HAWASSA UNIVERSITY COLLEGE OF MEDICINE AND HEALTH SCIENCES SCHOOL OF PUBLIC HEALTH

DETERMINANTS OF SEVERE ACUTE MALNUTRITION AMONG CHILDREN 6-23 MONTHS OF AGE IN DARA WOREDA PUBLIC HEALTH FACILITIES, SIDAMA REGION, ETHIOPIA: - A CASE CONTROL STUDY

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June 2024

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We the undersigned, members of the examiners of the Board of Examiners of the final open defense by Mekdes Seifu have read and evaluated her thesis entitled '' DETERMINANTS OF SEVERE ACUTE MALNUTRITION AMONG CHILDREN 6-23 MONTHS OF AGE IN DARA WOREDA PUBLIC HEALTH FACILITIES, SIDAMA, ETHIOPIA 2024'' and examined the candidate, this is therefore to certify that the thesis has been accepted in partial fulfillment of the requirement for the master's degree.

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ACRONYM

EMDHS	Ethiopia Mini Demographic and Health Survey
IYCF	Infant and young child feeding
SAM	Severe acute malnutrition
SNNPR	Southern Nations, Nationalities, and Peoples' Region
UNICEF	United Nations Children's Fund
WHO	World Health Organization
UN	United Nations
SDG	Sustainable Development Goal
MAD	Minimum Acceptable Diet
MDD	Minimum Meal Frequency
MUAC	Mid Upper Arm Circumference
EBF	Exclusive Breast Feeding
CF	Complementary Feeding
ANC	Antenatal Care
SD	Standard Deviation
WHZ	Weight for Height Z - Score

ABSTRACT

BACKGROUND Severe acute malnutrition remains a major killer of children under five years of age, especially in developing world, including Ethiopia. Identification of the determinants of severe acute malnutrition under the age of two years can significantly reduce the burden of child morbidity and mortality.

OBJECTIVE: To assess determinants of severe acute malnutrition among 6-23-month children

METHODS: A facility-based unmatched case-control study was conducted on children aged 6–23 months (213 cases and 213 controls) from four health centers in Dara woreda from February 1 to May 1, 2024. Children aged 6–23 months with severe acute malnutrition were cases and those visiting health centers outpatient service without diagnosis of severe acute malnutrition were controls. The study participants were selected using consecutive sampling technique. Data were collected by the Kobo toolbox and were exported to the Statistical Package for Social Sciences computer software program version 25 for analysis. Descriptive statistics and binary logistic regression were done and variables with p-value less than 0.25 were eligible for the final model. A multivariable logistic regression was also performed and statistically significant level was declared at a p-value < 0.05. The odds ratio at 95% CI was used to measure the strength of association between outcome and predictor variables. The result was presented with different texts, graphs, and tables.

Result: - The factors associated with severe acute malnutrition were perceived birth weight [AOR= 0.09, 95% CI=0.03-0.29], getting nutritional information [AOR=17.12; 95% CI: 6.18-47.37], introduction of complementary feeding after six months [AOR= 0.40; 95% CI: 0.18-0.89] and dietary diversity score < 5 groups [AOR= 4.62; 95% CI= 2.30-9.47] were significant.

Conclusion: In this study, perceived birth weight, nutritional information, initiation of complementary feeding and dietary diversity were significantly associated with severe acute malnutrition. Thus, emphasis should be given to improving infant and young child feeding practices, especially timely initiation of complementary feeding and dietary diversity.

Key Words: Determinants, 6-23 month children, severe acute malnutrition, Dara Woreda,Sidama

1. INTRODUCTION

1.1 BACKGROUND

SAM remains a major killer of children under five years of age especially in developing world. SAM can be a direct cause of child death, or it can act as an indirect cause by dramatically increasing the case fatality rate in children suffering from such common childhood illnesses as diarrhea and pneumonia (1).

According to world health organization (WHO), SAM is defined by a very low weight for height (below -3 z scores1 of the median WHO growth standards, by visible severe wasting, or by the presence of nutritional edema. In children aged 6–23 months, mid-upper arm circumference <115 mm is also indicative of SAM. Early identification of SAM is important for initiating treatment and minimizing the risk of complications. This can be done in both community and health-care settings using appropriate indicators (1).

SAM is thought to result from a complex interaction between infections and poor diet or feeding practices occurring in the context of multiple social-economic factors, with poor sanitation and hygiene increasing exposure to infection (2). Children with severe acute malnutrition are at immediate risk of death (3).

Appropriate infant and young child feeding practices is vital in preventing SAM, this practices includes early initiation of breastfeeding (within the first hour of life), exclusive breastfeeding for the first 6 months of life, continued breastfeeding for 2 years or more, and introduction of safe, appropriate, and adequate complementary foods at age 6 months (4).

Children at the age of 6-23 months are more vulnerable to malnutrition. This is because complementary feeding is not introduced at 6 months. It is often not timely as required, not adequate, not prepared in safe environment and not locally available. Complementary feeding should be timely, meaning that all infants should start receiving foods in addition to breast milk from 6 months onwards. It should be adequate, meaning that the complementary foods should be given in amounts, frequency, and consistency and using a variety of foods to cover the nutritional needs of the growing child (2).

Preventing and eliminating malnutrition is an important global challenge and remains core to the united nations (UN) Sustainable Development Goals: to end all forms of hunger and malnutrition

by 2030 and meet internationally agreed targets on stunting and wasting in children under five years of age (5). despite this commitment , in 2022, globally approximately 7.3 million children received treatment for severe acute malnutrition (6).

As per 2019 WHO report in Africa around 4.4 million children suffered from SAM (7) The problem is rampant in Ethiopia despite its developments in the past three decades, about 45% of mortality among under five-year children is directly or indirectly associated to under nutrition (8).

Studies done in Wondogenet in Sidama regional state showed a prevalence of stunting in children under 5 years of age was 50.3% (9) which is a result of under nutrition and its severe form, SAM. Despite being a significant public health problem, as to the investigator knowledge, there is scarcity of published literatures regarding the prevalence of severe acute malnutrition nor feeding practice in relation with SAM in Sidama region in general and Dara woreda in particular.

1.2 STATEMENT OF THE PROBLEM

Worldwide, it is estimated that there are nearly 20 million children who are severely acutely malnourished most of them live in south Asia and in Sub-Saharan Africa, resulting over one million death every year (1). Studies from different countries report mortality associated with SAM to range from 1.2% to as high as 9.3% (3) Undernourished children who survive are more frequently sick and suffer the life-long consequences of impaired development. In 2022 WHO estimation, approximately 232.9 million under-five children are malnourished from those, 148.1 million were too short for their age (stunting), 45.0 million were too thin for their height (wasting) (10) In India, estimates suggest that the prevalence SAM in under five children is about 6.4 %, accounting for nearly 8.1 million children (11).

Though the turn of the century has witnessed giant strides in economy in Africa, the number of under-five children hospitalized with SAM continues to rise in sub-Saharan Africa (12) In southern and eastern region of Africa, kwashiorkor accounts for 50–70% of cases of SAM (13). Ethiopia also showed progress in its economy in past decades similarly in reducing under nutrition but due to natural and man-made factors, like war, under nutrition (including SAM) is on rising. According to 2019 Mini Ethiopia Demographic and Health Survey (MEDHS), 7% of children under the age of five were wasted with 1% suffering from severe wasting (14) In

Ethiopia, about 45% of mortality among under five-year children is directly or indirectly associated to under nutrition, from that death SAM accounts 8% (15).

Poor infant feeding practices predispose children to nutritional disorders which may persist into early childhood with life-long consequences. Over two-thirds death associated malnutrition mostly related inappropriate feeding practices, occur during the first year of life. Only about 35% of infants worldwide are exclusively breastfed during the first four months of life; complementary feeding frequently begins too early or too late, and foods are often nutritionally inadequate and unsafe (1).

WHO recommends newborns be exclusively breastfed for the first six months of life, then begin nutritionally adequate, safe, and appropriately fed complementary foods from six to 24 months to meet the evolving needs of the growing children (7).

According to Ethiopian mini demographic and health survey 2019, the overall prevalence of appropriate complementary feeding practice among mothers of children aged 6–23 months was 9.76% as well as only 11% of children aged 6-23 months were fed a minimum acceptable diet (MAD) in the 24 hours before the survey. Only 14 % of children have an adequately diverse diet, though there was variation between urban and rural areas as well as region to region Somali region being the lowest.

In 2019 EMDHS, Southern Nations Nationalities and Peoples Region (SNNPR), Sidama Region was part of it, the burden of child under nutrition was closest to the national prevalence, where 36.3% and 6.3% of children were stunted, and wasted, respectively as well as in the survey minimum dietary diversity (MDD) , minimum meal frequency (MMF) and MAD were 9.2%, 43.9% , 6.8% respectively (14).

The previous published literatures in Sidama region focuses on the chronic outcome of under nutrition such as stunting. Since the Sidama region was established as a regional state in 2020, as a result there is no data regarding indicator for IYCF in 2019 EMDHS rather included under SNNPR report. Following this there is gaps regarding information on the association of SAM with socioeconomic, environmental, child and maternal related factors in the study area. Thus this research was conducted to assess the determinants of SAM among children aged 6-23 month at Dara Woreda public health facilities, Sidama region.

1.3 SIGNIFICANCE OF THE STUDY

If the United Nations Sustainable Development Goals ambitious target of eliminating malnutrition in all its forms by 2030 is to be met and Ethiopia to achieve its aim to eradicate under nutrition under 2 years by 2030, SAM needs to be prevented and controlled effectively. These initiatives to come into reality need to be supported by consistent and up-to-date data on SAM for its causes at very region, woreda and kebele level.

This study assumes that poor feeding practice is one of the culprits for SAM and its associated complication; in order to curb the problem it must be based on evidences that can be extrapolated from extensive researches. This research will be conducted to assess determinants of SAM in 6-23 months children who diagnosed to have SAM in comparison with non-SAM 6-23 months children. In Sidama region in general and Dara Woreda in particular there is no officially published research on feeding practice and SAM prevalence in 6–23-month children group. This research will fill the existing gap to some extent as well as it will be a foundation for future large scale and extensive researches.

Assessing the extent of factors associated with SAM patient in Dara Woreda public health facilities and its possible outcome will be initial point for creation of awareness and advocacy on proper feeding practice at community level as well as at regional and national level at large. It will be also additional input for education, health, agriculture and livestock bureaus as well as for non-governmental organization to implement their respective polices regarding SAM in different but in a positive manner.

2. LITRATURE REVIEW

2.1 Introduction

Nutrition is a prerequisite for the growth and physical as well as mental development of children. Careful selection of feeding is important for maintaining a good health. Children in age of 6-23 months experience a rapid physical and psychosocial growth and development.

2.2 Magnitude of Severe Acute Malnutrition

SAM is defined by an extremely low weight for height, by visible severe wasting, or by the presence of nutritional edema. It affects 13-19 million children under the age of five worldwide (16). Most of them are found in Africa and Asia. A child with SAM is 10 times more likely to die than a well-nourished child and it is one of the top three nutrition-related causes of death in children younger than five years. Estimates of deaths directly attributable to SAM varied from 0.5 to 2 million annually (17).

Since 2014, the global prevalence of undernourishment has remained virtually unchanged at slightly below 9 per cent. However, the total number of people going hungry has slowly increased for several consecutive years. Almost 690 million people were undernourished in 2019, up by nearly 60 million from 2014 (5). Due to their physiologic make up its obvious children between 6-23 months is the most severely affected group.

Africa, due to manmade and natural causes, is home for majority cases of SAM in the world, accounting 4.4 million children suffering from it each year (7). About a million die annually. Recently UNICEF has reported that in Horn of Africa , more than 7 million children under the age of 5 remain malnourished and in need of urgent nutrition support and over 1.9 million children are at risk of dying from SAM (18).

According to WHO 2022, greater horn situational report, there is sustained high levels of acute malnutrition in Ethiopia are reported, with SAM rates of above 2% with a projection deterioration. The situation is affected by conflict in the northern Ethiopia and Somali region and cholera outbreaks in Oromia (19). Over two-thirds of childhood deaths in Ethiopia are caused by few and easily preventable conditions including under nutrition which is major underlying cause contributing to nearly half of childhood deaths (8).

2.3 Factors associated with SAM

SAM occurs most commonly in the context of multiple adverse social and environmental factors related to poverty. Immediate factors are an inadequate dietary intake often resulting from suboptimal breastfeeding and complementary feeding and disease especially infections such as diarrhea, respiratory infections, measles, TB and HIV.

A matched case control study conducted at Gondar University Hospital indicates that risk for SAM was independently associated with lack of exclusive breast-feeding for the first six months of life (OR=3.22, 95% CI 1.31 7.91) and late initiation of complementary diet (OR=3.39, 95% CI 1.20–9.57) after the effects of other significant risk factors were controlled for Parental (caregivers') knowledge on infant and young child nutrition: Most of the caregivers had a knowledge that breastfeeding should be initiated within the first hour of birth, 82 (80.4%) of the cases and 84 (82.4%) of the controls; similarly 94 (92.2%) of the cases and 97 (95.1%) of the controls knew that breastfeeding should be continued up to two years of age and beyond. Forty one (40.2%) of the caregivers in the cases knew that complementary diet should be started at the age 6 months compared to 68 (66.7%) in the controls (OR=0.34, 95% CI 0.18-0.62). (20).

Parental feeding practices have been of interest to researchers and clinicians alike because they constitute modifiable risk factors for SAM and its long term outcome which appear to be amenable to intervention. Feeding practice is one of the risk factor for SAM, in addition to the other risk factor like child age, morbidity, family size and maternal educational status, agro-ecological zone and seasonality (21, 22).

Unmatched case control study conducted at Felege Hiwot Comprehensive Specialized Hospital and Tibebe Ghion Specialized teaching hospital indicates that family size was found to be significantly associated with SAM. Children from households with large family size > 5 were 3.89 times more likely to be affected by SAM [(AOR = 3.89, 95% CI; (1.19, -12.70)] as compared to children from households with smaller family size (≤ 5) (23).

Institutional based case control study conducted at Karat district general Hospital and Karat Health Center indicates that dietary diversity, relatively high proportion of children among cases 85 (74.6%) had low dietary diversity feeding practice (<=3 food groups) as compared to controls 80 (34.9%) who consumed low dietary diversity. Almost three fourth children from cases and one third among controls feed below four food groups of dietary diversity (24).

According to WHO and UNICEF recommendation a proper feeding practice includes initiation of breastfeeding within the first hour of life and exclusive breastfeeding for the first 6months. After 6 months of life continued breastfeeding with introduction of solid, semisolid or soft foods Appropriate food diversity (at least five food groups per day), appropriate frequency of meals: two to three times a day between 6 and 8 months, increasing to three to four times a day between 9 and 23 months, with nutritious snacks offered once or twice a day as desired, safe preparation of foods; and feeding infants in response to their cues.

In 2021, WHO and UNICEF revised the 2008 Infant and young child feeding (IYCF) practice guidelines, the current guidelines categorized IYCF into three:- breastfeeding indicators, complementary feeding indicator(introduction of solid, semisolid or soft foods 6–8 months, Minimum dietary diversity 6–23 months, Minimum meal frequency 6–23 months, Minimum milk feeding frequency for non-breastfed children 6–23 months, 1 Minimum acceptable diet 6–23 months, Egg and/or flesh food consumption 6–23 months, Sweet beverage consumption 6–23 months, Unhealthy food consumption 6–23 months, Zero vegetable or fruit consumption 6–23 months) and other indicators (Bottle feeding 0–23 months, Infant feeding area graphs) (25).

In developed countries like United states and Australia caregivers can practice appropriate feeding to their children because they are periodically visited at their homes or contacted via telephone calls by nurses, midwives, and peers for continuum education, support, and guidance (26, 27).

However, in developing countries, despite WHO and UNICEF recommendations, appropriate feeding practice is low, recently done research in Pakistan showed that only 41% of children are exclusively breastfed for six months, 25% receive MDD) and 51% receive the minimum required meal frequency (MMF) (4). In Sub-Saharan Africa, less than 35%, 60%, and 18% of children aged 6-23 months satisfied the MDD, MMF, and MAD criteria, respectively (28). One study done Tanzania showed 66.1% of caregivers had unsatisfactory feeding practices. It was observed that 67.8% of the caregivers fed their under-five children inadequately. Only 32.2% of them attained MMD while 35.3% and 31.5% of caregivers demonstrated feeding practices and the recommended MMF respectively (29).

The government of Ethiopia has taken several steps toward reducing under nutrition in the country. The recently endorsed 2019 Food and Nutrition Policy aims to achieve optimal nutritional status throughout the life cycle via coordinated implementation of nutrition-specific and nutrition sensitive interventions. Ethiopia has committed to ending under nutrition in

children under age 2 by 2030. However, According to EMDHS 2019, 37% of children under age 5 are stunted, 7% are wasted, and 21% are underweight. And only 7% and 14% fulfill the criteria for MAD and MDD respectively though there is variation from region to region highest in Addis Ababa lowest in Somalia region (14).

Southern Nations Nationalities and Peoples Region (SNNPR) from 2021 onward disintegrated into 4 regional states, including, Sidama Regional state. In 2019 EMDHS, burden of child under nutrition in SNNPR was closest to the national prevalence, where 36.3% and 6.3% of children were stunted, and wasted, respectively as well as in the survey MDD, MMF and MAD were 9.2%, 43.9% , 6.8% respectively (14). Under nutrition results in SAM and left untreated to death, those who survived result in chronic physical unwanted physical outcomes and poor mental development, recently done community-based study in Shebadino Woreda, Sidama Region showed 27% neonates are stunted (30). In another study in Shashogo district, Southern Ethiopia showed strong association of SAM with inappropriate infant and young child caring practices (31). To investigator knowledge there is no published literature on determinants of SAM among 6–23-month-old children SAM in Sidama region and Dara Woreda.

Conceptual Framework

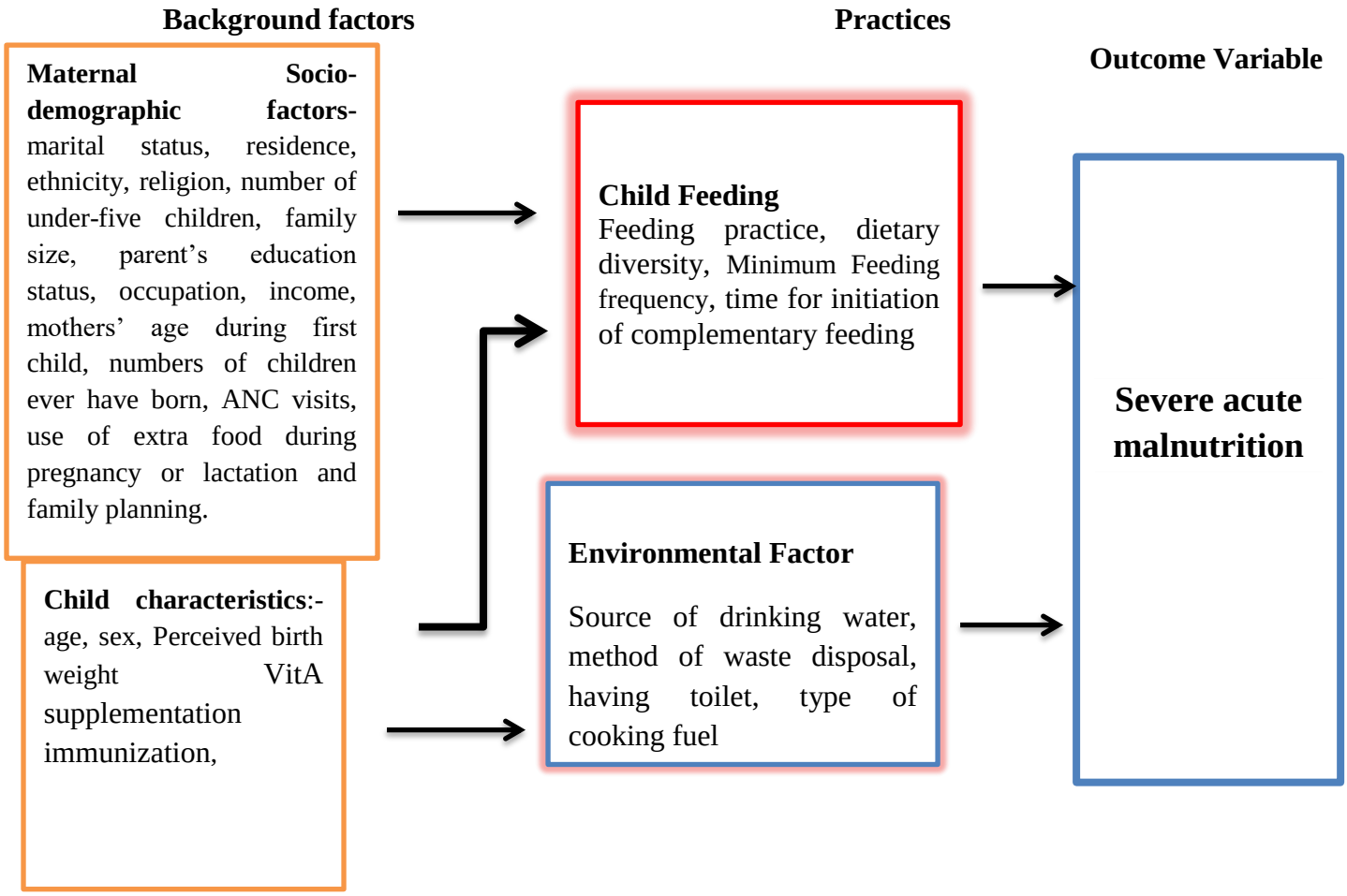


Figure 1 The conceptual framework of SAM and the associated factors

3. OBJECTIVE

To assess determinants of severe acute malnutrition among 6-23 months children in Dara Woreda, Sidama region from February 1-2024- May 1, 2024

4. METHODS AND MATERIALS

4.1 STUDY SETTING

The study was conducted at Dara Woreda public health facilities, Sidama Regional state, Ethiopia. Dara Woreda is located 365 km from Addis Ababa, the capital of the country, and 76 km from Hawassa city, the capital of Sidama Region, and the Woreda is bordered on the south by the Gedeo Zone on the northwest by Chuko, on the north by Aleta Wendo, and on the northeast by Hula. In the East, the Gedeo Zone in the South and Guji zone of Oromia region in the West and Southeast. According to the 2007 central statistical agency report of Ethiopia, the total population of the Woreda was estimated to be 129,953 of them 63,677 are male and 66,276 Female, under five years children were 20,272. The Woreda has 1 primary hospital, 4 health centers, and 24 health posts. It also consists of 10 private clinics in the district. Climate of the Woreda is weyna dega (mixed cold and warm weather) and most of its habitats predominately an agrarian society planting stable crops such as enset (false banana), potato, maize and cash crops like coffee. The stable food in the Woreda is kocho made from enset and potato.

4.2 STUDY DESIGN AND PERIOD

A facility-based unmatched case-control study was carried out among cases (children 6–23 months of age with SAM) and controls (children 6–23 months of age without SAM) visiting under-five OPD of Dara Woreda health centers from February 1- 2024-May 1, 2024 Unmatched case control study selected since it is time and cost effective than matched study as well as better to understand of the disease, identify sub group with higher risk.

4.3 POPULATION

4.3.1 SOURCE POPULATION

The source populations of this study were children in the age group of 6–23 months (pair with their mothers/ caretakers) who have been attending under-five OPD (Outpatient Department) service in Dara Woreda health centers.

4.3.2 STUDY POPULATION

The study populations were selected from children in the age group of 6–23 months (pair with their mothers/caretakers) in selected health facilities.

4.3.3 SAMPLE POPULATION

Children diagnosed to have SAM and those children without SAM who have been attending under five OPD for other medical services.

Cases

Presence of one of the three clinical signs and criteria. Children who were with clinical signs of possible SAM according to WHO'S Integrated Management of Neonatal and Childhood Illness (IMNCI) guidelines, defined as children aged 6–23 months with severe acute malnutrition whose MUAC < 11.5 cm, or WLZ < -3 SD or with bilateral pitting edema (based on data collector's assessment) and who were visiting health centers at Dara Woreda.

Controls

Children age 6–23 months who were with normal nutritional status who did not fulfill SAM criteria and who were admitted with other health problems other than SAM in health centers of Dara Woreda. The diagnosis has been including history taking, clinical manifestations and anthropometric measurements.

4.4 INCLUSION / EXCLUSION CRITERIA

4.4.1 INCLUSION CRITERIA: - Caregivers who are biological parents or caretakers with 6-23 months children who were diagnosed to have SAM and non-SAM same age group children visiting health centers.

4.4.2EXCLUSIONCRITERIA: - Caregivers who are not willing to participate in the study, caregivers who are biological parents or caretakers visiting under five outpatient with children aged above 23 months.

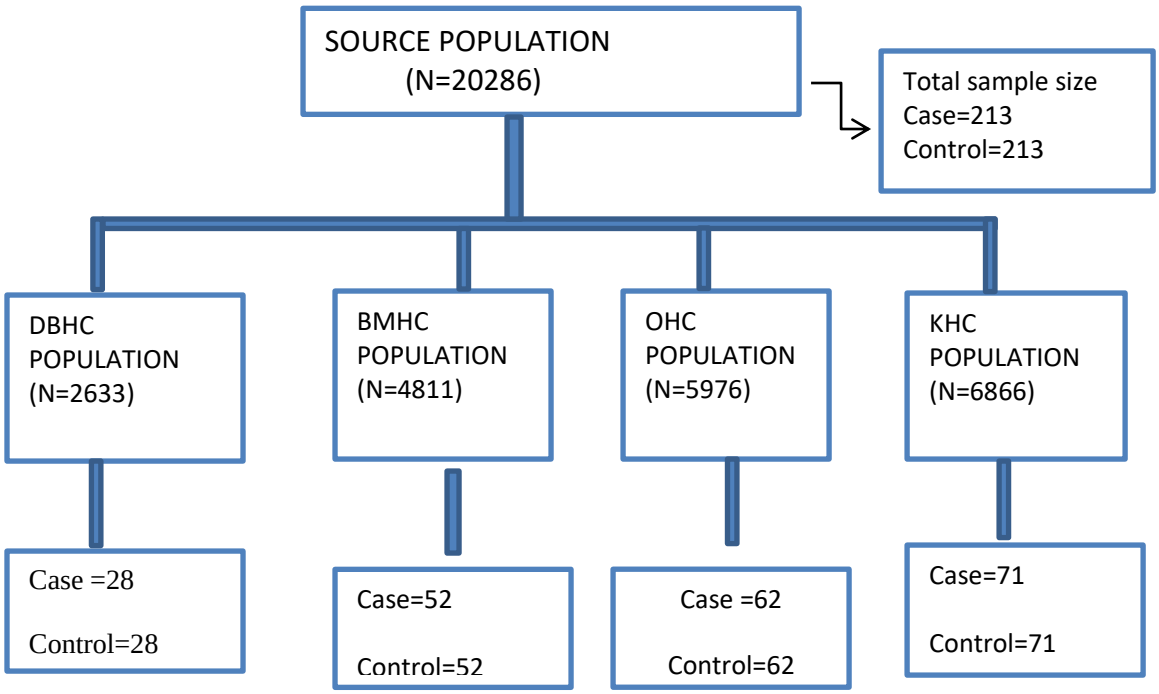
4.5 SAMPLE SIZE DETERMINATION

4.5.1 SAMPLE SIZE

Sample size was calculated using Epi info software version 7 by using two population proportion formulas. The assumption are 95% CI, and 80% power, case to control ratio of 1:1 as well as age complementary feeding started gives the largest sample with percent of controls exposed 67.7% and percent of cases exposed 53.4% [30]. Then by substituting the above figures into the Stat Calculator Fleiss with continuity correction taken and 200 cases and 200 controls obtained. Then after adding 10% for the potential none response rate the final minimum calculated sample size was 440 (220 cases and 220 controls).

4.6 SAMPLING TECHNIQUE AND SAMPLING PROCEDURE

In Dara woreda there are 4 health centers, namely Dama Banko helath center (DBHC), Banko okMarkos health center (BMHC), Odola health center (OHC) and Kumata health center (KUHC). In the woreda there are 20286 children. The average number of under five children visited health centers for the last three months for each health center are 2633 for DBHC, 4811 for BMHC, 5976 for OHC and 6866 for KHC and then the sample size was distributed proportionally among the health centers based on the monthly average for cases involving children between the ages of 6 and 23months. A consecutive sampling technique with primary data were used to select children between the age of 6 and 23 months until the calculated sample size is attained using the registration book as a sampling frame. From the total sample size (N=440) non response rate was 3% which means the data was collected for 426 (213 cases & 213 controls).



Total case=213

Total control=213

Figure 2 Schematic diagram of sampling procedure

4.7 VARIABLES

4.7.1 DEPENDENT VARIABLES

SAM

- WHZ-score < -3SD, height/weight) or
- MUAC <11.5cm or
- Bilateral pitting edema

4.7.2 INDEPENDENT VARIABLES

Maternal Socio-demographic variables: - marital status, residence, ethnicity, religion, number of under-five children, family size, parent's education status, occupation, and economic status. Age, mothers' age during first child, numbers of children ever have born, ANC visits, use of extra food during pregnancy or lactation and family planning.

Child characteristics: - age, sex, birth order, birth interval, place of delivery, types of birth, and morbidly status,

Child caring practices: - Feeding practice and immunization

Environmental Health condition: - water, hygiene, and sanitation.

4.8 DATA COLLECTION PROCEDURES

The data collection was administered by 3 Diploma and 1 Bsc nurse. The team has been given a two day on objectives of the study and data collection method, anthropometric measurement communication skill and how to handle patient and their mother/caretakers as well as how to collect reliable and accurate data. They were informed about their roles and responsibilities during data collection process. The principal investigator has been intensively supervising the data collection process. The data collectors were following the techniques of interview and they were interviewing feeding practice of the mothers/ caretakers face to face. A structured questionnaire and anthropometric measurement was used to collect data. Data collection were conducted in a stepwise manner in each health facility in their respective schedule and allocated sample size.

Anthropometric Measurement

A weight measurement was taken to the nearest 0.1 kg using an electronic digital weight scale. The scale was checked before each weighing to ensure that the mark returned to zero. The children were weighted with light clothing and no shoes. The parents or caregivers were standing on the scale first, without the child. Then measure the adult with the child and record. Weights

were taken in kilograms. Each child was weighed twice Length Measurement of supine or recumbent length were taken to the nearest 0.1 cm using a portable calibrated board. The sole of the baby's feet was held firmly against the wall at the zero point while the length was marked off on the chart at the crown of the head. Length of the child was measured in recumbent position without shoes. To improve measurements accuracy appropriate instruments were used and the data collectors were trained and know how to use these instruments properly and also by repeated measurement. After anthropometric measurement of the children, the result was interpreted using WHO chart weight for height. To use the charts to classify children's nutritional status: 1. Find the correct table for the child age (6–23 months) and sex (boy or girl). Measure children aged 6–23 months or less than 87 cm long lying down (length). 2. Find the figure closest to the child's length in the left column. 3. Find the range that contains the child's weight. 4. The label at the top of the column with the range containing the child's weight tells the child's nutritional status to classify as Cases (child with SAM) or controls (child without SAM). MUAC was measured on the left arm by using tape mater by taking at the level of the upper arm midpoint mark. To assess the presence of edema normal pressure is applied through the thumb on both feet for three seconds (count the numbers 101, 102, and 103 to estimate three seconds without using a watch.

4.9 DATA QUALITY AND MANAGEMENT

Data was collected using a structured, face-to-face interviewer- administered questionnaire and standard anthropometric measurements. A pre-tested questionnaire was prepared in English and translated into the local Sidamigna language and then retranslated back to English to ensure consistency to ensure the quality of 5% of sample was pre-tested in Dara primary hospital not in health centers to avoid data contamination. Pretest was done in those who have similar characteristics with the intended respondents before the actual implementation of the study to see for the accuracy of responses and to estimate the time needed; then appropriate adjustment and corrections were taken based on the findings. The data collectors were regularly checked and followed by principal investigator for data competence and consistency throughout the data collection. .

4.10 DATA PROCESSING AND ANALYSIS

Data were collected by Kobo toolbox and then exported to SPSS version 25 for analysis. Descriptive analyses such as mean, standard deviation, proportion were conducted to obtain descriptive measures for the socio-demographic characteristics and other variable. Binary logistics regression analysis was carried out to identify the determinant factors for the outcome variables. To verify the variables associated with optimal feeding practices, variables that show a P. value < 0.25 in the bivariate analyses was re-entered into multivariable logistic regression models to control for potential confounders. Odds ratio at 95% CI was used to measure the

strength of association between outcome and predictor variables. P-value <0.05 is considered to declare statistical significance in multivariate logistic regression analysis. Hosmer-lemenshow test and omnibus test were used to check for model fitness. Finally, the results were presented in texts and tables. Cronbach's alpha coefficient was used to check for internal consistency between items. Assumptions for logistic regression were checked and fulfilled.

4.11 OPERATIONAL DEFINITION

Minimum dietary diversity: - is present when the diet contains **five** or more of the following food groups: breast milk, grains, roots, and tubers; legumes and nuts; dairy products (milk, yogurt, cheese); flesh foods (meat, fish, poultry, liver, or other organs); eggs; vitamin A-rich fruits and vegetables; and other fruits and vegetables.

Minimum acceptable diet: - is present when the diet contains **four** or more of the following food groups: breast milk, grains, roots and tubers; legumes and nuts; dairy products (milk, yogurt, cheese); flesh foods (meat, fish, poultry, liver or other organs); eggs; vitamin A-rich fruits and vegetables; and other fruits and vegetables.

Minimum meal frequency: - the criteria are.

- Twice for breastfed infants aged 6-8 months.
- Three times for breastfed children aged 9-23 months.
- Four times for non-breastfed children aged 6-23 months.

Suboptimal child feeding: - refers to any feeding practices that deviate from the World Health Organization's (WHO) recommendations for children aged 0–2 years. These practices include delaying the initiation of breastfeeding, introducing formula or other liquids before 6 months of age, stopping breastfeeding before 2 years of age, and inadequate feeding. Suboptimal child feeding is considered when these practices occur.

SAM: - is defined as the presence of edema of both feet and severe wasting (weight-for-height/length <-3SD or mid-upper arm circumference < 115 mm).

The main diagnostic features are:

- Weight-for-length/height < -3SD (wasted) or
- Mid-upper arm circumference < 115 mm or
- Edema of both feet (kwashiorkor with or without severe wasting).

Protected water sources:- are those that have barriers against contaminants and provide water that is safe to drink.

Unprotected sources:- are those with no barrier or other structure to protect the water from contamination. All surface water sources, such as lakes, rivers and streams or poorly constructed wells, are examples of unprotected sources.

Proper waste disposal: - collection, sorting, transport and treatment of waste as well as its storage and tipping above or underground; the transformation operations necessary for its re-use, recovery or recycling.

Improper waste disposal: - the disposal of waste in a way that has negative consequences for the environment including littering, hazardous waste that is dumped into the ground, and not recycling items that should be recycled

Traditional cooking fuel: - energy sources consist of wood fuel, charcoal and dung.

Modern cooking fuel: - energy sources consist of gas and electricity.

4.12 ETHICAL CONSIDERATION

Ethical clearance was obtained from the institutional review board of Hawassa University College of medicine and public health Department post graduate study in public health. Informed written consent was obtained from each respondent (mother or caretakers) and for illiterate mothers and their children were obtained from their legal representatives. The participants were aware of the study purpose, risks, and benefits. They were notified that they have the right to refuse or terminate at any point of the interview without any precondition was disclosed. The study was not involved any invasive procedures and reporting of any response for intervention. Confidentiality of the information was secured throughout the study process by using code numbers rather than personal identifiers. And all methods were performed based on the relevant guidelines.

5. RESULT

5.1 Socio-demographic Characteristics

Out of the total sample size of 440, 426 caregivers/parents (213 cases and 213 controls) were included in the analysis, resulting in a response rate of 97%. According to this study, the mean age of the children was 13.42(S.D±5.29) months as well as 143(69.1%) cases and 181(70.9%) controls belonging to the age group of 12-23 months. Regarding the gender of children, more than half of them for both case & control were female; 128 (60.1%) and 119(55.9%) respectively. The mean age of mothers was 28.8(S.D±3.47) with the age group of 25-28 years representing 94 (44.1%) cases & 85 (39.9%) controls. And most of the participants were from rural areas (184 (86.4%) cases and 182 (83.4%) were controls). Similarly, most of the mothers were married 204(98.4%) for cases & 193 (92%) for controls. Regarding maternal education 106 (49.8%) controls have attended primary school however, 91 (42.7%) cases did not attend formal education. The majority of the mothers for both case & control were housewives 57(49.9% & 134**(Table 1).**

Table 1 Socio-demographic characteristics of study participants at Dara Woreda Sidama Region, 2024

Variable		SAM among 6-23 months children		Total N (%)
		Case N (%)	Control N (%)	
Mothers Age	<25	57 (26.8)	88 (41.3)	145 (34.0)
	25-28	94 (44.1)	85 (39.9)	179 (42.0)
	≥ 29	62 (29.8.1)	40 (18.8)	102 (23.1)
Marital status	Married	204 (98.4)	193 (92.0)	397 (93.2)
	Unmarried	12 (5.6)	17 (8.0)	29 (6.8)
Residence	Urban	29 (13.6)	31 (14.6)	60 (14.1)
	Rural	184 (86.4)	182 (83.4)	366 (85.9)
Family size	<=5	170 (79.8)	178 (83.6)	348 (81.7)
	>5	43 (20.0)	35 (16.4)	78 (18.3)
Age of child	6-11	70 (32.9)	62 (29.1)	132(31.0)
	12-23	143 (67.1)	181 (70.9)	324 (69.0)
Sex of child	Male	85 (39.9)	94 (44.1)	179 (42.0)
	Female	128 (60.1)	119 (55.9)	247 (58.0)

* = merchant, daily laborer, farmer, and student

5.2. Obstetric related characteristics

This study revealed that the proportion of women who gave their first birth less than twenty years was higher in cases 37(55.2%) than controls 29 (21.6%). Most of the mothers 38(56.7%) of cases and 121(90.3%) of controls had ever got ANC service during their pregnancy of the current child. The proportion of women who got ANC service less than three times is higher in cases 30 (78.9%) than in controls 50 (41.3%). Regarding place of delivery more than half of the women in cases 40(59.7%) and more than ninety percent of controls 126(94%) had given birth at health institutions **(Table 2).**

Table 2 Obstetric characteristics of mothers with 6-23months children at Dara Woreda Sidama Region, May 2024

		Case N (%)	**Control N (%)**	**Total**
Maternal age at first birth	15-19	56 (26.5)	66 (31.1)	122(28.8)
	20-49	155 (73.5)	146 (68.9)	301 (71.2)
ANC	Yes	209 (98.1)	211 (99.10	420 (98.6)
	No	4 (1.9)	2 (0.9)	6 (1.4)
Frequency ANC	≤3	95 (45.5)	49 (23.2)	144 (34.3)
	>3	114 (54.5)	162 (76.8)	276 (65.7)
Place of delivery	Home	9 (4.2)	10 (4.7)	19 (4.5)
	Health institution	204 (95.3)	203 (95.8)	407 (95.5)
use extra food during pregnancy	Yes	80 (37.6)	148 (69.5)	228 (53.5)
	No	133 (62.4)	65 (30.5)	198 (46.5)
Used family planning service	Yes	199 (93.4)	210 (98.6)	409 (96.6)
	No	14 (6.6)	3 (1.4)	17 (4.0)

5.3. Environmental characteristics

The families who had access to protected water sources for drinking were 7 (3.3%) of cases and 46 (21.6%) of controls. Concerning cooking fuel, 28 (13.1%) cases and 36 (16.9%) controls were using modern fuel. Households who have toilets 71 (33.3%) in cases and 137(64.3) in control. regarding methods of hand washing, 29(13.60%) cases and 7 (3.30%) controls washed their hands with water only **(Table 3)**.

Table 3 Environmental factors of study participants at Dara Woreda Sidama Region, May 2024

Variable		SAM among 6-23 months children status		Total N (%)
		Case N (%)	Control N (%)	
Drinking water source	Protected	7 (3.3)	46 (21.6)	53 (12.4)
	Unprotected	206 (96.7)	167 (78.4)	373 (87.6)
Type of cooking fuel	Modern	28 (13.1)	36 (16.9)	64 (15.0)
	Traditional	177 (83.8)	185 (86.9)	362 (85.0)
Method of waste disposal	Proper	65(30.5)	55 (25.8)	120 (28.2)
	Improper	148 (69.5)	158 (74.2)	306 (71.8)
Having toilet	Yes	71 (33.3)	137 (64.3)	208 (48.8)
	No	142 (66.7)	76 (35.7)	218 (51.2)

5.4. Child characteristics

The proportion of children with small perceived birth weight was higher in cases 178 (83.6%) than in controls 45 (21.1%). Similarly, the proportion of children who were fully vaccinated was in cases 135 (81.2) than controls 173 (81.2). Getting vitamin A supplementation cases were 142(66.7%) & controls were 202 (94.8%) **(Table 4).**

Table 4 Description of child characteristics of study participants at Dara Woreda Sidama Region, May 2024

Variable		SAM among 6-23 months children status		Total N (%)
		Case N (%)	Control N (%)	
Perceived birth weight	Large	6 (2.8)	37 (17.4)	43 (10.1)
	Medium	29 (13.6)	131 (61.4)	160 (37.6)
	Small	178 (83.6)	45 (21.1)	223 (52.3)
Get Vaccination	Fully vaccinated	135 (81.2)	173 (81.2)	308 (72.3)
	Not-fully vaccinated	74 (34.7)	30 (14.1)	104 (24.4)
	Not vaccinated at all	4 (1.9)	10 (4.7)	14 (3.3)
Get Vit-A supplementation	Yes	142(66.7)	202 (94.8)	344(80.8)
	No	71 (33.3)	11 (5.2)	82 (19.2)

5.5 Child feeding practice

Concerning EBF at 6 months 182 (85.4%) cases and 208 (97.7%) control have been exclusively breastfed. The proportion of children with dietary diversity score < 5 food groups in cases was 181 (85.0%) however for controls 127 (59.6%) were ≥ 5 food groups based on 24-hour dietary recall **(Table 5).**

Table 5 Description of Child feeding practice of study participants at Dara Woreda Sidama Region, May 2024

Variable		SAM among 6-23 months children status		Total N (%)
		Case N (%)	Control N (%)	
Get nutritional information	Yes	112 (52.6)	203 (95.3)	315 (73.9)
	No	101 (47.4)	10 (4.7)	111 (26.1)
EBF for 6 months	Yes	182 (85.4)	201 (94.1)	381 (91.5)
	No	31 (14.6)	12 (6)	43 (8.5)
breast-feeding now	Yes	178 (83.6)	183 (85.9)	361 (84.7)
	No	35 (16.4)	30 (14.1)	65 (15.3)
meals per day	2-3 times	144 (67.6)	43 (20.2)	187(43.9)
	4-5 times	62 (29.1)	99 (46.5)	161 (37.8)
	Above 5 times	7 (3.3)	71 (33.3)	48 (18.3)
DD score	< 5 food groups	181 (85.0)	86 (40.4)	267 (62.7)
	≥ 5 food groups	32 (15.0)	127 (59.6)	159 (37.3)

Key: EBF exclusive breastfeeding, DD Dietary diversity,

Regarding the introduction of complementary feeding of children 21(9.9%) cases and 15(7.0%) controls had started feeding before six months and also 34 (16.0%) cases and 53 (24.9%) controls had started feeding at six months (Figure 4)

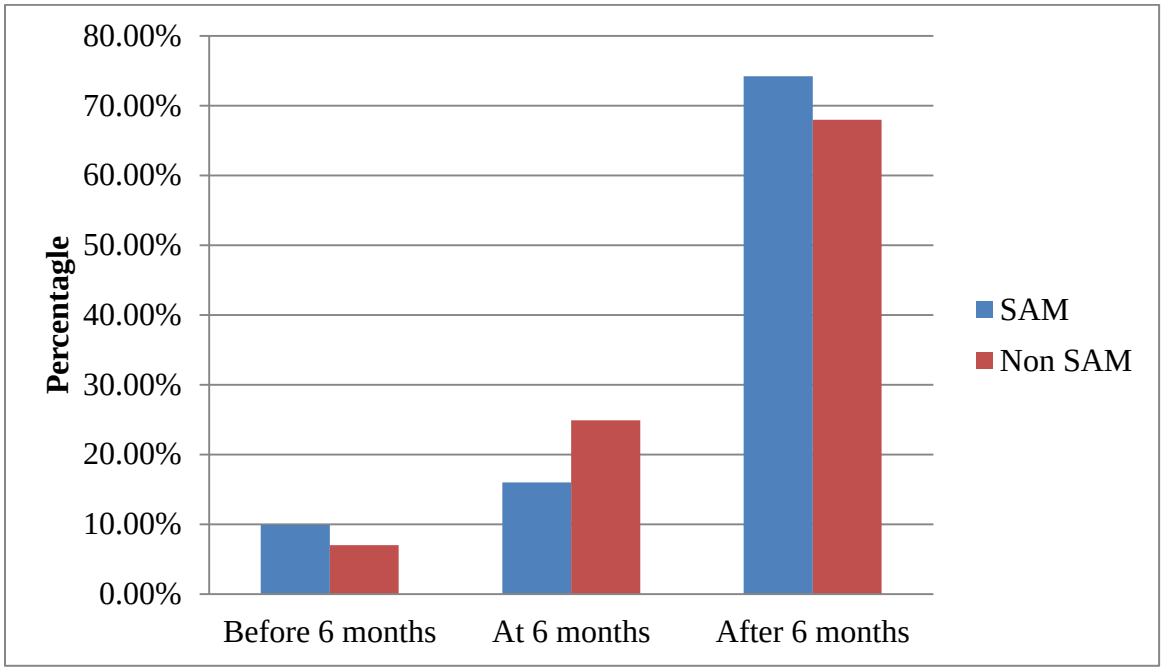


Figure 3 Distribution of Introducing CF among cases and controls of study participants at Dara Woreda Sidama Region, 2024

5.6. Determinants of SAM among 6-23 months children

In bi-variable logistic regression analysis, getting Vit A supplement, methods of hand washing, dietary diversity, getting nutritional information, cooking fuel, waste disposal, having a toilet, perceived birth weight, time for introducing complementary feeding and exclusive breastfeeding showed association with SAM (P<0.25). After applying multivariable logistic regression getting nutritional information, dietary diversity, perceived birth weight and time for introducing complementary feeding, were associated (significant at p<0.05) with SAM **(Table 6)**

Children from households who did not get nutritional information were 17.12 times more likely to have SAM [AOR=17.12; 95% CI: 6.18-47.37] compared to children from households get nutritional information.

Children who had poor dietary diversity (<5 food groups) were 4.62 times more likely to be acutely malnourished [AOR= 4.62; 95% CI= 2.30-9.47] compared to children with good dietary diversity (≥5 food groups).

The odds of having SAM was 91% lower if the child had average perceived weight at birth [AOR=0.09, 95% CI=0.03-0.29] Similarly, the odds of having SAM was 14% lower if the child had a large perceived weight at birth[AOR=0.86; 95% CI: 0.05-0.20].

The odds of having SAM was 60% lower if the child had introduction of complementary feeding after six months [AOR= 0.40; 95% CI: 0.18-0.89] as compared introduction of complementary feeding at six months.

Table 6 Bivariable & multivariable logistic regression result for the determinants SAM among 6-23 months children at Dara Woreda Sidama Region, May 2024

Variable		SAM among 6-23 months children status		OR (95% CI)		P-value
		Cases N (%)	Controls N (%)	COR(95%CI)	AOR(95%CI)	
Used extra food	yes	80 (37.6)	148 (69.5)	1	1	
	no	133 (62.4)	65 (30.5)	3.78 (2.53-5.66)	0.93(0.40-2.13)	0.86
Child PBwt at birth	small	178 (83.6)	45 (21.1)	1	1	
	Average	29 (13.6)	131 (61.9)	0.06(0.03-0.09)	0.09 (0.03-0.29)	0.00
	Large	6(2.8)	37 (17.4)	0.04 (0.02-0.10)	0.86 (0.05-0.20) **	0.00
Get nutritional information	yes	112 (52.6)	203 (95.3)	1	1	
	No	101 (47.4)	10 (4.7)	18.3(9.19-36.5)	17.12(6.18-47.37) **	0.00
Time for introducing CF	At 6 month	34 (16.0)	53 (24.9)	1	1	
	Before 6	21 (9.9)	15 (7.0)	2.18 (0.99-4.81)	0.56(0.16-1.89)	0.35
	After 6 month	158 (74.2)	145 (68.0)	1.69 (1.04-2.76)	0.40(0.18-0.89)**	0.02
Having toilet	yes	71 (33.3)	137 (64.3)	1	1	
	no	142 (66.7)	76 (35.7)	3.60 (2.42-5.38)	0.44(0.18-1.05)	0.06
DD score	<5 food groups	181 (85.0)	86 (40.4)	8.35 (5.25-13.2)	4.62 (2.30-9.47)**	0.00
	≥ 5 food groups	32 (15.0)	127 (59.6)	1	1	
Get VT A supplement	No	71 (33.1)	11 (5.2)	9.18 (4.67-17.9)	0.97(0.35-2.72)	0.96
	Yes	142 (66.7)	202 (94.8)	1	1	

Key: PBwt perceived birth weight, DD Dietary diversity, CF complementary feeding**=p-value<0.001, * =p-value<0.05,

6. Discussion

The study aims to assess determinants of severe acute malnutrition among 6-23 months children at Dara Woreda public health facilities, Sidama region accordingly. It is determined that the occurrence of SAM was significantly associated with getting nutritional information, dietary diversity, perceived birth weight, and introduction of complementary feeding.

In this study children with dietary diversity score less than five food groups was higher in cases 181 (85.0%) than in controls 86 (40.4%) based on 24-hour dietary recall [AOR= 4.62; 95% CI= 2.30-9.47] This finding is comparable with other documented studies done in Ghana (32). This is due to the fact that poor dietary diversity is an indicator of poor quality of diet and nutrient intake of children and it negatively affects the nutritional status of children. During early life, the growth and development of the body are dependent on an adequate supply of all essential nutrients. Providing nutrient-rich foods in sufficient quantity and quality starting from six months of age is one strategy to reduce child malnutrition. Providing good dietary diversity is also important to develop the immune system and prevent infections. So poor dietary diversity may expose the child to infection due to low immunity, which may lead to severe acute malnutrition (24).

This study also indicates, The odds of having SAM was 91% lower if the child had average perceived weight at birth [AOR= 0.09, 95% CI=0.03-0.29] as compared to children perceived as small at birth. Similarly, the odds of having SAM was 14% lower if the child had a large perceived weight at birth [AOR=0.86; 95% CI: 0.05-0.20]. as compared to children perceived as small at birth. Similarly consistent with a study conducted in Myanmar further analysis of 2015–16 DHS, revealed the risks of under nutrition were higher among children perceived to have low birth size compared with children of average and above perceived birth size (33). Another study in Malaysia also showed that households with low birth weight were at higher odds of having malnourished children as compared to average and above birth weight (34). This might be due to maternal malnutrition during pregnancy which results in birth weight less than the average and a child with malnutrition. In addition, children born of well-nourished mothers are less likely to be wasted due to the mother's adequate intake of nutrients such as protein, energy, vitamins, and minerals during pregnancy; such nutrients are important for the fetus to obtain average and large weight at birth (35).

Time for the introduction of complementary feeding was significantly associated with the risk of severe acute malnutrition. The odds of having SAM was 60% lower if the child had introduction of complementary feeding after six months [AOR= 0.40; 95% CI: 0.18-0.89] as compared introduction of complementary feeding at six months. This finding is also supported by studies which are done in India (36), and Nepal (37); initiation of complementary feeding before or after

6 months was found to be at risk of SAM. This is due to the early introduction of complementary food and is associated with an increased risk of gastrointestinal and other infections. When complementary foods are started before six months, there is a reduction in breast milk consumption, which can lead to a reduction in immunity. When there is low immunity it can lead to infection and finally, it results in SAM (38).

7. Limitations

Questions which relied on the memory of the mothers/ caretakers such as exclusive breast feeding for the last six months & 24 hour dietary recall might introduce recall bias. There might also be selection bias because controls were selected from health facilities. Matching has a potential benefit in preventing confounding so this study could have limitations on addressing it. SAM tends to be seasonal, but I didn't account for seasonal variation, this study has limitations on addressing seasonal variation.

8. Conclusion

To reduce severe acute malnutrition among children 6-23 months concerned bodies should work up on reducing SAM and it is important to improve knowledge and practice of parents on appropriate infant and young child caring practices at community level.

9. Recommendation

The Regional Health Bureau and Dara Woreda Heath Office

should work on community-based integrated IYCF services in the health facilities as well and emphasis should be given to improving Infant and young child feeding practices, especially timely initiation of complementary feeding and dietary diversity.

Health Professionals

Working in child health service should provide simple and easy-to-understand information to the mother/ caretaker on child caring practice and nutritional information including timely initiation of complementary feeding and appropriate diet diversity. Interventions should be given during ANC follow-up to improve maternal nutrient intake including supplementation with iron, folic acid, or multiple micronutrients and provision of food and other supplements where necessary to prevent a child's low birth weight.

Research

Future study on child SAM is recommended to conduct community-based longitudinal study integrating with qualitative study design on prospective dietary assessment.

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Annex

\Documents\Output1 Multivariate analysis new.spv
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Consent form

In signing this document, I am giving my consent to participate in the study entitled "severe acute malnutrition and the associated feeding practices in children 6-23 months of age in Dara Woreda of Sidama Region."

I have been informed that the purpose of this study is to identify the association of severe acute malnutrition and feeding practice. Thus, I have understood that participation in this study is entirely voluntarily. I have been told that my answers to the questions will not be given to anyone else and no reports of this study ever identify me in any way. I have also been informed that my participation or non-participation or my refusal to answer questions will have no effect on me. I understood that participation in this study does not involve risks. So, are you willing to participate in this study?

1. If yes, proceed to the next page.
2. If no, thank you, and skip to the next participant.

Respondent's signature_____ Date of interview: _____

Interviewer Name_____ Signature _____

Supervisor's name _____ signature _____

Results of interview questionnaire

1. Completed
2. Refused
3. Partially completed

QUESTIONNAIRE (English and Sidaamu Affo)

Hawassa University College of medicine and health sciences school of public health
Questionnaire for study of severe acute malnutrition and the associated feeding practices in children 6-23 months of age in Dara Woreda of Sidama Region.

1. Questionnaire code number
2. Name of health facility
3. Status case

C ol

Note: Encircle from the given options and write if any other idea or answer is given

	Part 1. Socio-demographic and economic characteristics of the family and the child (6-23months)		
	Questions and filters	**Response**	
	Mothers age	_____ (in years)	
	Marital status of the mother	1. Single 2. Married 3. Widowed 4. Divorced 5. Separated	
	What is your religion?	1. Orthodox 2. Muslim 3. Catholic 4. Protestant 5. Other (specify) _____	
	Residence	1. Urban 2. Rural	
	Maternal level of education	1. Can't read and write. 2. Can read and write. 3. Primary school 4. Secondary school 5. College and higher	
	Occupation of mother	1. Housewife 2. Government employee 3. Merchant 4. Private Organization 5. Daily laborer 6. Other (specify) _____	
	Monthly income of the household	_____ Ethiopian Birr	

	Family size	_____ (in number)	
	Age of the child	_____months	
	Sex of the child	1. Male 2. Female	
Part 2 maternal related characteristics			
	Maternal age at first birth	_____ (in year)	
	Number of children ever born	_____ (in number)	
	Did you visit health facility for ANC during your pregnancy for this child?	1. Yes 2. No	
	If yes, for question '203' How many times you visited health facility for ANC during the pregnancy?	_____ times	
	Place of delivery	1.Home 2.Health institution 3. Other (specify) _____	
	Did you use extra food during pregnancy or lactation	1. Yes 2. No	

	Did you used any type of family planning service	1. Yes 2. No	
Part 3. Environmental characteristics			
	Source of drinking water	1. Spring 2. well 3. Tap 4. Other (specify)_____	
	If your source is not tap do you treating your water before drink in your home?	1. Yes 2. No	
	By what method do you wash your hand before preparing food and delivering food?	1.Always wash with water and soap 2. Always wash with water only 3. wash sometimes with soap	
	Type of cooking fuel?	1. Firewood 2. Gas 3. Electric	
	Method of waste disposal	1. Burning 2. Bury to pit 3. Open field	
	What type of toilet do you have?	1. Temporary 2. Hygienic 3. No 4. Other(specify) _____	
Part 4. Child characteristics			

	Perceived birth weight /size of the child at birth	1. Very small 2. Small 3. Average 5. Large	
	Did the child get Vaccination?	1. Fully vaccinated 2. Not-fully vaccinated 3. Not vaccinated at all	
	Did the child get Vit-A supplementation?	1. Yes No	
Child feeding practice			
	Do you get nutritional information on child feeding?	2. Yes 3. No	
	If yes for the above question '406' from, where do you get information?	1.From health institution 2.From media(radio/TV) 3.From newspaper or magazine	
	Did your child breast feed exclusively for six months?	1. Yes 2. No	
	Is the baby on breast feeding now?	1. Yes 2. No	
	Time for introducing complementary feeding	1. Before 6 months 2. After 6 months 3. At 6 months	

	Usual number of meals per day/ Minimum Feeding frequency	1. 2-3 times 2. 4-5 times 3. Above 5 times	
	Food groups in 24 hours/ Dietary diversity score	1. < 5 food groups 2. ≥ 5 food groups	

24 hours dietary recall for the child

What did your child eat yesterday (from morning when she/he woke up until bed time?)

	Bread, rice, biscuit, roasted-grain, maize, barely, wheat, teff, cereal or foods made from pulse	1. Yes	2. No
	Potato, sweet potato, foods made from root or tuber	1. Yes	2. No
	Vegetables or foods made from vegetables	1. Yes	2. No
	Fruits or foods made from fruits	1. Yes	2. No
	Meat products; beef, lamb, goat, chicken	1. Yes	2. No
	Egg or foods made from egg	1. Yes	2. No
	Fish or foods made from fish	1. Yes	2. No
	Foods made from bean, pea, lentil, nut	1. Yes	2. No
	Milk, cheese, yoghurt and foods made from milk products	1. Yes	2. No
	Foods made with oil, fat, or butter?	1. Yes	2. No
	Foods made with honey, sugar	1. Yes	2. No
	Drinks with spice; tea, coffee	1. Yes	2. No
	Breast milk	1.Yes	2.No

Dietary Diversity Score for the child below two years

	From the foods reported in table…above, place 1 if there is any food consumed by the child and zero if the foods in that particular group were not consumed.	**Child (put 1 if consumed, 0 if not consumed)**
	Grains, roots or tubers- Any food from grain/cereals like rice, wheat, barley, oats, cornmeal(e.g. bread, pasta, breakfast cereals, grits , porridge) Roots (carrots, onions, turnip, beets, beetroot) Tubers(yams, potatoes)	
	Vitamin A-rich foods(liver**,** salmon, butter, boiled egg, sweet potato, carrot, peas, red pepper, broccoli, tomato, spinach, lettuce, mango, grapefruit, watermelon, papaya, tangerine**)**	
	Other fruits and vegetables- Fruits (apples, oranges, grapefruits, bananas, mangoes, strawberries, avocados) Vegetables(lettuce, cabbage, potato, sweet potato, onion, garlic, asparagus)	
	Flesh foods (Meat, poultry, fish and seafood) - Any beef, lamb, goat, chicken, liver, kidney, heart, or other organ Meats?	

	Eggs		
	Legumes, Pulses or nuts- Any foods made from beans, peas, lentils, or nuts ,peanut, soybean, lupines, chickpeas,		
	Milk and milk products-Any cheese, yogurt, milk or other milk products?		
	Breast milk		
	Total		
Part 5. Anthropometrical measurement of the child			
	Child's weight	_____Kilogram	
	Child's recumbent length	_____Centimeter	
	Child's Mid upper arm circumference	_____Centimeter	

Z- Score _____

Thank you!!

Fajjote qitse

Tenne sanade malaatisatenni Sidaamu Qoqqwi Daarrate Woradi 6-23 agani diri giddo noo qaaqquulli aana jawa ikkitinota taaltino sagale anje nna xaadooshshu noosiha saga'late amanyoote roortino xiinxallo aana beeqqaanchoho.

Tenne xiinxalloti mixo jawa ikitinota taaltino sagale hoonge nna saga'late amanyoote xaadooshshe badate ikkinota huwatoommo. Xa'mubbate ane dawaro wolu manchira syinse uyinannikkita kulloonnie. Ikkinohurano tenne xiinxallo odoo ma daninni ane bade diafino.

Ane beeqqaanchimma woyi beeqqa hooga woyi xa'mubbate dawaro qolate ane aana mittu daniti mitiimma (micco) nooseikkita kulloonnie.

Tenne xiinxallo giddo beeqqa dano giddose amaddinoikkita ikkase huwatoommo. Kunni daafira tenne xiinxallo aana beeqqaancho ikkate fajjamaancho ikkatto?

1. E''e ikkiro sufe afamanno qoolira sai .
2. Dee'ni ikkiro galaxxeemmohena yite aane noo beeqaanchi widira sai

- Woshshamaanchu malaate

- Qaalu xa'mo assinoonni barra

- Xa'mannohu su'ma ----------
  malaate----------
- Qoriqoraanchu su'ma ----------
  malaate----------

- Qaalu xa'mo assate gumma:-

1. Gooffino
2. Giwino
3. Gamu raginni gooffino

- Hawaasi Yuniveriste hakimetenna fayyimmate sayinse kolleejje dagate fayyimmate rosu mine
- Sidaamu qoqqowi Daarrate woradi giddo 6-23 agani diri qoqqowi giddo noori qaaqquullu aana noota jawa wiinamunnita sagalete hoonge nna amadante noore saga'late rosich aana xiinxallo assate shiqqino xa'mooti.

1. Xa'mote koodde kiiro
   ----
2. Fayyimmate uurrinsha su'ma
3. ----------
4. Ikkitote hajo

Qaaggooshshe:- uyinoonni doorshubba giddonni qoqqobbe, wole hedo woyi dawaro uyiniro borreessi.

Kifi 1. maatetenna beettunnita dagoomitte dagatenna miinju akatubba (6-23 aganna)

Kiiro	Xa'mubbanna buuxaancho	Dawaro
101	Amuwu diro	--------dirra gidooti
102	Amannita galtoomu ikkito	1. Adhantinoikkite 2. Adhantinote 3. Gunnittete 4. Tidhantinote 5. Babbaxxitino
103	Amma'noikki maati?	1. Ortodokisete 2. Isilaamaho 3. Kaatoolikete 4. Kirstaanaho woyi Pirotesitaantete 5. Wolenoro xawisi
104	Hee'ratto base (dargi)	1. Quchumaho 2. Baadiyyete.
105	Amuwunniha rosu deerra	1. Nabbawanna borreessa didandiitanno. 2. Nabbawanna borreessa dandiitanno. 3. Umi dirimi Rosu mine 4. Layinki dirimi Rosu mine 5. Kolleejje nna Aliidi roso
106	Amuwu looso	1. Mini amaati 2. Mootimmate loosaatinchooti 3. Daddalaanchote 4. Qoonnete dirijjite 5. Barru loosaasincho 6. Wolu nooro xawisi
107	Maatennita aganu eo	----------Tophiyu birraati
108	Maatete batinye	----------(Kiirotenni)
109	Beettu (qaaqqu) diro	----------aganaati
110	Beettunniha koo/Tee akata	1. Labbaaho 2. Meyaate

Kifile 2 Amuwu ledora amadantino akatubba

201	Umi qaaqqo iltu woyite amate diro	---------- (Dirunni)	
202	Ilantino ooso batinye	----------(kiirotenni)	
203	*Konne beetto godowinni heedhe (AANS) fayyimate uurrinshawa marootta?*	*1. e'e* *2. dee'ni*	*Dee'ni ikkiro*

			205 widira sai
204	E'e ikkiro xa'mo 203 godowinni keeshshita yannara (AANS) fayyimmate uurrinshawa me'e higge maritta?	----------yanna	
205	Uyinanni base (darga)	1. Mine 2. Fayyimmate uurrinshawa 3. Wolu nooro xawisi	
206	Godobbe nootta yannara woyi unuuna qansi'ratta yannara ledote sagale horoonsi'rootta?	1. e''e 2. dee'ni	Dee'ni ikkiro 207 widira sai
207	Hiikko danihano ikkiroilama ajishate woyi godowu gatannoikki gede assitanno owaante horoonsidhe egennootta?	1. e'e 2. Dee'ni	

Kifile 3 Qooxeessu akatubba

301	Anganni waa afi'nanni gara	1. Xeenunni 2. Kofotenni 3. ha'ranno waa 4. Bowaanbunni 5. Wolu nooro xawisi
302	Waa afi'nannihu Bowaanbunni ikka hoogiro agatta waa agate albaanni xagichunni akka'mite egennootta?	1. e'e 2. Dee'ni
303	Sagale qixxaassate nna shiqishate albaanni angakki mayi dani hayyonni hayishshi'ratta?	1. Wo'ma woyite wayinninna saamununni hayishshi'ratta 2. Wo'ma woyite waayinni calla hashshi'ratta 3. mite mite yanna saamununni
304	Sagale rasi'nanni dana?	1. Ichimunni woyi haqqetenni 2. laanbunni 3. Elekitiriketenni

305	Madanihu shumate mini noohe?	1. Yanna geeshshira calla horoonsi'nannihu 2. Shumate mine 3. Dubboho 4. Gate 5. Wolu nooro xawisi
306	Ishine hunnanni gara	1. Giirre hunnanni 2. Balete giddo waamme hunnanni 3. Fano darga 4. Gate massine hunanni

Kifile 4 oosote akata

401	Qaaqqu ilami woyite noositi kiilote (ayirrate)bikki	1. Lowo geeshsha shiimaho 2. shiimaho 3. Mereerima 4. Jawate
402	Qaaqqu kittiwaate qasi'rino?	1. Wo'munni wo'ma kittiwaate qasi'rino 2. Wo'munni wo'ma kittiwaate diqasi'rino 3. Horontanni diqasi'rino
403	Qaaqqu Vayitamini "A" woyi wonshaancho afi'rino	1. e'e 2. Dee'ni

Ooso saga'litanno gara

404	Qaaqqikkira Sagale itisatta gara lainohunni mashalaqqe afidhe egennootta?	1. e'e 2. Dee'ni	dee'ni ikkiro xa'mo 407 widira sai
405	Kunni aleenni 403 aana noo xa'mora e'e yittaro mashalaqqe mamiichinni afi'ratta	1. Fayyimmate uurrinshanni 2. Radoonetenna Televizhiinetenni 3. Gaazeexunni woyi maxaafunni	
406	Qaaqqoikki lee agana unuuna calla qansi'ratta?	1. e'e 2. Dee'ni	

407	Qaaqqikki xaa yannara unuuna qananno?	1. e'e 2. Dee'ni
408	Ledote sagale qaaqqoho egensiisate yanna	1. 6 aganira albaanni 2. 6 aganira duunbaanni 3. 6 aganinni
409	Uurrinshunni uyinanni sagale batinye	1. 2-3 yannara 2. 4-5 yannara 3. 5 yannara aleenniiti
410	24 sa''ate giddo sagalete gaamo /saga'late/ badooshshi bixxille	1. <5 sagalete gaamo 2. >5 roortannota sagalete gaamo

Qaaqqoho 24 sa'ate itisatta gara qaagiissa qaaqqikki be'ro ma iti /soodinni kayise hashshi geeshsha

1.	Daabo ,Ruuze,Busikuute du'rinshoonnire, gide, badala, hayixe ,sinde, gaashe,woyi babbaxxino gidinni loonsoonni sagale	1. e'e 2. Dee'ni
2.	Dinnichunni loonsoonni sagale	1. e'e 2. Dee'ni
3.	Shaana labbannorinni loonsoonni sagale	1. e'e 2. Dee'ni
4.	Gummatenni loonsoonni sagale	1. e'e 2. Dee'ni
5.	Maalu gumma (sircho) Handu maala ,Ge'rechu, meichu,lukkichu maala	1. e'e 2. Dino
6.	Quuphe woyi quuphunni looantino sagale	1. e'e 2. Dino
7.	Qulxu'me woyi qulxu'metenni loosantino sagale	1. e'e 2. Dino
8.	Baaqeelu ,Ataru,Missiru.leewuzetenni loonsoonni	1. e'e 2. Dino
9	Ado, Ayibe,Geintonna adote guminni loonsoonnisagalla	1. e'e 2. Dino
10.	Zayitetenni, coomunni woyi buurunni loonsoonni sagalla	1. e'e 2. Dino
11.	Malawunni, Sukkaaretenni loonsoonni sagalla	1. e'e 2. Dino
12	Agatto qimamma,shae Buna	1. e'e 2. Dino
13	Unuunu ado	1. e'e Dino

<u>Lamu diri woroonni noo qaaqqita saga'late badooshshi guma</u>

K i i	sanxarazhete giddo tittirroonni sagallaaana qaaqqu itannoti sagale heedhuro "1" wori hattenne gaamo giddonni ita hoogiro "0" wori	- qaaqqu itinoro "1"

r o		- qaaqqu itinoik kiro "0"
1.	Gide, rumudda, daro, Ruuze ,sinde,Hayixe, gardaama,Badalate Bullee lawishshaho Dabbo paatita shoomu gide giriitoota sherkorumudda /kaaroote/ tuma, Baaqeela hiittenne sagaleno dinnicha	
2 .	Vayitamine "A" wo'mitino sagalla afale ,salmoone,Buuro,gafamino quuphicho Dinnicha, Kaaroote, Atara, Duume Baribare, Birokoole, Tumaatume,Isippinaache,Salaaxa,Mango,Woyinete guma Habiibe, Pappaayya Menderiine)	
3 .	Woloota gummanna shaanna:- - Gumma /poome, burtukaane woyinete guma muuze, mango ,go'ra, awukaato/ - Shaanna /salaaxa ,shaana dinnicha maxaxeesha,tuma,shunkuruuta,waajjo shunkuurta	
4 .	Maalu sagalla:-	
	(maala,lukkote ceano qulxu'menna wayi giddo sagalla) hiikkonneno handu maala ,ge'rechu meichu, lukkichu, maala afale, mule, wodana woyi wole saada maala	
5 .	Quuphicho	
6 .	Gumma,woyi lewuze,Baaqeelunni Atarunni missirunni,woyi lewuzetenni ocholoone,Akuri Atara,Luphiinse shumbura	
7 .	Adotenna adote giddonni afantanno gumma ayiibe ,Geinto,iibbado ado woyi wole adote gumma	
8 .	unuunu ado	
	Xaphooma	

Kifile 5 qaaqqunnita antiroppete meetirike bikkaasincho

1 .	qaaqqu qelpheephpho (kilo)	------- Kiilo giraame
2 .	qaaqqunnita wirro bikkinoonni hojjasi	------- Saanti meetire

3 .	qaaqqunnita mereerima aliidi cigile gaangaawa	------- Saanti meetire

ZD-Naxiwe

Galaxxeemo !!