical factors associated with SAM relapse post discharge from OTP

HIV infection

A follow-up study conducted in Malawi post discharge from the MAM treatment center found; children without HIV infection sustain recovery 1.7 times more likely than their counterparts. In the study, relapse was defined if WHZ between -2 and -3 z-score (20).

Episode of hospitalization

A study conducted in India found, children with history of hospitalization after exit as default to be 3 times more at risk of SAM relapse than children with no history of hospitalization post-discharge. However, an association was not found between an episode of hospitalization and SAM relapse in children discharged as cured (33).

Comorbidities

A prospective matched cohort study conducted in Nigeria found, children who had diarrhoea and fever two weeks before the follow up visit to have SAM experience more likely than their counterparts(21). On the contrary, a study conducted in Malawi not found an association between children's diarrheal and fever episode two weeks before a follow up visit and SAM relapse (31).

Months post-discharge

A study conducted in Pakistan found high SAM relapse within 3-month post discharge (30). Similarly, the study conducted in India reports the combined rates of SAM relapse were 9.1%, 2.9%, 2.1%, 2.8%, and 0% at 3, 6, 9, 12 and 18 months after discharge (33).

Immunization status

A follow-up study conducted in Burkina Faso found, children who were not fully vaccinated for their age to have SAM relapse 1.8 times more likely than children who were fully vaccinated for their age(32). Similarly, the study conducted in India found significant association between SAM relapse and partial immunization (37). The finding might be explained by; children who are fully vaccinated will be less vulnerable to recent infections as a result of boosted immunity.

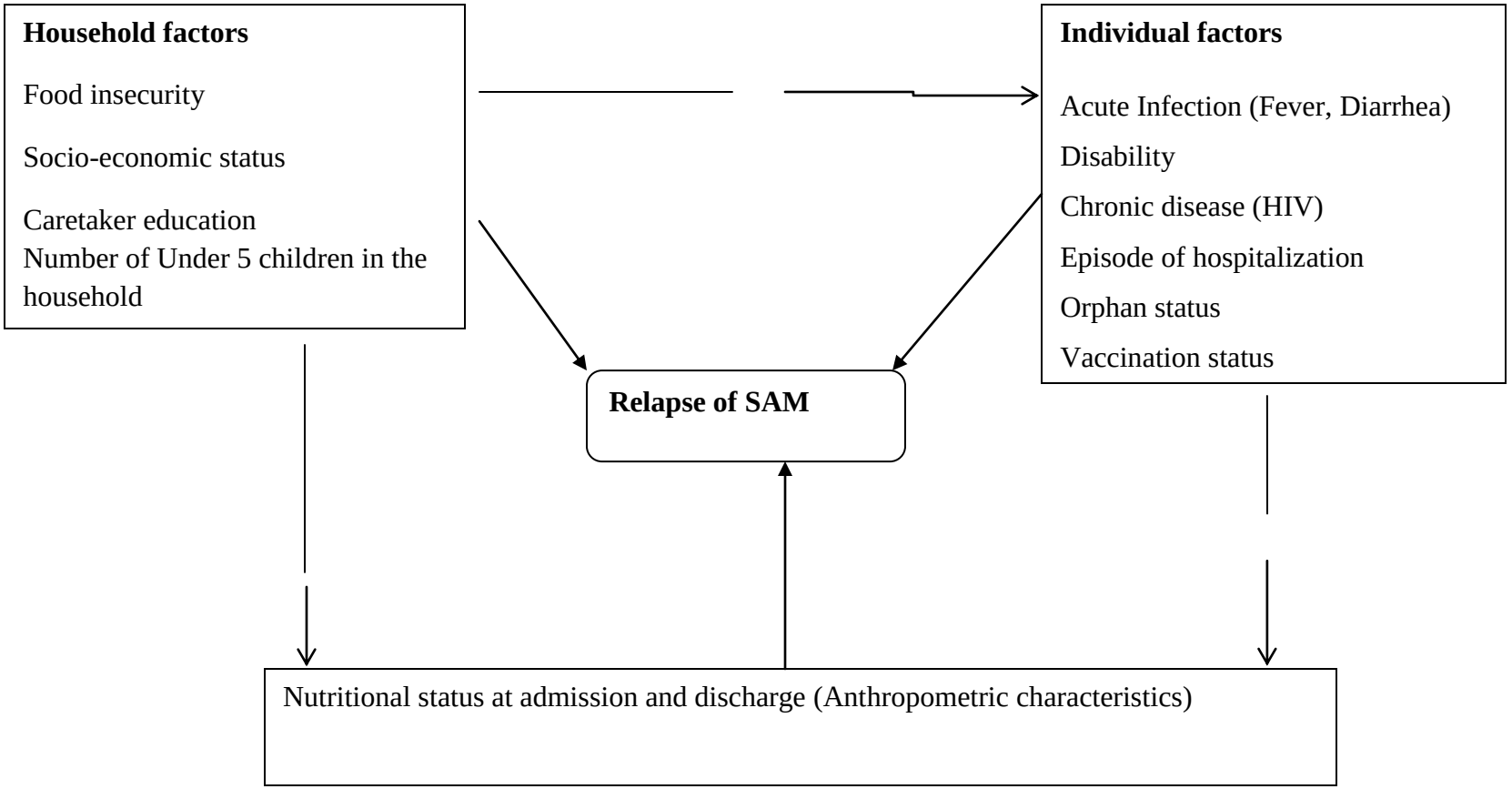

Figure 1: A conceptual frame work for factors associated with SAM relapse post discharge from OTP. (Source: constructed from reviewed literatures)

3. OBJECTIVE

3.1. General objective

To assess the magnitude of severe acute malnutrition relapse in children (6-59 months) of age who have been discharged from the OTP between Jan, 2019 to Jan, 2020 and its associated factors in Gambella region, South West Ethiopia.

3.2. Specific objectives

- To assess the magnitude of severe acute malnutrition relapse in children (6-59 months) of age who have been discharged from the OTP between Jan; 2019 to Jan, 2020.
- To determine the associated factors with severe acute malnutrition relapse in children (6-59 months) of age who have been discharged from the OTP between Jan; 2019 to Jan, 2020.
- To determine the change in WHZ index compared to that recorded at discharge.

4. METHOD

4.1. Study setting

The study was conducted in the Gambella region, located 777 km away from Addis Ababa, the capital city of Ethiopia. Gambella is one of the regions from the nine regions of Ethiopia, previously known as region 12 and its capital city is Gambella. It is situated in the western tip of Ethiopia bordering South Sudan in the west, south and north. Its size is 25,802.01 square kilometers. The main nationalities of the region are Anyuak, Nuer, Mezhenger, Komo and Opo. However, there are also other ethnic groups including settlers from other highlands of the country.

According to the Ethiopian population census 2007, the population of the region was 307,096 of this, 159,787 are males and 147,309 were females. Gambella town and Gambella nearby woredas are places where my research was conducted. The population of Gambella town and Gambella nearby woredas respectively is 39,022, and 10,590. The under 5 population of Gambella town was 4646 and for Gambella nearby woreda, 1474(38). In the town, there is one governmental referral hospital, one primary hospital, one government health Center, 2 health post and 11 private clinics. And, the available government health facilities in Gambella nearby woredas are 13 health facilities; of this 11 are health posts and two health centers which are found in Abol and Bonga towns. In the study area, health posts do not treat SAM cases; rather they refer children with SAM to the health centers and the primary hospitals.

In the study setting 302 children have been discharged from OTP as cured between January; 2019_ January 2020. Of this, 137, 90 and 75 were from Gambella town Primary hospital, Abol health center, and Bonga health center respectively. The region is considered food insecure for at least four months from April-July. In the study area supplementary feeding program is not available as a result children discharged from outpatient therapeutic program does not have a program to link to for further period of nutritional support.

4.2. Study design and period

A facility-based cross-sectional study was conducted from April; 2020 to June; 2020, among children who have been discharged as cured from OTP in Gambella region.

4.3. Population

4.3.1. Source of Population

All children who have been discharged as cured from OTP in Gambella region.

4.3.2. Study Population

Children (6-59 months) of age who have been discharged as cured from the selected OTP with mother's pair.

4.3.3. Eligibility criteria

4.3.3.1. Inclusion criteria

Randomly selected children (6-59 month) of age who have been discharged as cured from the selected OTP between Jan, 2019 to Jan, 2020 with mother's pair.

4.3.3.2. Exclusion criteria

The cases which will be excluded in the study are children whom their care givers decline the consent, children with physical deformity or congenital malformation which alters accurate anthropometric measurement.

4.4. Sample Size Determination and Sampling Technique

4.4.1. Sample size determination

4.4.2. Sample size determination for objective one (Magnitude of post discharge SAM)

The sample size was calculated using single population proportion formula based on the following assumption: SAM relapse (WHZ<-3) of 18.1% from the previous study done in Nigeria (29), a margin of error of 5% and 95% confidence interval. The calculated sample size becomes (227) and by considering a non-response rate of 10% the final sample size becomes (250).

$$n = \frac{(Z\ \alpha/2)^2 * (P) * (1-P)}{d^2}$$

$$n = \frac{(1.96)^2 x 0.181\ (1-0.181)}{(0.05)^2} = 227$$

Where n is the required sample size

z = the standard score corresponding 95% confidence level (1.96).

p= proportion of SAM among children discharged from SAM management from a study done in Nigeria.

q= complement probability (1-p).

d= the permissible Margin of error (the required precision) =5%

4.4.2 Sample size determination for objective two (factors associated with SAM relapse)

To estimate the required sample size for objective two, epi-info version 7.2.0.1 software was used considering the percent outcome in exposed (p1) and percent outcome in unexposed (p2) from previous studies with a 1:1 ratio of unexposed to exposed, 95% confidence interval and power 80%. Variables considered for sample size calculation are age(34), HIV status(34), breastfeeding status(39), and an episode of hospitalization (33).

Table 1: Sample size determination for factors associated with SAM relapse post discharge from OTP

Variable	Power (%)	CI (%)	AOR	Ratio	Outcome among non-exposed (%)	Sample size (N)	Final sample size with non-response rate10%
Breastfeeding status (39)	80	95	4	1:1	50.8	92	102
Episode of hospitalization (33)	80	95	3.9	1:1	13.2	118	130
Age <12 month(34)	80	95	2.49	1:1	31	178	196
HIV status (34)	80	95	4.03	1:1	17	96	106

The sample size calculated for the first specific objective using single population proportion formula considering 10% non-response rate was 250, which is the largest sample size calculated value than the sample size calculated for objective two. Therefore, the sample size selected for the study was 250.

4.4.3. Sampling Technique

The study was conducted in all available public health facilities which provide routine OTP service in Gambella town and Gambella nearby woredas. The available health facilities which are providing routine OTP service in Gambella town and Gambella nearby woredas are one primary hospital and two health centers respectively. Then, these three available facilities were selected. In the study children's who have been discharged from OTP as cured between Jan; 2019 to Jan, 2020 with their caregivers have participated. To recruit children for the study first, the sample size calculated was proportionately allocated among these three health facilities based on the previous one-year data of discharged children. Then, using children's OTP registration as a sampling frame, children's were selected randomly using the computerized lottery method, consecutively.

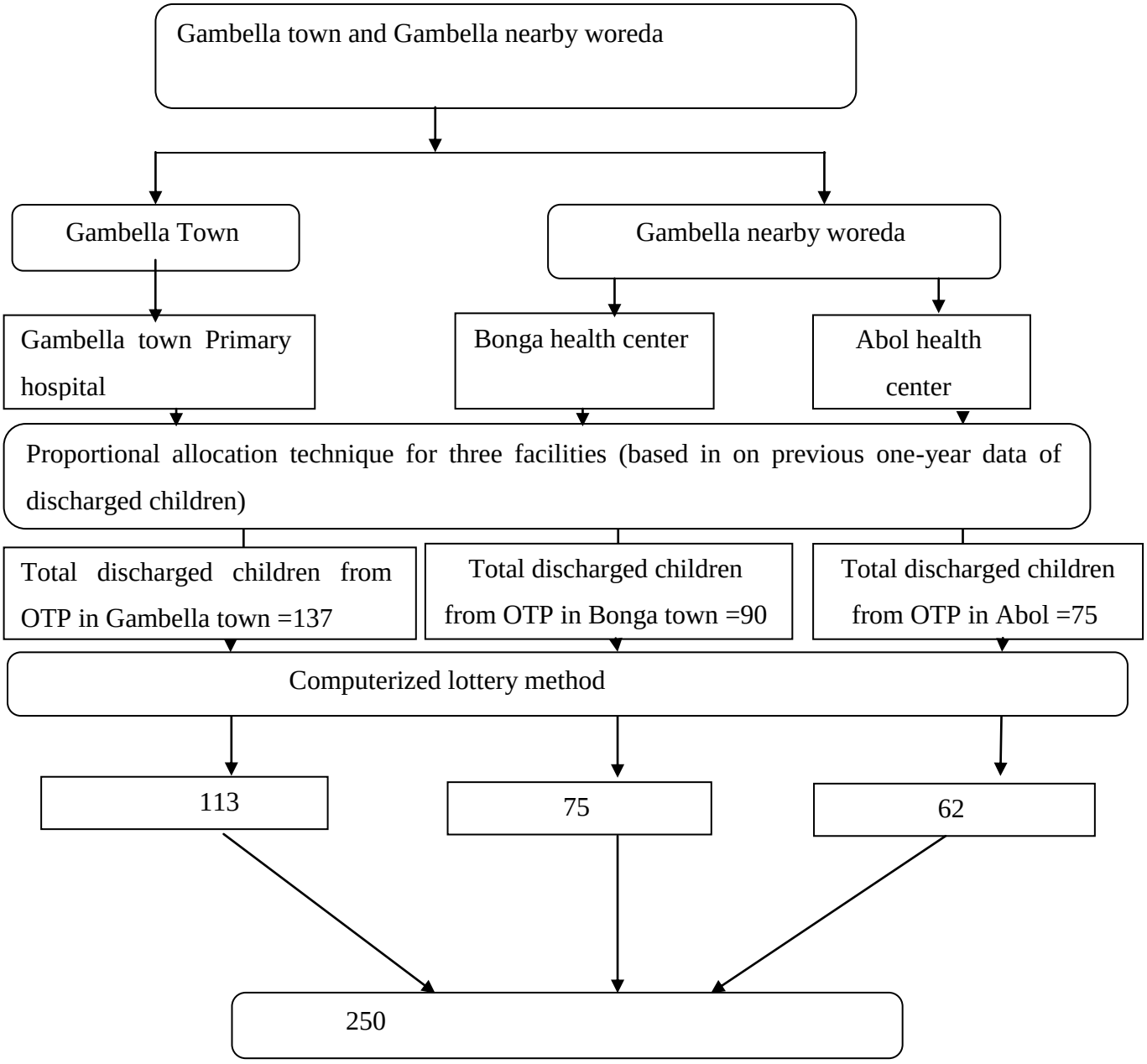

Figure 2: Schematic representation of sampling procedure on assessment of SAM relapse in children (6-59 months) and its associated factors in Gambella town and Gambella nearby woreda, South West Ethiopia

4.5. Study variables

4.5.1. Dependent variables

The primary outcome of the study is the magnitude of SAM relapse among children who have been discharged from OTP (3-15 months) prior.

4.5.2. Independent variables

Socio-demographic data: Age of a child in months, age of a mother in years, sex, marital status, level of education, occupational status, number of people in the household, number of under-five children in the household and household income.

Nutrition-related variables: Questions related to household food insecurity, child feeding practice, and education on IYCF practice, and WHZ and MUAC on admission and discharge.

Clinical related variables like*:* HIV infection, the immunization status of the child, illness history after discharge, the symptom of illness after discharge (fever, diarrhea, and cough) and an episode of hospitalization.

4.6. Operational definition of terms

Relapse: A child was considered as relapsed into SAM; if he/she had (WH/LZ) less than a -3 z-score (4).

Household Food Insecurity Access Scale (HFIAS): Household food security status was assessed by using a validated 9 item household food insecurity access scale. The maximum score for HFIAS is 27(if the response for all 9 frequency of occurrence question is often, coded with a response code of 3 and the minimum score is 0 (if the response for all 9 frequency of occurrence question is no (coded with response code of 0). The higher the score the more food insecurity the household experienced and the lower the score the less food insecurity the household experienced (40, 41). Based on the total household score ranging from 0-27, the study categorized households into four as food secured (0-1), mildly food in secured (2-8), moderately food in secured (9-16) and severely food in secured (17-27).

Full (complete) immunization: A child is defined as fully vaccinated for his/her age, when a child receives all the recommended vaccines, including at birth (polio 0 and BCG), at six weeks (pentavalent, OPV1, PCV1, Rota1), at 10 weeks (pentavalent2, OPV2, PCV2, Rota2), at 14 weeks (pentavalent3, OPV3, PCV3), at 9-month measles and recent vitamin A supplementation (within 6 months) (42).

Partial (incomplete) immunization: A child is defined as incompletely vaccinated for his/her age; when a child missed at least one of the recommended vaccines at that age.

Income: The monthly average income of the household was classified using the World Bank Atlas method(43). And was categorized in to four: low-income (<=2424 ETB), low-middle-income (2426-9475 ETB), upper-middle-income (9477-29362 ETB) and high-income (>=29364 ETB).

4.7. Data collection tools and procedures

The process of data collection was started by reviewing the OTP registration by preparing a checklist using the OTP multi-chart and registration logbook which has been used in the country (11). From the registration important variables like sex, age, weight, height, MUAC, date of admission, date of discharge, and address (kebele and phone numbers) of the caregivers were captured and documented on paper forms. Then, based on the address in the registration children discharged as cured were identified. Additionally, the severity of malnutrition (anthropometric measurements) on admission and discharge from the OTP program was captured from the registration.

During the data collection, the data collectors explained the purpose of the study and obtained informed consent from the caregivers. And, caregivers were interviewed using a structured questionnaire which takes about 20-30 minutes and was asked to bring children to health facilities for anthropometric measurement.

A total of 6 data collectors who were working in OTP centers and had previous experience in data collection were recruited (3 urban health extension nurses and 3 diploma nurses) and trained for 2 days along with 2 supervisors (health officers). The training was to make them familiar with the data collection tool, mainly on how to take anthropometric measurements plus

on techniques of administering the questionnaire. In addition, in the training awareness was created on how to prevent the transmission of corona virus (COVID-19) by using personal protective equipment like mask, gloves, and sanitizer. The questionnaire composed of three sections, which is related to socio-demographic, clinical and nutritional factors. The data collection took place from April; 2020 to June; 2020.

To determine the age of children's during the data collection, mothers were asked to recall the date of birth beside all mothers was asked to bring birth certificates and immunization cards to cross check and capture the date of birth. Then the age of the children's was calculated by subtracting date of birth from the interviewed date and recorded in months. While the age of the caregivers measured in years. Questionnaires related to maternal age, maternal education, marital status, number of people living in the household, number of <5 children in the household, occupational status of the caregivers were adopted from EDHS (17).

While, to get information related to child feeding practice, standard indicators for assessing infant and child feeding practice was asked to the caregivers(44). These questions are related to the initiation of breastfeeding, colostrum, exclusive breastfeeding and complementary feeding. Initiation of breast feeding was categorized into three: Immediately (within 1 hour of birth), <24 hour, and >one day. While; questions related to colostrum were categorized into two: child received colostrum within three days of birth (Yes) or a child not received colostrum within three days of birth (No). Questions related to excusive breastfeeding were categorized into four: child received breast milk only, a child received breast milk and water, breast milk and infant formula, and the fourth is other.

To get information on age complementary feeding introduced, the question was categorized into three: supplementary feeding introduced at <6 months, at 6 months and >6 months. For children $\leq$ 2 years of age, questions on continuity of breastfeeding were also asked. It was categorized into two: children currently on breastfeeding (Yes) and children not currently breastfeeding (No). Then, based on the literature reviewed questions whether the caregivers had obtained any education on IYCF practice was asked. It was categorized in to two: had education on IYCF practice (Yes) and had not got any education on IYCF practice (No).

Regarding the HIV status of the child, the study captures the test result recorded in OTP registration and cross checked from the caregivers. Concerning child level illness first, the caregiver was asked to know whether the child was ill in the previous one month before the survey. Then, for children who were ill, a symptom of the illness and episode of hospitalization was asked.

Regarding immunization status, FMOHs guideline was used and based on the schedule in the guideline children's status was evaluated (42). First, the caregivers were asked to know whether the child has received any vaccination previously (Yes or No). Then, for children who were vaccinated, the study assessed whether children's were fully vaccinated or not for their age based on reviewing immunization cards.

Anthropometric measurements

Anthropometric measurements were measured using standard guideline for each measurement procedures(11). Height was measured for a child with age greater than two using a portable measuring board, which was placed on a flat surface with the backboard supported by a wall. This child was measured with the head, back, buttocks and heels touching the backboard; heels together; knees extended, and; head in the Frankfort horizontal plane. However, for a child with an age less than two or (<85cm) and for a child, who is not cooperating sufficiently for a standing height measurement, the measuring board was placed on the ground and length was measured. Then measurement was taken to the nearest 0.1 cm.

And, weight was measured using a digital scale. Children aged two and above were weighted alone. While for younger children below two years of age, first were weighted together with the mother. Then the mothers were weighted alone. Then the difference between the two measurements was recorded as the weight of the child. Weight measurement was recorded to the nearest 0.01kg.

Anthropometric measurements, weight and height were measured two times then; the difference between replicate results was checked. For values above the allowable difference, the measurements were repeated and then, the average of the two measurements was taken. The maximum allowable difference for weight is 0.5 kg and for height 1.0 cm.

Additionally, oedema was checked by applying thumb pressure on top of both feet for 3 seconds to see if leaves a pit (indentation) in the foot after the thumb is lifted (14).

4.8. Data quality assurance

To ensure the data quality data collection tool was prepared after reviewing the literature related to the study. Then, two days of training was given about the objective of the study and about the contents in the questionnaire by the principal investigator. Additionally, a pre-test of the questionnaire was performed on 5 % of the total sample size on mothers of children 6-59 months who were discharged from OTP at Itang health center which is located 38 km far from Gambella town that wasn't a part of the study. Then correction was made for questions that create confusion or misunderstanding.

Besides, daily monitoring of the data collection was made by the investigators along with the supervisors. Immediate feedback was given to each question that occurred at the field level and the response completeness and appropriateness was checked before finalizing the data collection. Then, appropriately completed questionnaires were coded. Then before starting analysis, data was cleaned using Epi data version 4.4.1 to ensure data quality. Additionally, the accuracy of the weight scale was checked during the data collection by placing a weight of 3 kg iron bars on the scale.

4.9. Data Management and Analysis

4.9.1. Data Management

The data was edited and entered into Epi-Data version 4.4.1 software by the principal investigator and was exported to SPSS version 23 for data analysis. Before starting the analysis, inconsistencies and missing values were cleaned by checking the original questionnaire. Predictors are dichotomized as well as polychtomized while the outcome is dichotomized (1= SAM relapsed, 2=SAM not relapsed).

4.9.2. Data Analysis

All statistical tests were done using SPSS version 23software. And, anthropometric measurements including, weight and height were measured and anthropometric indices were

derived based on WHO 2009 child growth standard(45) using WHO Anthro software 3.2.2. Data were summarized and presented in frequency table and summary statistics.

For categorical predictor variables, their association with the dependent variable was assessed using Chi-square and Fisher exact test. Additionally, WHZ on discharge was compared with WHZ post-discharge via pairwise Wilcoxon signed ranks test.

To determine association between dependent and independent variables univariate binary logistic regression analysis and multivariate logistic regression analysis was done. Initially binary logistic regression analysis for each variable was done to determine independent variables which are associated with the dependent variable (SAM relapse) without controlling confounders. Then, independent variables with p-value<0.05 in bivariate logistic regression were entered into the final multivariable binary logistic regression model (backward stepwise method). And variables in the final model with a p-value<0.05 were declared statistically significant. The strength of association was determined using the odds ratio of 95% Cis.

4.10. Ethical consideration

Ethical clearance was obtained from the research and ethical review board, School of Public Health, College of Health Science of the Addis Ababa University before the start of the data collection process. Following the approval, an Official letter of co-operation was secured to concerned bodies by the Department of Public Health of Addis Ababa University.

The necessary permission to undertake the study was also obtained from Gambella town and Gambella nearby woreda health bureau and the respective health facilities. Before data collection, all data collectors were trained about preventive measures of COVID-19.

During data collection, all the data collectors and the supervisors were using personal protective equipment's such as mask gloves and sanitizer in addition to keeping their physical distance to prevent the transmission of COVID-19. Informed verbal consent was obtained from all study participants after explaining the purpose, procedure, risk, benefit and confidentiality.

The degree of involvement in the study was also explained to caregivers by their local language and, the data collectors signed on the consent form to indicate the caregiver's agreement to

participate in the study. Consent was voluntary and free from any coercion. Privacy and confidentiality was maintained for all study participants by coding results known only to the caregivers. A child who found to be SAM and who is not fully vaccinated for his/her age was linked to health facilities. Additionally, nutritional education on IYCF was given to all caregivers who participated in the study.

4.11. Plan for dissemination of the research findings

The final finding of this study will be submitted and defended as a master's thesis at Addis Ababa University College of Medicine and health science, department of public health. The finding of the research will be also disseminated to Gambella town and Gambella nearby woreda health institutions, Zonal and Regional health bureau, ministry of health and other concerned bodies at different managerial levels to enable them to consider recommendations during their planning process. Finally, the finding will be reported on the scientific forum workshops, seminars, and other professional meetings and an effort will be made to publish in peer-reviewed journals.

5. RESULT

5.1. The magnitude of SAM relapses

Figure 3 shows the magnitude of SAM (WHZ<-3) among children (6-59 months) of age who have been discharged from OTP as cured (from January 2019; to, 2020), following 3-15 months of discharge. A total of 250 children who have been discharged from OTP as cured were traced of which the study able to collect the data from 208 children while; 7(2.8%) children were reported to have died and 35(14%) were either gave untraceable address or consent withdrawn.

Among 208 children successfully traced, 21(10.1%) of children were found relapsed in to SAM while 187(89.9%) were not found relapsed (WHZ>-3). And of this total relapse, 14(66.6%) were among children discharged <6 months before the survey date while; 7(33.3%) were among children discharged >6 months before the survey date.

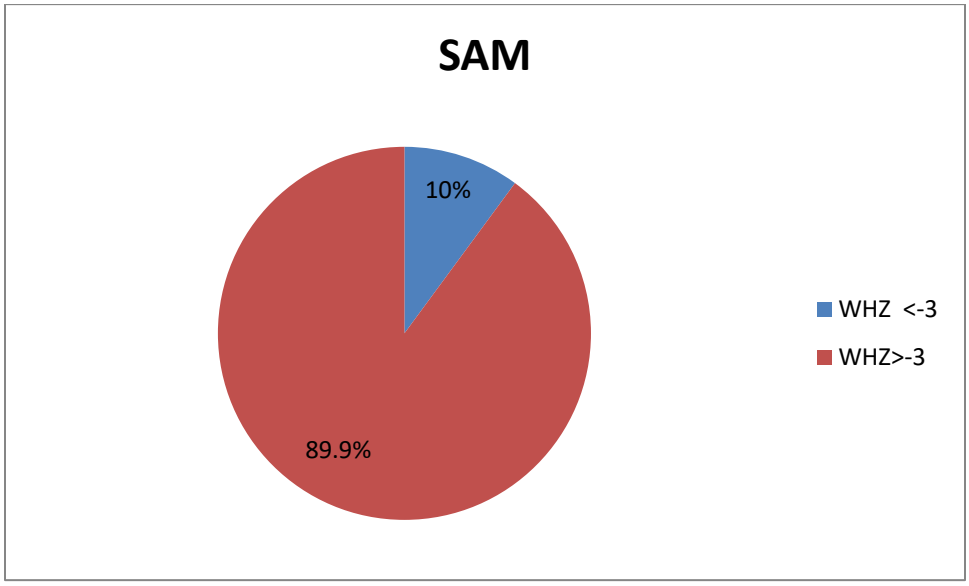

Figure 3: The magnitude of SAM relapses among children (6-59 months) of age who have been discharged as cured from OTP (from January, 2019-January, 2020), in Gambella town and Gambella nearby woreda, South West Ethiopia (N=208)

5.2. Socio-demographic characteristics of children (6-59 months)and their care givers post discharge from OTP in Gambella town and Gambella nearby woreda, South West Ethiopia (N=208)

Out of the total estimated sample size of 250, the study able to follow and collect data from 208 children/mother pair from April; 2020-June, 2020 making the response rate of 83.2%.

Table 2 shows about socio-demographic characteristics of children (6-59 months) and their caregivers. Among the study participants majorities, 99(47.6%) were from Gambella town primary hospital while, 64(30.8%) and 45(21.6%) were from Bonga town and Abol town health centers respectively.

In terms of sex distribution of the children majorities, 106(51%) were males and, the median age of children's in months was 24.38(IQR: 20.46-29.9). And among these children majorities, 93(44.7%) and 90(43.3%) were between the age of 12-<24(months) and 24-<36 (months) respectively.

Regarding mothers of subjects majorities, 167(80.3%) were married, 146(70.2%) attended school and of these majorities, 65 (31.3%) were attended primary education. The median age of the mothers was 27 (IQR: 21-31). When we see occupation of the mothers, majorities 33(15.9%) were students while; 32(15.4%) were unemployed. The average monthly household income of majorities, 185(88.9%) were in the low-middle income category and, 145(69.7%) households had >5 people in the household. Likewise, 51(24.5%) of the households had >2 under-5 children.

Table 2:Socio-demographic characteristics of children (6-59 months) and their care givers post discharge from OTP in Gambella town and Gambella nearby woreda, South West Ethiopia (N=208) and their caregivers

Characteristics		Frequency (%)	SAM (relapsed) (%)	SAM (not relapsed) %	Chi-square/fissure Exact	p-value
Town	Abol Town	45(21.6)	3(14.3)	42(22.5)	4.6*	0.11
	Bonga Town	64(30.8)	11(52.4)	53(28.3)		
	Gambella Town	99(47.6)	7(33.3)	92(49.2)		
Sex	Male	106(51)	9(42.9)	97(51.9)	.6*	.43
	Female	102(49)	12(57.1)	90(48.1)		
Age	Median (IQR)	24.4(20.5,29.9)	27.2(19.4-33.8)	24.4(20.5-29.5)	3.73'	.39
	6-<12	2(1)	0(0)	2(1.1		
	12-<24	93(44.7)	7(33.3)	86(46)		
	24-<36	90(43.3)	10(47.6)	80(42.8)		
	36-<48	15(7.2)	2(9.5)	13(7)		
	48-<59	8(3.8)	2(9.5)	6(3.2)		
Maternal age	Median(IQR)	27(21,31)	25(19-33)	27(21-31)	1.81'	.42
	15-24	89(42.8)	10(47.6)	79(42.2)		
	25-34	101(48.6)	8(38.1)	93(49.7)		
	>35	18(8.7)	3(14.3)	15(8)		
Attended school	Yes	146(70.2)	11(52.4)	135(72.2)	3.5*	.06

	No	62(29.8)	10(47.6)	52(27.8)		
Highest level of education	Can read and write	37(17.8)	3(14.3)	34(18.2)	3.33'	.47
	Primary 1-8	65(31.3)	6(28.6)	59(31.6)		
	Secondary 9-12	39(18.8)	2(9.5)	37(19.8)		
	Above secondary	5(2.4)	0(0)	5(2.7)		
Marital status	Married	167(80.3)	16(76.2)	151(80.7)		.57
	Other (Single/divorced/widowed)	41(19.7)	5(23.8)	36(19.3)		
Occupational status	Gov't employee	13(6.3)	2(9.5)	11(5.9)	4.48'	.4
	Student	33(15.9)	3(14.3)	30(16)		
	Daily laborer	4(1.9)	1(4.8)	3(1.6)		
	House wife	117(56.3)	10(47.6)	107(57.2)		
	Unemployed	32(15.4)	3(14.3)	29(15.5)		
	Private	9(4.3)	2(9.5)	7(3.7)		
Household family size	<=5	63(30.3)	4(19)	59(31.6)	1.4*	.24
	>5	145(69.7)	17(81)	128(68.4)		
Household under-five children	<=2	157(75.5)	7(3.4)	150(72.1)	22.4*	.00.
	>2	51(24.5)	14(6.7)	37(17.8)		
Income	Low-income	8(3.8)	1(4.8)	7(3.7)	0.43'	.86
	Low-middle	185(88.9)	19(90.5)	166(88.8)		
	Upper-middle	15(7.2)	1(4.8)	14(7.5)		

***=Values of Chi-square test & '=Values of Fisher exact test**

5.3. Nutritional related characteristics of children (6-59 months) post discharge from OTP in Gambella town and Gambella nearby woreda,South West Ethiopia (N=208)

Table 3 shows about nutritional related characteristics of children (6-59 months) who have been discharged from OTP. Regarding the child's breastfeeding experience, all the mothers reported having breastfed or were breastfeeding their children's. Among the study participants, the majority 144(69.2%) of children's initiated breastfeeding immediately within an hour and, 190(91.3%) received colostrum within the first three days after birth. Similarly, majority 125 (60.1%) of children's exclusively breastfeed in the first six months and, 148(71.2%) started semisolid at 6 months of age. Regarding continuity of breastfeeding of children's <2 years of age, 27(13%) has stopped breastfeeding before 2 years of age.

The food security status of the households was also assessed and, only 14(6.7%) of the households were food secured while, 98(47.1%), 57(27.4%) and 39(18.8%) were mildly, moderately and severely food insecure respectively. Regarding education on infant and young child feeding practice (IYCF) majorities, 117(56.3%) of the caregivers has got education on IYCF.

Additionally, children's severity of malnutrition on admission and discharge from the OTP program was captured from the registration. Regarding the WHZ z-score of children's on admission majorities, 172(82.7%) were enrolled with WHZ<-3 z-score while, 36(17.3%) were enrolled with WHZ>-3 z-score. While on discharge majorities, 143(68.8%) of children's were discharged with WHZ>-2 z-score while, 65(31.3%) were discharged with WHZ z-score between >-3-<-2.

When we see MUAC on admission, the majority, 133(63.9%) of children's were admitted with MUAC<11.5cm while, 9(4.3%) were admitted with MUAC>12.5cm. And on discharge majority of children's, 131(63%) were discharged with MUAC>12.5cm. The median (interquartile range) of WHZ z-score on admission and discharge was -3.29(-3.8_-3.07) and -1.715(-2.135_-1.27) respectively. And the median (interquartile range) of MUAC on admission and discharge was 11.45(11-12) cm and 12.8(12.5-13) cm respectively. No case of oedema was recorded on admission and during the survey date.

Regarding the months at which the children are discharged from OTP with the survey date majorities, 118(56.7%) were discharged within 6 months before the survey while, 90 (43.3%) were discharged before > 6 month. In the current study, children were assessed after a median (interquartile range) of 6 (4-9) months of recovery.

Table 3: Nutritional related characteristics of children (6-59 months) post discharge from OTP in Gambella town and Gambella nearby woreda, South West Ethiopia (N=208)

Variable		Frequency (%)	SAM (relapsed)	SAM (not relapsed)	Chi-square (x^2)/ Fisher	P value
Initiation of breastfeeding	Immediately	144(69.2)	14(66.7)	130(69.5)	1.23'	.6
	< 24 hrs	53(25.5)	5(23.8)	48(25.7)		
	>One days	11(5.3)	2(9.5)	9(4.8)		
Exclusive breastfeeding	Yes	125(60.1)	8(38.1)	117(62.6)	4.72*	.03
	No	83(39.9)	13(61.9)	70(37.7)		
Colostrum	Yes	190(91.3)	14(66.7)	176(94.1)		.00
	No	18(8.7)	7(33.3)	11(5.9)		
Timely initiation of supplementary feeding	Yes	148(71.2)	16(76.2)	132(70.6)	0.3*	.59
	No	60(28.8)	5(23.8)	55(29.4)		
Child stop breastfeeding (for <2 years)	Yes	27(13)	5(23.8)	22(11.8)	5'	.07
	No	69(33.2)	3(14.3)	66(35.3)		
Education on IYCF	Yes	117(56.3)	4(19)	113(60.4)	13.2*	.00
	No	91(43.8)	17(81)	74(39.6)		
Food security	Food secured	14(6.7)	1(4.8)	13(7)	9'	.02
	Mildly insecure	98(47.1)	4(19)	94(50.3)		
	Moderately insecure	57(27.4)	9(42.9)	48(25.7)		
	Severely insecure	39(18.8)	7(33.3)	32(17.1)		

On admission						
WHZ z-score	Median (IQR)	-3.29(-3.8_-3.07)	-3.68(-3.99_-3.24)	-3.26(-3.78_-3.04)		.77
	<-3	172(82.7)	17(81)	155(82.9)		
	>-3	36(17.3)	4(19)	32(17.1)		
MUAC (cm)	Median (IQR)	11.5(11-12)	11.4(11-11.75)	11.5(11-12)	1.43'	.69
	<11	60(28.8)	7(33.3)	53(28.3)		
	11-11.5	73(35.1)	9(42.9)	64(34.2)		
	11.5-12.5	66(31.7)	5(23.8)	61(32.6)		
	>12,5	9(4.3)	0(0)	9(4.8)		
On discharge						
WHZ z-score	Median (IQR)	-1.715(-2.135_-1.27)	-2.27(-2.565_-1.99)	-1.67(-2.01_-1.17)	.51*	.47
	>-3-<-2	65(31.3)	8(38.1)	57(30.5)		
	>-2	143(68.8)	13(61.9)	130(69.5)		
MUAC (cm)	Median (IQR)	12.8(12,5-13)	12.4(12.3-12.8)	12.8(12.5-13)	8.8*	.003
	<12.5	77(37)	14(66.7)	63(33.7)		
	>12.5	131(63)	7(33.3)	124(66.3)		
Time between exit from OTP and survey date	<3 Month	50(24)	7(33.3)	43(23)	1.87'	.6
	3-<6 Month	68(32.7)	7(33.3)	61(32.6)		
	6-<9 Month	51(24.5)	3(14.3)	48(25.7)		
	9->12 Month	39(18.8)	4(19)	35(18.7)		

***=Values of Chi-square test & '=Values of Fisher exact test**

5.4.Clinical related characteristics of children (6-59 months) post discharge from OTP in Gambella town and Gambella nearby woreda, South West Ethiopia (N=208)

Table 4 shows about clinical related characteristics of children (6-59 months) who have been discharged from OTP. Regarding children's immunization status, majorities 184(88.5%) were vaccinated and of this, 151(72.6%) were fully vaccinated for their age. While, 36(17.3%) do not have immunization cards.

When we see children's history of illness one month before the survey, majorities 134(64.4%) of the children were ill and of this, most of the symptoms reported were diarrhea and fever, 55(26.4%) and 53(25.5%) respectively. Among children with a history of illness post-discharge, 21(10.1%) had a history of hospitalization. And children's HIV status was assessed by capturing the test result recorded in the registration and crosschecked from the mothers. Out of 208 children, 11(5.3%) were HIV positive while, 78(37.5%) were not tested.

Table 4: Clinical related characteristics of children (6-59 months) post discharge from OTP in Gambella town and Gambella nearby woreda, South West Ethiopia (N=208)

Variable		Frequency (%)	SAM (relapsed) (%)	SAM (not relapsed)%	Chi-square/ fissure Exact	p-value
Fully immunized	Yes	151(72.6)	7(33.3)	144(77)	16.6'	.00
	No	21(10.1)	5(23.8)	16(8.6)		
Illness history	Yes	134(64.4)	18(85.7)	116(62)	4.6*	.03
	No	74(35.6)	3(14.3)	71(38)		
Symptom of illness	Diarrhea	55(41)	11(61.1)	44(37.9)	4.9'	.24
	Cough	17(12.7)	0(0)	17(14.7)		
	Rapid breathing	6(4.5)	0(0)	6(5.2)		
	Fever	53(39.6)	7(38.9)	46(39.7)		
	Other	3(2.2)	0(0)	3(2.6)		
Episode of hospitalization	Yes	21(10.1)	3(14.3)	18(9.6)	5'	.06
	No	113(54.3)	15(71.4)	98(52.4)		
HIV test result	Positive	11(5.3)	4(19)	7(3.7)	6.6'	.03
	Negative	119(57.2)	10(47.6)	109(58.3)		

***=Values of Chi-square test & '=Values of Fisher exact test**

5.5. Comparison of WHZ on discharge and WHZ post discharge

Table 5 shows Wilcoxon signed ranks test result. As shown from the table below, the median WHZ z-score at discharge was -1.72(IQR:-2.13 to -1.27) and has decreased significantly to -2(IQR:-2.74 to -1.6).

Table 5: Wilcoxon signed ranks tests result of WHZ z-score on discharge and post discharge from OTP

Descriptive

Variable	N	Mean	Std. Deviation	Minimum	Maximum	Percentile		
						25th	50th(median)	75th
WHZ on discharge	208	-1.63	.757	-2.97	1.12	-2.13	-1.72	-1.27
WHZ post discharge	208	-1.99	.964	-3.53	1.72	-2.74	-2.0	-1.6

Ranks

		N	Mean Rank	Sum of Ranks	Test Statistics	
WHZ post discharge	Negative Ranks	165[a]	112.75	18603.00	Z	-9.085[b]
WHZ on discharge	Positive Ranks	42[b]	69.64	2925.00	Asymp.Sig (2-tailed)	.000
	Ties	1[c]				
	Total	208				

6.1.1. Factors associated with SAM relapse post discharge from OTP

Initially logistic regression analysis for each variable (sociodemographic, nutritional and clinical related factors) was done to determine independent variables associated with the dependent variable (SAM relapse) without controlling confounders.

Table 6 shows binary logistic regression analysis. As shown from the results of binary logistic regression analysis, the number of under-5 children, receiving colostrum, IYCF education, food security, full immunization status, MUAC at discharge and Illness history in the last month was significantly associated with SAM relapse.

Children living in the household with>2 number of under 5 children were 8 times more likely to relapse into SAM than children living in the household with <2 number of under 5 (COR: 8, 95% CI: 3-21). Likewise, children who have not received colostrum in the first 3 days after birth were 8 times more likely to relapse in to SAM than children who have received colostrum in the first 3 days after birth COR: 8, 95% CI: 2.68-23.9).

Regarding the food security status of the household, children who live in severe food insecure household were 5 times more likely to relapse into SAM than children living in food secured household (COR: 5.1, 95% CI: 1.4-18.7). In addition, children with mothers who had not obtained any IYCF education were 6 times more likely to relapse into SAM than children of mothers who had obtained IYCF education (COR:6.5, 95% CI: 2.1-20).

Immunization status was also associated with SAM relapse, children who were not fully vaccinated for their age were 6.4 times more likely to relapse into SAM than children who were fully vaccinated for their age (COR: 6.4, 95% CI: 1.83-22.6). Moreover, children with MUAC at discharge <12.5 cm were 3.9 times more likely to relapse into SAM than children who were discharged with MUAC >12.5 cm (COR: 3.9, 95% CI: 1.5-10.2). While, children who were not sick at any time in the last one month were 70% less likely to relapse into SAM than children who were sick at any time in the last one month (COR: 0.3, 95% CI: 0.08-0.95).

Table 6: Binary logistic regression analysis of associated factors with SAM relapse in Gambella town and Gambella nearby woreda, South West Ethiopia (N=208)

Variable		Frequency (%)	SAM (relapsed)	SAM (not relapsed)	COR (95% CI)	P value
Household under-five children	<=2	157(75.5)	7(3.4)	150(72.1)	1	
	>2	51(24.5)	14(6.7)	37(17.8)	8.1(3.1-21.5)	.00*
Colostrum	Yes	190(91.3)	14(66.7)	176(94.1)	1	
	No	18(8.7)	7(33.3)	11(5.9)	8(2.68-23.9)	.00*
Education on IYCF	Yes	117(56.3)	4(19)	113(60.4)	1	
	No	91(43.8)	17(81)	74(39.6)	6.5(2.1-20)	.001*
Food insecurity (FI)	Food secured	14(6.7)	1(4.8)	13(7)	1	
	Mildly FI	98(47.1)	4(19)	94(50.3)	4.4(1.3-15)	0.02*
	Moderately FI	57(27.4)	9(42.9)	48(25.7)	1.8(0.19-17.4)	0.6
	Severely FI	39(18.8)	7(33.3)	32(17.1)	5.14(1.41-18.7)	.013*
MUAC (cm) at discharge	<12.5	77(37)	14(66.7)	63(33.7)	3.9(1.5-10.2)	.005*
	>12.5	131(63)	7(33.3)	124(66.3)	1	
Fully immunized	Yes	151(72.6)	7(33.3)	144(77)	1	
	No	21(10.1)	5(23.8)	16(8.6)	6.4(1.83-22.6)	0.004*
Illness history	Yes	134(64.4)	18(85.7)	116(62)	1	
	No	74(35.6)	3(14.3)	71(38)	0.3(0.08-0.96)	0.043*

***=variables which are candidate for multivariable logistic regression**

6.1.2. Factors independently associated with SAM relapse

During the analysis model goodness of fit was tested using Hosmer-Lemeshow and the result was (x^2) (1.6, n=208), p-value=0.79 indicating good model fit. Additionally, multicollinearity was checked and the value of variable inflation factor (VIF) for all independent variables was <3 indicating no multicollinearity therefore multivariable logistic regression was done.

Table 7 shows the multivariable logistic regression analysis result of factors independently associated with SAM relapse. Variables that significantly associated with SAM relapse in bivariate analysis with p value <0.05 were entered into multivariable logistic regression to control confounders. The variables which were entered into multivariable logistic regression are the number of under-5 children, receiving colostrum, IYCF education, food security, MUAC at discharge, fully immunization, and illness history.

Of seven factors entered into multivariable logistic regression, three variables retain their significance in the final regression model; these variables are IYCF education, full immunization status, and MUAC at discharge.

Children with mothers who have not obtained any IYCF education were 5.7 times more likely to relapse into SAM than children with mothers who have obtained IYCF education (AOR:5.7, 95%CI, (1.3-26.9). Additionally, children who were not fully vaccinated for their age were 8 times more likely to relapse into SAM than children who are fully vaccinated for their age (AOR: 8, 95%CI, 1.8-34.8). Plus, children with MUAC at discharge <12.5 cm were 4.4 times more likely to relapse into SAM than children who were discharged with MUAC >12.5 cm (AOR: 4.4, 95% CI: 1.1-18.8).

Table7: Multivariable logistic regression analysis (Backward Method) of factors associated with SAM relapse in Gambella town and Gambella nearby woreda, South WestEthiopia (N=208)

Variable		SAM (relapsed)	SAM (not relapsed)	COR(95% CI)	AOR(95%CI)	P value
Household under-five children	<=2	7(3.4)	150(72.1)	1	1	
	>2	14(6.7)	37(17.8)	8.1(3.1-21.5)	1.9(0.3-10.4)	.45
Colostrum	Yes	14(66.7)	176(94.1)	1	1	
	No	7(33.3)	11(5.9)	8(2.68-23.9)	4.8(0.8-26)	.07
Education on IYCF	Yes	4(19)	113(60.4)	1	1	
	No	17(81)	74(39.6)	6.5(2.1-20)	5.7(1.3-26.9)	.003*
Food security (FI)	Food secured	1(4.8)	13(7)	1	1	
	Mildly FI	4(19)	94(50.3)	4.4(1.3-15)	0.8(0.04-17)	.9
	Moderately FI	9(42.9)	48(25.7)	1.8(0.19-17.4)	0.9(0.04-19)	.9
	Severely FI	7(33.3)	32(17.1)	5.14(1.41-18.7)	2.3(0.12-45)	.56
MUAC (cm) at discharge	<12.5	14(66.7)	63(33.7)	3.9(1.5-10.2)	4.4(1.1-18.8)	.04*
	>12.5	7(33.3)	124(66.3)	1	1	
Fully immunized	Yes	7(33.3)	144(77)	1	1	
	No	5(23.8)	16(8.6)	6.4(1.83-22.6)	7.9(1.8-34.8)	0.01*
Illness history	Yes	18(85.7)	116(62)	1	1	

	No	3(14.3)	71(38)	0.3(0.08-0.96)	0.77(0.12-5)	.78

***=variables which are significant in multivariable logistic regression**

6. DISCUSSION

The study assesses the magnitude of SAM relapse and its associated factors among children (6-59 months) of age who have been discharged from OTP as cured. In the current study, children were assessed after a median of 6 months of recovery.

Among 208 children traced from April, 2020-June, 2020, the study found SAM relapse (WHZ<-3) of 10.1% (95% CI: 5.8-14%). The current SAM relapse finding of 10.1%(WHZ<-3) is in line with the finding of other studies conducted in Congo and Burkina Faso, which found SAM relapse of 11.1% (46) and 10.5% (23) respectively.

On the contrary, SAM relapse finding in the current study was lower than the finding of other studies conducted in Nigeria, which found relapse of 24% (21). However, there were multiple differences from the current study in the way children are admitted and discharge from the CMAM program in Nigeria. In Nigeria, children are admitted and discharged from CMAM program using MUAC. However, currently WHO recommends both MUAC and WHZ to be used independently for identifying children with acute malnutrition (3), as the two criteria identify different children with acute malnutrition in practice. This difference in prevalence of acute malnutrition between using MUAC and WHZ criteria was also noted in a recent study conducted(47). And, it is important to note that the other study was conducted during the rainy season, this seasonal variation among the studies might also one reason for the discrepancy in the magnitude of SAM relapse as a recent study conducted in Malawi reported, the prevalence of acute malnutrition followed a seasonal pattern of food shortage(22).

On the contrary, SAM relapse finding in the current study was higher than the findings reported from the study conducted in Malawi, which found relapse of 1.9%(48). However, there were differences from the current study in the way children are discharged from the program in Malawi. In Malawi there was an additional week before discharge; children will be provided with a two-week supply of program ration at discharge due to this, in Malawian study 45(29%) of children had received program ration. This could be a reason for the low SAM prevalence post-discharge in a Malawian study because; a recent study found supplementary feeding following discharge to help ensure children reach a state of adequate nutrition (49). And it is mentioned that the risk of relapse will more likely be high in settings with no kind of support

post-discharge because; interventions like supplementary feeding following discharge from SAM treatment will modify the risk of relapse by addressing the risk factors (20). This was also found in an evaluation study conducted in Ethiopia, as supplementary feeding was found to be effective in increasing the WHZ z-score (50). Previous studies have also found different interventions post-discharge to be effective in reducing relapse. For instance, a cluster randomized control trial conducted in the democratic republic of Congo found cash transfer to be effective in preventing relapse(51). These suggested that different interventions could help prevent relapse. It is important to note that the Ethiopian CMAM program did not have an associated supplementary feeding program available for children discharged from CMAM programs. The current strategy in Ethiopia is to restrict supplementary feeding programs in selected woredas in the country which are defined as chronically food insecure but, relative food security at the woreda level may not necessarily indicate nutritional security in all households (52). In the current study, only 6.7% of the households found to be food secured.

Regarding the associated factors with SAM relapse, three variables retain their significance in the final regression model; these variables are IYCF education, full immunization status, and MUAC at discharge.

Children with mothers who had not obtained any IYCF education were 5.7 times more likely to have SAM relapse than children with mothers who had obtained IYCF education (AOR: 5.7, 95% CI, 1.23-26.9). This finding is in line with other studies conducted in Ethiopia and India, as children with mothers who had not obtained nutritional counselling about IYCF practice are found more likely to relapse(49, 53). This might be explained by, knowledge about nutrition may be more important than formal maternal education to affect the nutritional status of the child (54). And, IYCF practice is more often associated with the absence of knowledge on nutrition than affordability of food (55). Nutritional education focusing on improving IYCF practice is recommended due to its effectiveness in treating children with acute malnutrition (56, 57). It was noted in the current study that only 117(56.3%) of the caregivers had received education on IYCF practice.

Full Immunization status was also associated with SAM relapse, children who were not fully vaccinated for their age were 8 times more likely to have SAM relapse than children who were

fully vaccinated for their age (AOR: 8, 95% CI, 1.8-34.8). This finding is in line with other studies conducted in Burkina Faso and India, as children who were not fully vaccinated for their age were found more likely to have SAM relapse than children who were fully vaccinated for their age (23, 37). This might be explained by, children who are fully vaccinated are less likely affected by infection than children who are not fully vaccinated because, vaccines support the development of the immune system(58) and, an updated vaccination status reinforces immunity that prevents recent infections(59). Therefore, vaccinating children fully have a positive effect on overall health and nutrition (58).

In addition, children with lower MUAC at discharge (<12.5 cm) were 4.4 times more likely to have SAM relapse than children who were discharged with higher MUAC (>12.5 cm) (AOR: 4.4, 95% CI: 1.1-18.8). This finding is in agreement with the studies done in Burkina Faso and Malawi as children with lower MUAC at discharge were found more likely to have SAM relapse(20, 32). This might be explained by, children with lower MUAC at discharge have more comorbidities and have an additional underlying biological deficit which takes longer to recover immunologically and physiologically than which can be identified by simple anthropometric measurement, due to this they remain susceptible to infections(7, 15). While; higher anthropometric measures are protective because; children will be more hardy exposed to new infections that might precipitate relapse(60).

7. STRENGTH AND LIMITATION OF THE STUDY

The study is the first study that assessed the magnitude of SAM relapse and its associated factors among children discharged from OTP in the study area, with no access of supplementary feeding. Due to this, it can be used as a baseline data and will help program managers as this determines the policy and program which are required to sustain the recovery of children post-discharge.

Besides the study included both urban and rural health facilities, and also, the demographic, clinical, nutritional related, and anthropometric status (both at admission and discharge) had also assessed; gives us a clear picture of the associated factors with SAM relapse.

The primary investigator conducted a standardization of the anthropometric instruments by providing intensive training to the data collectors and carried out close supervision during the data collection to overcome the anthropometric measurement errors. In the current study, the standard deviation (SD) in the WHZ Z-score was 0.96 providing evidence that WHZ measurement is in good quality as WHO recommends that standard deviation (SD) for the survey sample of WHZ Z-score to be in the range of 0.85 to 1.1.

However this study could have the following limitations: Firstly, due to resource limitation we can't not able to follow up regularly at a fixed time points post-discharge, rather relied on a single data collection, hence, some variables such as socioeconomic status may have changed over time and we might have missed their effect. Second, as some information was gathered from mothers it was likely to have a recall bias. Third, we cannot be sure how the 14% of the children untraced might have affected the result and also caution must be taken when extrapolating the current study finding to other children discharged from OTP in other regions due to contextual differences.

8. CONCLUSSION AND RECOMMENDATION

The study found that; the prevalence of SAM relapse in children discharged from OTP as cured in areas with no access of supplementary feeding programs is high. And children, with mothers who had not obtained any IYCF education, who were not fully vaccinated for their age, and with MUAC at the discharge of <12.5 cm had higher odds of SAM relapse.

Understanding these factors might help in identifying a subset of children who are highly likely to relapse into SAM post-discharge.

Therefore, the current study finding suggests that; to limit relapse programs should avoid premature discharge before a MUAC of <12.5 cm and periodic monitoring of discharged children should be organized to detect earlier those who are at risk of relapse. In addition, our finding suggests that; interventions in the form of supplementary feeding should be considered for children with low MUAC at discharge. Further study is needed with a cohort study design consisting of a control group (children with no previous history of SAM) in different study settings to estimate the relative risk of relapse related to a previous SAM episode.

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ANNEXES

Participant selection form

Enrollment and discharged data of the child with full information was taken from OTP registration.

Table 7: A checklist prepared using OTP registration logbook

Number	Name	Address	Age	Sex	Date at admission	Weight	Height/length (cm)	W/H%	Oedema(+,++,+++)	MUAC (cm)	Date at discharge	Weight	Height/length (cm)	WH%	MUAC	HIV test
1)																

Table 8: Routine immunization schedule in Ethiopia, 2015

Vaccine	Disease	Age
BCG	Tuberculosis	At birth
pentavalent	Diphtheria, pertussis, tetanus, H influenza, hepatitis type B	6, 10, 14 weeks
OPV	Polio	At birth, 6, 10, 14 weeks
Measles	Measles	9 month
Pneumonia-conjugate vaccine (PCV)	Pneumonia	6, 10, 14 weeks
Rotarix (Rota vaccine)	Rota virus	6, 10, weeks

Annex I: Information sheet

Introduction: This information sheet is prepared for Gambella town and Gambella nearby woreda health facilities. The aim of the form is to make the institution clear about the purpose of the research, data collection procedures and finally to get permission to conduct the research.

Purpose of the research project: Primarily, the result of the study will be submitted to Addis Ababa University School of Public Health for the requirements to get Masters of Public Health in nutrition.

Due to the fact that there are a very few studies conducted on the area of Community based management of acute malnutrition, especially after they have been discharged from outpatient therapeutic program (OTP), research is needed in different contexts including Ethiopia on clinical outcome of children after they have been discharged, as evidence is needed to evaluate OTP program and to develop strategy to reduce the post OTP nutritional deterioration. Thus, the finding of this study will contribute its part in filing the information and knowledge gap on post OTP nutritional status. Additionally it helps also to identify factors which have impact on sustaining or deteriorating the nutritional status of children after they have been discharged. So this research will guide specific interventions on those factors. Therefore, it will contribute its part for policies that focus on Community based management of acute malnutrition.

Procedure: Data's of all children discharged as cured from OTP in the year from 2019 to 2020 in Gambella town and Gambella nearby woreda OTP centers will be selected and a review of the required information from the OTP registration will be made using checklist by four health extension nurses after training. During the data collection, data collectors will use personal protective equipment's like mask, gloves and sanitizer, in addition of adhering to the physical distance to prevent the transmission of COVID-19.The information which is taken from the registration includes MUAC, WHZ, Age, sex and address of the child. Additionally face to face interview will be made with the mothers of the children using the address found in the OTP registration and the questions are about socio demographic, clinical, and food security. Finally, after necessary information is collected from the caregivers, the children's will be assessed for oedema and finally anthropometric measurement will be taken from them.

Risk/ discomfort: There will be no risk at all on children whom their records are reviewed and during anthropometric measurement, plus during interviewing the families.

Benefits: Findings from this study would be important to develop strategies to minimize nutritional deterioration after children discharged as cured from Outpatient therapeutic program (OTP), plus children with relapse of SAM will be linked back to the program.
Finally, the finding will be important in providing information for government policy makers, planners (NGOs) to develop relevant intervention strategies

Confidentiality: any information or data obtained from facility and participants will be kept confidentially, so no other parties can obtain except the principal investigators and also will not be utilized for other purpose.

Annex 2: Study Informed Sheet in English

Addis Ababa University, School of public health

Subject Information Sheet

Good morning/Good afternoon

My name is _____. I am working with Mr. Endalkachew Befekadu who is doing a research as partial fulfillment for the requirement of MPH at Addis Ababa University. This study is intended to assess the nutritional status of children (6-59 month) discharged as cured in the previous one yearfrom outpatient therapeutic program and its associated factors in Gambella town and Gambella zuriya woreda OTP centers.

You are selected randomly to participate in this study because you are the care giver of the child who has been discharged as cured from OTP. Your participation in this study will only be based on your willingness. You have the right to choose not to take part in this study. If you choose to take part, you have the right to stop at any time. If you are willing to participate or refuse or decide to withdraw later, you will not be subjected to any ill-treatment. If you agree to participate in the study, socio demographic, clinical, breastfeeding and food security related questions will be asked. Later, weight, height and MUAC of the child will be measured. You can stop at any time if you don't feel comfortable during an interview and during measuring the child. Your right not to participate or to terminate will have no effect on services that you or your family may receive from the health service provider. However, if you participate in the interview, you will contribute a lot for improvements in SAM management and follow up. As the study fills the information gap and provide evidence for program planners, implementers and decision makers at different level.

During conducting the questionnaire and anthropometric measurements, the data collectors will use personal protective equipment's like mask, gloves and sanitizer, in addition of adhering to the physical distance to prevent the transmission of COVID-19.I assure you that your information will be kept confidential and your name will not be used in the study. Your answers to any of the questions will not be given to anyone else and no reports of the study will ever identify you. The interview is voluntary and it may take 20-25 minutes. Your right not to

participate or to terminate will have no effect on services that you or your family may receive from the health service provider.

Annex 3: Informed Consent

Based on the understanding of the above information, are you willing to participate in this study?

A) Yes

B) No

If yes, I will continue and if no, I will skip to next participant after writing the reasons of refusal ———

Respondent

Signature _____Date_____

Data collector

Name_____ Signature_____

Questionnaires ID number_____

Date of data collected_____

Result of data collected

A) Completed B) Not completed C) Partially completed D) Refused

Checked by Supervisor:

Name _____Signature_____

For further explanation, use the Principal Investigator's Address;

Name: Endalkachew befekadu

Email: endalkachewbefekadu2020@gmail.com Cell phone: +25192106348

Instruction: circle all the possible answers of the respondent from the choice provided.

Annex 4: Questionnaire (English Version)

Questionnaire ID Number _____ institution _____

Name of the interviewer_____ date of the interview_____ Time started_____ Time finished _____

Checked by Supervisor Name _____ Signature _____

Questionnaire for use with women with children from 6-59 month after discharged as cured from OTP.

Part1. Socio-demographic information of the mother/caretaker and household

Instruction: Now I am going ask you questions concerning socio demographic characteristics

No	Questions	Responses	Skip
301	How old are you in completed years (Yrs)?	☐☐ Years	
302	Have you ever attended school?	Yes……1 No……...2	If no skip to Q 304
303	What is the highest level of school you attended?	Can read and write…….1 Primary (1-8)…….2 Secondary (9-12)…….....3 Technical/vocational……..4 Collage graduated or above…5	
304	What is your current marital status?	Single/never married…….1 Married…….2 Divorced……..3 Separated…….4	

		Widowed …….5	
305	What is your current occupational status?	Government Employee….1 Merchant ……..……2 Student …….3 Daily laborer…….4 Housewife ……5 Unemployed ……6 Private ……..7 Other specify……..	
306	How many people are living in the household?	<=5……1 >5……..2	
307	How many children under 5 years live in the household?	<=2……..1 >2……...2	
308	What is the approximate monthly household income from the entire source?	_____	

PART 2: Medical history of the child

Instruction: Now I am going to ask you about your child's medical related history. Please circle your possible answer within the response box.

No	Questions	Responses	Skip
401	Is the child immunized?	Yes …….1 No ……..2	If no skip to Q 404
402	Do you have a card where (Names) vaccinations are written down? If Yes May I see it?	Yes……..1 No……2	If no skip to Q 404
403	Copy vaccination date for each vaccine from the card Write ''44'' in years column if given but no date is recorded a) BCG b) Polio0 c) Polio 1 d) Polio 2 e) Polio 3 f) DPT 1 g) DPT 2 h) DPT 3 i) PNEUMOCOCCAL 1 j) PNEUMOCOCCAL 2 k) PNEUMOCOCCAL 3 l) ROTAVIRUS 1 m) ROTAVIRUS 2 n) Measles o) Vitamin A (most recent)	Day Month Year BCG _____ _____ _____ Polio0 _____ _____ _____ Polio 1 _____ _____ _____ Polio 2 _____ _____ _____ Polio 3 _____ _____ _____ DPT 1 _____ _____ _____ DPT 2 _____ _____ _____ DPT 3 _____ _____ _____ PNEUMOCOCCAL 1 __ __ __ PNEUMOCOCCAL 2 __ __ __ PNEUMOCOCCAL 3 __ __ __ ROTAVIRUS 1 ___ ___ ____ ROTAVIRUS 2 ___ ___ ____ Measles ____ _____ _____ Vitamin A (most recent)__ __ __	
404	Has the child ill in the last one month?	Yes ……..1	If no skip

		No ……..2	to Q 408
405	What were the symptoms of the illness?	Diarrhea ……1 Cough ……2 Rapid /Difficult Breathing….3 Fever …….4	
406	Did the child been admitted into hospital in the last one month due to illness?	Yes ……1 No …….2	If no skip to Q 408
407	How many times the child been admitted into hospital?	<=2……1 >2……..2	
408	Does the child ever tested for HV?	Yes ……..….1 No ……..2	If no skip to Q 501
409	What was the test result of the child for HIV?	Positive ……..…1 Negative ……...2 Unknown……...3	If no skip to Q 501

PART 3: **Childs breast feeding experience**

Instruction: Now I am going to ask you about your child's breast feeding experience. Please circle your possible answer within the response box.

No	Questions	Responses	Skip
501	Did the child ever breastfeed?	Yes …….1 No ……..2	If no skip to Q 508
502	What did the child receive in the first 6 months of life?	Breast milk only……..1 Breast milk and water……..2 Breast milk and infant formula....3 Infant formula only…….4 Other (specify)…….5	If no skip to Q 504
503	For how long was this child given breast milk alone? (in days)	_____	
504	How long after birth did you first put (Name) to the breast? If less than 1 hour or immediately record "00" hours, If less than 24 hour record hours Otherwise record days	Immediately ……..00 Hours …….. Days ---------- Don't know----------98 Never breastfeed…….99	
505	In the first three days of life did the child receive the milk that flowed from the breast (colostrum)?	Yes ……1 No …….2	
506	Have you stopped breast feeding the child now?	Yes ……...1 No ……...2	
507	At what age did you first introduce liquids or foods (semi-solid) other than breast milk to the child?	Month ……1 Don't know…….98 Not yet started……..97	
508	Have you ever received any education on infant and young child feeding?	Yes ……..1 No ……..2	

PART 4: HOUSEHOLD FOOD INSECURITY ACCESS SCALE (HFIAS) MEASUREMENT TOOL

Instruction: Now I am going to ask you about household food security. Please circle your possible answer within the response box.

No	Questions	Responses	Code
601	In the past four weeks, did you worry that your household would not have enough food?	0=No(skip to q602) 1=Yes	…___
601.a	How often did this happen?	1=Rarely (once or twice in the past four weeks) 2=Sometimes (three to ten times in the past four weeks) 3=Often (more than ten times in the past four weeks)	…___
602	In the past four weeks, were you or any household member not able to eat the kinds of food you preferred because of a lack of resources?	0=No (skip to q603) 1=Yes	…___
602.a	How often did this happen?	1=Rarely (once or twice in the past four weeks) 2=Sometimes (three to ten times in the past four weeks) 3=Often (more than ten times in the past four weeks)	…___
603	In the past four weeks, did you or any household member have to eat a limited variety of foods due to lack of resources?	0=No(skip to q604) 1=Yes	…___
603.a	How often did this happen?	1=Rarely(once or twice in the past four weeks) 2=Sometimes(three to ten times in the past four weeks) 3=Often (more than ten times in the past four weeks)	…___

604	In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?	0= No(skip to q605) 1=Yes	…___
604a	How often did this happen?	1=Rarely(once or twice in the past four weeks) 2=Sometimes(three to ten times in the past four weeks) 3=Often(more than ten times in the past four weeks)	…___
605	In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	0=No(skip to q606) 1=Yes	…___
605.a	How often did this happen?	1=Rarely(once or twice in the past four weeks) 2=Sometimes(three to ten times in the past four weeks) 3=Often(more than ten times in the past four weeks)	…___
606	In the past four weeks, did you or any other household member have to eat fewer meals in a day because there was not enough food?	0=No (skip to Q607) 1=Yes	…___
606.a	How often did this happen?	1= Rarely (once or twice in the past four weeks) 2=Sometimes (three to ten times in the past four weeks) 3=Often (more than ten times in the past four weeks)	…___
607	In the past four weeks, was there ever no food to eat of any kind in your household because of lack of Resources to get food?	0 = No (skip to Q608) 1 = Yes	…___
607.a	How often did this happen?	1 = Rarely (once or twice in the past four weeks)	…___

		2 =Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks)	
608	In the past four weeks, did you or any household member go to sleep at night hungry because there Was not enough food?	0 = No (skip to Q609) 1 = Yes	…___
608.a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 =Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks)	…___
609	In the past four weeks, did you or any household member go a whole day and night without eating anything because there was Not enough food?	0 = No (questionnaire is finished) 1 = Yes	…___
609.a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 =Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks)	…___

PART 5: PHYSICAL EXAMINATION AND ANTHROPOMETRY OF THE CHILD POST-DISCHARGE FROM OTP

Instruction Now I am going to examine and measure weight, height/length and MUAC of the child. Can you please remove the shoes and heavy cloths for measurement?

PHYSICAL EXAMINATION

701	Oedema	Present…….1 Absent…….2	If not skip to 801
702	Oedema (Grade)	Mild (+1)…….1 Moderate (+2)…….2 Severe (+3)……3	

ANTHROPOMETRY OF CHILD

801	Weight1 in kg_____ Weight2 in kg_____	Mean Weight in kg_____
802	Height/length1 in cm_____ Height/length2 in cm_____	Mean height/length in cm_____
803	MUAC1 in mm_____ MUAC2 in mm_____	Mean MUAC in mm_____

Annex 5: Study Information Sheet in Amharic

<u>ከኦቲፒክትትልየወጡሕጻናትቤተሰቦችየፈቃደኛነትመጠየቅያቅጽ</u>

አዲስ አበባ ዩኒቨርስቲ ጤና ሣይንስ ኮሌጅ የህብረተሰብ ጤና

አጠባበቅ ትምህርት ክፍል

የተጠያቂው / የመላሾች የመረጃ ቅፅ

ጤና ይስጥልኝ!

ስሜ_____ ይባላል። በአሁኑ ሰዓት የአዲስ አበባ ዩኒቨርስቲ የማህበረሰብ ጤና ዘርፍ የሁለተኛ ዲግሪ የመመረቂያ ጥናታዊ ፅሁፋቸውን ከሚሰሩት ከአቶ እንዳልካቸው በፍቃዱ ጋር በመሆን መረጃ በመሰብሰብ ላይ እገኛለው። ጥናቱ የሚደረገውከ2019-2020 (እ.አ.አ) ከጋምቤላ ከተማ እና ከጋምቤላ ዙሪያ ወረዳዎች ካሉ <u>ኦቲፒ</u> ከሚሰትባቸው የጤና ተቋሞች በኦቲፒ ክሊኒክ ክትትል በመከታተል ላይ የነበሩ እና ድኖ የወጡ ሕጻናት ለይ ሲወን የጥናቱም ሃላማ ልጆቹ ያሉበትን የኒውትሪሽናል ሁኔታ ለማወቅና ከክትትል ከወጡ በዋላየ ኒውትሪሽናል ሁኔታችውን የሚወስኑ ምክኒያቶችንም ለመለየት ነው።

ጥናቱ ለፕሮግራም አውጭዎች፣አስፈጻሚዎች እንዲሁም ውሳኔ ሰጪዎች ጥናታዊ መረጃ በመስጠትና ያለውን የመረጃ እጥረት በመቀነስ የህሙማኑን የጤና ሁኔታ ለማሻሻል ጉልህ አስተዋፆ ያደርጋል።

ስለዚህም ከጋምቤላ ከተማ እና ከጋምቤላ ዙሪያ ወረዳዎች ካሉ ከተመረጡ <u>ኦቲፒ</u> ከሚሰትባቸው የጤና ተቋሞች ፈቃድ በማግኘት ለዚህው ጥናት የሚውል መረጃ ከኦቲፒ ማህደር ከክትትል ከወጡ ሕጻናት ቤተሰቦች እና ከኦቲፒ ክትትል ከወጡ ሕጻናት በመሰብሰብ ላይ እንገኛለን።

የሚሰጡት መረጃ ሚስጥራዊነት የተጠበቀ ሲሆን፤ስምዎትም በዚህ ጥናት ውስጥ አይገለጽም መረጃውንም ለሌላወገን አሳልፈን እንደማንሰጥ አረጋግጥልዎታለው።ቃለምልልሱም እስከ 30 ደቂቃ ሊፈጅ ይችላል።

መረጃው በሚሰበሰብበት ግዜ መረጃውን የሚሰበሰቡት ባለሞያወች ኮሮናባይረስን ለመከላከል እንዲረዳ ማስክ፥ግላብ፥እናሳኒታይዘር ይጠቀማሉ።

ቃለምልልሱ በፈቃደኝነት ላይ የተመሰረተ ሲሆን ያለመሳተፍ ወይም በማንኛውም ሰዓት የማስቆም መብትዎ የተጠበቀነው።ይህ በመሆኑም በእርሶም ሆነ በቤተሰብዎ ላይ ከሆስፒታሉ በሚያገኙት አገልግሎት ላይ ምንም አይነት ተፅእኖ አይኖረውም።ሆኖ ምግን መረጃ በመስጠት ቢተባበሩን ለኦቲፒ ፕሮግራም ለሚደረጉ ማሻሻያዎች የበኩልዎን አስተዋፆ ያበረክታሉ።

Annex 6: Informed Consent Amharic

የስምምነት መጠየቂያ /ማረጋገጫ ቅፅ

ከላይ በሰጠንዎት መረጃ መሰረት በጥናቱ ላይ ለመሳተፍ ፍቃደኛነዎት?

አዎ----------1

አይደለሁም----------2

ፈቃደኛ ካልሆኑ ምክንያቱን ፅፈው ወደሚቀጥለው ተሳታፊ ይለፉሁ _____

ፊርማ_____ ቀን_____

የመረጃ ሰብሳቢ ስም_____ ፊርማ_____

የመጠይቅ ቁጥር _____ መጠይቁ የተካሄደበት ቀን _____

የመጠይቁውጤት

1. ሙሉ በሙሉ የተሞላ 2) በከፊል የተሞላ 3) ምንም ያልተሞላ በተቆጣጣሪው ተረጋግጧል፡

ስም_____

ፊርማ_____

ለተጨማሪ ማብራሪያ የዋና አጥኚውን አድራሻ ይጠቀሙ

ስም፡ እንዳልካቸው በፍቃዱ

ኢሜይል፡endalkachewbefekadu@gmail.com ስልክ፡+251921063489

Annex 7: Amharic Version Questionnaire

የመጠይቁ መለያ ቁጥር_____ ተቁም _____

መጠይቁን ያስሞላው ሰው ሰም _____ መጠይቁ የተሞላበት ቀን ___/___/

የተጀመረበት ሰሃት _____ ያለቅበት ሰሃት _____

የተቆጣጣሪ ስም _____ ፊርማ _____

ክፍል አንድ: አጠቃላይ የማህበራዊ አኗኗር ሁኔታ መረጃ ዳሰሳ

አሁን የማህበራዊ እና የስነ ህዝብ የተመለከቱ ጥያቄዎችን እጠይቅዎታለሁ።

ቁጥር	ጥያቄ	መልስ	መዝለያ
301	እድሜሽ ስንት ነው?	☐☐ አመት	
302	ትምህርት ተምረሽ ታውቂያለሽ?	ተምሬ አውቃለው---------1 ተምሬ አላውቅም--------2	ተምሬ አላውቅም ከወነ ዝለል ወደ ጥቁ 311
303	እስከ ስንተኛ ተምረሻል?	ማንበብ እና መጻፍ ተምሪያለው---1 የመጀመርያ ደረጃ(1-8) ----------2 ሁለተኛ ደረጃ(9-12)----------3 ቴክኒካል----------4 ኮሌጅ ምሩቅ/ከዛ በላይ--------5	

304	የጋብቻ ሁኔታ?	ያላገባች----------1 ያገባች ----------2 የፈታች----------3 የተለያዩ----------4 ባል የሞተባት----------5	
305	አውን ስራዎት/ሞተዳደርያዎት ምንድነው?	*የመንግስትሰራተኛ-------1* *ነጋዴ----------2* *ተማሪ----------3* *የቀን ሰራተኛ----------4* *የቤትእመቤት-------5* *ሰራ አጥ----------6* *የግል----------7* *ሌላ ካለ ይገለፅ* _____	
306	ከቤተሰቡ ጋር ሰንት ሰው ነው የሚኖረው ?	*<=5----------1* *>5----------2*	
307	ከአምስት አመት በታች የወኑ ልጆች ቁጥር ስንት ነው ?	<=2----------1 >2----------2	
308	የቤተሰቡ የወር ገቢ ከውሉም ገቢ ምን ያህል ነው ?	_____	

ክፍል 2: የሜዲካል (የህክምና) ታሪክ

መመሪያ፥አሁን ሰለ ልጁ ህክምናን የተመለከቱ ጥያቄዎችን እጠይቅዎታለሁ።።

ቁጥር	ጥያቄ	መልስ	መዝለያ
401	ልጁ ተከትብዋል?	ተከትብዋል----------1 አልተከተበም----------2	አልተከም ከወነዝለል ወደ ጥቁ404
402	ስለ ክትባት የተፃፈበትን ካርዱን ወይም ሌላ ዶክመንት ማየት እችላለው? መልሰ፡ አወ ይቻላል ከወነ ከካርዱ ላይ ኮፒ አድርግ	ይቻላል---------- 1 አይቻልም----------2	አይቻልም ከወነ ዝለል ወደ ጥቁ 404
403	ለያንዳንዱ ክትባት ቀኑን ከካርዱ ላይ ኮፒ አድርግ ቀን በሚለው ቦታ ላይ ስረዝ አድርግ (ክትባቱ ከተሰጠ) 44 ብለ ጻፍ አመት በሚለው ቦታ ለይ ተከትቦ ግን ቀኑ ካልተጻፈ a) የ ህፃናት የ ቲቢ መከላከያ ክትባት b) በአፍ የሚወሰድ የልጅነት ልምሻ ክትባት 0 c) በአፍ የሚወሰድ የልጅነት ልምሻ ክትባት 1 d) በአፍ የሚወሰድ የልጅነት ልምሻ ክትባት 2 e) በአፍ የሚወሰድ የልጅነት ልምሻ ክትባት 3 f) የ ትክትክ ክትባት(ባለ አምስቱ የበሽታ መከላከያ(1) g) የ ትክትክ ክትባት(ባለ አምስቱ የበሽታ መከላከያ(2) h) የ ትክትክ ክትባት(ባለ አምስቱ የበሽታ መከላከያ(3) i) የ ሳምባ ምች ክትባት1	ቀን ወር አመት የ ህፃናት የ ቲቢ መከላከያ ክትባት ___ ____ ____ በአፍ የሚወሰድ የልጅነት ልምሻ ክትባት 0 ___ ____ ____ በአፍ የሚወሰድ የልጅነት ልምሻ ክትባት 1___ ____ ____ በአፍ የሚወሰድ የልጅነት ልምሻ ክትባት 2 ___ ____ ____ በአፍ የሚወሰድ የልጅነት ልምሻ ክትባት 3 ___ ____ ____ የትክትክ ክትባት(ባለ አምስቱ የበሽታ መከላከያ(1) ___ ___ ___ የትክትክ ክትባት(ባለ አምስቱ የበሽታ መከላከያ(2) ___ ___ ___ የትክትክ ክትባት(ባለ አምስቱ	

	j) የ ሳምባ ምች ክትባት2 k) የ ሳምባ ምች ክትባት3 l) የ ሮታ ባይርስ1 m) የ ሮታ ባይርስ12 n) የ ኩፍኝ ክትባት o) ቢታሚን A በክርብ የተወሰደ	የበሽታ መከላከያ(3) ___ ___ ___ የ ሳምባ ምች ክትባት1___ ___ ___ የ ሳምባ ምች ክትባት2___ ___ ___ የ ሳምባ ምች ክትባት3___ ___ ___ የ ሮታ ባይርስ1___ ____ ____ የ ሮታ ባይርስ12 ___ ____ ____ የ ኩፍኝ ክትባት___ ____ ____ ቢታሚን A በክርብ የተወሰደ ___ ____ ____	
404	ባለፉት ሃንድ ወር ልጁ ታሞ ያውቃል?	ታሞ ያውቃል ----------1 ታሞ አያውቅም----------2	አያውቅም ከወነ ዝለል ወደ ጥኩ 408
405	ምልክቱ/የሚሰማው ምን ነበር? (ምልክት አድርግ)	ተቅማጥ----------1 ሳል----------2 ቶሎ ቶሎ/የ መተንፈስ ችግር-----3 ትኩሳት----------4 ሌላ----------5 ሌላ(ግለጽ) _____	
406	ባለፉት ሃንድ ወር ልጁ በበሽታ ሆስፒታል ተኝቶ ያውቃል?	ያውቃል ----------1 አያውቅም----------2	አያውቅም ከወነ ዝለል ወደ ጥኩ 408
407	ባለፉት ሃንድ ወር ልጁ ሰንቴ በበሽታ ሆስፒታል ተኝቷል?	<=2----------1 >2----------2	
408	ልጁ ኤች አይቢ ተመርምሮ ያውቃል?	ተመርምሮ ያውቃል---------1 ተመርምሮ አያውቅም---------2	አያውቅም ከወነ ዝለል ወደ ጥኩ 501
409	የ ልጁ የኤች አይቢ ምርመራ ውጤት ምን ነበር?	ፕዘቲብ ----------1 ነግቲብ----------2	ነግቲብ ከወነ ዝለል ወደ ጥኩ 501

		አልታወቀም----------3	
410	ለ ኤች አይቢ ኢንፌክሽኑ መዳኒት እየወሰደ ነው?	አወ እየወሰደ ነው----------1 እየወሰደ አይደለም----------2	

ክፍል 3: ከኒውትሪሽን ጋ የተያያዘ

የአመጋገብ ታሪክ (ከጡትመጥባት ጋር የተያያዘ)

አሁን (ከጡት መጥባት ጋር የተያያዘ) ጥያቄዎችን እጠይቅዎታለሁ።

ቁጥር	ጥያቄ	መልስ	መዝለያ
501	ልጁ ጡት ጠብቶ ያውቃል ?	ጠብቶ ያውቃል ----------1 ጠብቶ አያውቅም ----------2	ጠብቶ አያውቅም ከወነ ዝለል ወደ ጥቁ 508
502	ልጁ በመጀመሪያ ስድስት ወር ምንድነው የወስደው?	የጡት ወተት ብቻ ----------1 የጡት ወተት እና ውሃ----------2 የጡት ወተት እና ፎርሙላ ------3 ፎርሙላ(የተቀናበረ)ወተት ብቻ----4 ሌላ(ይገለፅ)----------5	4 ከወነ ዝለል ወደ ጥቁ 506
503	ለምን ያህል ግዜ ነው ልጁ የጡት ወተት ብቻ የወሰደው?	____	
504	ከተወለደ ከምን ያህል ግዜ በዋላ ነው ልጁን ጡት ላይ ያረግሽው? ከ 1 ሰሃት በታች ውይም ወዲያውኑ ከወነ “00” ሰሃት ብለ መዝግብ ከ24 ሰሃት በታች ከወነ ሰሃት መዝግብ ካልወነ ቀን ጻፍ	ወዲያውኑ--------00 ሰሃት----------_____ ቀን----------_____ አላውቅም----------98 ጠብቶ አያውቅም----------99	

505	በመጀመሪያ ሶስት ቀን ልጁ ከእናት ጡት የሚወጣውን እንገር ወተት ወሰደዋል?	ወሰደዋል----------1 አልወሰደም ----------2	
506	ልጁን ማጥባት አቁመሻል?	አቁሚያለው----------1 አላቆምኩም ----------2	
507	በየትኛው እድሜ ነው ተጨማሪ ምግብ የተጀመረው?	ወር _____ ገና አልተጀመረም-------97	
508	ስለ ጨቅላ ህፃናት አመጋገብ ተምረሽ ታውቂያለሽ?	አውቃለው --------1 አላውቅም ----------2	

ክፍል 4:የቤተሰብየምግብዋስትናመለኪያሚዛን (ኤችኤፈአይኤስ)መሳርያ

አሁንሰለቤተሰቡምግብዋሰትናየተመለከቱጥያቄዎችንእጠይቅዎታሇሁ።

ቁጥር	ጥያቄ	መልስ	ኮድ
601	ባለፉት አራት ሳምንታት ቤተሰቡ በቂ ምግብ አይኖራቸውም ብሎ ተጨንቆ ያውቃሉ?	0=አይ(ወደ ጥቁ 602 ዝለል) 1=አወ	…_____
601.a	በምን ያህል ግዜ (ድግግሞሽ)ይከሰታል?	1=ያልተለመደ(አንዴ ወይም ሁለቴ ባለፉት አራት ሳምንታት) 2=ሃልፎ ሃልፎ(ሶስቴ እስከ አስር ግዜ ባለፉት አራት ሳምንታት) 3=በብዛት(ከአስር ግዜ በላይ ባለፉት አራት ሳምንታት)	
602	ባለፉት አራት ሳምንታት አንቺ ወይም የቤተሰቡ አባል የሚፈልጉትን የምግብ አይነት ሳይመገቡ ቀርትዋል በአቅም የተነሳ?	0=አይ(ወደ ጥቁ 603 ዝለል) 1=አወ	…_____

602.a	በምን ያህል ግዜ (ድግግሞሽ)ይከሰታል?	1=ያልተለመደ(አንዴ ወይም ሁለቴ ባለፉት አራት ሳምንታት) 2=ሃልፎ ሃልፎ(ሶስቴ እስከ አስር ግዜ ባለፉት አራት ሳምንታት) 3=በብዛት(ከአስር ግዜ በላይ ባለፉት አራት ሳምንታት)	
603	ባለፉት አራት ሳምንታት አንቺ ወይም የቤተሰቡ አባል የተለያየ የምግብ አይነት እንዲመገቡ ተገድዋል በአቅም የተነሳ?	0=አይ(ወደ ጥቄ 604ዝለል) 1=አዎ	…_____
603.a	በምን ያህል ግዜ (ድግግሞሽ)ይከሰታል?	1=ያልተለመደ(አንዴ ወይም ሁለቴ ባለፉት አራት ሳምንታት) 2=ሃልፎ ሃልፎ(ሶስቴ እስከ አስር ግዜ ባለፉት አራት ሳምንታት) 3=በብዛት(ከአስር ግዜ በላይ ባለፉት አራት ሳምንታት)	
604	ባለፉት አራት ሳምንታት አንቺ ወይም የቤተሰቡ አባል የተወሰኑ የማይፈልጉትን የምግብ አይነት እንዲመገቡ ተገዷል በአቅም የተነሳ?	0=አይ(ወደ ጥቄ 605ዝለል) 1=አዎ	…_____
604.a	በምን ያህል ግዜ (ድግግሞሽ)ይከሰታል?	1=ያልተለመደ(አንዴ ወይም ሁለቴ ባለፉት አራት ሳምንታት) 2=ሃልፎ ሃልፎ(ሶስቴ እስከ አስር ግዜ ባለፉት አራት ሳምንታት) 3=በብዛት(ከአስር ግዜ በላይ ባለፉት አራት ሳምንታት)	
605	ባለፉት አራት ሳምንታት አንቺ ወይም የቤተሰቡ አባል ከሚፈልጉት በታች ትንሽ ምግብ እንዲበሉ ተገድዋል በቂ ምግብ ስላልነበር?	0=አይ(ወደ ጥቄ 605ዝለል) 1=አዎ	…_____
605.a	በምን ያህል ግዜ (ድግግሞሽ)ይከሰታል?	1=ያልተለመደ(አንዴ ወይም ሁለቴ	

		ባለፉት አራት ሳምንታት) 2=ሃልፎ ሃልፎ(ሶስቴ እስከ አስር ግዜ ባለፉት አራት ሳምንታት) 3=በብዛት(ከአስር ግዜ በላይ ባለፉት አራት ሳምንታት)	
606	ባለፉት አራት ሳምንታት አንቺ ወይም የቤተሰቡ አባል ትንሽ ምግብ እንዲበሉ ተገድዋል በቀን ውስጥ በቂ ምግብ ስላልነበር?	0=አይ(ወደ ጥቁ60 7ዝለል) 1=አዎ	…_____
606.a	በምን ያህል ግዜ (ድግግሞሽ)ይከሰታል?	1=ያልተለመደ(አንዴ ወይም ሁለቴ ባለፉት አራት ሳምንታት) 2=ሃልፎ ሃልፎ(ሶስቴ እስከ አስር ግዜ ባለፉት አራት ሳምንታት) 3=በብዛት(ከአስር ግዜ በላይ ባለፉት አራት ሳምንታት)	
607	ባለፉት አራት ሳምንታት ቤተሰቡ ምንም አይነት የሚበላ ምግብ አጥቶ ያውቃል በአቅም የተነሳ ምግብ ለማግኘት?	0=አይ(ወደ ጥቁ 608ዝለል) 1=አዎ	…_____
607.a	በምን ያህል ግዜ (ድግግሞሽ)ይከሰታል?	1=ያልተለመደ(አንዴ ወይም ሁለቴ ባለፉት አራት ሳምንታት) 2=ሃልፎ ሃልፎ(ሶስቴ እስከ አስር ግዜ ባለፉት አራት ሳምንታት) 3=በብዛት(ከአስር ግዜ በላይ ባለፉት አራት ሳምንታት)	
608	ባለፉት አራት ሳምንታት አንቺ ወይም የቤተሰቡ አባል እየራበው በማታ ተኝቷል በቂ ምግብ ስላልነበር?	0=አይ(ወደ ጥቁ 609ዝለል) 1=አዎ	…_____
608.a	በምን ያህል ግዜ (ድግግሞሽ)ይከሰታል?	1=ያልተለመደ(አንዴ ወይም ሁለቴ ባለፉት አራት ሳምንታት) 2=ሃልፎ ሃልፎ(ሶስቴ እስከ አስር ግዜ	

		ባለፉት አራት ሳምንታት) 3=በብዛት(ከአስር ግዜ በላይ ባለፉት አራት ሳምንታት)	
609	ባለፉት አራት ሳምንታት አንቺ ወይም የቤተሰቡ አባል ቀኑን ሙሉ እና ማታ ምግብ ሳይበላ ውሏል በቂ ምግብ ስላልነበር?	0=አይ(መጠየቁ አልቋል) 1=አዎ	…_____
609.a	በምን ያህል ግዜ (ድግግሞሽ)ይከሰታል?	1=ያልተለመደ(አንዴ ወይም ሁለቴ ባለፉት አራት ሳምንታት) 2=ሃልፎ ሃልፎ(ሶስቴ እስከ አስር ግዜ ባለፉት አራት ሳምንታት) 3=በብዛት(ከአስር ግዜ በላይ ባለፉት አራት ሳምንታት)	

ክፍል 5: **የልጁ አንትሮፖሜትሪ (የአካል ልኬት) እና የአካል ምርመራ ከኦቲፒ ከወጡ ቡሃላ**

የአካል ምርመራ

አሁንየልጁንየአካልምርመራእናየአካልልኬትላደርግነው

701	እብጠት	አለ ----------1 የለም----------2	እብጠት ከሌለ ወደ አካል ልኬት ቁጥር 801 ዝለል
702	እብጠት (ደረጃ)	(+1)----------1 (+2)----------2 (+3)----------3	

801	ክብደት1 በኪሎ ግራም _____ ክብደት2 በኪሎ ግራም _____	አማካኝ ክብደት በኪሎ ግራም _____

802	ቁመት1 በ ሴንቲሜትር _____ ቁመት2 በ ሴንቲሜትር	አማካኝ ቁመት በ ሴንቲሜትር _____
803	ሙአክ1 በሚሊሜትር _____ ሙአክ2 በሚሊሜትር _____	አማካኝ ሙአክ በሚሊሜትር _____

Annex V: Curriculum vitas of Investigator

PERSONAL INFORMATION

Curriculum vita of Investigator

Endalkachew befekadu, *(Male, 30yrs)*

Gambella Town, +0475510451 Gambella (Ethiopia)

+251921063489

endalkachewbefekadu@gmail.com

WORK EXPERIENCE

With key responsibilitie

02/08/2017–Present - ***Head of the TB clinic and Head of outpatient department***

In Gambella town primary hospital, Gambella region (Ethiopia)

-

01/10/2016–01/08/2017 **Health extension supervisor**

In Gambella town primary hospital, Gambella region (Ethiopia)

-continuous support, monitoring and giving feedback to the works of HEWs at community level.

01/01/2015–01/09/2016 **Public health officer(HO)**

In Gambella town primary hospital, Gambella region (Ethiopia)

- **As a public health officer :** service delivery on OPD, ANC, Family planning, Delivery, Emergency,triage & other health care services

EDUCATION AND TRAINING

01/07/2011–19/09/2015 **Bachelor of Science in Public Health Officer**

Bethel medical college, Addis Ababa(Ethiopia)

- **Cumulative GPA:3.4**
-

Trainings

January 10-14.2017 ***Malaria case management training***

USAID& Gambella region Health Bureau, Gambella(Ethiopia)

October 10-15/2016 **National comprehensive tuberculosis and TB/HIV training**

Organized by Regional health Bureau in collaboration with Global fund

April 6-9/2016

Syndromic management of sexually transmitted infections(STI) organized by ST Paul's Hospital Millennium Medical Collage Training and Federal Ministry of Health

National comprehensive TB,LEPROCY and TB/HIV *training* Gambella health bureau in collaboration with ICAP

Awards

- **PHOA-E'S 'PHCU CHAMPION-2016'**

PERSONAL SKILLS

Organisational / managerial skills — I have experience of working as a delegate head of the Gambella primary Hospital several times and as focal person in different units

Job-related skills

- I have skill on delivering and managing standard trainings, health service quality control and its evaluation and monitoring.

Language Skills — Fluent Speaker of Amharic, Afaan Oromoo and English and medium speaker of Nueregha and Aghuakigha.

Due to many responsibilities listed above, I had been working with different

Communication skills

government officials, international NGOs and Community leaders. Thus, I built a good communication skill.

Professional Membership

- Member of Health Officers Association

References

1) Dr. Berhanu Dibaba (PhD),
   Position: Dean of school of public health of Bethel Medical Collage

   Tel: 0911864753; *Email:* *dibaba berhanu 54@gmail.com*

2) Mr. Ron Gogh(Bsc)
   Position: Head of Gambella primary Hospital

   Tel: 0964583060; *Email:* rongogh@gmail.com